Knowledge Production Practices in Higher Institutions of Learning in Zambia: a case of the University of Zambia

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Declaration

I, **Christine Wamunyima Kanyengo**, hereby declare that the work on which this thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university. I authorise the University to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever.

Signed by candidate

Signature:……. Date: October 19, 2020

Dedication

This research is dedicated to my parents

Ndate Robert Kanyengo Mwangana

ni

Ma-Inambao Makula Siyumbwa Kanyengo

"for enabling me see beyond the horizon, I will eternally be grateful"

To the memory of

My brother;

'Dusty' Martin Siyumbwa Kanyengo

"Gone too soon"

My Niece

Roselyn Mufungulwa Imataa Banda

"You were a rising naleli"

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Abstract

The core business of higher education institutions such as universities is knowledge production. This is achieved by conducting research which results in various research products being produced, as well as through teaching and the production of graduates. The main objective of the study was to explore and describe knowledge production practices and their attributes within a university environment at the University of Zambia. The study's major contribution to knowledge is that it indicates to what extent this objective is achieved.

A mixed methods case study approach that used both quantitative and qualitative research methodology was adopted for the study. The mixed methods analysis framework was based on grounded theory, bibliometric techniques, and concurrent triangulation. The site of investigation was the School of Medicine at the University of Zambia. The sampling technique also adopted a mixed methods approach by using purposive, availability and stratified purposeful sampling to sample the respondents. The PubMed/Medline database, academic staff, key informants and the documents reviewed all served as the key sources of information for the study. Data obtained from PubMed/Medline, questionnaires and semi structured interviews were quantitatively analysed using the Statistical Package for the Social Sciences (SPSS) software, while the more qualitative information that was gleaned from open-ended questions, semi-structured interviews and documentary sources was analysed thematically. The subject analysis of PubMed/Medline articles was done using the VOSviewer software and Microsoft Excel.

The findings reveal that the yearly research output from 1995 to 2015 was 281 scholarly papers in 159 journals. The lowest number of papers published were recorded in 1997, 2000, and 2004 while the years 2013, 2014 and 2015 show the highest number of papers per year; and the highest was recorded in 2015. It was found that, except in 1997 and 2000, most of these papers were authored by more than five researchers. This indicates a high degree of collaboration. The journals in which the academic staff were publishing in emanated from all over the world; Asia, Africa, Europe and North America. The journals themselves are also a combination of both high impact factor journals such as the *PLoS One, American Journal of Tropical Medicine and Hygiene, International Journal of Tuberculosis and Lung Disease, The Lancet, Malaria Journal* and those with no impact factor

like the *Medical Journal of Zambia*. The results indicate that the respondents mostly investigated and published in subject fields related to diseases most prevalent in Zambia, i.e. HIV and Aids, Malaria and Tuberculosis.

In addition, the findings indicate that the majority of the academic staff were born after 1960 (73%), with high digital information retrieval skills (95.2%), and with their research output published mainly in journals. The knowledge was produced for various reasons: 85.4% for research purposes, 80.5% for academic promotion, 80.5% for production of knowledge, 73.2% to improve teaching, 61% to provide evidence, 51.2% to change practice, 41.5% to improve policy, 41.5% for personal advancement, and 24.4% for research funding. The knowledge was produced ethically, advancing scholarship, and deemed to be beneficial to society.

The overall conclusion drawn from the study is that the knowledge productivity of the School of Medicine has steadily increased over the years and that this is supported by various institutional policies. Additionally, there is increased collaboration with persons outside the continent, whilst there is less collaboration with countries in Africa. The key recommendation for the School of Medicine is that it should work with and within the various layers of the university's institutions such as the Library, Directorate of Research and Graduate Studies, University of Zambia Press, and the Centre for Information and Communication Technology. This would ensure that impediments to knowledge production, diffusion and utilisation are mitigated.

Acronyms and Abbreviations

ACAPS	Assessment Capacities Project
ACS	Academic Conditions of Service
ADB	Asian Development Bank
AERA	American Education Research Association
AHRQ	Agency for Healthcare Research and Quality
AIDS	Acquired Immune Deficiency Syndrome
AMREF	African Medical and Research Foundation
ANR	Applied Nursing Research
AOR	Artificial Optic Radiations
AOSTI	African Observatory in Science Technology and Innovation
APU	Average Publishable Unit
ART	Antiretroviral Therapy
ASHA	American Speech-Language-Hearing Association
ASIST	Association for Information Science and Technology
ASLIB	Association for Information Management
ASSAf	Academy of Science of South Africa
AU	African Union
BMC	BioMed Central
BMJ	British Medical Journal
CA	California
CCR	Centre for Conflict Resolution
CD-ROM	Compact Disc, Read-Only-Memory
CDC	Centers of Disease Control and Prevention
CF	Confer
CFR	Code of Federal Regulations
CHET	Centre for Higher Education Transformation
CHU	Centre Hospitalier Universitaire
CI	Confucius Institute
CICT	Centre for Information and Communication Technology

CIRDZ	Centre for Infectious Disease Research in Zambia
CODESRIA	Council for the Development of Social Science Research in Africa
CSIR	Council for Scientific and Industrial Research
CSO	Central Statistics Office
CSR	Corporate Social Responsibility
CSV	Comma-Separated Values
CVR	Cardiovascular Research
DC	District of Columbia
DHHS	Department of Health and Human Services
DOI	Digital Object Identifier
DRC	Democratic Republic of Congo
DRGS	Directorate of Research and Graduate Studies
DZIF	German Centre for Infection Research
E&B	Epilepsy & Behavior
ECE	Emergency Capacity Building Project
ECE	Early Childhood Education
ECSA	East, Central and Southern Africa-Health Community
ENG	Engineering
ENT	Ear Nose and Throat
EPHTI	Ethiopian Public Health Training Initiative
ERP	Enterprise Resource Planning
ESB	Educational Statistical Bulletin
FANCAP	Fundación para la Alimentación y Nutrición de Centro América y Panamá
FY	Financial Year
GDP	Gross Domestic Product
GSB	Graduate School of Business
GRZ	Government of the Republic of Zambia
GT	Grounded Theory
H1N1	Influenza A virus OR “Swine flu”
HE	Higher Education
HEI	Higher Education Institutions

HERANA	Higher Education Research and Advocacy Network in Africa
HER-SA	Higher Education Resource Services – South Africa
HIB	Human Information Behaviour
HIV	Human Immunodeficiency Virus
HRIS	Human Resources Information System
HSR	Health Services Research
HSRC	Human Sciences Research Council of South Africa
HSS	Humanities and Social Sciences
HSSREC	Humanities and Social Sciences Research Ethics Committee
IAU	International Astronomical Union
ICCBTR	International Conference on Competency-Based Training and Research
ICF	Inner City Fund
ICT	Information and Communication Technology
IDE	Institute for Distance Education
IGTP	The Institute for Health Science Research Germans Trias i Pujol
IINSERMU	French National Institute of Health and Medical Research
IJTLD	International Journal of Tuberculosis and Lung Disease
IL	Illinois
INESOR	Institute for Social Science Research
IOSR	International Organisation of Scientific Research
IP	Intellectual Property
IPR	Intellectual Property Rights
IS	Information Science/Systems
ISBN	International Standard Book Number
ISI	Institute for Scientific Information
ISS	Institute for Security Studies
ISSN	International Standard Serial Number
JAMA	Journal of the American Medical Association
JANAC	Journal of the Association of Nurses in AIDS Care
JETEMS	Journal of Emerging Trends in Economics and Management Sciences
JHSS	Journal of Humanities and Social Science

JMLA	Journal of the Medical Library Association
JN	Jawaharlal Nehru
JOLIS	Journal of Librarianship and Information Science
JSS	John S. Sampalis
KEMRI	Kenya Medical Research Institute
KLE	Karnataka Lingayat Education
KM	Kilometre
KM	Knowledge Management
LAN	Local Area Network
LHK	Lameck Kazembe Hazal
LIBRES	Library and Information Science Research Electronic Journal
LIS	Library and Information Science
LLB	Bachelor of Laws
LMU	University of Munich
LSHTM	London School of Hygiene and Tropical Medicine
LTD	Limited
MA	Massachusetts
MakCHS	Makerere University College of Health Sciences
MBChB	Bachelor of Medicine and Bachelor of Surgery
MCDMCH	Ministry of Community Development, Mother and Child Health
MD	Maryland
MEASURE	Monitoring and Evaluation to Assess and Use Results Evaluation
MEDLINE	Medical Literature Analysis and Retrieval System Online
MENA	Middle East and North Africa
MEPI	Medical Education Partnership Initiative
MLA	Medical Library Association
MMED	Master of Medicine
MMR	Mixed Methods research
MOE	Ministry of Education
MOH	Ministry of Health
MOU	Memorandum of Understanding

MS	Microsoft
MSc	Master of Science
MUNDO	Maastricht Centre for International Cooperation in Academic Development
NASREC	Natural and Applied Sciences Research Ethics Committee
NCBI	National Center for Biotechnology Information
NCD	Non Communicable Diseases
N. D.	Not Dated
NIH	National Institutes of Health
NIMR	National Institute for Medical Research
NJ	New Jersey
NLM	National Library of Medicine
NS	Natural Science
NUFU	Norwegian Programme for Development, Research and Education
OA	Open Access
OECD	Organisation for Economic Co-operation and Development
OGAC	Global AIDS Coordinator
OJS	Open Journal System
ORC	Opinion Research Corporation
OSSREA	Organisation for Social Science Research in Eastern and Southern Africa
PA	Pennsylvania
PATH	Programme for Appropriate Technology in Health
PDA	Personal Digital Assistant
PEPFAR	President's Emergency Plan for AIDS Relief
PhD	Doctor of Philosophy
PICMET	Portland International Center for Management of Engineering and Technology
PLoS	Public Library of Science
PMCID	PubMed Central Reference Number
PMID	PubMed Reference Number
PNU	Payame Noor University
PPR	Peste des Petits Ruminants

R & D	Research and Development
RAE	Research Assessment Exercise
RAIC	Research Audit, Implementation Monitoring Committee
RAND	Rand and Development
REF	Research Excellence Framework
RISE	Research, Innovation, and Science Policy Experts
RSUST	Rivers State University of Science and Technology
RWJF	Robert Wood Johnson Foundation
SA	South Africa
SAICSIT	South African Institute of Computer Scientists and Information Technologists
SAMJ	South African Medical Journal
SARUA	Southern African Regional Universities Association
SD	Standard Deviation
SDF	Staff Development Fellow
SEA	South East Asia
S/N	Serial Number
SOM	School of Medicine
SPINTAN	Smart Public Intangibles
SPSS	Statistical Package for the Social Sciences
SSA	Sub Saharan Africa
STEM	Science, Technology, Engineering and Mathematics
S & T	Science and Technology
TB	Tuberculosis
TBA	Traditional Birth Attendants
TEFL	Teaching English as a Foreign Language
TEVETA	Technical Education, Vocational and Entrepreneurship Training Authority
TGNG	Tropical Gastroenterology & Nutrition Group
TN	Tennessee
TV	Television
UCLMS	University College London Medical School

UCT	University of Cape Town
UFMG	Universidade Federal de Minas Gerais
UK	United Kingdom
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNAM	University of Namibia
UNC	University of North Carolina
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nations Population Fund
UNZA	University of Zambia
UNZABREC	University of Zambia Biomedical Research Ethics Committee
UNZALARU	University of Zambia Lecturers' and Researchers' Union
US	United States
USA	United States of America
USR	Unilag Sociological Review
UTH	University Teaching Hospital
WHO	World Health Organisation
XML	Extensible Markup Language
ZAMBART	Zambia AIDS Related Tuberculosis
ZANGO	Zambian Journal of Contemporary Issues
ZAWA	Zambia Wildlife Authority
ZDHS	Zambia Demographic and Health Survey
ZM	Zambia
ZOU	Zimbabwe Open University

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CHAPTER ONE

Introduction to the Study

1 Introduction

This chapter provides an introductory background to the study, including the motivation for the study. It gives an overview of what is known of the study problem, what needs to be known and briefly presents any conflicts in what is known. The statement of the problem, objectives of the study, specific objectives and research questions are described in this chapter. The chapter also discusses the rationale of the study and theoretical framework adopted for the study. Lastly, the chapter gives an overview of the methodological approach of the study as well as presenting the chapter layout of the thesis.

1.1 Knowledge Production, Diffusion and Utilisation

Higher education institutions (HEIs) are in the business of knowledge production, diffusion and utilisation. Abrahams, Burke, Gray, and Rens (2008: 24) argue that it has been and still is "generally understood that the Higher Education (HE) academic endeavour has, at its core purpose, the function of creating, teaching and sharing knowledge". It is the purpose of higher education to generate and produce knowledge, which will then be up taken by society. No HEI anywhere in the world produces knowledge just for the sake of producing knowledge without linking that knowledge to a need in society. The desire, therefore, to be relevant in society is at the core of any HEI that embarks on research or any knowledge generation activities. Castells (2009) has said that because of the rapid technological changes in society, a university needs to underwrite that change by producing the human capital required by society. It is in this vein that Badat (2009) has also argued that one of the major roles of universities is the "production of knowledge which advances understanding of the natural and social worlds and enriches humanity's accumulated scientific and cultural inheritances and heritage". Universities therefore have to produce the knowledge that will make society understand itself and appreciate what is happening around it. Hill (1998: 4) further says that "knowledge is produced when people make sense of their world and knowledge is based on their experience as they construct tools, methods, and approaches to cope with the situations facing them. This meaning-making notion of knowledge production leads to an understanding of

power imbalances in society". Knowledge is produced to create an understanding of a phenomenon; it is never about just producing knowledge for the sake of it. And yet others view the role of education and particularly higher education, be it academic or professional levels, as the means to "educate and equip the mind and the soul, to recognise what is right and good in life, to prepare a student for the demands of a modern labour market, and to offer specialised learning in various fields and occupations" (Bennett & Wilezol, 2013: xvi). Indeed, the creation and generation of new knowledge is one of the fundamental missions of HEIs. However, studies of various universities in Africa -- University of Botswana (Botswana), University of Cape Town (South Africa), University of Dar es Salaam (Tanzania), Eduardo Mondlane University (Mozambique), the University of Ghana (Ghana), University of Mauritius (Mauritius), Makerere University (Uganda) and the University of Nairobi (Kenya) -- established that most of these universities were not meeting the objective of producing high quality research. The only one that met this mission of publishing high quality research was the University of Cape Town, followed by Makerere University in Uganda (Cloete, Bunting & Maassen, 2015: 29).

The knowledge produced by HEIs could either be in the form of graduates or in the form of research outputs. This is confirmed by Dzamba and Future (2012) who state that scholarly communication comes in the form of research work or human products (graduates) that are introduced into the market to improve the market's way of life. It is for this reason that Chan, Brown, and Ludlow (2014: 1) have contended that "higher education exists to create and disseminate knowledge, and to develop higher order cognitive and communicative skills in young people, such as, the ability to think logically, the motivation to challenge the status quo, and the capacity to develop sophisticated values". The second important role of universities is to disseminate knowledge, sometimes referred to as knowledge diffusion, in academic spheres. This is very critical in the knowledge production cycle and ensures that society at large is made aware of the knowledge being produced by universities and research institutions. This diffusion of knowledge makes it possible for knowledge to move from the space where it is produced to a space where it will be utilised. The diffusion of knowledge is dependent on several factors. Cardinal amongst them is that knowledge should firstly have been produced; secondly, a mechanism should be in place to facilitate the movement of that knowledge from one place to another; and lastly that there should be someone willing to receive or utilise that knowledge.

Over the years, it has been acknowledged that knowledge production in universities has been facilitated by the introduction of information technologies. Not only has knowledge production increased exponentially, but the entire knowledge production process is much faster than it had been before. This exponential growth has made the need to disseminate and diffuse the knowledge produced even more urgent and necessary. In this regard, Subotzky and Cele (2004: 343) have stated that in the "global relation and the rise of the new information technologies, producing relevant knowledge is central to the role of higher education in contemporary society". Therefore, without the production of knowledge, higher academic institutions will be rendered irrelevant.

At universities and research institutes, this knowledge is produced in various ways, such as during teaching, learning and the research process. However, for HEIs to engage in meaningful knowledge production, various factors must be in place. These factors make it possible and conducive for people engaged in the knowledge production process to create knowledge, disseminate that knowledge and for society to utilise that knowledge. These factors may include incentives such as promotion at work, monetary gains in terms of new knowledge created and sold and, probably most important, the prestige associated with the process of intellectual knowledge creation. Other factors that could stimulate knowledge production may include the realisation that the knowledge being produced would be diffused and utilised, leading to appreciation by the wider society and therefore, endorsing the relevance of universities in society.

The third role of universities is to track how the knowledge they have produced is utilised by society. This is essentially a monitoring and evaluation phase that feeds into a university's knowledge production cycle. Hence, a critical factor of the knowledge process is to ensure that whatever knowledge is produced, it is not only utilised within the institution itself by the academic staff, researchers, administration staff and students, but also utilised in the wider society. This aspect also relates to the role that universities and research institutions have in engaging with their communities. In engaging with their communities, universities are contributing to a nation's social and economic development. In this context "universities as agencies of knowledge exchange and production are potential sources of knowledge inputs to the economy and society"(Abrahams et al., 2008: 11).

It is thus clear that the critical steps in the knowledge production process after knowledge has been produced, is the diffusion and utilisation of that knowledge. Oyewole (2010: 19) quoting the World Bank (2007) reinforces this by stating that "simple exposure to knowledge, while necessary, does not ensure its effective use. One must be able to select the right form of knowledge, master its application, adapt it to specific circumstances, keep up with changes and make improvements". The knowledge processes outlined above are clearly mutually reinforcing; in other words, once knowledge has been produced, it must be diffused and utilised to create new knowledge. Against this background, the knowledge process involves three phases: knowledge production, knowledge diffusion and knowledge utilisation. Knowledge production is cumulative and builds on previous knowledge that has been produced by the individual, i.e. one's own knowledge and other people's knowledge, and this creates a continuous cycle. Once knowledge has been produced, that knowledge needs to be communicated to all concerned so that it can be utilised by society.

It is contended here that for universities to remain relevant, society in general should be made aware of what knowledge is being produced by their universities and what it is being used for. This is especially true for public funded universities that largely depend on tax payers for their revenue. The important role that a nation's universities play in its development has been emphasised by several authors, for example Cloete et al. (2011) have stated that "universities' unique contribution to development is via knowledge – either transmitting knowledge to individuals (teaching), or producing and disseminating knowledge that can be applied to the problems of society ... (research, engagement)". Simukanga (2009: viii), a former Vice Chancellor of the University of Zambia, has in turn indicated that "universities have been known to be engines of discovery and generation of new knowledge through research. Universities ultimately contribute to national development through innovations and technological advancements". This assertion has been affirmed by Uluocha and Mabawonku (2014: 50) who argue that "globally, universities are recognised as the centres of production of knowledge accumulation and knowledge transfer through research and scholarship". This is also summed up by Cloete and Bunting (2013a: 7) when they state that universities are the "only specialised institutions whose primary business is the production, reproduction and dissemination of knowledge, including the education of the next knowledgeable or suitably qualified generation". Again, the triple axis of knowledge is clearly visible: knowledge production, knowledge diffusion and knowledge utilisation.

This study focuses on knowledge production practices and their attributes in HEIs in Zambia, taking the case of the School of Medicine at the University of Zambia. In so doing the study looks at contextual factors, both social and institutional, that affect knowledge production practices and attributes at the School of Medicine, University of Zambia. It is contended that by focusing on one school of the University the researcher will obtain a more in-depth and detailed exploration and description of the topic.

1.2 Statement of the Problem

In the previous section it was argued that one of the major roles of HEIs, particularly universities and research institutes, is the production of knowledge. Once that knowledge has been produced it needs to be diffused (shared) and utilised by society. There is, however, a general lack of knowledge of the situational and institutional context of knowledge production practices and attributes at universities and research institutes in Zambia; and especially in health and medical related fields. There is also a lack of information of the type of knowledge produced and how that knowledge is produced, diffused and used. It is therefore important that this study contributes to the systematic and comprehensive understanding of knowledge production, diffusion and utilisation practices and attributes in HEIs in Zambia. This study, though exploratory and descriptive in nature, paves the way for future studies on knowledge production and attributes in Zambia.

1.3 Objectives of the Study

The main objective of the study was to explore and describe knowledge production patterms and their attributes within a university environment taking the case of the School of Medicine at the University of Zambia.

1.3.1 *Specific Objectives of the Study*

More specifically, the study focuses on the following aspects within the context of the School of Medicine at the University of Zambia during the period 1995-2015:

1. Investigating the knowledge production patterns and their attributes in a university environment i.e.;

a) Determining the published research output of the academic staff,
b) Investigating the authorship patterns of the academic staff,
c) Identifying the collaborative patterns of the academic staff,
d) Highlighting the main journals wherein the academic staff publish, and
e) Classifying the subject areas covered by the published works of the academic staff.

2. Establishing the knowledge diffusion patterns in a university environment,
3. Analysing the knowledge utilisation patterns in a university environment,
4. Exploring the determinants of knowledge production, diffusion and utilisation in a university environment; and
5. Identifying and discussing policies that foster knowledge production, diffusion and utilisation in a university environment.

1.3.2 *Research Questions of the Study*

From these specific objectives, the following research questions were developed to serve as the framework for the study:

1. What are the primary knowledge production patterns and their attributes at the School of Medicine, University of Zambia from 1995-2015, as represented by the following questions?
    a) What is the published research output of the academic staff?
    b) What are the authorship patterns of the academic staff?
    c) What are the collaborative patterns of the academic staff?
    d) What are the main journals of publication of the academic staff?
    e) What are the major subject areas covered by the published works of the academic staff?
2. What are the knowledge diffusion patterns in the School of Medicine, University of Zambia?
3. What are the knowledge utilisation patterns in the School of Medicine, University of Zambia?
4. What are the determinants to knowledge production, diffusion and utilisation in the School of Medicine, University of Zambia?
5. What are the policies relating to knowledge production, diffusion and utilisation in the School of Medicine, University of Zambia?

1.3.3 *Scope and Delimitations of the Study*

This study is about knowledge production practices and their attributes in HEIs of learning, using the case of University of Zambia School of Medicine. Knowledge production practices includes knowledge production patterns, knowledge diffusion patterns as well as knowledge utilisation patterns. The major outcomes of the study would therefore specifically pertain to the findings derived from the University of Zambia School of Medicine. It is thus plausible that other populations within the institution that were not included in the study might have different opinions, perceptions and views of knowledge production practices and attributes within the University of Zambia. It also means that their experiences might be different from the case study group. Moreover, it is possible that other case units within the institution would have different knowledge production patterns. This also applies to other institutions of higher learning in Zambia whose experiences with knowledge production and their attributes might be different from that of the University of Zambia, School of Medicine.

The researcher's intention in conducting this study was to understand in detail, the context and situation of knowledge production practices and attributes of the case that was included as the study sample, i.e. the University of Zambia School of Medicine. As argued by Baxter and Jack (2008: 545) a "case study is an approach to research that facilitates exploration of a phenomenon within its context using a variety of data sources. This ensures that the issue is not explored through one lens, but rather a variety of lenses which allows for multiple facets of the phenomenon to be revealed and understood". In a similar manner, Chreim, William and Hinings (2007: 1535) have stated that, even if findings are based on a single case, it does not limit their "generalisability [and] it should be noted that naturalistic case studies should be judged not based on generalisability, but on the basis of transferability and comparability". Therefore, this being a study of one unit within the University of Zambia does not mean that the findings of this study might not be useful and generalisable to the general population of researchers or other institutions of higher learning both within Zambia or outside the country. Further, findings of this case may be relevant to the institution in general, i.e. the findings with regard to knowledge production at the School of Medicine may hold meaningful lessons for other units at the University of Zambia. Hence, the case study method provides one with the opportunity to not only delve more deeply into a specific situation, but also allows for a multi-faceted approach.

1.3.4 *Limitations of the Study*

This research study, though well prepared may have several shortcomings and limitations. Although, the University of Zambia has have a central repository meant for the research output from all research produced by academic staff members, this repository is not comprehensive enough and does not archive peer reviewed publications such as journal articles. The researcher, therefore, decided to rely on the United States (US) National Library of Medicine's PubMed/Medline Biomedical database as an alternative repository to access the research output of the University of Zambia's School of Medicine. Additionally, the researcher did not have access to other proprietary scholarly indexes while conducting the research in Zambia, thus reinforcing the choice to use PubMed/Medline which is freely available and accessible online. The United States of America National Library of Medicine, National Center for Biotechnology Information (2019: 1) covering over 29 million citation with diverse coverage of biomedical literature with links to some full text journal articles.

It is well known that each bibliographic database has its own behavioural characteristics. In PubMed, articles where the authors are not the first author, or the author affiliation field is not listed on the article, searching with an automatic search script such as *"University of Zambia [ad]"* does not retrieve those articles. Secondly some authors are not consistent in the way they name themselves on an article. For instance *Fastone Goma* will be searched as "*Goma, F [ad]"* and yet the same author has citations with *Fastone Matthew Goma* and in PubMed they will be retried as "*Goma FM [ad]"* in the author address field. So unless one individually checks all the articles, it means they will be missed in the counting. Thirdly, if these authors have left the institution, it is very difficult to establish their link with the institution. Fourthly, it was also discovered that some authors whilst on studies especially PhD Studies which may take anywhere from three to six years, taken at other institutions other than the University of Zambia, used the addresses of the universities where they were studying on their articles; and yet they were still full time employees of the University of Zambia. This means that these authors' articles might not be retrieved if we search using the author address field. In order to minimise these limitations the researcher, used the address field as search strategy as well as individually searching each name of the academic staff who were currently employed by the University of Zambia. However, research output of staff

who had left the University of Zambia employment were not retrieved if they had not included their address field on their article.

It is possible therefore, that not all the materials produced by the School of Medicine of the University of Zambia are covered in the PubMed/Medline database. However, it is argued that since PubMed/Medline is the largest and most comprehensive biomedical repository in the world, it could safely be used to measure and assess trends in the biomedical knowledge production patterns of an individual or indeed an institution.

1.3.5 *Rationale of the Study*

This study's significance lies in the fact that it provides an in-depth understanding of knowledge production, diffusion and utilisation practices and attributes at the School of Medicine, University of Zambia. The findings of the study, however, may also be of importance to other higher institutions in Zambia and the rest of the world. It is suggested that by providing such an understanding, it may assist university policymakers and managers in Zambia and the African continent to address institutional challenges that could hinder knowledge production, diffusion and utilisation. It is also hoped that the study's outcomes will contribute to the body of knowledge on knowledge production practices not only at the University of Zambia's School of Medicine, but also in Zambia in general and in other African higher education systems. Importantly, the findings of this study may be of interest to other schools and departments within the University of Zambia as they could use the findings of this study to compare knowledge production practices and their attributes with what is prevailing in their schools or departments.

1.4 Research Approach Adopted for the Study

This study is anchored mainly in a mixed methods study approach (cf. 4.3.1 – Research Methodology Adopted for the study), using both qualitative and quantitative research frameworks. However, to obtain a comprehensive overview of the case, it is critical to utilise both qualitative and quantitative aspects of research. Therefore, to get a holistic perspective of the study, it has adopted a triangulated approach by combining the more quantitative bibliometric research method with the more qualitative grounded theory approach. Although, the methodological framework adopted for the study was mainly informed by works of scholars in the library and information

science discipline, this does not mean that relevant studies from other disciplines were excluded. Refer to Chapter 4 for further elaboration on the methods adopted.

1.4.1 *Single Case within a Case Study*

This study follows in the footsteps of several studies that have adopted a single case unit using a case study approach. Relevant to this study research project are the studies conducted by Tess et al. and Frantz et al. Malapela (2014) conducted a 'study into the availability of and access to electronic journals for teaching and research by the academic staff at the Faculty of Agriculture, University of Zimbabwe'. Tess et al. (2009) used a case study approach to assess scientific research productivity at the Heart Institute of the Medical School of the University of Sao Paulo, Brazil while Frantz et al. (2010) looked at the research productivity of academics attached to the Physiotherapy Department at the University of the Western Cape in South Africa.

1.4.1.1 Triangulation

Patton (1999: 1192–1194) refers to triangulation as a technique that allows a researcher to utilise multiple methods to arrive at an in-depth and comprehensive understanding of a phenomenon. It offers several benefits to a research project. These range from strengthening validity and credibility, to obtaining a more complete and comprehensive perception of a situation, to generating new insights regarding the situation (Joint United Nations Programme on HIV and AIDS, 2010: 18). The Robert Wood Johnson Foundation (2008) in turn, argues that "rather than seeing triangulation as a method for validation or verification, qualitative researchers generally use this technique to ensure that an account is rich, robust, comprehensive and well-developed".

Four types of triangulation have been identified by the Joint United Nations Programme on HIV and AIDS (2010: 14–17), namely methods triangulation, triangulation of data sources, analyst triangulation, and theory/perspective triangulation. Barbour (2001: 1117) asserts that the use of more than one method of data collection is particularly effective in addressing the issue of internal validity. This study adopted two of the triangulation techniques; data and methods triangulation. This is the approach adopted by this study, i.e. using multiple sources of data, for example the PubMed/Medline database, questionnaires, interviews and documentary sources and a mixed methods approach combining both quantitative and qualitative aspects of the study.

1.4.1.2 Grounded Theory

Glaser and Strauss (1967) in their seminal work, *The discovery of grounded theory: strategies for qualitative research,* set the foundation for grounded theory research work that is mostly still followed today. However, there has been differences and disagreements, even amongst the founders of the theory themselves, on what grounded theory is, how it should be applied and how it should be interpreted or explained. At that time, they had argued that grounded theory was "the discovery of theory from data—systematically obtained and analysed in social research" (Glaser & Strauss, 1967: 1). Later, Strauss and Corbin (1990: 23) described grounded theory as a "qualitative research method that uses a systematic set of procedures to develop an inductively derived grounded theory about a phenomenon". In 1992 Glaser similarly stated that grounded theory, provides a systematic methodology and means of analysis to inductively generate a theory about an area of investigation (Glaser, 1992: 16). What this means in effect is that when one is conducting research, meaning and interpretations of the results should be informed by the phenomena experienced.

Schwandt (1997: 60) further argues that while grounded theory is often seen as any approach that develops theories from data, it is in fact based on a rigorous methodology and set of procedures to derive substantive theories relating to social phenomena. It simultaneously uses induction, deduction, and verification techniques to analyse data to develop theory. Grounded theory has "systematic, yet flexible guidelines for collecting and analysing qualitative data to construct theories 'grounded' in the data themselves" (Charmaz, 2006: 2). It provides a systematic method to analyse the commonalities and incongruities found in the data being examined (Barbour, 2001: 1116). Although grounded theory gives a researcher flexibility in the way one approaches data collection and analysis as well as the interpretation of the data, this should be guided by a highly organised set of procedures to ensure that the research is not conducted in a chaotic and disorderly manner.

1.4.1.3 Bibliometrics

Pritchard (1969: 348), one of the early proponents of bibliometrics, defined it as "the application of mathematical and statistical methods to books and other media of communication". However, it was Edward Wyndham Hume, who first proposed the idea of tracing the development of science

by measuring characteristics of publication of scientific articles. This was in 1922 at two lectures that were delivered at the University of Cambridge (Hume, 1922). He published his ideas in 1923 as *Statistical bibliography in relation to the growth of modern civilization* (Hume, 1923). It was Pritchard who proposed the term "bibliometrics" as a better descriptor for this field of research. The Thompson Reuters white paper on bibliometrics expands on Pritchard's definition and refers to bibliometrics as the "application of quantitative analysis and statistics to publications such as journal articles and their accompanying citation counts" (Thomson Reuters, 2008: 3). Rehn et al. (2014: 1) while providing a similar definition, more specifically discusses the use of bibliometrics to measure scientific research. Evidently, bibliometrics is about the measurement of knowledge; regardless of whether that measurement is done quantitatively or qualitatively. Ismail et al. (2012: 5) argue that bibliometric methods can effectively be used to not only determine quantitative measures of interdisciplinarity and collaboration, but indications of quality as well. Fairthorne (1969: 341), in turn, not only viewed bibliometrics as a means to examine the properties of recorded information, but also attendant behaviour. He further suggests that bibliometrics should be combined with other research methods to increase the usefulness of the research project. White and McCain (1989: 119) expand on these definitions to state that bibliometrics should not only quantitatively examine literatures, it should also develop "evolutionary models of science, technology, and scholarship". In summary, Akakandelwa (2007: 50) provides an apt and extensive outline of the scope of bibliometrics. He states that it is a combination of mathematics and data visualisation in its analysis.

In this study, bibliometrics will be used to measure the research output of the individual researchers within the University of Zambia's School of Medicine. This will be done in terms of yearly research outputs, collaboration trends, subject coverage and scholarly communication channels used by the researchers. Cumulatively this will serve as a measure of the research output and research productivity of the School of Medicine.

1.4.2 *Grounded Theory, Bibliometrics and Triangulation in Library and Information Science Research*

Several library and information science scholars have applied grounded theory to their research studies. For example, Musoke (2016: 16) used grounded theory in her study '*Informed and*

healthy' in Uganda. Her choice of grounded theory was primarily informed by its inductive approach both as a method and an analysis strategy. She argues that it can "generate theoretical models systematically through the constant comparative method whereby data, emerging concepts, categories and their properties are constantly compared". Nguyen's (2015a: 477) study on '*Establishing a participatory library model*' also adopted grounded theory arguing that it is suitable for studies where "little knowledge or no empirical study is available". Mansourian's (2006: 386) article on the suitability of grounded theory in LIS studies concluded that grounded theory was an appropriate methodology to utilise in LIS research. Seldén (2005: 118), who critically reviewed the applicability of grounded theory to LIS studies, argues that from personal experience grounded theory is not as promising and easy to use as assumed by various researchers but it "helps shift some of the focus in social research from generalisations and verifications of statistical material to the exploration of new land to find even unexpected knowledge". Other researchers, such as Oliver, Whymark and Romm (2005), Pace (2004), Goede and Villiers (2003), Allan (2003), Powell (1999), Star (1998), Ellis (1993), Orlikowski (1993), Soto (1992), and Brown (1990) have used grounded theory in library and information science research; showing that this is a method that has gained significance in this profession. What clearly emerges regarding grounded theory as a research method is its latitude and its ability to allow the researcher to explore and describe the situational context of a study without setting preconceived parameters and, more importantly, without the pressure to generalise the findings.

González-Teruel and Abad-García (2012) combined both bibliometrics and grounded theory in the study of information behaviour. Their adoption of grounded theory was based on its "qualitative inductive nature, which enables observation of the user in context without resorting to pre-established categories, and its orientation towards the emergence of theory based on data, thus avoiding superficial descriptions of the interaction between user and system, or user and information" (González-Teruel & Abad-García, 2012: 32). By combining these two research approaches, the researcher has the flexibility of looking at the research study through a quantitative lens in data collection and analysis, as well as a qualitative approach in the interpretation of data.

Malapela (2014: 35,133) argues that triangulation "allows the usage of more than one research strategy in a single investigation" whilst grounded theory was adopted for its flexibility in allowing

the researcher to constantly compare data emerging from the research with similar trends emerging from the other methods. In his study of young parent health information practices, Greyson (2015: 1, 3; Greyson, 2018) in turn, applied a constructivist grounded theory design to study young parents' use of triangulation practices to seek health and parenting information in Canada. He concluded that information triangulation helped the young parents to more effectively make sense of complex health information.

1.4.3 *Why a Concurrent Triangulated and Grounded Theory Research Approach in this Study?*

As mentioned earlier, the study adopted a research approach that allowed the researcher to explore and describe the context of knowledge production practices and attributes at the School of Medicine, University of Zambia. This meant that the research approach needed to be sufficiently flexible and at the same time stringent enough to allow the researcher to obtain an in-depth understanding of the situational and institutional context of the study field. A triangulated bibliometric and grounded theory framework was deemed the most suitable to ensure that the researcher could methodologically triangulate the analysis and interpretation of the data collected by means of different methods. The approach allowed the researcher to contextualise the data collected as well as giving meaning to the data through the experiences of the persons and the institution. This mixed methods approach ensured that:

- Data was collected from several data sources;
- Different types of data were collected;
- Different methodological approaches were adopted and;
- Importantly, different perspectives on data analysis and interpretation were made possible.

The methodology for this study will be further elaborated on in Chapter Four.

1.5 Operational Definitions of Concepts

Understanding how various concepts that have a bearing on the research topic are being applied in the study is critical to avoid misunderstandings. The concepts, as defined herein, should therefore be understood within the context of this study.

1.5.1 *Academic Staff*

University personnel whose primary assignment is instruction, research, or public service in an institution. At the University of Zambia, this category of staff, (academic staff) are grouped into teaching staff, research fellows and library staff who are involved in teaching (University of Zambia, Quality Assurance Unit, 2016: xiii). Although faculty is used to refer to this category of staff, in this study, this group of staff will be referred to as academic staff or lecturer as these are the terms that are commonly used in the institution.

1.5.2 *Attributes*

Lin (2006: 147) cites Spinoza defining attributes as "that which the intellect perceives as constituting the essence of a substance". A substance is further described as something "which is, and is conceived through itself: in other words, that of which a conception can be formed independently of any other conception" (Shein, 2009, 2018). Therefore, attributes are the elements that characterise the being or item.

1.5.3 *Bibliometrics*

Bibliometrics, as a quantitative measurement of scientific research output, measures publication patterns and impacts. However, "bibliometric indicators can also be used to provide other types of information, for instance related to scientific collaboration, mobility, interdisciplinarity, gender, and open access publishing" (Waltman & Noyons, 2018: 4). Bibliometrics are quantitative measurement methods for tracking and analysing the quantility and quality of research output (Pritchard, 1969: 349; Durieux & Gevenois, 2010: 342; Roemer & Borchardt, 2015: 28).

1.5.4 *Citation Analysis*

Citation analysis is a way of measuring the relative importance or impact of an author, an article or a publication, by counting the number of times that an author, article, or publication has been cited by other works (University of South Dakota, 2017). It 'involves counting how many times a paper or researcher is cited, assumes that influential scientists and important works are cited more often than others" (Meho, 2007: 32). Smith (1981: 85) had earlier defined citations as "signposts left behind after information has been utilised and as such provide data by which one may build pictures of user behaviour without ever confronting the user himself". It is thus clear that the reference list in any document can be used for citations analysis purposes (Smith, 1981: 85). The citation counts obtained from a specific collection of documents hence provide a precise and objective measure of impact (Smith, 1981: 85). Citations, therefore, are like footprints that can

be used by both individuals and institutions to measure the importance and usefulness of their research output. It helps researchers and institutions in answering the question of whether their research output has made an impact in society.

1.5.5 *Communication*

Communication is the "process of transferring information from a source via a transmission medium to one or more receivers. The transmitting source should express the information clearly, the medium used should convey the information efficiently and the receiver should understand the information received" (Keena & Johnston, 2011: 51). The National Joint Committee for the Communicative Needs of Persons with Severe Disabilities (1992: 3) defines communication the action of receiving and gving information. Weaver (1949: 2) took a broad view of the meaning of communication to "include all of the procedures by which one mind may affect another, not only written and oral speech, but also music, the pictorial arts, the theatre, the ballet, and in fact all human behaviour". Therefore, "communication involves transmission of verbal and non-verbal messages. It consists of a sender, a receiver and channel of communication. In the process of transmitting messages, the clarity of the message may be interfered with or distorted by what is often referred to as barriers that are likely to exist" (Munodawafa, 2008: 369). The World Health Organisation, Regional Office for South-East Asia (2008: 2) in turn, refers to communication as "the process by which we interact with each other. It is the flow (transmission and reception) of information, ideas, feelings, attitudes, perception and understanding, both verbally and non-verbally, between two or more parties". Communication has been an important aspect of human interaction. This is particularly critical in the university environment where knowledge is produced and needs to be communicated both within and outside academia. In summary, communication can be viewed as the process in which information is transferred, exchanged and shared between people from various sources and using different channels to communicate the information. This study is more specifically concerned with communication that is non-verbal, i.e. written communication.

1.5.6 *Communication Channel*

A communication channel is the "means by which messages transfer between individuals" (Lajoie-Paquette, 2005: 119). Suttiposuwan (2000: 9) cites Bovee and Thill's definition of a communication channel as "the medium through which messages are sent and received, for example, face-to-face or through electronic mail". Communication channels can therefore include

a variety of media such as an article, a book, a video, face-to-face, an exhibition, and a newspaper article (Huizing, 2014: 2). In conclusion, a communication channel can be defined as a medium that assists in the movement of information from one source to the recipient. The focus in the communication process is on how appropriate the medium is for the message and the recipient. In this study, a communication channel is a medium through which faculty or a researcher communicates their research outputs, such as journal articles, books, conference proceedings, etc.

1.5.7 *Degree of Collaboration*

Subramanyam's (1982) formula, defines the degree of collaboration as "the ratio of the number of collaborative research papers to the total number of research papers in the discipline during a certain period of time" (Subramanyam, 1983: 37). That is, "C= NM /NM + NS. Where C = Degree of Collaboration, NM = Number of Multi authored papers, and NS = Number of single authored papers" (Padma & Ramasamy, 2013: 53).

1.5.8 *Digital Literacy*

Digital Literacy "is the ability to use information and communication technologies to find, understand, evaluate, create, and communicate digital information, an ability that requires both cognitive and technical skills (American Library Association, 2013: 2). Karpati (2011: 1) defines digital literacy as a "set of basic skills which include the use and production of digital media, information processing and retrieval, participation in social networks for creation and sharing of knowledge, and a wide range of professional computing skills". These are skills that enable the academic staff to search and retrieve online information that is necessary for them to conduct research and produce papers, and thereby effectively participate in the scholarly communication process. These skills are furthermore essential in social networking and using social media (Cordell, 2013: 178).

1.5.9 *Knowledge*

Davenport and Prusak (1998: 5) define knowledge as "a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information". Pollock (2009: 1) states that knowledge may be "used broadly to signify all forms of information production including those involved in technological innovation, cultural creativity and academic advance". Döring and Schnellenbach (2004: 3) in turn argue that "knowledge comprises all cognitions and all abilities that individuals use to solve problems, to make decisions and to understand incoming information". Li, Qiong and

Xiao (2009: 2036) draws on Liebeskind et al., (1996) who define knowledge as "validity that has been established through a test of proof and can therefore be distinguished from opinion, speculation, beliefs, or other types of unproven information". In this context, Nonaka (1994: 15) asserts that "information is a flow of messages, while knowledge is created and organised by the very flow of information, anchored on the commitment and beliefs of its holder. This understanding emphasises an essential aspect of knowledge that relates to human action". In this study, the term knowledge will be used in the context of the scientific research output produced by universities. It will refer to the knowledge products that arise out of academic research, i.e. the outcome of the academic research process which is expressed in a physical or electronic format as either a book, journal article, patent, conference proceeding or other identifiable research output.

1.5.10 *Knowledge Diffusion*

Chen and Hicks (2004: 199) define knowledge diffusion the application of knowledge that is wrriten down." It is the "movement of useful ideas between organisations" (Appleyard & Kalsow, 1999: 288). Knowledge diffusion is the dissemination and sharing of knowledge after it has been produced. This dissemination and sharing is done in various ways such as by means of books, journals, newsletters, the Internet, seminars and discussion forums. This study adopts the definition that knowledge diffusion refers to the dissemination and sharing of knowledge from one space to another using a medium. In this regard, Ordoñez and Serrat (2009: 1) state that "dissemination is best described as the delivering and receiving of a message, the engagement of an individual in a process, or the transfer of a process or product". Dissemination of knowledge products also denotes that knowledge is being moved from one place to another, meaning there should be a source and a recipient of that knowledge as well as a medium.

1.5.11 *Knowledge Product*

Taylor defines a knowledge product as an "artifact of *information* — a kind of persistent retention of the knowledge of one or more individuals" (Taylor, 2017). Typical examples are text documents such as books and journals, recorded music, and art work. Their significance lies in the knowledge being conveyed and not in the physical container. Milton (2018) argues that the term "Knowledge Products" should only be used for "items that are expressly written to convey knowledge, with the user in mind". In this study, a knowledge product is considered to be the result of the intellectual research process. It is a product that arises out of the work that the academic staff and researchers do. They are the research outputs that have been recorded in some form of scholarly medium such

as books, journals, conference proceedings, theses, dissertations, etc.

1.5.12 *Knowledge Production*

Nokkala (2007: 4) says that "knowledge production primarily refers to explicit communicable knowledge aimed to be disseminated to a wider audience". Knowledge production has also been defined by Cloete and Bunting (2013b: 8) as the "cluster of related activities in the university that has to do with producing new knowledge". In their discussion of knowledge production, they expand its coverage to include both graduates and publications. In this study knowledge production refers to the activities, processes and systems as they relate to the production of knowledge through mainly publications.

1.5.13 *Knowledge Attributes*

In this study knowledge attributes refer to the characteristics of knowledge that is produced by the UNZA SOM; these attributes must fit in the attributes that are normmaly associated with knowledge produce by academia.

1.5.14 *Knowledge Production Practices*

This study takes the view that knowledge production practices relate to the various ways that have been used over the years to produce knowledge at HEIs. This constitutes a combination of the three knowledge domain processes that is the focus of the study namely, knowledge production, diffusion and utilisation. Whilst previous studies have generally focused on each distinct aspect of the knowledge production cycle, i.e. either the creation, dissemination or application of knowledge, this study collectively refers to them as knowledge production practices. Appleyard and Kalsow (1999: 288) and Edwards (1991) take a similar view and refer to the knowledge cycle as the progression of knowledge through the three main stages of creation, diffusion and implementation.

1.5.15 *Knowledge Utilisation*

Knowledge utilisation is the application of knowledge once it has been received by an individual, institution, society or country. This application may entail various things, for example, use of that knowledge can change behaviour, change policy and result in the adoption of new features, knowledge can be applied for teaching purposes, or it can be used to create new knowledge. It has been argued that the application of knowledge is a specific goal of universities for they have a concern that the knowledge that they produce is being utilised by society. Chagnon et al. (2010: 1) refer to the fact that "despite growing research productivity and accessibility to its products,

studies consistently show a gap between the availability of scientific knowledge and its application". The utilisation of knowledge produced at universities by society is one of the ways that universities contribute to the economic and social development of their societies. This is akin to Alavi and Leidner's (2001: 122) point that the "source of competitive advantage resides in the application of the knowledge rather than in the knowledge itself". This study, however, takes a more specific view and mainly focusses on knowledge utilisation as a component of the knowledge production process within an academic and research environment and not society at large. It is further interested in the impact that knowledge use has on the academic staff and researchers.

1.5.16 ***Policy***

A policy is a framework that sets boundaries within which everyone should operate. The University of Zambia defines policy as guidelines that help the institution make consistent decisions (University of Zambia, 2014: 1). In other words, policies are "operating rules that can be referred to as a way to maintain order, security, consistency, or otherwise furth (sic)] [further] a goal or mission" (Vargas-Hernandez, Noruzi & Haj, 2011: 288) as they provide the "principles which dictate how the members of the University will act (Vargas-Hernandez, Noruzi & Haj, 2011: 289).

1.5.17 ***Practice***

In this study practice, will specifically refer to the procedure, policy, method, system or way of producing knowledge. It will further refer to the rules and regulations that have been established in academia to govern itself regarding knowledge production, diffusion and utilisation.

1.5.18 ***Research***

Tress, Tress and Fry (2005: 21) quote the United Kingdom Research Assessment Exercise 2001 that defines research as the "original investigation undertaken specifically to gain knowledge and understanding. It includes work of direct relevance to the needs of commerce and industry as well as to the public. Research pushes forward the boundaries of knowledge within a specialism and/or challenges existing subject boundaries …". The United States Department of Health and Human Services (2009: 4) defines research as "a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalisable knowledge". Lertputtarak (2008: 14) cites Creswell describing research as "any scholarly research produced by academic faculty members that contributes to the knowledge base of a discipline".

1.5.19 *Research Capacity*

Research capacity is the ability to engage effectively with the knowledge production process; the conceptualisation of the idea to the time when that idea has become a research output; up until that research output has been disseminated and utilised by others.

1.5.20 *Research Culture*

A research culture refers to all the supportive structures that exist in an institution to advance and promote knowledge production activities, as well as to promote the communication and visibility of knowledge products. A culture of research therefore provides a "supportive context in which research is uniformly expected, discussed, produced, and valued" (Hanover Research, 2014: 5).

1.5.21 *Research Productivity*

Research productivity is the study of academic research output and the factors associated with it" (Ramsden, 1994: 208). It "refers to the research output produced by academics. It is commonly measured as the total number of publications by a researcher, usually adjusted for quality" (Mitev, Ridley & Wills, 2013: 4). Furthermore, Martin (2009: 15) explains that writing is essential to research productivity since papers and books need to be completed. Writing entails that the academic staff or researcher has the necessary skills to engage in the academic research process. In academia, it has been "regarded as the main source of esteem, as a requirement for individual promotion, as evidence of institutional excellence, and as a sine qua non for obtaining competitive research funds, publication is central to scholarly activity" (Ramsden, 1994: 207).

1.5.22 *Research Output*

Research output is the product of research, usually in some or another written format. Martin (2009: 15) states that "publication is a key measure of research output because it is the way findings are communicated and placed on the record". Wootton (2013: 2) argues that research output is "the product of performing research activities". This may include writing journal articles and books, obtaining research grants, supervising research students, acting as an examiner, serving on editorial boards, presenting lectures, etc. We are specifically interested in research outputs that have been recorded in a published or non-published format such as books, journal articles, conference proceedings etc.

1.5.23 *Scholarly Communication*

The University of Namibia (2013: 4) defines scholarly communication as the "creation, transformation, dissemination and preservation of knowledge. This is the process by which

academics, scholars and researchers publish and share their work in the academic community and beyond". The Association of College and Research Libraries (2013: 4) cites the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities defining scholarly communication as "the systems by which the results of scholarship are created, registered, evaluated, disseminated, preserved, and reshaped into new scholarship". Indeed, scholarly communication is the "process of sharing, disseminating and publishing research findings of academics and researchers so that the generated academic contents are made available to the global academic communities" (United Nations Educational, Scientific and Cultural Organisation, 2015a: 6). Again, in academic communication, it is critical that the knowledge that has been produced is peer reviewed and that it is communicated using academic communication channels.

1.5.24 *Scholarly* Outputs

The University of Namibia (2013: 4) refers to scholarly outputs as those output that have been produced by staff, students and affiliates and may include amongst others "conference papers, books, monographs, journal articles, research abstracts, consultancy reports, sound, video and film recordings, artistic and creative works, and the interactive multimedia". Within the context of this study, scholarly outputs are those academic research outputs that are mostly recognised by the University of Zambia for its own academic appointment and promotion processes.

1.5.25 *University*

An institution of higher learning that grants its own certificates, diplomas and degrees and normally undertakes leading-edge research, as well as having a social critical role in society (University of Zambia, Quality Assurance Unit, 2016: xvi).

1.6 Thesis Outline

In this section, the layout of the chapters of the thesis is provided as well as a synopsis of their content. The first chapter provides an introductory background to the study as well as the motivation for this study. It gives an overview of what is known of the study problem and what needs to be known. This chapter further presents the aims and objectives and justification to conduct the study. The research approach adopted for the study is also briefly outlined in this chapter.

The second chapter locates the study within the national higher education system in Zambia. It also includes the institutional context of the study and specifically looks at the existing state of

knowledge production, diffusion and utilisation at the University of Zambia.

The third chapter reviews the literature relevant to the study, i.e. knowledge production practices and their attributes in a University environment. The chapter firstly gives an overview of knowledge production, diffusion and utilisation by reviewing each of the three concepts independently and thereafter providing a synthesis. It then reviews the literature according to the study objectives and research questions as follows: knowledge production practices and their attributes; knowledge diffusion and knowledge utilisation in a university environment; knowledge production, diffusion and utilisation determinants in a university environment; and lastly knowledge policies in a university environment. The chapter concludes with a summary of the literature that was reviewed in the chapter.

Chapter four looks at the study design and research methodology adopted for the study. It firstly revisits the research objectives and research questions and then explores the mixed methods case study approach and why it was adopted for the study. This is followed by an outline of the sampling strategy of the study and how the study sample was determined. It then proceeds to look at the data collection procedures as well as the instruments used to collect data from the study sample. This chapter also looks at how issues of reliability and validity were handled in the study. The chapter concludes with the data collection process, the type of analysis used in the study and ethical issues.

The findings of the study are outlined in chapter five. The chapter presents findings from the bibliometric study that is presented in figures and tables. The responses to the structured questions are presented as frequencies and percentages in figures and tables, while descriptive narratives are used to convey the responses to open ended questions from the unstructured questionnaires and interviews. This chapter also presents findings from secondary sources such as books, policy manuals and other documentary sources of evidence. The chapter commences with a background profile of the academic staff of the University of Zambia's School of Medicine. Thereafter, the findings of the study are presented according to the research questions as outlined in Chapter One.

The interpretation and discussion of the findings are presented in chapter six. This section relates the outcomes of the study to the research objectives and questions as outlined in chapter one and

evaluates to what extent these have been addressed. This chapter further correlates the findings of the study to knowledge production practices highlighted in the literature reviewed.

The conclusions derived from the study are presented in chapter seven. This is followed by recommendations and suggested interventions relating to knowledge production practices and their attributes within a Zambian university environment. Thereafter the contribution that this study has made to attain a better understanding of knowledge production practices and their attributes in HEIs is outlined and areas for future research are suggested.

1.7 Chapter One Summary

Chapter one provides an introductory synopsis of knowledge production practices and their attributes in a university environment. It further articulates the main objectives of the study, and the specific objectives and the research questions being addressed. This study is exploratory and descriptive in nature and, although addressing all three aspects of the knowledge domain process, it gives more prominence to knowledge production. The scope, limitations, delimitations and the rationale of the study have further been highlighted in this chapter. The chapter summarises the research approach adopted and motivates why triangulation, using both bibliometric and a grounded theory approaches, has been used for the study. Operational definitions of concepts used in the study are followed by an outline of the thesis.

The main thesis of the chapter is that the reason for existence of universities is the production of knowledge which should always be relevant to society. At the core of the existence of universities is knowledge production, which is relevant, diffused in several platforms and uptaken by society. The knowledge produced is for knwoeldge problem solving, producing skilled human resources and research outputs.

The next chapter locates the study within Zambia and in the higher education system by discussing the context of the sector. It then places the study at the University of Zambia and more specifically at the School of Medicine and briefly gives an overview of knowledge production practices and their attributes at the University of Zambia.

CHAPTER TWO

STUDY SETTING

2 Introduction

Chapter two locates the study in Zambia at the University of Zambia and more specifically it's School of Medicine. In addition, this chapter presents a brief overview of knowledge production practices and their attributes in a university environment, thus explaining the subject context for the study.

2.1 The Context of Higher Education in Zambia

The current higher education system in Zambia is an outcome of the early aspirations of the post-independence leadership to provide education to as many people as possible. Zambia has since 1964 followed a "*massification*" model for tertiary education, i.e. to encourage the "absolute growth in student enrolments as well as a more egalitarian distribution of students in higher education" (Jansen, 2003: 292). The aim of the massification of higher education worldwide has been to reduce societal inequalities and make education accessible to all social groups within society. This philosophy was congruent with the vision of Zambia's post-independence leadership to improve access to tertiary education as one of the means to reduce poverty. It was further argued that increased investment in education would lead to growth in knowledge and knowledge products which would further contribute to the development of the country.

The lack of trained human resources and the need to increase the pool of qualified people to implement Zambia's development agenda added further impetus to adopting the massification model after independence. All these factors exerted considerable pressure on the University of Zambia. Established in 1965, it was the first and only public university in Zambia during the first years after independence. The arguments for the massification of tertiary education are still being advanced today, but the pressure on the University of Zambia was alleviated by the establishment of another two public universities, the Copperbelt University in 1987 and Mulungushi University in 2008. Since 2008 a number of colleges have been transformed into universities, viz, the Mukuba University in Kitwe, the Kwame Nkrumah University situated in Kabwe, and the Chalimbana

University situated in Chongwe. The Zambian government has more recently established the Robert Makasa University in Chinsali, the King Lewanika University in Mongu and the University of Luapula in Mansa, however these are not yet operational. The Higher Education system in Zambia consists of both public and private universities with a mandate to provide higher education that will contribute to national development by providing a skilled human resource and also contributing to schorlaship- knowledge production (Zambia. Ministry of Higher Education, 2013: 106–107).

2.1.1 *Legal and Regulatory Framework*

The legal framework under which the higher education system in Zambia operates is underpinned by various legislation frameworks such as those indicated in Table 2.1.

Table 2.1. Zambia Higher Education Policy Context

Higher Education Legislation	*Brief Description*
Higher Education Act, 2013 [No. 4 of 2013].	The Higher Education Act provides for the Higher Education Authority whose role is to provide oversigh over HEIs. (Zambia. Ministry of Higher Education, 2013: 97).
Technical Education, Vocational and Entrepreneurship Training Authority, 1998 [*No.13 of 1998*].	The Technical Education, Vocational and Entrepreneurship Training Authority (TEVETA) Act is aimed at providing for the "establishment of government institutions of technical education, vocational and entrepreneurship training" (Zambia. Ministry of Science and Technology, 1998: 157).
Zambia Qualifications Authority Act, 2011 [No. 13 of 2011].	The Zambia Qualification Authority's (ZAQA) role is to preside over a "National Qualifications Framework for the classification, accreditation, publication and articulation of quality-assured national qualifications" (Zambia. Ministry of Education, Science, Vocational Training and Early Education, 2011: 182).
Chapter 300 The Nurses and Midwives Act 1970	The Nurses and Midwives Act role is the "better provision for the registration, enrolment, control and training of nurses and midwives" (Zambia. Ministry of Health, 1970: Part I).
Health Professions Act [No. 24 of 2009].	The Health Professions Act aim is to "provide for the recognition and approval of training programmes for health practitioners" (Zambia. Ministry of Health, 2009: 355).

2.1.2 *Institutional Setting: the University of Zambia*

The University of Zambia's early foundations begin with the Oppenheimer College of the Social Sciences that was later integrated into the University of Zambia. The University of Zambia was

established by an act of parliament (Act No 66 of 1965). The university formally opened to the public on the 12th of July 1966 (University of Zambia, 2015: 12). The first students started their learning at what is now the Ridgeway campus (Oppenheimer College), before they were relocated to the Great East Road Campus in 1968. The first Chancellor, his Excellency Dr David Kenneth Kaunda, the first Republican President, was installed as Chancellor in July of 1966, two years after Zambia's independence (Carmody, 2004: 171). The university is situated in Lusaka, the administrative capital of Zambia.

At the time of opening, the University consisted of three schools namely, the School of Education, the School of Natural Sciences and the School of Humanities and Social Sciences (HSS). Today, the University is comprised of the following schools and units: School of Agricultural Sciences, School of Education, School of Engineering, School of Humanities and Social Sciences, (HSS) School of Medicine, School of Mines, School of Natural Sciences and School of Veterinary Medicine. Other schools were later established: Graduate School of Business (GSB) in 2016, School of Health Sciences, School of Public Health and School of Nursing Sciences in July 2016 (University of Zambia, 2018a). The School of Health Sciences, School of Public Health and School of Nursing Sciences used to be part of the School of Medicine, but were split into independent schools, leaving the School of Medicine to concentrate on the training of medical doctors. There are three institutes: the Confucius Institute (CI), the Institute of Distance Education (IDE) and the Institute of Economic and Social Research (INESOR). There is also a Directorate of Research and Graduate Studies (DRGS) responsible for the coordination of all research and postgraduate programmes at the University of Zambia. The Confucius Institute at the University of Zambia (CI-UNZA) was established on the 26th of July 2010 (University of Zambia Confucius Institute, 2018).

In addition, there are two supportive units; the Centre for Information and Communication Technology (CICT) and the University Library System (University of Zambia, 2009: 12). Further, the Technology Development Advisory Unit (TDAU) establishment is responsible for translating engineering research to the wider society in Zambia (University of Zambia, 2015: 457). The University offers various degree programmes in numerous fields with different modes of study such as evening, full time, part time, parallel and distance. The degrees offered comprise of Bachelors, Masters and Doctor of Philosophy (PhD) (University of Zambia, 2015).

The University's mandate is derived from Section 12 (1) of the Higher Education Act No 4 of 2013 (Zambia. Ministry of Higher Education, 2013). This study is primarily concerned with two objectives of the Higher Education Act No. 4 of 2013 namely: a) conduct research necessary and responsive to national needs and; b) contribute to the advancement of all forms of knowledge and scholarship in keeping with international standards of academic quality. The 2018-2022 University of Zambia Strategic Plan has interpreted this mandate into seven broad categories, one of which speaks directly to the subject of this research; *Enhance Excellence in Research and Publishing* (University of Zambia, 2018b: ix). To achieve this strategic objective, the University of Zambia intends to carry out activities and programmes that will lead to the:

- Improvement of the research and publications policy;
- Increment in the number of research publications in reputable journals;
- Development of flagship research partnerships with international organisations;
- Establishment of a system for awarding outstanding research outputs;
- Enhancement of institution-wide Intellectual Property Rights management system; and
- Establishment of an integrated knowledge management system" (University of Zambia, 2018b: ix).

Increments in the research outputs were also emphasised by the University of Zambia Strategic Plan document 2013-2017 which stated that the number of papers published in refereed journals and quality of research contracts and consultancies undertaken are key performance indicators of monitoring the strategic plan when it comes to research (University of Zambia, 2012a: 74). Sikwibele (2007) indicates that these two roles were already articulated by the Lockwood Report which was commissioned 1963 by the first government of Zambia to consider the possibilities of establishing a university. She elucidates on these two roles of the University of Zambia as "teaching, which is the provision of higher education itself through advancement of learning; and research, which entails the promotion and execution of research" (Sikwibele, 2007: 6). One of the two objectives specifically speaks to the tenets of this study. In this regard, the University of Zambia had indicated in its 2013 -2017 strategic plan that the institution would provide an environment that is conducive to research and innovation and lead to the production first class world research (University of Zambia, 2012a: 2–3). Kelly (1999: 129) indicates that Prof L. H. K Goma, a former Vice Chancellor of the University of Zambia had in 1969 already articulated the

University's developmental role and emphasised that its research should be relevant to the needs of the country.

The significance of research to the life of the University of Zambia cannot be overemphasised. This recognition of research is well articulated and is underpinned by the various documents that put it on the agenda of the university. The University's research agenda has always resonated well with the national research agenda of the Ministry of Higher Education which states that amongst the policy goals of higher education is that of increasing the involvement of universities in research and development (Zambia. Ministry of Education, 2011: 44) and together with the strategy of strengthening the capacity of the universities to undertake research (Zambia. Ministry of Education, 2011: 85). The university research performance indicators for the policy goals were identified as reflected in Table 2.2. These are the same indicators that the University of Zambia has reflected in the 2013-2017 (University of Zambia, 2012a: 21–23) and 2018-2022 (University of Zambia, 2018b: 25–26) strategic plans. Additionally, the University of Zambia Strategic Plan document 2013-2017 also says the number of papers published in refereed journals and number and quality of research contracts and consultancies undertaken are key performance indicators of monitoring the strategic plan (University of Zambia, 2012a: 74); ultimately measuring the universities' research output performance.

Table 2.2. University Research Performance Indicators

Strategic Objective	*Strategies*	*Key Activities*	*Performance Indicators*
To increase university involvement in research and development	Strengthening research financing mechanisms Strengthening the capacity of the universities to undertake research and development	Increase funding for research Increase postgraduate Enrolment Develop policy oriented research programmes relevant to the needs of the country	Number of Researches Number of research programmes

2.2 The University of Zambia Population Profile

2.2.1 *University of Zambia Undergraduate Student Population*

At the time of establishment of the University of Zambia in 1966, there were only 312 students that were enrolled. The enrolment numbers rose to 1,000 in 1970 and in 1980, the student population stood at 4,000 (University of Zambia, 2009: 12). However, as time went by, there was

an increased demand for higher education within the country. In response to this high demand, the University of Zambia Senate liberalised university entrance in the 2006/2007 academic year and the student population then rose from 7,570 to 9,980 students (University of Zambia, 2009: 13). In December 2010, the number of students stood at 14,901. These were divided into 6,252 (43%) females and 8,349 (57%) males. The student population had continued to grow due to increased demand and by 2017 there were 27,000 students at the University of Zambia (Mumba, 2018: para 1). This student growth is illustrated by Prof Luke E. Mumba, the University of Zambia Vice Chancellor as indicated in Figure 2.3 (Mumba, 2017: slide 7).

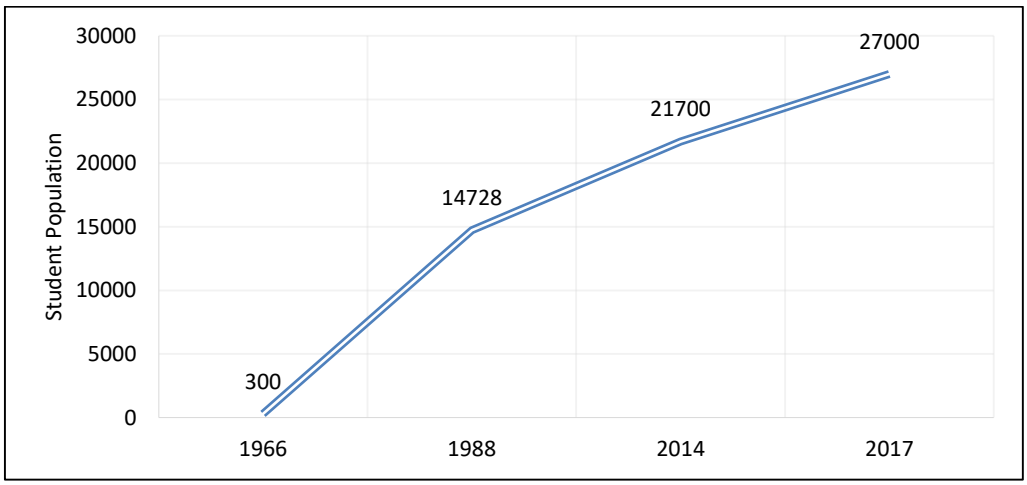


Figure 2.1. University of Zambia Student Population Growth

2.2.2 *University of Zambia Post Graduate Student Population*

The university's postgraduate student population has also been growing steadily. The total student population that has graduated from the institution from 1970 to 2015 is divided as follows: post graduate diploma (340), Masters (2,355) and Doctoral (102)[1]. At the 2017 graduation ceremony[2] the University of Zambia graduated a total of 965 graduates. The 156 postgraduates were the first to graduate with graduate degrees after studying via distance learning in a partnership between the University of Zambia and the Zimbabwe Open University (ZOU). In 2016, there were a total of 2,410 postgraduate students registered under the Directorate of Research and Graduate Studies excluding those studying in the Graduate School of Business (University of Zambia, 2017a: 19).

[1] This data was obtained from the University of Zambia yearly graduation booklets of 1968-2015. Published in Lusaka by UNZA Press.

[2] This 46th graduation ceremony was divided into three graduation ceremonies that were respectively held in November 2016, January 2017 and lastly February 2017.

2.2.3 *University of Zambia Staff Profile*

There are three categories of staff of the university as stipulated by the Higher Education Act No 4 of 2013; academic, administrative staff and other staff (Zambia. Ministry of Higher Education, 2013: 137). Support staff are employees such as messengers, cleaners, gardeners etc. The University of Zambia Quality Assurance Framework states that academic staff are those "personnel whose primary assignment is instruction, research, or public service in an institution. In this regard, academic staff are grouped into teaching staff, research fellows and library staff who are involved in teaching" (University of Zambia, Quality Assurance Unit, 2016: xiii). In 2016, the staff profile of the University of Zambia was estimated at 2,046. Of these 1,332 (65%) were males and 714 (35%) were females. The total number of academic staff was 792 divided into 213 (27%) females and 579 (73%) males (University of Zambia, 2016)[3].

2.3 Profile of the University of Zambia School of Medicine

As mentioned in chapter 1, this research project adopted as its study population a specific unit, the School of Medicine, within the case of the University of Zambia. The School of Medicine at the University of Zambia was established in 1965 by means of an act of parliament, number 66 of 1965. Its first intake of students was in 1966. The clinical departments are situated at the University Teaching Hospital (UTH) and the pre-clinical departments at the Ridgeway Campus in Lusaka. The school obtained its establishment as an independent School of the University Zambia in 1970 (University of Zambia, 2015: 294).

2.3.1 *Mandate of the Institution*

The University of Zambia School of Medicine operates under a broad mandate of the University of Zambia under Section 12 (1) of the Higher Education Act No 4 of 2013, which stipulates that it should:

a) Provide higher education, promote research and advancement of learning; and
b) Disseminate knowledge and hold out to all persons, without discrimination, the opportunity of acquiring higher education (Zambia. Ministry of Higher Education, 2013: 106).

[3] Records collected from the Human Resources Information Systems through the University of Zambia Computer Centre Records, April 2016)

2.3.2 *Vision and Mission Statement*

The Vision of University of Zambia School of Medicine is to be "a leader in tertiary health, education, care and research in the region by 2030", whilst its mission is to "to provide excellent tertiary education and training in health sciences to address current and emerging health needs" (University of Zambia School of Medicine, 2012: 23).

2.3.3 *Goal of the University of Zambia School of Medicine*

Amongst the many goals of the School of Medicine most relevant to this research project are:

a) To increase the number of quality graduates to address the health care needs of the nation;
b) To increase the number of staff conducting research and publishing research papers to promote academic excellence and improve patient care" (University of Zambia School of Medicine, 2012: 24).

Through the strategic goal of increasing the "number of staff conducting research and publishing research papers to promote academic excellence and improve patient care"; the school has committed itself to "undertake research in health sciences and disseminate findings in order to enhance academic excellence and contribute to the development of the health of the nation" (University of Zambia School of Medicine, 2012: 26). As argued before, undertaking research and dissemination in different media format is at the core of universities as well as at the centre of academic staff rising on the academic ladder.

2.3.4 *University of Zambia School of Medicine Academic Programmes*

Over the years, the School of Medicine has been training several groups of health personnel in various disciplines through the following departments: Anaesthesia, Anatomy, Biomedical Sciences, Internal Medicine, Medical Education, Nursing Sciences, Obstetrics and Gynaecology, Paediatrics and Child Health, Pathology and Microbiology, Pharmacy, Physiotherapy, Physiological Sciences (Physiology, Biochemistry and Pharmacology), Psychiatry, Public Health and Surgery (Orthopaedics, Urology, Ophthalmology, Ear, Nose and Throat, Anaesthesiology and Critical Care). The first output of graduates with full medical qualification was in 1973. Since then, the School has awarded over 1,200 medical doctors with the joint degrees of Bachelor of Medicine and Bachelor of Surgery (University of Zambia, 2012b: 304). In 1981, the school commenced the

Master of Medicine (MMEd) postgraduate programmes in several clinical areas, for example in General Surgery, Obstetrics and Gynaecology, Paediatrics and Child Health, Internal Medicine, Orthopaedic Surgery, Ophthalmic Surgery, Urology, Anaesthesia and Critical Care, Pathology and Public Health. In addition, the school offers MSc and PhD programmes in all the disciplines offered in the school (University of Zambia, 2012b: 304).

2.3.5 *University of Zambia School of Medicine Undergraduate Student Population*

The student population in the School of Medicine has been increasing exponentially in the period from 2003 to 2014. See Fig 2.4. In the 2017 there were 2646 student (University of Zambia, 2017a: 10).

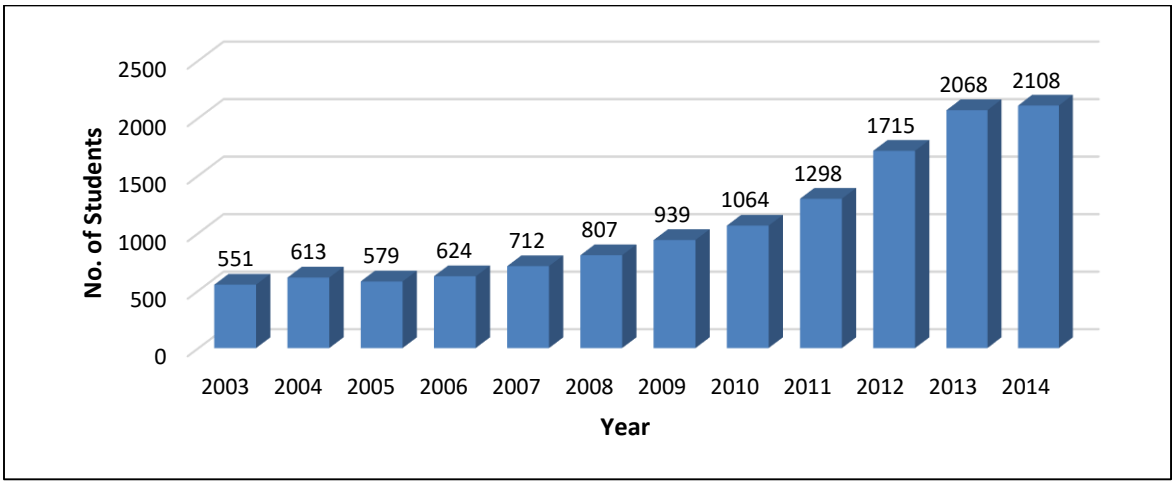


Figure 2.2. University of Zambia School of Medicine Student Population (2003-2014)
Source: UNZA Graduation Booklets[4]

2.3.6 *University of Zambia School of Medicine Postgraduate Student Population*

Bowa et al. (2008: 90) reported in 2008 that since the inception of the Masters of Medicine (MMed) programmes, the School of Medicine had been producing on average five graduates per year. This number has increased to the thirty-six graduands that were awarded MMed degrees at the March 2017 degree ceremony. However, at the end of June 2016, the University of Zambia School of Medicine had a total of 428 postgraduate students registered in various disciplines of the school (Chipeta, 2016: 2).

[4] This data was obtained from the University of Zambia yearly graduation booklets of 1968-2015. Published in Lusaka by UNZA Press.

2.3.7 *University of Zambia School of Medicine Academic Staff*

In his report to the University of Zambia Research Board, Chipeta (2016: 2), the Assistant Dean of Research for the School of Medicine, indicates that there was a total of 123 academic staff in the period January to June of 2016. These included twelve Professors, and Associate Professors, eighteen (18) Senior Lecturers and ninety-two (92) Lecturers. The total staff for the School of Medicine to operate optimally should be as approved by the University of Zambia Council; meaning that if the school were to operate optimally and efficiently, there was need for the school to fill all the approved staff positions. However, it appears that there is a pattern of staff shortages as these low staffing levels were also reported by Mulla (2012) who pointed out that, as 2012, amongst the Professorial Ranks there was a staff deficit of 63 (83%), where at Senior Lecturer Rank was 37 (86%) and amongst Lecturers (i.e. Lecturer III, Lecturer II and Lecturer I) was 73 (58%). This means that in the year 2012 there was a staff deficit of 173 representing a deficit of 71% (Mulla, 2012: 5). See Table 2.3.

Table 2.3. Staffing Shortages for UNZA Schoo of Medicine

Cadre	*Approved Positions when Programmes established*	*Actual Staff*	*Deficit (%)*
Professors & Associate Professors	76	13	63 (83%)
Senior Lecturers	43	6	37 (86%)
Lecturers	125	52	73 (58%)
Total	**244**[5]	**71**	**173 (71%)**

Mulla (2012: 5)

2.3.8 *University of Zambia Medical Library*

The University of Zambia Medical Library is a constituent division of the wider University of Zambia Library system which is administered as a single centralised library system. The University Library system, in addition to the Medical Library, in 2017 consisted of five libraries, namely the Main Library, the Veterinary Library, the Graduate School of Business Library, the Confucius Institute Library and the Institute of Distance of Education (IDE) Library. These libraries are all based at the Main campus whilst the Medical Library is located in the grounds of the University Teaching Hospital. The library system, in addition to the resident students, also provides services to extension and distance learning students (University of Zambia, 2015: 453–456). The Medical Library building has a seating capacity of 240. The library offers access to

[5] Approved Staff Establishment as of 2012

digital information resources in addition to print resources. It has been mandated to collect, organise, disseminate, and preserve biomedical literature to advance medical education, and through this process to improve public health in the country. This mandate therefore allows the library to serve as a national reference library for health information in the country (University of Zambia, 2015: 453–456).

2.4 Knowledge Production Attributes and Practices at UNZA

This section gives a brief overview of knowledge production and its attributes at the University so as to set the context in which to describe and discuss the case of the University of Zambia School of Medicine. Knowledge production has been one of the main cornerstones of the University of Zambia since inception as articulated by Kelly (1999: 129) . These objectives, of contributing to national development are reaffirmed in the University of Zambia Strategic Plan of 2013-2017 (University of Zambia, 2012a: xiii). Additionally, research outputs are disseminated through various media and platforms (University of Zambia Directorate of Research and Graduate Studies, 2009: xvi).

2.4.1 *University of Zambia Categories of Research Output*

The University identifies various categories of research output as defined by the University of Zambia Council. These are as categorised in Table 2.4 as cited by Akakandelwa et al. (2016a: xix–xxi). These categories of research output are the ones that the university uses to promote academic staff from one academic rank to another.

Table 2.4. Categories of Research Output

Category	*Sub-Category*
Journal Article	a) Article
	b) Letter
	c) Review
	d) Rapid Communication
	e) Corrigendum
	f) Addendum
	g) Editorial comment
	h) Discussion paper
Conference contribution	a) Abstract
	b) Oral Presentation
	c) Conference paper not published in formal

	proceedings
	d) Conference paper published in formal proceedings
	e) Poster
Book Publications	a) Monograph
	b) Book Chapter
	c) Edited Works
Technical Reports	a) Consultancy Reports
	b) Research/ Survey Reports
Postgraduate Research Output	a) Master Dissertations
	b) PhD Theses

Akakandelwa et al. (2016a: xix–xxi)

2.4.2 *University of Zambia Overall Research Productivity (1966-2015)*

The importance of research output is central to the academic advancement of all academic staff including the academic staff of the UNZA School of Medicine. As can be discerned, these policies and guidelines put strong emphasis on academic research output among others to rewarding and promoting academic members of staff; which in itself is essential to the project of knowledge production. In this context, the University of Zambia has since its inception endeavoured to encourage research as well as the reporting of research output in local and international publications. Akakandelwa and Rousseau (2016: 17) report that during the period 1966 to 2016, the University of Zambia's research output had "steadily increased from four articles in 1966 to 2692 articles in 2015". See Figure 2.5. An analysis of the research output indicates a predominant pattern of multi-authored publications. Akakandelwa and Rousseau (2016: 17) also indicate the type of publications in which UNZA academic staff were publishing their research output. See Table 2.5 below. Journal publications are by far the largest contributor and the main determinant of the growth pattern. They account for 68.6% of the total units, while book reviews account for 12.3% and meeting abstracts for 5.3%".

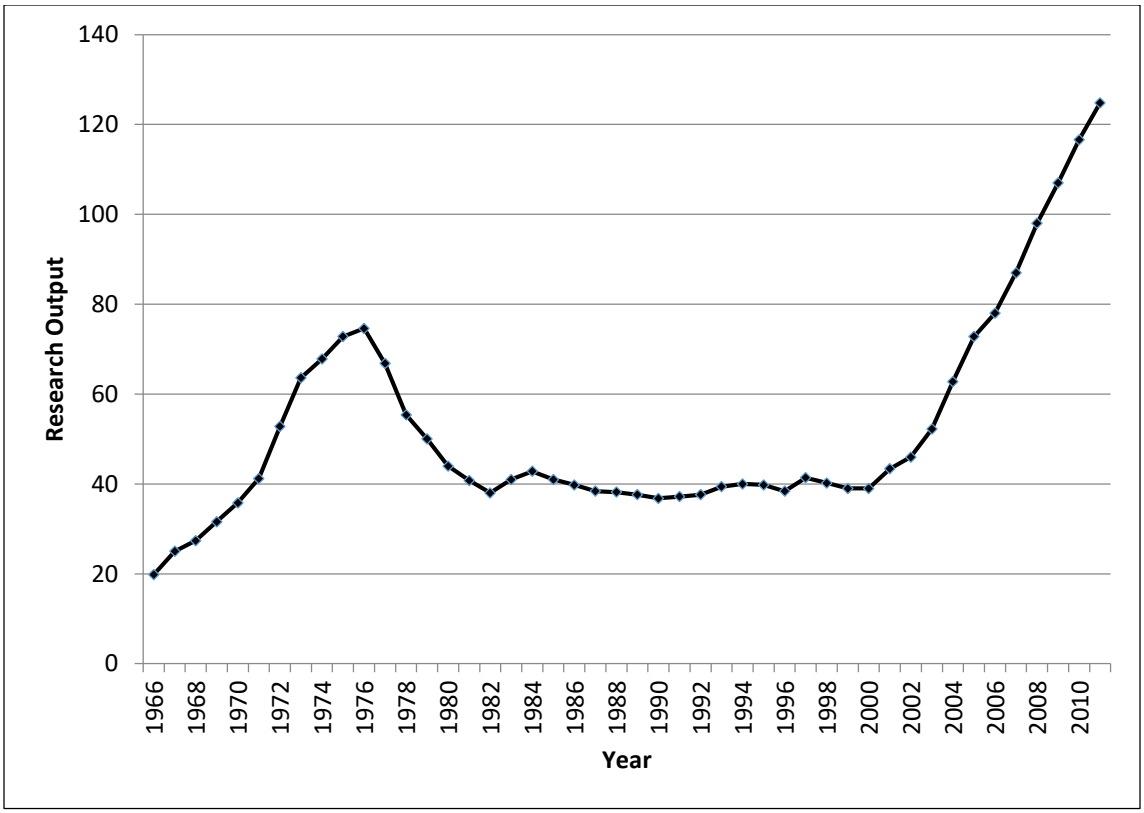


Figure 2.3. Research Output (1966-2015): 5 Year Moving Averages
Source: Akakandelwa and Rousseau (2016: 24).

Table 2.5. Publication Types

	Frequency	*Percent*	*Cumulative Percent*
Article (journal)	1847	68.6	68.6
Book Review	331	12.3	80.9
Meeting Abstract	142	5.3	86.2
Note	83	3.1	89.3
Letter	73	2.7	92.0
Review (journal)	55	2.0	94.0
Proceedings Paper	49	1.8	95.8
Article; Proceedings Paper	47	1.7	97.6
Editorial Material	41	1.5	99.1
Poetry	9	.3	99.4
Discussion	5	.2	99.6
Article; Book Chapter	4	.1	99.8
News Item	3	.1	99.9
Fiction, Creative Prose	1	.03	99.9
Item About an Individual	1	.03	100.0
Review; Book Chapter	1	.03	100.0
Total	**2692**	**100.0**	

Source: Akakandelwa and Rousseau (2016: 25).

2.4.3 *University of Zambia Postgraduate Research Output (1966-2015)*

The University of Zambia has a very strong postgraduate research culture which has been articulated in the University of Zambia Research and Intellectual Policy as follows: "develop research capacities and skills among postgraduate students and integrate them into the University of Zambia agenda" (University of Zambia Directorate of Research and Graduate Studies, 2009: 14). In this context, the total postgraduate research output of the University of Zambia in terms of theses and dissertations is reflected in table 2.6. This table indicates that postgraduate dissertations and theses have been increasing per year.

Table 2.6. Distribution of Dissertations and Theses by School

School	Year of Publication									
	1971-1975	*1976-1980*	*1981-1985*	*1986-1990*	*1991-1995*	*1996-2000*	*2001-2005*	*2006-2010*	*2011-2015*	***Total***
School of education	2	7	17	9	16	4	29	157	249	490
School of Humanities and Social Sciences	2	8	29	41	21	29	50	103	201	484
School of Medicine	0	0	5	10	17	62	66	88	176	424[6]
School of Agricultural Sciences	0	2	2	4	21	22	28	12	15	106
School of Natural Sciences	2	6	9	13	7	12	12	4	5	70
School of Law	4	8	13	16	2	3	0	0	7	53
School of Engineering	1	1	1	2	3	7	6	3	1	25
School of Mines	0	0	0	0	0	0		10	11	21
School of Veterinary Medicine	0	0	0	0	0	0	0	0	16	16
Sub Total	11	32	76	95	87	139	191	377	681	1689
									Total	**1701**

Akakandelwa et al. (2016: 118)

2.5 Chapter Two Summary

This chapter situates the study in the political and social context of Zambia. It has given a descriptive account of the University of Zambia as the largest public university in Zambia that was established in 1965, a year after independence in 1964. The chapter has also provided a brief profile of the University of Zambia and that of the School of Medicine. In addition, the chapter has given an overview of the relevant legislative, regulatory and policy frameworks under which the University of Zambia and the School of Medicine operates.This chapter includes the framework

[6] Dissertations from School of Medicine where the year of publication is uncertain were 12

within which HEIs are set up and it follows closely what has been articulated in Chapter 1: the main HEIs in Zambia are tasked with the production of knowledge in all its various formats. This knowledge, both tangible (human resources) and intangible (knowledge in the form of research outputs) should remain relevant to Zambian society.

Lastly, the chapter has given a short synopsis of the knowledge production practices and their attributes at the University of Zambia.

After looking at the background and situational context in which the study is located, the next chapter provides a review of the literature pertaining to the study and develops a theoretical framework upon which this study is anchored. The literature review looks at theoretical perspectives and research findings relating to knowledge production practices and their attributes in HEIs and particularly as it relates to Zambia.

CHAPTER THREE

Knowledge Production Practices and Attributes: a Literature Review

3 Introduction

A literature review was conducted to provide a synthesis of international and particularly Africa-based literature on knowledge production attributes and practices in a university environment. This chapter begins by looking at knowledge production practices and their attributes in general to set the context in which to locate the review. Thereafter, the literature review is organised into the following thematic areas which essentially reflect the main study objective and research questions as stated in chapter 1, Section 1.3, subsection 1.3.1 and 1.3.2:

a) Knowledge production patterns and attributes;
b) Knowledge diffusion patterns;
c) Knowledge utilisation patterns;
d) Determinants of knowledge production, diffusion and utilisation, and,
e) Policies relating to knowledge production, diffusion and utilisation.

3.1 Knowledge Production Practices and Attributes in a University Environment

This section reviews literature on knowledge production practices and attributes, and more specifically the outputs of research in a university environment. In many instances, this is referred to as research production attributes and practices or, simply, research productivity. Knowledge production attributes and practices define the basic characteristics of knowledge that is produced, as well as the common tools, methods and ways in which knowledge is produced, diffused and utilised in a university environment. Determinants and barriers to knowledge production, including policies that lay the foundation in which knowledge production flourishes are all essential ingredients to the success of any knowledge production programmes.

Knowledge production is one of the principal pillars of the work of any university (Cloete et al.,

2011). In order for a university to demonstrate its relevance to society, it needs to not only teach and produce graduates, but also to be engaged in research and the concomitant knowledge production outputs. The need for universities to assert their significance to society has been compounded by the rapid developments in information technology worldwide and the growing need to be interconnected. Cloete and Bunting (2013a: 5) in their study on 'strengthening knowledge production' observed that all the institutions they surveyed "have become part of the global and national policy context of increasing knowledge production". It is argued that the important role that universities have always played in knowledge production will continue to grow with increased globalisation and interconnectivity. According to Marginson and van der Wende (2009: 18) "higher education was always more internationally open than most sectors because of its immersion in knowledge, which never showed much respect for juridical boundaries".

It is further maintained that if universities wish to remain part of this globalised world, they will have to put in place supportive structures that enable them to participate in the knowledge production industry. Cloete and Bunting (2013a: 5) argue that these supportive structures consist of three categories, namely development, support and incentives. They further argue that the "development function deals, on the one hand, with policies that promote research culture and, on the other hand, with broader capacity building, such as further studies and academic advancement" (Cloete & Bunting, 2013a: 5). Support and incentives in turn relate to structures and policies that institutions put in place in order to create a conducive environment for knowledge production. They have also contended that institutional knowledge production policies should draw from both "international best practices and national, contextual factors" (Cloete & Bunting, 2013a: 7). The University of Zambia has outlined in its latest *Strategic Plan* a clear commitment to provide the requisite supportive structures and environment to promote knowledge production as a core component of its mission of teaching and learning, research and community engagement (University of Zambia, 2018b: ix).

3.1.1 *Knowledge Production Modes*

Over the past few decades, scholars have been debating various aspects related to scientific research, its relevance to changing contexts in society and the impact on knowledge production (Boehm, 2015: 1) Of significance here is the discourse around the two modes of knowledge

production and subsequent deliberations to expand on these concepts. These discussions in effect argue that the focus of the one mode (Mode 1) is on the creation of knowledge without undue concern about its application whilst Mode 2 is concerned with, not only the creation of knowledge, but also its application.

According to Gibbons et al. (1994: 3–33), traditional knowledge production, i.e. Mode 1, usually relates to the output of scientists within an academic or research institute environment, the focus is on basic research within a specific discipline, the objective is to provide comprehensive explanations of the world, and quality control is maintained by peers within the same discipline. By contrast, mode 2 knowledge production places far more emphasis on knowledge application and its widespread diffusion, there is greater inter-disciplinarity often involving many disparate disciplines, and the output is geared towards social accountability and "reflexivity". Further attributes of this mode are that tacit knowledge is as important as codified knowledge and quality control is maintained by a community of practitioners who are not constrained by institutional and discipline-specific restrictions. A number of scholars have subsequently supported the views expressed by Gibbons et al. (1994: 3–33). For example, Nowotny, Scott and Gibbons (2003: 179) distinguish between the two modes of knowledge production by referring to Mode 1 as the outcome of the "old paradigm of scientific discovery", while Mode 2 follows a "new paradigm of knowledge production" that is application-oriented, distributed across society and disciplines, and is "subject to multiple accountabilities". Sousa (2011: 58) in turn, reasons that Mode 1 is "contextualised by the ideal of academic knowledge as a contribution to human emancipation whereas in Mode 2, the key word is application". Hessels and van Lente (2008: 741) provide a succinct summary of the distinguishing attributes of each mode of knowledge production in the following Table 3.1.

Table 3.1. Attributes of Mode 1 and Mode 2 Knowledge Production

Mode 1	*Mode 2*
Academic context	Context of application
Disciplinary	Transdisciplinary
Homogeneity	Heterogeneity
Autonomy	Reflexivity/social accountability
Traditional quality control (peer review)	Novel quality control

Source: Hessels and van Lente (2008: 741)

Hessels and van Lente (2008: 740) further stress that "while knowledge production used to be located primarily in scientific institutions and structured by scientific disciplines, its locations, practices and principles are now much more heterogeneous". This is evident in the wide range of institutions that now engage in knowledge production practices, for example Non-Government Organisations (NGOs) that produce knowledge for specific purposes according to their mandate. Strohmaier (2014) again emphasises that Mode 2, while giving more prominence to the context and application of the knowledge produced, is still based on sound scientific principles. Both modes, therefore, adhere to the norms and practices of scientific knowledge production.

The knowledge production and scholarly communication landscape is continuously changing and developing. In 2001, Nowotny, Scott and Gibbons argued that the lines between knowledge and society are blurring and that knowledge production will increasingly reflect a two-way symbiotic relationship that addresses the relevance of context (Nowotny, Scott & Gibbons, 2001). They clearly anticipated the evolution of a "contextualised science" with greater interaction and inter-dependence between science and society (Danermark, 2003: 168). This is why several scholars are now referring to Mode 3 knowledge production. They state that Mode 3 knowledge production spans across Modes 1 and 2 and allows for the co-development of multilevel knowledge and innovation modes where the emphasis shifts from individual scholarly contributions to knowledge outputs developed by clusters and networks (Carayannis, Barth & Campbell, 2012: 3; Carayannis, Campbell & Rehman, 2016: 18–19).

This has to a large extent been facilitated by developments in information communication technologies, and the expanding use of electronic platforms and the Internet. Knowledge production, diffusion and utilisation is increasingly being done in a digital context and digitisation has become a critical component of the process. Strohmaier (2014), for example, argues that the widespread use of new technologies and platforms by a variety of persons has the potential to "democratise certain aspects of scientific processes", i.e. more persons can now participate in the various activities of the knowledge production and scholarly communication processes. This has seen the emergence of new creators of knowledge, new publishers and new users of knowledge. Strohmaier (2014) further states that the digital world has made it possible for "everyone who can use these tools (such as the programming language Python) and publish the results from their

analysis (e.g. via blog posts) can now participate in knowledge production".

The space that was traditionally occupied by academia is therefore seeing new players. That is why Boehm (2015: 2) has said that in Mode 3, the practices and attributes of knowledge production is that of "partnerships between universities, industry, government and the civic sector (the not-for-profit and voluntary sectors)". Carayannis and Campbell (2012: 3), in turn, stated that Mode 3 knowledge production "architecture focuses on and leverages higher order learning processes and dynamics that allow for both top-down government, university, and industry policies and practices and bottom-up civil society and grassroots movements initiatives and priorities to interact and engage with each other toward a more intelligent, effective, and efficient synthesis". Indeed, society has seen a proliferation of not-for-profit and voluntary sector agencies with a primary focus on knowledge production. Such agencies as the Council for the Development of Social Science Research in Africa (CODESRIA) based in Dakar, Senegal, the Organisation for Social Science Research in Eastern and Southern Africa (OSSREA) based in Addis Ababa, Ethiopia, the Centre for Conflict Resolution (CCR) based in Cape Town, South Africa and the Institute for Security Studies (ISS) based in Pretoria, South Africa are but a few of the institutions which are not in academia but are in the business of knowledge production in Africa.

3.1.2 *Published Research Output Practices*

Every nation or institution aspires to be known, locally or internationally. Therefore, any activity or platform that enhances the visibility of a nation or, indeed, an institution has always been pursued by that nation or institution. It is argued that research capacity and research output – i.e. the ability to generate knowledge -- are important indicators of a nation's development and a nation's overall influence over world affairs. Pastor and Serrano (2016: 2) argue that it "is widely accepted that a country's capacity to generate wealth and achieve high levels of well-being is closely linked to its capacity to generate knowledge. Knowledge is the basis for innovation and an essential requirement for increasing production in modern societies". It therefore follows that the generation of new knowledge is a prerequisite for advancement, whether it be personal, institutional or societal. For example, it is argued that the ability to solve problems is directly related to knowledge use at all levels of society.

A further consideration is the importance of measuring knowledge output to establish how well an individual, institution or indeed society is doing in terms of knowledge generation. Georghiou (2015: 10) argues this point when he states that the "value of research is not only economic. There is a direct contribution to societal challenges (which itself requires better measurement through understanding impacts on human behaviour in general and on policy in particular)". A number of indicators have been used to measure this productivity and these, amongst others, include quantitative measures of output, as well as the impact thereof. As argued by Hadjinicola and Soteriou (2006: 1) "research productivity in academic institutions is reflected in the number and quality of articles published by the affiliated faculty". However, there is still a debate as to the right type of measurement to use.

Worldwide, research productivity of universities has been increasing and, indeed, it is the preoccupation of universities to increase their research output. It is therefore to be expected that this growth is also shared by countries in Africa. Bunting, Cloete and van Schalkwyk (2014: 20) have indicated a steady growth in knowledge research output in eight universities in Africa, namely the University of Botswana in Botswana, University of Cape Town in South Africa, University of Dar es Salaam in Tanzania, Eduardo Mondlane University in Mozambique, University of Ghana in Ghana, Makerere University in Uganda, University of Mauritius in Mauritius and the University of Nairobi in Kenya. Their findings further indicate that the "dominant performance of Cape Town, Nairobi and Makerere in terms of both research article output and PhD graduates indicates a positive correlation between doctoral graduates and knowledge production". It can thus be argued that a university needs to a strong and robust postgraduate programme with the requisitie number of students that can push the agenda of knowledge production.

In Ghana, a study that evaluated the research output of lecturers at the University of Education Winneba, Kwame Nkrumah University of Science and Technology, the University of Cape Coast, and the University of Ghana, concludes that publications from the four universities have been on the increase since 2003 and this shows the importance that these universities attach to knowledge production (Iddris, 2017: 210). In a similar vein, Schemm (2013:1) states that Africa's contribution to world research has more than doubled in the period from 1996 to 2012. She further indicates that during this period the "number of research papers published in scientific journals with at least

one African author more than quadrupled (from about 12,500 to over 52,000)". A study in Tanzania, in the period of 1995-2015, concluded that there was an increase of research productivity. They estimated that the increase in research productivity during the same period was "more than 12.5 fold increase in number of articles per year from 105 in the year 1991 to 1,327 articles in the year 2015, which is a 92% increase in publications" (Sangeda & Lwoga, 2017: 68).

Globally, developed countries have been the leaders in knowledge production, diffusion and utilisation. This is especially true for explicit knowledge, that is, knowledge published in books and journals, and more recently on the Internet. According to the Nature Index of 2018, the United States of America (USA) is the leading producer of scientific research output, followed by China and then Germany (Makri, 2018). This index audits scientific research published in high-quality journals on an annual basis. It is further interesting to note that, at a regional level, South Africa is the leader in Africa. The leading international institution in terms of research output is the Chinese Academy of Sciences, China, followed by Harvard University, USA, and the Max Planck Society, Germany. Interestingly, these countries are the three dominant economies in the world today, perhaps showing the linkage between knowledge production and economic advancement. The Nature Index, however, reports that despite the continued rise of China, "the United States remains the preeminent scientific nation with its institutions accounting for 46 of the global top 100" (Makri, 2018). More specifically, in the academic institutions category, the USA leads with the following institutions in ascending order, Harvard University, Stanford University, and the Massachusetts Institute of Technology (MIT).

A number of studies have indicated that, despite significant growth over the last few decades, developing countries generally still experience low research productivity when compared to their developed country counterparts (Geyskens, Steenkamp & Kumar, 1998; Farley & Lehmann, 2001) With specific reference to Sub-Saharan Africa (SSA), several researchers have indicated that although research output has steadily increased over the years, it still lags well behind that of developed countries. For example, UNESCO reports that Sub-Saharan Africa's world share of scientific publications had grown from 1.2% in 2008 to 1.4% in 2014 (United Nations Educational, Scientific and Cultural Organisation, 2015b: 36). Although this reflects a considerable percentage change in real terms, it still remains insignificant in comparison to the output of developed nations.

The World Bank (2014: 4) concludes that while both the quality and quantity of scientific research output has increased in Sub-Saharan Africa, this region still "accounts for less than 1 percent of the world's research output". This figure is based on their evaluation of trends in science, technology, engineering and mathematics (STEM) research in SSA from 2003 to 2012. It should, however, be noted that they excluded South Africa from their evaluation (World Bank, 2014: 11) and that this would account for the discrepancy between the numbers reported by the World Bank and UNESCO. Other key findings outlined in the World Bank's report are that, not only had the SSA research output more than doubled from 2003 to 2012, but the relative citation impact of research in this region had also improved. They further report that the STEM research output "lags that of other subject areas significantly"; that Sub-Saharan Africa "relies heavily on international collaboration and visiting faculty for their research output"; and that it is important to understand the characteristics of research collaboration in Africa in order to develop effective country-specific research policies (World Bank, 2014: 3–4).

3.1.2.1 Biomedical Research Publication

Worldwide the research output in the biomedical field has followed a similar growth pattern to research in general. Nwagwu (2016: 41), in looking at biomedical research in West Africa, has pointed out that over a period of ten years (2005-2014), there was a general pattern of growth in research output where "Nigeria, Ghana, Senegal, Burkina Faso and Mali had the highest number of publications". Similarly, Uthman and Uthman (2007: 1) found that South Africa, Egypt, and Nigeria made up to 60% of the total number of articles indexed by PubMed between 1996 and 2005. In the same study, they found that South Africa and the Gambia had the biggest research output per million inhabitants and that Eritrea and the Gambia performed well in relation to their Gross Domestic Product (GDP). However, they concluded that the contribution of Africa as a continent to worldwide literature was rather limited. A study done later by Uthman et al. (2015: 4) "revealed that health research productivity in Africa is highly skewed, with three countries (South Africa, Nigeria and Kenya) contributing more than half of all research papers indexed in PubMed between 2000 and 2014". The study also used Gross Domestic Product (GDP) as a necessary predictor of health research productivity. Taking this into account, South Africa and Nigeria still maintained their dominant place in health research output, whilst the Gambia had dropped in the

ranking and Kenya had increased its ranking. These studies however excluded the North African Countries of Morocco, Tunisia and Egypt and used PubMed, a database which might exclude articles written in Arabic. Zainal and Zainab (2011: 216) in their study on Biomedical and Health Sciences publication productivity in Malaysia have argued that the research output in that country had steadily increased during the years they covered in the study and that overwhelmingly, the authorship patterns showed one-time authors were the majority. Kebede et al. (2014) questionnaire-based survey of Research output of health research institutions and its use in 42 sub-Saharan African countries they concluded that even though Africa's contribution to the world health research is minimal when compared with other regions, it is still significant. In their study which targeted only health research institutions, with a focus on the WHO African Region except Algeria, Angola, Sierra Leone and South Africa, Kebede et al., were of the view that even though these "institutions had research as a high priority in their missions, the publication of that research in books or journals was not always important to them" (Kebede et al., 2014: 111).

Other studies have established similar findings, indicating that the research in SSA has over the years increased. This is especially evident in biomedical research publishing as reported in various studies: in the study, 'Increasing the value of health research in the WHO African Region beyond 2015—reflecting on the past, celebrating the present and building the future' (Uthman et al., 2015); SA's clinical research output in crisis (Bateman, 2011); 'Mapping the health research landscape in Sub-Saharan Africa: a study of trends in biomedical publications' (Hofman et al., 2009); 'Research productivity of junior academic staff at a tertiary medical college in south west, Nigeria' (Lesi et al., 2009); and the 'Geography of Africa biomedical publications: an analysis of 1996–2005 PubMed papers (Uthman & Uthman, 2007); These studies illustrate positive growth in Africa biomedical publications. However, Uthman and Uthman (2007: 5) is of the view that countries like South Africa and Nigeria had lower number of research publications in relation to their GDP and possibly in relation to their population size. They argue that when it comes to comparing research output from the various countries in sub Saharan Africa, it is important and critical that the statistics are adjusted to population size and GDP, otherwise the increases and volumes of research output would not reflect the real country comparisons.

3.1.3 Authorship Patterns and Attributes

The importance of authorship in academia and generally in knowledge production cannot be underestimated. Authorship is at the cornerstone of knowledge creation and production and therefore, the key to assessing competence and achievement. The Harvard Medical School Ombuds Office (1999) states that authorship "is an explicit way of assigning responsibility and giving credit for intellectual work". They further indicate that "authorship is important to the reputation, academic promotion, and grant support of the individuals involved as well as to the strength and reputation of their institution". The International Committee of Medical Journal Editors (ICMJE) provide a similar outline of the importance of authorship and indicate that not only does it acknowledge ownership of a work, but it also has additional "academic, social, and financial implications" which also include answerability for the published knowledge output. They further recommend that this authorship should be based on the following four criteria:

- "Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; and
- Drafting the work or revising it critically for important intellectual content; and
- Final approval of the version to be published; and
- Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved" (International Committee of Medical Journal Editors, 2018) .

The United States of America National Institutes of Health (2016: 9) endorses the above sentiments in their guidelines about conducting research. They further emphasise that authorship implies the responsibility "to communicate research results to the scientific community for external evaluation" and that it provides the means to judge "a scientist's contributions to developing new knowledge". Authorship further requires that each individual author must contribute to a significant component of the work and that they must accept personal accountability for the data published and the study in its entirety. Several authors conclude that individuals and persons who have assisted in one way or another on the study but did not meet the criteria of an author as articulated in the above guidelines should only be listed in the acknowledgements but not as authors – there should be no ghost authors or people masquerading as authors when they did not meet that criteria (Flanagin et al., 1998: 224; Newman & Jones, 2006; Wager, 2007a,b,

2009, 2010; Street et al., 2010: 1458; Smith, 2012: 6–8; Gasparyan, Ayvazyan & Kitas, 2013: 288; Smith, Hunt & Master, 2014: 6–8; Kornhaber, McLean & Baber, 2015: 4839; United States of America National Institutes of Health, 2016: 9; International Committee of Medical Journal Editors, 2018, para. 10) As argued by Smith, Hunt and Master (2014: 2) "authorship is very important to researchers in all disciplines because it directly impacts decisions regarding hiring, tenure and promotion, and awards and grants".

Strange (2008) states that from the 1600s up until the 1920s scientific authorship was mainly attributed to an individual – i.e. sole authorship was the norm. This was a reflection of how society was ordered, and that researchers or scientists were mostly working alone. It is, however, clear that the pattern of authorship in the biomedical field is changing, and that co-authorship has become the norm rather than the exception. The trend to co-author scientific publications, including those in the biomedical field, started gaining momentum during the 1960s. This trend in the shift of authorship patterns from a single author to multiple authorship has been reported on by a number of researchers, for example Clarke (1964); Chew (1988); Powers (1988); Weeks, Wallace and Kimberly (2004); Greene (2007); Shaban and Aw (2009); Osareh, Chakoli and Keshvari (2010); Barão et al. (2011); Vinther and Rosenberg (2012); Yousefi et al. (2012); Dang et al. (2015); Cordero et al. (2016;) Brunson, Wang and Laubenbacher (2017).

Brunson, Wang and Laubenbacher (2017: 2) surmise in their article on the development of co-authorship in biomedicine that many factors contribute to the phenomenon and that these vary according to the level of complexity and competition. They further state that co-authorship growth is also "multifactorial and increasingly associated with research competition". A study by Weeks, Wallace and Kimberly (2004: 1949) established that the "number of authors per article increased dramatically over time in each journal, from an average of 4.5 in 1980 to 6.9 in 2000 across journals. As a proportion of published manuscripts, group authorship (authors listed in the byline) increased from virtually zero to over 15%, while corporate authorship (authors not listed in the byline) remained rare and stagnant. Manuscripts published by single authors all but vanished".

The decline in single authorship or rather the rise in multiple authorship has, as mentioned above, been driven by various factors. Some authors are motivated by collaboration, i.e. the need to

collaborate with other researchers from within the institution or outside the institution. It is argued that the benefits that accrue from such collaboration is related to tapping into different expertise that might lie in different disciplines, departments, schools, institutions or countries. Other advantages might be related to sharing the resources such as equipment or finance so that one study in multiple study sites may benefit from the resources that may exist in different locations, i.e dsciplines departments, schools, institutions or countries. It has been contended that in biomedical research the "increase in multi-authorship is partly attributable to the fact that biomedical research has become more multi-disciplinary and international, and is often conducted as collaborative projects with many participants" (Nylenna, 2015). Another contributory factor, according to Nylenna, could be the advantage of being included in a list of prestigious authors. Others have argued that the more authors on a paper, the more impact that paper will have. Basically, what authors would like is to maximise their influence by increasing their visibility and this, they contend, can be achieved by having multiple authors contribute to a paper that originates from various disciplines, departments, institutions and countries.

3.1.4 *Collaboration Patterns in Science*

In Science, authorship patterns are closely linked to collaboration. Collaboration relates to two or more people working together to achieve a concrete output. These people may be in one organisation and working in different departments or they can be based in different institutions and, sometimes, located in different countries. Collaboration, however, can also take place between institutions.

A few characteristics of scientific collaboration are important to highlight. For instance the study by Kamalski (2009: 7) where her analysis of data on collaborative article output by country revealed that smaller countries proportionally conduct more international collaborative research than larger countries. The World Bank has, similarly, established that many countries in Eastern and Southern Africa rely heavily on international collaboration for their research output. They established that in 2012 this represented 79% and 70% of all research conducted in these regions. South Africa, as mentioned previously, was excluded from their analysis of trends in Sub-Saharan Africa (World Bank, 2014: 3–4). They further established that research collaboration is characterised by research capacity fragmentation across the regions; very little collaboration

between the countries; and that a large proportion of World Bank researchers are visiting researchers. The World Bank, while encouraging international collaboration, also further expresses concern regarding the high reliance on such collaboration in these regions as this to their mind indicates lack of internal research capacity. UNESCO again indicates that South Africa, albeit the first collaborator, is a key research partner for most countries within the Southern Africa Development Community SADC) (United Nations Educational Scientific and Cultural Organisation, 2015b: 545).

3.1.4.1 Scholarly Communication Channels of Academic staff

In communicating research output, scientists use publications as a primary means of communication between colleagues. However publications in "peer reviewed journals are proof of academic competence, are used as a crucial component in evaluation criteria for academic promotion and fundraising and increase the prestige of research centres and universities" (Borry, Schotsmans & Dierickx, 2006: 213). In their study that looked at the 'Research output of health research institutions and its use in 42 sub-Saharan African countries', Kebede et al., conclude that books and book chapters were leading as the favourite publication output for the scientists in these countries. They found that "books or chapters in books accounted for the highest information products published (on average 16.7 per respondent institution), followed by patents registered per country (8.2), discussion or working papers (6.5) and conference proceedings (6.4)" (Kebede, et al., 2014: 107); and on average at least 16.7% in each responding institution said they used books or book chapters as their research output. Many authors, however, argue that journals are by far the predominant format in which authors publish their research articles, for example: Tijssen (2015), Musiige and Maassen (2015) and Bunting et al. (2015).

3.1.5 ***Determinants of Knowledge Production, Diffusion and Utilisation in a University Environment***

Knowledge production, diffusion and utilisation in a university environment is determined by various factors; i.e. the factors that encourage or impede knowledge production in universities. This section will be discussed as follows; Determinants of a) knowledge production, b) knowledge diffusion and lastly, c) knowledge utilisation.

3.1.5.1 Determinants of Knowledge Production in a University Environment

Knowledge production in universities is facilitated by a lot of factors that can either be institutional or individual. These factors of knowledge production are bear a similarility all over the world. Stephens Balakrishnan (2013: 233) believes that the factors that affect research productivity in the MENA (Middle East and North Africa) region could be put into several sub groups. In her final analysis, she observes that "while individual strategies are more within the control of the researcher, policy changes at the government level, more involvement of industry and the institutions is required to overcome barriers to publishing". In Africa, factors affecting research output in universities have been observed. Masukume's (2012) study on Mpilo Central Hospital in Bulawayo Zimbabwe research output found that there was a decrease in research output during the years 1999-2004; which he argued was attributable to the economic problems that the country was experiencing. This finding has been echoed before in relation to Zimbabwe (Hofman et al., 2009: 41) where the authors observed that "between 1995 and 2004, the annual number of articles indexed in MEDLINE by first authors from the top-ten SSA producing countries grew 41% from 2,073 to 2,929". As observed from the time periods the two studies are referring to, this is the period when Zimbabwe was experiencing a general lack of an environment that is conducive to increasing research output.

Sulo et al. (2012: 483) in their study on Factors Affecting Research Productivity in Public Universities of Kenya, with a focus on Moi University in Eldoret, found that "researcher's qualification was the variable that influenced the most research output. This was followed by research environment, funding, and lastly, by time. The results therefore indicated that better qualifications, improvement in research environment, increased funding, and more time availed to staff for research will likely increase research output". Musiige and Maassen (2015: 113) says that several factors affect research productivity such as "individual factors, organisational factors, and funding and research culture". Individual factors relate to staff qualification where those who had higher qualifications such as PhDs were publishing more as opposed to those who had master's degree or lesser qualifications. This also suggests that the higher the qualification held the more likely the holder will be on a higher academic rank. Incentives that promote professional individual development of academic academic staff are critical to increasing research output. Schemm (2013) in turn, states that factors that have resulted in the positive, upward, trend in

African research output include improved "funding, policy changes within countries that have promoted research, enhanced research infrastructure at both the human and physical level, more ICT resources, improved and often free or lower cost access to peer reviewed literature, and better training to build research capacity". Amongst these factors, funding is a major barrier to research productivity in universities. In studies done across different institutions all over the world, it has been observed that lack of funding is a major impediment to increased research productivity: in Kenya (Kendagor et al., 2011; Migosi, Migiro & Ogula, 2011; Adoyo, 2015); in Nigeria (Nwagwu, 2007, 2016; Usang et al., 2007; Isola, Siyanbola & Ilori, 2011; Imhonopi & Urim, 2013; Okiki, 2013; Kpolovie & Onoshagbegbe, 2017). Further, African researchers could increase their research output if these challenges were tackled in a collaborative manner (Schemm, 2014).

In Asia, studies done in China indicate that factors that have a bearing on research productivity are many and include among others the following: funding, research capacity, motivation, institutional and social support. Zhang (2014: 46) citing Creswell (2002) has argued "that the factors that influence faculty research productivity can be divided into two parts: one part focuses on individual characteristics, such as innate attributes like ability, stamina, personality, gender, age and years of experience and self-efficacy; another part is related to environmental factors such as departmental size, research resources support, teaching load and culture". Bai (2010: 252), on the other hand says it is important to "improve the overall quality of Chinese TEFL [Teaching English as a Foreign Language] academics entails advancing both their teaching and research competence". The argument here is acknowledging the dominance of the English language that perhaps people who want to reach a larger audience must be prepared to invest in the English language as a form of communicating their research output. Among dental schools in Malaysia, it is alleged that research skills training was an important step in increasing staff participation in research and consequently increasing research output in dental research in Malaysia. Additionally, it was established that a mere positive attitude towards research does not lead to actual participation in research but more to a favourable view of research and development (Pau et al., 2017: 51-51). Still in Malaysia, Zainal and Zainab (2011: 222) argue that the promotion criteria is one of the reasons why researchers work hard in order to get their research work published, because without published papers, one cannot be promoted through the academic ranks. In medical universities in Pakistan, lack of time allotted for research, lack of research training, lack of statistical and data

processing support, lack of mentorship and lack of financial incentives were among the many barriers to research productivity amongst junior faculty (Sabzwari, Kauser & Khuwaja, 2009: 5).

In Thailand Lertputtarak (2008: 209) found there were several factors that could be attributed to increased research productivity in universities. These were identified as "personal career development factors that directly influence self-motivation (willingness to do research) and self-confidence (which derives from experience and skills) to perform research activities" (Lertputtarak, 2008: 209). In Vietnam, it was established that staff worked "under limited conditions of research resources, research funding, and research time", with a negative research climate in all the departments that were surveyed (Nguyen, 2015b: 197). Nguyen concluded that these reasons "contributed to low research productivity in general, and as a consequence, a low representation of research disseminated in international refereed journals" (Nguyen, 2015b: 197). Amongst factors influencing research productivity in Taiwanese universities are adequate research funding, organisational climate, hardware and facilities, human resources, and library and journal resources funding: these were thought to have a strong influence on research productivity (Yang, 2017: 19) . In Asia, it is evident that knowledge production at universities has been affected by factors that are similar to the factors that affect knowledge productivity at universities worldwide.

In the Middle East, several authors have observed a similar phenomenon, such as in Iran (Isfandyari-Moghaddam, Hasanzadeh & Ghayoori, 2012); Bahrain (Fawzi & Al-Hattami, 2017); and a study in six countries of Lebanon, Qatar, the United Arab Emirates (UAE), Morocco, Saudi Arabia and Jordan found similar findings (Abouchedid & Abdelnour, 2015). In the six countries of Lebanon, Qatar, the United Arab Emirates, Morocco and Saudi Arabia, the researchers recognised that research output had for the most part been increasing. Whereas the acknowledged traditional factors contributing to research output of funding and skills levels amongst academic staff were important, there are other critical factors that should be taken into consideration in relation to research output. They identified these factors as "overall satisfaction levels of academic staff, socialisation of faculty staff members into a research climate, and university mission vis-à-vis academic research" (Abouchedid & Abdelnour, 2015: 673).

In Bahrain, teaching workload and administrative duties were the major hindrances to research

productivity as it meant that the staff did not have adequate time to devote to research and actual writing of papers (Fawzi & Al-Hattami, 2017: 226). The Iranian research environment is similar to what is prevailing in other countries. However, amongst women, it was found that "most inhibitory factors affecting negatively publishing scholarly articles by Iranian women are 'Shortcomings in the existing laws', 'Stereotypes and beliefs concerning women', 'Family work', 'Social and cultural contingencies', 'Child care', and 'Low collaboration with male colleagues" (Isfandyari-Moghaddam, Hasanzadeh & Ghayoori, 2012: 167). It can be argued therefore that, in Iran, the culture of patriarchy had a greater influence on their research productivity. Alghanim and Alhamali (2011:1301) found that major barriers in research productivity among faculty members at medical and health schools in Saudi Arabia were many, such as lack of time and finance, as well as a general lack of institutional support by not providing an environment that is conducive to research productivity.

Other important determinants of knowledge production are rooted in the "process of producing knowledge within the ideological, political, and economic realities of modern universities" (Muntaner et al., 2012: 916). These also relate to how universities are structured and how knowledge is produced in those structures. Knowledge should be produced by academic departments; by those in academic ranks and that knowledge should be produced in a certain way and published in certain publications, otherwise that knowledge is not recognised (Clark, 1998; Cloete et al., 2011). There is an element of rigidity.

Nwagwu (2007) has looked at the significance of authorship in biomedical literature as it relates to Nigeria, which is very relevant to this study. In that study, he established that the "lag in scientific progress in Nigeria can be linked to an unfavourable social, economic, and political environment" (Nwagwu, 2007: 25). He evidently illustrates that the rise in publication volumes coincided with periods when the Nigeria state was under democratic governments. This illustrates the elements of stability and certainty that any person who need to use their intellectual abilities to produce anything need. Although there are differences in barriers to knowledge production and practices amongst developing and developed nations, there is evidence that there are common problems regarding research productivity in universities regardless of where the university is situated.

3.1.5.2 Determinant of Knowledge Diffusion in a University Environment

Knowledge diffusion is a process that is critical to the knowledge production cycle. Knowledge diffusion ensures that knowledge reaches the intended target audience: it is the dissemination and sharing of knowledge. Sometime this process is referred as scientific dissemination of information. Chen and Hicks (2004: 199) define knowledge diffusion "as the adaptations and applications of knowledge documented in scientific publications and patents". It is the "movement of useful ideas between organisations" (Appleyard & Kalsow, 1999: 288) and individuals in society. This knowledge diffusion happens when information, carried in various forms of medium such as scientific publications, moves to the intended targets (Appleyard & Kalsow, 1999: 288; Chen & Hicks, 2004: 199). In this movement, this flow of knowledge within organisations or society may be aided by a number of factors that may either hinder or facilitate that flow of knowledge from one place to the other. In this study knowledge diffusion is that which occurs using tangible objects: through books, journals and the electronic media. It is also important to take cognisance of the fact that knowledge diffusion may happen differently in various sectors of society as well as different subject areas.

In Asia, meanwhile, knowledge diffusion seems to have taken place at a much faster pace and over a dispersed area, based on several factors such as growth in technology, education and possibly the high penetration of mobile phone industry. For instance, the existence of knowledge clusters, where knowledge production and dissemination occurs, were considered essential to the diffusion of knowledge in Singapore. These knowledge clusters require well designed government policies, infrastructure and programmes (Menkhoff & Evers, 2011: 1-2,18-19) in order for them to be effective in diffusing knowledge. In this respect, Chen, Shyu and Huang (2017) refer to Koh (2006), who have argued that "Singapore has effectively managed knowledge diffusion via its export-led growth, continuous skills upgrading and human capital development, broadening of its industrial clustering, value added production and services and R&D". In Taiwan, on the other hand, they have claimed that "academic knowledge production requires long-term planning and complex multi-level, multidisciplinary mechanisms. Taking that context into account, policy instruments should foster the mechanisms of academic knowledge production, diffusion, and commercialisation" (Chen, Shyu & Huang, 2017: 5715). These policies should respond to the factors that have a bearing on the smooth diffusion of knowledge within society. The identified

factors of knowledge diffusion from academia to industry in Taiwan were instruction, training, internship, R & D, publications, networking, consultation, patents, technology transfer, strategic alliances and university startup companies (Chen, Shyu & Huang, 2017: 5705). In the study, their concern was knowledge diffusion from academia, such as universities, to industry and they concluded that it is important for knowledge diffusion to take place if the government put in place policies that facilitate diffusion and where the government plays an administrative and monitoring role. In Indonesia, the approach to knowledge diffusion was through field farmer training schools where advanced technical knowledge from universities is passed on to the farmer during training. In this model, the key focus was to diffuse knowledge that is practical and very close to farming needs such as crop and pest management (Feder, Murgai & Quizon, 2004: 222). It is through such forums that farmers share knowledge amongst themselves. Nowadays this is being enhanced through the use of social media such as WhatsApp.

In Africa, meanwhile, knowledge diffusion has been dominated by various methods in specific disciplines. In the Agriculture sector for instance, it has been argued that knowledge diffusion outside academia is primarily through extension services. In their study on "Diffusion of Scientific Knowledge in Agriculture: The Case for Africa", Assefa, Alemneh and Rorisaa (2014) have argued for strengthening of traditional extension services with translational research in order to communicate agricultural scientific information to rural farmers in Africa (Assefa, Alemneh & Rorissa, 2014: 43). In Uganda with regard to financial information, Sseruyange and Bulte (2018: 627–628) found that although knowledge diffusion may occur on its own without providing any incentives, the intended targeting of populations with economic benefits may speed up the process of diffusion as well as increase the population that will receive that knowledge. A study on mobile phone penetration in Africa found that the mobile phone was a strong contributor to knowledge diffusion in the countries of sub Saharan Africa in the years 2000-2012 (Asongu & Nwachukwu, 2017: 289). In Mali, a study established that the diffusion of knowledge on health took place mainly through social networks (Dillon et al., 2014: 7). The importance of networks in a society has been highlighted as a contributor to knowledge diffusion, be it in an institution or community. Fisher et al. highlighted this role in their study on knowledge diffusion within a conservation organisation in the United States and they asserted that "social networks play an important role in promoting or hindering an individual from engaging in knowledge diffusion" (Fisher et al., 2018:

3). However, in Mali, Beaman and Dillon suggest caution in relying on the use of networks for knowledge diffusion as they argue that "information diffusion declines with social distance, suggesting frictions in the diffusion of information" (Beaman & Dillon, 2018: 147); the implication is that the farther a person is from the centre of a network the more distorted the information might become.

3.1.5.3 Determinants of Knowledge Utilisation in a University Environment

In the knowledge production cycle, knowledge utilisation is another stage that is necessary in order to complete the cycle. This is a stage at which knowledge is up taken by individuals, organisations and society at large. Knowledge utilisation could be described differently, according to subject discipline: "extension' is used in agricultural sciences, 'utilisation' in social sciences and 'technology transfer' for engineering and applied sciences" (Grobbelaar, 2015) whilst in the health and medicine fields it is referred to as 'knowledge translation'. It has been said that knowledge utilisation may sometimes be dependent on the type of knowledge that the people require to meet their information needs; this may either be the knowledge content or may be a package in which the knowledge is contained. This characterisation is important because when it comes to knowledge utilisation, the level and packaging of the content is very strategic in affecting understanding and uptake of the knowledge by different members of society. Incidentally, Chagnon et al. (2010: 3) says that "knowledge utilisation needs and types may vary depending on the targeted users", always requiring the appropriate message and messenger. So, the need for a particular type of content may drive the uptake of that particular knowledge in society. The same argument can be made of the format in which the knowledge is packaged; in today's context the utilisation of knowledge in increasingly being influenced by access to the Internet, Mass Media, and Personal Digital Assistants (PDAs).

A systematic review of the use of research information in nursing found the following characteristics as the main determinants of research use: "positive attitude towards research, attending conferences and/or in-services, having a graduate degree (compared to a bachelor's degree or diploma), current role (*i.e*., leadership and/or advanced practice compared to staff nurse), clinical specialty (working in critical care areas compared to general hospital units), and job satisfaction" (Squires et al., 2011: 14). These are determinants of research utilisation that can be termed as affecting the nurses on an individual level even though they might arise out of the work

context. In their study of nurse use of research knowledge in patient care Estabrooks et al. established that "contextual factors at the patient care unit level, in addition to individual nurse characteristics, were important to promoting research utilisation by nurses" (Estabrooks et al., 2008: 14). In Zambia, in a study of utilisation of research knowledge by nurses in clinical practice, it was established that over 50% of the nurses use research information in their clinical practice (Monde, Akakandelwa & Kanyengo, 2017: 11), a result of different barriers afftecting the hurses access to research information. In another study on the challenges of accessing and seeking research information amongst nurses in Zambia, they established that among the top challenges which in this case are essential factors of knowledge utilisation were "lack of access to information resources, poor Information and Communication Technology (ICT) infrastructure, lack of support from hospital administration, lack of time to read, lack of awareness of available information resources and; a poor information sharing culture (Monde, Kanyengo & Akakandelwa, 2017: 7). These studies indicate that knowledge utilisation is affected by a myriad of factors that may exist either at individual, institutional or society level. It is follows therefore, that in order for knowledge to be fully utilised in any particular situation, these factors have to be resolved. Knowledge utilisation is critical to the knowledge production process as it the evidence that the knowledge was not only produced for the sake of production only, but that it actually found a purpose; by being applied in a practical context and therefore changing certain outcomes. In this regard, it has been argued that research utilisation is the evidence of how research knowledge has made an impact in society as well as how it has directly influenced practice (Heinsch, Gray & Sharland, 2016: 105).

3.1.6 *Policies Relating to Knowledge Production*

Policies are important frameworks in any community, that play a significant role in guiding the general direction in which any institution or society is going. A policy is "a statement of intent to achieve certain goal(s) by a local, regional or national governments of a country. A policy could be documented in a legislation or other official documents" (United Nations Framework Convention on Climate Change, n.d: 1) . Others have argued that a policy defines the problem to be addressed, having "a statement of goals (the desired state of affairs), and at least the broad outline of the instruments (approaches and activities) by which the goals are to be achieved" (Mutongi & Marume, 2016: 92). It has further been defined as a bold statement of intent to achieve

certain goals and objectives which everyone in the institution should abide by in order to reach the intended vision of that particular institution. It should thus outline "principles and programmes designed to address perceived problems" (World Health Organisation, Western Pacific Region, 2005: 17).

Policies for knowledge production in universities are those formal statements that set out a specific set of actions that will lead to increased knowledge production or research output within the institutions. The rationale for formulating knowledge production policies are multifaceted; and not only focused on "merely increasing the total amounts of these goods in societies; it also concerns their distribution" to advance skills in society that can lead to innovation and contribution of more knowledge production. (Rizk & Shaver, 2010: xx)

Knowledge production policies in universities are usually derived from higher education legislation that apply to universities in a particular country. In the case of the University of Zambia, the higher education legislations are then translated into institutional knowledge production policies. In this respect, the Higher Education Act No 4, of 2013 stipulates that HEIs in the country should "contribute to the advancement of all forms of knowledge and scholarship in keeping with international standards of academic quality" (Zambia. Ministry of Higher Education, 2013: 106). These generic requirements are embedded either in research policies or any other such policy as the particular institution may deem appropriate to its needs. In their study of social policy, Vargas-Henandez, Noruzi and Haj (2011: 289) cite Rahimi and Noruzi arguing that at the institutional level, policies are imbued with the "law and regulations that govern the University; national standards and community expectations, and the values and mission the University articulates in its strategic plan". On this subject, Cloete and Bunting (2013b: 18), in referring to a specific institution in South Africa, reported that although the University of Cape Town "does have centrally driven knowledge-production policies, entities within the university are strongly encouraged to exercise autonomy in formulating policies that fit their own needs". Nonetheless, what has been encouraged is that these individual unit-/department-specific knowledge production policies should be in line with the overall University of Cape Town knowledge production policies. The authors further note that the University of Cape Town can operate this way because the institution "places heavy emphasis on research projects driven by individual and groups of academics but which, at the same time, makes provision for national and/or institutional research projects. It is able to do this because

its academic capacity, overall management capacity and research management capacity are all high" (Cloete & Bunting, 2013a: 18). It is further stated by Cloete and Bunting that all universities in South Africa do not necessarily follow the same devolved policy structure as many institutions do not necessarily have a sufficiently strong research management capacity (2013a: 25).

In general, knowledge production, diffusion and utilisation policies should be responsive, relevant and reflect the context of knowledge production, as well as being relevant to society. Pang, Sadana, Hanney, Bhutta et al. (2003: 818) has argued that in most countries, the research process and policies related to it are not integrated, thus there is little chance of interaction. They further state that "researchers and decision-makers tend to interact only around the products of their processes" — for example, the results of a study for the researcher and a set of priorities for the decision-maker. Clearly, more attention needs to be given to establishing and maintaining ongoing links between the two worlds (Pang et al., 2003: 818).

3.1.7 *Knowledge Production at the University of Zambia*

While several studies have been conducted that investigate the research output of universities and individuals in Zambia, not many are associated with the University of Zambia. A study by Akakandelwa, that used informetric techniques to examine research at the University of Zambia with specific reference to the provision of library and information resources, concluded that from 1990 to 2001, there were no significant increases in research output arising from journal articles (Akakandelwa, 2007: 232). A later study, conducted in 2016, established that the yearly research output at the University of Zambia has been increasing (Akakandelwa, Makondo, et al., 2016b: 139–141) This lack of qualitative and quantitative evidence that the institution does not produce or maintain annual knowledge production reports means that researchers have to look elsewhere to estimate yearly as well as overall cumulative data with regard to knowledge production at the University of Zambia.

Another study that explored faculty productivity at the University of Zambia found that there were fluctuating increases in research productivity amongst the academic staff (Kulyambanino, 2016: 46–51). This study, however, did not quantitatively measure research output but rather focused on perceptions derived from various reports regarding the productivity of teaching staff at the

University of Zambia and how this reflected the research output of the institution. The study reports fluctuations in research ouput, which are also based on perceptions of the staff (Kulyambanino, 2016: 51).

3.2 Chapter Three Summary

This chapter has examined knowledge production practices and attributes. It more specifically reviewed the literature relating to the characteristics that describe the knowledge production, diffusion and utilisation process in a university environment. The overall conclusions from a review of the literature indicate that there is a general increase in research output and knowledge production in developing countries including Sub-Saharan Africa. The literature has also shown that increasingly, researchers are working in collaborative teams and therefore there is an increase in the number of co-authored papers.

However the literature has also shown gaps in that, a detailed study has not been done on knowledge production in the heatlh sector. Since, as no comprehensive studies had been conducted in Zambia on knowledge production in the health sector, it is impossible to make inferences that knowledge production patterns are following the same trend as had been happening in the developing world, specifically sub-Saharan Africa. Further, since the literature reviewed refer to studies carried out elsewhere, this study, is therefore contextualising the Zambian situation and specifically the School of Medince, University of Zambia.

The next chapter is the methodology chapter; discussing why the specific methodology has been adopted and it's appropriateness in answering the research problem set out in chapter one.

CHAPTER FOUR

Research Methodology

4 Introduction

This chapter introduces the methodology and methods used to conduct the study, the justification thereof, the research instruments adopted, and an outline of the sampling technique adopted. The chapter further discusses the data collection techniques and processes, as well as the type of analysis used in the study, ethical issues, limitations and delimitations of the study. The chapter concludes with a summary.

4.1 Methodological Objective

The research methodology adopted for this study was preferred to find answers to the following five research questions and their sub-questions that were derived from the study objectives outlined in *section 1.3.1*. and *section 1.3.2*.

4.2 Research

Kothari (2004: 1) defines research as "a scientific and systematic search for pertinent information on a specific topic. In fact, research is an art of scientific investigation". Others such as Degu and Yigzaw (2006: 2) define research as a "scientific inquiry aimed at learning new facts, testing ideas, etc. It is the systematic collection, analysis and interpretation of data to generate new knowledge and answer a certain question or solve a problem". Research, according to these authors is a systematic questioning that would lead to answers to an identified problem; an argument that has also been advanced by Blaxter, Hughes and Tight (2010: 63) . In a similar disposition, Bello (n.d.: 3) contends that "research, in general, has to do with an enquiry into the unknown. Research as the term literally implies, is to search again or re-examine a given phenomenon thoroughly". This suggests that the research or an inquiry has been carried out on a problem, but also that this might be complementary to previous research or an inquiry conducted on a similar problem. Mertens (2010: 2) further expands on these definitions of research by stating that it is a more systematic was of inquiry.

Research, therefore, is always about investigating a problem and trying to find a solution to that problem. Research enables society or researchers to find the right solution to a problem that is based on sound evidence derived from that research or investigation. It must be carefully planned and conducted in a reliable and verifiable manner so that the outcomes can universally be accepted. Pandey and Pandey (2015: 7) aptly summarise research as "a systematic investigation or activity to gain new knowledge of the already existing facts". Research hence strives to look at all aspects of a situation or problem to arrive at an informed conclusion, mostly considering the context in which that problem is situated. It is about generating new knowledge that adds value to society.
Library and information science (LIS) research is generally considered to be problem based, designed to resolve practical issues and provide the theoretical underpinnings that enhance service delivery in library and information services. As far back as 1976, Shaughnessy stated that LIS research should make an important contribution to "establish or develop a body of theory on which to base our practice" (Shaughnessy, 1976: 51). Walke (2013: 40), in turn, refers to the views of Ranganathan, the renowned Indian librarian and erstwhile mathematician, who looked at research as an extensive investigation during which data is collected, evaluated and interpreted within the framework of known concepts and schemas to arrive at the development of new theories and laws that can be applied to practical solutions. Walke (2013: 40) further states that the purpose of research is to "verify knowledge, which further aids in construction of a theory … [and] ultimately helps to extend the existing frontiers of knowledge".

Research, for that reason, should be conducted to seek new knowledge to enable society to better understand certain phenomena, to expand its horizons, and to base its actions on the newly acquired knowledge. This quest for knowledge should not be done in a haphazard manner but should be structured in such a way that the same path is followed when investigating a similar issue so that the same or comparable conclusions can be arrived at. However, for one to conduct any activity, let alone a scientific or academic investigation, there should be a purpose. It is important hence, that before one embarks on any research, one should have a very clear idea of the purpose and objective of why the research should be conducted.

4.3 Research Methodology

Research methodology is an "explanation of the approach, methods and procedures with some

justification for their selection" (Austin & Sutton, 2014: 436). Nachmias and Nachmias (1981: 15) have stated that "methodology is a system of explicit rules and procedures upon which research is based and against which claims for knowledge are evaluated". Methodology is essentially an explanation of why a certain research approach and methods are adopted. A number of authors have therefore indicated that research methodology is the overarching work plan that is adopted to conduct the research (Ishak & Alias, 2005: 326; Rajasekar, Philominathan & Chinnathambi, 2013: 5). Rajasekar, Philominathan and Chinnathambi (2013: 1) further differentiate between research methodology and the various methods used by a researcher during a research study. Research methodology provides the overall framework and strategy the researcher will follow to achieve the objectives set out at the beginning of the research process. Research methods, in turn, are the procedures used to find a solution to the stated problem.

Several authors have outlined the components of research methodology as: the rationale for undertaking the research, the background to the research problem formulation, the data categories that have been collected and how this was done, as well as the motivation for using a specific data analysis technique. Further, research methods include, among others, the study design, the population to be sampled and sampling procedures, treatment and procedures of how data will be collected and handled, measurement and data analysis, as well as how data will be interpreted once the results have been analysed (Blaxter, Hughes & Tight, 2001, 2010; Rajasekar, Philominathan & Chinnathambi, 2013; Pandey & Pandey, 2015). It is, then, important to understand that both the procedure and strategy are meant to assist researchers to answer and respond to the research questions they originally set, and to make linkages to the evidence from the research findings in such a way that an observer can follow the process clearly.

4.3.1 *Research Methodology Adopted for this Study*

An important initial decision, therefore, in this study, was to decide on an appropriate research design. A research design is generally seen as the overall research structure and strategy that outlines how the various components of the research project integrate to resolve the research questions (De Vaus, 2001: 1; Kombo & Tromp, 2006: 70). The study adopted a mixed methods research (MMR) approach within a case study framework. Both quantitative and qualitative research methodologies were applied in a convergent concurrent triangulation design. These

research approaches are further elaborated upon below and depicted in the schematic outline developed by the researcher (see Fig 4.1).

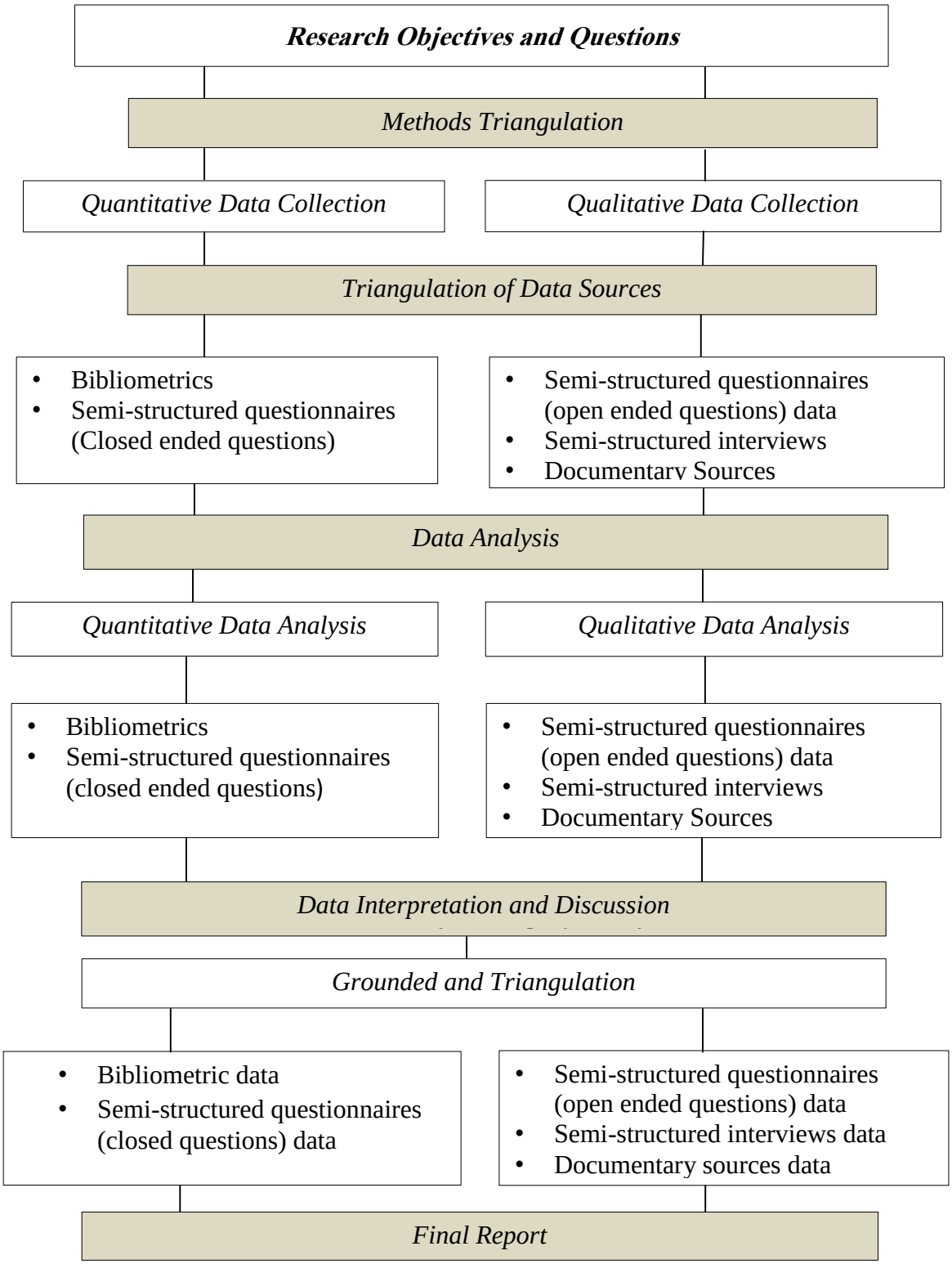


Figure 4.1. Schematic of the Study Design

As stated above, a mixed method approach was adopted for this study. Morse and Niehaus (2009) define mixed methods as "the incorporation of one or more methodological strategies or techniques drawn from a second method, into a single research study, in order to access some part of the phenomena of interest that cannot be accessed by the use of the first method alone" (Morse & Niehaus, 2009: 9).

Wisdom and Creswell (2013: 1) identify five distinguishing characteristics that depict a well-designed mixed methods research project. Of these, the following four are particularly appropriate to this study:

1. Collecting and analysing both quantitative (closed-ended) and qualitative (open-ended) data.
2. Using rigorous procedures in collecting and analysing data appropriate to each method's tradition, such as ensuring the appropriate sample size for quantitative and qualitative analysis.
3. Integrating the data during data collection, analysis, or discussion.
4. Using procedures that implement qualitative and quantitative components either concurrently or sequentially, with the same sample or with different samples.

The researcher is in agreement with Schoonenboom and Johnson (2017:113) who argue that sometimes in a mixed method approach, it is appropriate to give more prominence to one approach, whilst using the other as supplementary to the main method. In this study the quantitative aspects were therefore mainly supportive of the qualitative aspects of the research (Hashemi & Babaii, 2013: 840). The rationale for adopting this approach was mainly to achieve two goals:

- Triangulation – to "converge, corroborate or validate results from different methods" (Grand Canyon University, Center for Innovation in Research and Teaching, n.d.).
- Complementarity – to "elaborate, enhance, further illustrate or clarify the results of a method" (Grand Canyon University, Center for Innovation in Research and Teaching, n.d.).
- The "fit of integration describes the extent the qualitative and quantitative findings cohere" (Fetters, Curry and Creswell, 2013: 2134).

- Ground the themes emerging from the data collected into the context of the study as well as the literature reviewed.

As mentioned above, the study adopted a convergent concurrent triangulation design. According to Creswell (2009: 228) it provides an effective method to fully and systematically study the research problem. He further expands on the advantages of this approach as follows:

> this method is used to confirm, cross-validate or corroborate findings. It is often used to overcome a weakness in one method with the strengths of another. It can also be useful in expanding quantitative data through collection of open-ended qualitative data.

As mentioned, quantitative and qualitative data were collected concurrently and reported on separately. The findings were thereupon collocated and triangulated at the interpretation and discussion stage of the report. The major objective of this type of design is to converge and triangulate the different parts of the research into one.

4.3.1.1 Quantitative Research Approach

Quantitative research approaches are those approaches that are characterised by the collection of information which can be analysed numerically, the results of which are typically presented using statistics, tables and graphs (Muijs, 2010: 1; Assessment Capacities Project (ACAPS), Emergency Capacity Building Project (ECB) and Practical Action Publishing, 2014: 4). Blaxter, Hughes and Tight (2010: 65) have, in turn, argued that quantitative research "tends to involve relatively large-scale and representative sets of data, and is often, falsely in our view, presented or perceived as being about the gathering of 'facts'". Muijs (2010: 2) further states that the real purpose of quantitative research is "essentially about collecting numerical data to explain a particular phenomenon". Quantitative research should therefore help a researcher to interpret the results of a study by using statistical methods.

4.3.1.2 Qualitative Research Approach

Dawson (2002: 14) postulates that qualitative research "seeks to understand a given research problem or topic from the perspectives of the local population it involves. Miles and Huberman (1994: 1) further elaborate by stating that a qualitative research approach is "a source of well-

grounded, rich descriptions and explanations of processes in identifiable local contexts. With qualitative data, one can preserve chronological flow, see precisely which events lead to which consequences, and derive fruitful explanations". Blaxter, Hughes and Tight (1996: 64, 2010: 65) in turn, argue that qualitative research focuses on exploring fewer cases in depth rather than large numbers in breadth. These cases are specifically selected for being interesting and informative. Qualitative methods are therefore particularly relevant to investigate complex subjects and to provide an in-depth understanding of the social context of the phenomena being investigated (Austin & Sutton, 2014: 436; Sutton & Austin, 2015: 226). Gorman and Clayton (2005: 3) advocate for the use of qualitative research methodology in library and information science by stating that it is "a process of enquiry that draws data from the context in which events occur, in an attempt to describe these occurrences, as a means of determining the process in which events are embedded and the perspectives of those participating in the events, using induction to derive possible explanations based on observed phenomena". The importance of the context to qualitative research has aptly been summarised by Mack et al. (2005: 1) as having the ability to bring out the human side of the subject o investigation.

4.3.1.3 Case Study Design

Yin (2003: 13) succinctly describes the case study as an approach that "investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident". Rose, Spinks and Canhoto (2015: 1) further elaborate by stating that "the word 'case' means 'an instance of' and the central feature of case study design is the investigation of the one or more specific 'instances of' something that comprise the cases in the study. A case can be something relatively concrete such as an organisation, a group or an individual, or something more abstract such as an event, a management decision or a change programme". Crowe et al. (2011: 1) add that an important tenet of case studies is their "naturalistic" design, i.e. phenomena are investigated in their natural context.

Various authors have therefore identified the following distinctive features of this approach, viz.

- it provides an in-depth investigation of a relatively small number of cases,
- complex issues can be investigated,
- it is an ideal method to use for a longitudinal study,

- data can be collected and analysed about a large number of factors for each case,
- the real-life context of the case is of prime concern,
- cases are not manipulated but are studied in their naturally occurring setting, and
- multiple data sources such as interviews, observation, archival documents and even physical artefacts can be used to triangulate the findings (Punch, 2005: 144; Kombo & Tromp, 2006: 72; Crowe et al., 2011: 1; Rose, Spinks & Canhoto, 2015: 1).

Several factors have further been highlighted in the literature that would predicate the use of a case study design. These include a research project:

- that investigates new fields and issues where the underlying theory and measurement have not been defined (Kohn, 1997: 3),
- that wishes to investigate and explain complex phenomena (Kohn, 1997: 3),
- where there is a need to answer 'how' and 'why' questions within a specific context (Baxter & Jack, 2008: 556; Yin, 2009: 9),
- where it is not necessary to manipulate the behaviour of the individuals under investigation (Yin, 2009: 9),
- where contextual conditions are particularly relevant to the study (Baxter & Jack, 2008: 556; Yin, 2009: 9), and;
- where there is no clear distinction between the phenomena being studied and their context (Yin, 2009: 9).

Although the case study design is generally associated with qualitative methodologies and data collection techniques (De Vaus, 2001: 1), it has likewise been argued that it could effectively be used to also collect quantitative data (Rose, Spinks & Canhoto, 2015: 2). In his overview of research methods in librarianship and informatics, Eldredge (2004: 84) states that "the case study represents one of the most popular research methods, not only in our own field but also in the social, policy, and management sciences". He further says that in librarianship the "the case study describes and analyses the author's experiences with a process, group, innovation, technology, project, population, programme, or organisation (Eldredge, 2004: 84).

There is indeed evidence that the case study design has been adopted and used for the study of

library and information science research and particularly to studies of knowledge and research productivity by library professionals. Significant to note are the following studies

- Rotich and Onyancha (2017) conducted an informetric study to investigate the trends and patterns of medical and health research at Moi University, Kenya, between 2002 and 2014,
- Ani, Ngulube and Onyancha, (2014, 2015) studied the productivity of academic staff in selected Nigerian Universities,
- A case study method was adopted to conduct a citation analysis of social science research in selected Nigerian Universities (Iroaganachi, Itsekor & Osinulu, 2014),
- Kasa, Ibrahim and Momoh (2014) conducted a bibliometric analysis of publication output patterns of faculty members of an agriculture and veterinary science complex at a Nigerian University,
- Onyancha used informetric techniques to evaluate research performance in the study of HIV/AIDS research in sub-Saharan Africa (Onyancha, 2014),
- A case study approach was used to study the publication productivity and scholarly impact of academic librarians in Tanzania (Sife & Lwoga, 2014)**,**
- Tella and Olabooye (2014) conducted a bibliometric analysis of the 'African journal of library, archives and information science' from 2000-2012,
- Abiolu (2013) conducted a bibliometric study of the 'Studies in family planning journal' 2003 to 2005,
- D Ocholla, Ocholla, L and Onyancha (2013) investigated the research publication output of academic librarians in Southern African public universities from 2002-2011,
- D Ocholla, and Ocholla, L (2007) analysed the journal research output in Library and Information Science in South Africa from 1993-2006, and;
- Edewor (2013) analysed a Nigerian library and information science journal.

There are researchers, not necessarily from the library and information science profession, who have looked at knowledge and research productivity with a focus on the African continent and, again, using a case study design methodology. Notable among these studies are those of

- Cloete and Bunting (2013a) of the Centre for Higher Education Trust (CHET who used a case study approach in their studies titled **'**Strengthening knowledge production in

universities: five South African case studies' and 'Challenges and opportunities for African universities to strengthen knowledge production';

- Cloete, Maassen and Bailey (2015) who researched 'Knowledge production and contradictory functions in African higher education'; and
- Hofman, et al. (2009) who analysed the health research landscape in Sub-Saharan Africa by studying trends in biomedical publications.

In Zambia, more specifically, several studies have been conducted where the case study methodology was used to investigate research productivity. Such studies include

- A study on faculty productivity at the University of Zambia (Kulyambanino, 2016),
- A study that mapped postgraduate research at the University of Zambia by reviewing dissertations for the Master of Medicine programme at the School of Medicine (Ahmed, Kanyengo & Akakandelwa, 2010),
- Akakandelwa's (2009) study on author collaboration and productivity at the University of Zambia, 2002-2007, and;
- An Informetric Analysis of Research at the University of Zambia linking it to the provision of Information Resources (Akakandelwa, 2007).

All these studies clearly demonstrate that the case study methodology has been successfully applied to the study of knowledge and research productivity by both librarians and professionals from other fields. This clearly illustrates the strength of using such a methodology. It allows researchers to focus on a single case in depth and enables them to reveal issues and complexities that would not be possible with other research methodologies. These studies have been further elaborated on in Chapter Three of the literature review.

Taking all these aspects into consideration, the researcher therefore decided that an interpretive, triangulated case study design would be the most suitable approach to illuminate in detail the factors at play in knowledge production practices at the University of Zambia, School of Medicine. More specifically,

- Case studies provide enhanced context and therefore provide an in depth understanding of the phenomena being investigated, i.e. knowledge production, diffusion and utilisation at the University of Zambia, School of Medicine.
- Case studies facilitate the investigation of the viewpoints of individuals, in this case the academic staff at the University of Zambia, School of Medicine.
- The site of investigation provided a unique case to study – the School of Medicine is located within the University Teaching Hospital grounds and provides for a rich experience in terms of teaching, learning, research and practice. Therefore, the environment gives an opportunity for the academic staff to not only produce the necessary and relevant knowledge, but also apply that knowledge within their practice.
- Ease of access to the site of investigation for the researcher; both in terms of accessing official documents of the university, as well as access to individual respondents.
- The researcher's interest in the study was not to generalise the findings but to explore and understand the case in as much detail as possible and offer explanations of how and why certain knowledge production practices and processes exist within the organisation.

4.3.2 ***Research Methods Adopted***

The study, from the onset adopted a blend of research methods (mixed) and data collecting techniques within a single case unit, the School of Medicine at the University of Zambia. These methods included bibliometrics, semi-structured questionnaires, semi-structured interviews, a literature review and document reviews. These research methods are further elaborated below:

4.3.2.1 Bibliometrics

In this study, bibliometrics was used to quantitatively measure the research output of the University of Zambia School of Medicine in terms of trends, growth, prevalence, and subject coverage. *Cf 1.5.3.* It should, however, be noted that there are limitations to bibliometrics in measuring research productivity in various fields. It has been argued that these limitations pertain to: limited coverage, exclusion of certain types of documents, classification of journals by discipline, changes in journal titles, names spelled the same way, number of authors (and distribution of work); and excessive, selective, secondary, negative and erroneous citations as well as self-citation and personal strategies (Archambault & Gagné, 2014: 9).

The limitations of bibliometrics in measuring research output may therefore limit its effectiveness to evaluate knowledge productivity at both the individual and institutional level. Due to the limitations outlined above, it was therefore important that this study combined other research methods such as semi-structured questionnaires, semi-structured interviews and documentary sources to get obtain a complete and deeper understanding of knowledge production at the University of Zambia School of Medicine.

4.3.2.2 Semi-Structured Questionnaires

A questionnaire is a "self-report data collection instrument that each research participant fills out as part of a research study" (Johnson & Christensen, 2014: 191). In a questionnaire survey respondents answer or comment on the various questions or statements outlined in the questionnaire to the best of their ability and in their own time (Cohen, Manion & Morrison, 2000: 248). Such a data collecting technique is on the whole useful in "providing data on prevalence, trends, incidence and patterns in relation to attitudes, beliefs, experiences and behaviour" (Paraboo, 2008: 306). A questionnaire may in many instances include multiple choice answers as well as open-ended answers, which are in a form of statements. For this study, the questionnaire survey included both multiple choice questions and statements. The advantage of a questionnaire survey is that it is self-administered and therefore can give the research participant time to go back to it whenever they have time. However, there are some disadvantages, such as the respondents losing or misplacing the questionnaire. In such an instance, the researcher may supply the respondents who had lost their questionnaire with new ones. Other disadvantages include the possibility of low response rates and the restriction on the complexity of questions that can be asked. These problems did not arise in this study as the researcher personally distributed and collected all questionnaires, and the questionnaire was specifically designed not to include overly complex questions.

The study adopted a semi structured questionnaire; as this allows the researcher to elicit responses that might not be available in a structured questionnaire. A semi structured questionnaire essentially gives voice to the respondents by giving them an opportunity to respond as they wish to open-ended questions.

4.3.2.3 Semi-Structured Interviews

Semi-structured face-to-face interviews relate to structured conversations, between the interviewer and the interviewee. These are usually based on a pre-planned set of questions (Babbie & Mouton, 2003: 249). Face-to-face interviews give the researcher the opportunity to engage in in-depth conversations with interviewees and ensure that interviewees understand and answer the questions. It further ensures that ambiguities in questions and responses are minimised. Other advantages are that it is a flexible technique and can potentially yield more extensive information on the research topic and even information that is not related to the research (Hardon, Hodgkin & Fresle, 2004: 28; DiCicco-Bloom & Crabtree, 2006: 315; Whiting, 2008: 36). The semi-structured interview "allows depth to be achieved by providing the opportunity on the part of the interviewer to probe and expand the interviewee's responses" (Rubin & Rubin, 2018: 88). It further helps to put the respondent in a more relaxed mood and ensures that they are more forthcoming and informative.

In this study, semi-structured interviews were used to to obtain further information on issues that are pertinent to knowledge production within the University of Zambia. Jackson, Daly and Davidson (2008: 281) contend that a "qualitative research interview is designed to gather narrative which can be used to develop knowledge and understanding of the phenomenon in a research study". The method, however, also has several disadvantages, for example the United States Centers for Disease Control (2009: 2) have stated that it could be "susceptible to interview bias; time consuming and expensive compared to other data collection methods and may seem intrusive to the respondent". The limitations of this method were noted, counteracted where possible and alleviated by using other methods such as documentary evidence that the researcher consulted.

4.3.2.4 Literature Review

Documentary research relates to extracting data from various secondary sources that exist in libraries, archives and on the Internet. This evidence is mainly drawn from written documents whether available in print or online and is particularly important in tracing and shedding light on the trends of knowledge production practices and their attributes within an institution. As argued by Punch (2011: 184) "documents, both historical and contemporary, are a rich source of data for social research". The researcher therefore utilised documentary sources to investigate the following: what are the factors at play in knowledge production practices and in what contexts is this knowledge produced, diffused and utilised. In addition, the study described and explored how

these social and institutional contexts impact on the knowledge production process (*cf* chapter 3, literature review).

4.3.2.5 Convergence of the Research Methods

As already indicated (cf 1.4) a convergent concurrent triangulated design was adopted for the study. A convergent design "involves quantitative and qualitative data collection and analysis at similar times" (Guetterman, Fetters & Creswell, 2015: 555). Fetters, Curry and Creswell (2013: 2137) further state that in such a concurrent research design, the "qualitative and quantitative data collection occurs in *parallel* and analysis for integration begins well after the data collection process has proceeded or has been completed".The researcher, therefore collectedg data simultaneously, using all the methods outlined above, viz. bibliometrics, semi structured questionnaires, semi structured interviews, and the literature review of documentary sources. This convergence helped the researcher to clarify and understand the context of research productivity at the UNZA School of Medicine. The bibliometric method was therefore used to obtain an assessment of the overall research output of the academic staff of the UNZA School of Medicine. This was mainly related to:

1) *Investigate the knowledge production patterns in a university environment* i.e.;
    a) Determining the published research output of the academic staff,
    b) Investigating the authorship patterns of the academic staff,
    c) Identifying the collaborative patterns of the academic staff,
    d) *Highlighting the main channels of scholarly communication (whether journal, book, etc.) of the academic* staff and;
    e) Identifying the subject areas covered by the published works of the academic staff.

The semi – structured questionnaires were used to elicit information from academic staff related to:

1) Establishing the knowledge diffusion patterns,
2) Analysing the knowledge utilisation patterns,
3) Examining the determinants to knowledge productivity; and;
4) *Identifying and discussing policies that foster knowledge productivity*.

Documentary sources were consulted to *offer insights from policy and official documents* from both the University of Zambia and other government agencies on the above objectives.

4.3.3 ***Research Design Schema (Plan)***

Choguill (2005: 616) describes a research design matrix as "a device consisting of rows and

columns that forces the researcher to think through the logic of a proposed study, ensuring that the various components of a study link together in a logical manner and that no essential parts of the study are omitted". Accordingly, to answer the research questions which are linked to the study's research objectives, the researcher developed the research plan indicated in Table 4.1. below.

Table 4.1. Research Design Matrix

Research Objective	**Explore and describe knowledge production practices and their attributes within a university environment: a case Study of the University of Zambia**				
Overarching Research Question: What are the primary knowledge production practices and their attributes in a university environment in Zambia?			***Main Research Outcome****: Knowledge production practices and their attributes*		
Specific Research Questions	**Research Design**	**Source of Data**	**Sampling Frame**	**Analysis Strategy**	**Anticipated Outcomes**
What are the knowledge production patterns and their attributes in the university environment in Zambia?	Quantitative Case Study	Bibliometrics	Purposive and Availability Sampling of PubMed/Medline Indexed Citations: 1995-2015	Keyword Extraction Citation Analysis Grounded Theory; Constant Comparative Analysis; Interpretive; Concurrent Triangulation	Knowledge Production Patterns and their Attributes
What are the knowledge diffusion patterns in a University environment in Zambia*?*	Mixed Case Study Descriptive Exploratory Explanatory	Semi Structured Questionnaires; Semi Structured Interviews; Literature Review; Document Review;	Purposive Sampling; Stratified Purposeful Sampling; Availability Sampling	Thematic Analysis; Grounded Theory; Constant Comparative Analysis; Interpretive; Concurrent Triangulation	Knowledge Diffusion Patterns
What are the knowledge utilisation patterns in a University environment in Zambia*?*	Mixed Case Study Descriptive Exploratory Explanatory	Semi Structured Questionnaires; Semi Structured Interviews; Literature Review; Document Review;	Purposive Sampling; Stratified Purposeful Sampling; Availability Sampling	Thematic Analysis; Grounded Theory; Constant Comparative Analysis; Interpretive; Concurrent Triangulation	Knowledge Utilisation Patterns
What are the determinants to knowledge production in a University environment in Zambia?	Mixed Case Study Descriptive Exploratory Explanatory	Semi Structured Questionnaires; Semi Structured Interviews; Literature Review; Document Review;	Purposive Sampling; Stratified Purposeful Sampling; Availability Sampling	Thematic Analysis; Grounded Theory; Constant Comparative Analysis; Interpretive; Concurrent Triangulation	Knowledge Production Diffusion and Utilisation Determinants
What policies relate to knowledge productivity in a university environment in Zambia?	Mixed Case Study Descriptive Exploratory Explanatory	Semi Structured Questionnaires; Semi Structured Interviews; Literature Review; Document Review;	Purposive Sampling; Stratified Purposeful Sampling; Availability Sampling	Thematic Analysis; Grounded Theory; Constant Comparative Analysis; Interpretive; Concurrent Triangulation	Knowledge Production, Diffusion and Utilisation Policies

4.3.3.1 Study Population and Sampling Strategy

4.3.3.2 Target Population

According to Alvi (2016: 10) a target population "refers to all the members who meet the particular criterion specified for a research investigation". They are the individuals who are questioned and to whom the results of the study apply. The target population for this study were all members of the University of Zambia School of Medicine staff employed on academic conditions of service. The University of Zambia Collective Agreement between the Council of the University of Zambia (the employer) and the University of Zambia Lecturers and Researchers' Union (UNZALARU) defines academic staff as "all members of staff appointed by the Council of the University of Zambia on full-time basis for teaching and or research, the University Librarian and such other library staff appointed on these terms" (University of Zambia, 2017b: 1).

The estimated overall target population of the study was 123 academic members of staff. This number was retrieved using payroll data from the University of Zambia Human Resources Information System (HRIS) in April 2016 (University of Zambia, 2016). The number was verified in a report by Chipeta to the University of Zambia Research Board in the April to June reporting period (Chipeta, 2016).

There are six ranks in the academic staff salary scales at the institution and these categories are in ranked in order of Lecturer III (the entry grade into academia with a minimum educational qualification of a Master's degree), followed by Lecturer II, Lecturer I, Senior Lecturer, Associate Professor and lastly Professor. See table 4.2.

Table 4.2. University of Zambia Academic Ranks

Salary Scale	*Academic Rank*
ACS 01	Professor
ACS 02	Associate Professor
ACS 03	Senior Lecturer
ACS 04	Lecturer I
ACS 05	Lecturer II
ACS 06	Lecturer III

4.3.3.3 Mixed Methods Sampling Strategy

A mixed method sampling strategy was adopted for the study. This was in line with the mixed method research approach adopted for the study and the choice of each sampling technique was based on the information categories that the study intended to collect. These were further informed by the study objectives and the research questions the study wanted answered.

4.3.3.3.1 Purposive Sampling

The main sampling design adopted by the researcher was purposive sampling, a form of non-probability sampling (Polit & Hungler, 1999: 284). According to Cohen, Manion & Morrison (2000: 103) it relates to instances where researchers specifically select cases to study and this selection is based on the distinctive needs of the study. It is especially used "in qualitative research for the identification and selection of information-rich cases related to the phenomenon of interest" (Palinkas et al., 2015: 533). Purposive sampling was used to select the PubMed/Medline database for the bibliometric study, key informants to question, background documentary sources, the School of Medicine as the study unit, and the individual persons within the study unit. In the latter instance stratified purposeful sampling was used to identify the academic staff members the study wished to investigate. Stratified purposeful sample is obtained by dividing or separating the study population into non-overlapping, more homogeneous groups termed strata, and then selecting a purposeful sample from within each stratum (Onwuegbuzie & Collins, 2007: 286). The advantage of stratification is that it facilitates the accurate representation of the different strata of the population in the sample.

4.3.3.3.2 Availability Sampling

The researcher further implemented availability, or convenience sampling to select the PubMed/Medline database and the various documentary sources that were consulted. Availability or convenience sampling is a specific category of non-probability sampling where the sample is drawn from a study population that is conveniently available and which is easy and quick to access (Hardon, Hodgkin & Fresle, 2004: 58). It allows the researcher to "enroll subjects according to their availability and accessibility" (Elfil & Negida, 2017: 2). Therefore, convenience sampling is utilised for a study when the sample is accessible to the researcher both in terms of proximity and also in availability.

4.3.3.3.3 Synopsis of the Sampling Strategies Adopted by the Study

In summary, the sampling strategies adopted by the study are outlined below and in table 4.3:

- Stratified purposeful sampling of individual academic staff within the School of Medicine;
- PubMed/Medline database purposively selected, and also based on it being freely available online, therefore it was accessible to the researcher;
- Purposive sampling of key informants deemed to have an impact on knowledge productivity in the university and;
- Availability sampling was used to identify documentary sources that were accessible to the researcher.

Table 4.3. Mixed Methods Sampling Procedure

No	*Sample*	*Strategy*
1	PubMed/Medline	Purposive and Availability
2	Academic staff	Stratified and Purposeful
3	Documentary Sources	Purposive and Availability
4	Key Informants	Purposive

4.3.3.3.4 The Sampling Process

A decision was further taken to adopt a multi-stage sampling process. This approach consists of more than one stage of sampling in consecutive order. The stages are outlined in table 4.4. and discussed in greater detail in the sections below:

Table 4.4. Multi Stage Sampling Processes

1st stage	Sampling of the Case	University of Zambia
2nd Stage	Sampling of the Case Unit within the Case	School of Medicine
3rd stage	Sampling of the Bibliographic Database	PubMed/Medline
4th Stage	Sampling of Academic staff Respondents	Academic staff from the UNZA SOM
5th Stage	Sampling of Key Informants	Library, DRGS, UNZA Press, CICT
6th Stage	Sampling of Documentary Sources	Reports, Policy Documents etc.

4.3.3.3.5 First Stage Sampling of the Case

First, there was need to identity the institution in which the study will be carried out. The University of Zambia was purposively chosen based on the following reasons:

- It is the oldest University in the country;
- It the largest public university in the country;
- It has the largest diversity of study programmes; both at undergraduate and postgraduate level;
- It has the largest number of students amongst all the public universities in the country.

4.3.3.3.6 Second Stage Sampling of the Case Unit within the Case

The second stage purposively sampled a case unit within the case. The School of Medicine was chosen as the case unit based on the following:

- It is one of the oldest schools in the University, having been established in 1965 although it only became an independent school of the university in 1970. However, its first intake of students was in 1966.
- The School has both undergraduate and postgraduate programmes in diverse fields of study.
- It is the oldest medical school in the country.

4.3.3.3.7 Third Stage Sampling of the Bibliographic Database – PubMed/Medline

Purposive and availability sampling was used during the third stage sampling to identify the PubMed/Medline database for the study. The study needed to access citation data on knowledge productivity and patterns in a university environment of the case unit, the UNZA SOM. PubMed/Medline is a freely available public database that the researcher could access which is comprehensive enough to be able to use for the study. PubMed is one of the largest databases in the world that indexes biomedical and health literature. PubMed has "over 25 million citations for biomedical literature from MEDLINE, life science journals, and online books. PubMed citations and abstracts include the fields of biomedicine and health, covering portions of the life sciences, behavioural sciences, chemical sciences, and bioengineering. PubMed also provides access to additional relevant web sites and links to the other NCBI molecular biology resources. PubMed is a free resource that is developed and maintained by the National Centre for Biotechnology Information (NCBI), at the U.S. National Library of Medicine (NLM), located at the National Institutes of Health (NIH)" in Bethesda, Maryland USA (Hardon, Hodgkin & Fresle, 2004: 58).

The sample size that was selected for the study were citations published from 1st January 1995 to December 31st, 2015 that were incorporated in the PubMed/Medline database.

4.3.3.3.8 Fourth Stage Sampling of Academic staff Respondents

Fourthly, there was a need to identify the actual study respondents amongst the academic staff in the SOM. In selecting the individual persons within the SOM, the researcher adopted stratified purposeful sampling procedures. This meant that all academic staff were purposely selected and stratified according to academic rank. The researcher was authorised by the University Registrar

to gain access to certain information from the Human Resources Information System (HRIS) of the University of Zambia for the purposes of the study. The researcher derived the staff numbers from payroll data and targeted only those academic staff members who appeared on the UNZA SOM payroll during April 2016. The Assistant Deans of Research and Postgraduate Studies were also included in the study population as members of the academic staff.

The following categories of staff were, however, purposely excluded from the study population:

1) Staff Development Fellows (SDFs). These are university employees with a Bachelor's degree who have the potential to be admitted as full academic members of staff once they have obtained their Master's degrees and were therefore engaged in training programmes to attain such qualifications.
2) Special Research Fellows (SRF). These are University of Zambia employees who are on study leave pursing various studies either within UNZA or at other institutions and are not required to take part in the teaching or research activities of the School during the period of their study. They were excluded from the sample if they took study leave of more than one year.
3) Honorary Lecturers. They are persons with specific expertise who on a part-time basis lecture and conduct research at the UNZA SOM. They are typically medical consultants employed by the University Teaching Hospital and in other sectors in the country. They are officially not employees of the University of Zambia; as this study was interested in research output of University of Zambia employees at the School of Medicine.
4) All academic librarians in the medical library were excluded from the study as the staff belong to the University Library system even though, physically, they are located in the School of Medicine.

After applying the above exclusion criteria there was a total study population of one hundred and seventeen (117). These members of staff were then categorised according to the positions they held in the university, viz.: Lecturer III (ACS 06), Lecturer II (ACS 05), Lecturer I (ACS 04), Senior Lecturer (ACS 03), Associate Professor (ACS 02) and Professor (ACS 01). Table 4.5 below outlines the purposely selected study population stratified according to their academic rank.

Table 4.5. Total Study Population by Academic Rank in the School of Medicine

Academic Ranks		*No. of Staff per Strata*	*% of Staff per Academic Rank*
Professor	ACS 01	9	8%
Associate Professor	ACS 02	4	3%
Senior Lecturer	ACS 03	13	11%
Lecturer I	ACS 04	20	18%
Lecturer II	ACS 05	21	18%
Lecturer III	ACS 06	50	42%
	Total	**117**	**100**

To determine the sample size, the researcher then proceeded to calculate a proportional study sample that would be representative of the various strata of the population of academic staff. The size of each stratum in the sample was therefore proportionate to the size of the stratum in the population i.e. the researcher treated each stratum as an independent sub group of the whole academic population of the School of Medicine. The sample size for the academic population was calculated using the formula as outlined in Table 4.6 and the proportionate study sample for each academic rank was calculated as indicated in Table 4.7 below. The sample size formula to calculate the study sample was adopted from Godden (2004: 1).

Table 4.6. Study Sample Size Calculation

Sample Size Formula

$SS= (Z^2 \times (p) \times (1-p))/C^2$

Where:

SS = Sample Size

Z = Z-value. The Z-score is the number of standard deviations a given proportion is away from the mean and depicts the desired confidence level. For this study a 90% confidence level was selected giving a Z score of 1.645

P = Percentage of population picking a choice, expressed as decimal. For this study p was set at 0.85 (85%)

C = Confidence interval, or margin of error. This is expressed as a decimal. C was set at 0.55, i.e. +/- 5.5 percentage points

Adjusted Sample Size with a Finite Population (where the population is less than 50,000 the sample calculation takes the population size into account)

New SS = SS/ ((1 + (((SS – 1)/ Pop)))

Pop = Population (i.e. 117)

The final calculation yielded an adjusted sample size of **58**

Godden (2004: 1).

Table 4.7. Proportionate Sample Calculation for each Stratum

Academic Ranks	*No. of Staff per Strata*	*% of Staff per Strata*	*Sample Calculation Formula per Strata*	*Sample per Strata*
Professor	9	7.7	0.077 x 58	4
Associate Professor	4	3.4	0.034 x 58	2
Senior Lecturer	13	11.1	0.111 x 58	6
Lecturer I	20	17.1	0.171 x 58	10
Lecturer II	21	17.9	0.179 x 58	10
Lecturer III	50	42.7	0.427 x 58	25
Total	**117**	**100**		**57**

4.3.3.3.9 Fifth Stage Sampling of Key Informants

Key Informants deemed to have influence on knowledge productivity within the University were purposively selected for the study. These informants for the study were purposively selected from other case units; the Library, DRGS, CICT, Quality Assurance Unit, and the University Press. These were purposively selected because they are deemed to influence knowledge productivity within the university by virtue of the roles they perform within the institution. Eight such persons were identified and interviewed.

4.3.3.3.10 Sixth Stage Sampling of Documentary Sources

The researcher finally selected documentary sources that were available and could provide information of value to the study. Availability sampling was used to identify the requisite documentary evidence in the relevant published and unpublished literature. Such evidence came from books, journals, quarterly and annual reports, strategic plans, budget estimates plans and other materials that had relevance to the study topic. The documentary sources reviewed are outlined in Table 4.8.

Table 4.8. Documentary Sources

- Libraries	- Strategic Plans
- Internet	- Manuals
- Databases	- UNZA Committee Minutes
- UNZA Institutional Repository	- UNZA Annual Reports
- Policy Documents	- Higher Education Acts

4.3.4 ***Data Collection Procedures and Matrix***

The objectives of the study guided the researcher in her selection of data collection techniques and instruments that she employed in the study, viz. a semi-structured questionnaire study of the academic staff (*cf appendix A*); semi-structured interviews conducted with key informants (*cf appendix B*); collection and analysis of citation data from the PubMed/Medline database; review

of documentary sources retrieved from libraries and the Internet, as well as a review of official documents such as strategic plans, manuals, policy documents produced by UNZA and data obtrained from the Human Resource Information Systems (*cf Appendix E.1 and E.2*)

4.3.4.1 Data Collection Matrix

The relationship between the various data collecting procedures and instruments and the research questions have further been outlined in the data collection matrix depicted in 4.9. below. Further, data was collected concurrently; because the data was not building on each other but rather reinforcing the findings and therefore complementing each other

Table 4.9. Data Collection Matrix

Research Question	Sources of Data 1	Sources of Data 2	Sources of Data 3
What are the knowledge production patterns and their attributes in a university environment in Zambia?	United States of America, National Library of Medicine database - PubMed/Medline	Libraries Internet	Policy Documents Strategic Plans Manuals Minutes of Committees of the University UNZA Annual Reports
What are the knowledge diffusion patterns in a university environment in Zambia?	Semi Structured Questionnaires Semi Structured Interviews	Libraries Internet Databases UNZA Institutional Repository[7]	Policy Documents Strategic Plans Manuals UNZA Committee Minutes UNZA Annual Reports Higher Education Acts
What are the knowledge utilisation patterns in a university environment in Zambia?	Semi Structured Questionnaires Semi Structured Interviews	Libraries Internet Databases UNZA Institutional Repository	Policy Documents Strategic Plans Manuals UNZA Committee Minutes UNZA Annual Reports Higher Education Acts
What are the determinants to knowledge production, diffusion and utilisation in a university environment in Zambia?	Semi Structured Questionnaires Semi Structured Interviews	Libraries Internet Databases UNZA Institutional Repository	Policy Documents Strategic Plans Manuals UNZA Committee Minutes UNZA Annual Reports Higher Education Acts
What policies relate to knowledge production, diffusion and utilisation in a university environment in Zambia?	Semi Structured Questionnaire Semi Structured Interviews	Libraries Internet Databases UNZA Institutional Repository	Policy Documents Strategic Plans Manuals UNZA Committee Minutes UNZA Annual Reports Higher Education Acts

[7] The University of Zambia Institutional Respository does not archive all research output from the institution; e.g published peer reviewed journal articles.

4.3.4.2 Citation Data Extraction from the PubMed/Medline Database

Data was retrieved from the PubMed/Medline database after a search was conducted on 17th of April 2016. The data was then extracted into an Excel spreadsheet that was later transferred to SPSS and VOSviewer software. The search strategy utilised a search string that included the University of Zambia [ad*] in the author's address field and limited the search from the 1st January 1995 to 31st December 2015. Table 4.10 outlines the search string used.

Table 4.10. Search String

University of Zambia [ad] AND ("1995/01/01"[PDAT!]: "2015/12/31"[PDAT])

Note. *[ad] refers to author address field; and! PDAT refers to publication date.

A number of bibliometric research studies have used the author's address field as a delimiter in their citation searches. For example, Rehn et al. (2014: 4) have argued that the author's address field "can identify prolific countries, universities or other organisations and give an overview of the co-publication patterns". This method was used by the HERANA project to investigate the research outputs of eight flagship research universities. Full publication counts were additionally assigned to each of the universities appearing in the address field (Cloete, Bunting & Maassen, 2015: 24). Hofman et al. (2009) also used the address field as delimiter to retrieve online citation data from PubMed/Medline in their study on 'mapping the health research landscape in Sub-Saharan Africa'. Ettarh (2015, 2016), likewise, used a similar methodology when looking at 'institutional level and patterns of international collaboration in cardiovascular research in sub-Saharan Africa'.

The initial search that was conducted retrieved a total of 523 citations and this data was then downloaded from PubMed into an XML file format. This file was later imported into a PubMed2XL programme, which converted the XML file into a MS Excel file spreadsheet. *PubMed2XL* (http://blog.humaneguitarist.org/projects/pubmed2xl/) is a Microsoft Windows and Linux application that can convert PubMed.gov citations to Microsoft Excel files (Arora, 2010). According to Isaak (2016: 93) PubMed2XL was "written by Nitin Arora and includes software developed by Roman V. Kiseloiv". It has been argued that this is an "easy-to-use programme that transforms PubMed XML data into a spreadsheet. The default style sheet further provides metadata in a better format than the CSV download that PubMed offers" (Isaak, 2016: 94).

After converting the 523 citations that were retrieved into an MS Excel Spreadsheet, each citation was individually screened to include only those articles that had an affiliation address with the University of Zambia and a department associated with the School of Medicine. Those articles that were retrieved with the University of Zambia affiliation but belonging to another school other than the School of Medicine, for example Veterinary Science, or other units of the University of Zambia, or the Teaching Hospital were excluded. See Table 4.11 for examples of such instances. A total of 281 usable citations were retained for the study. This data was then later transferred into SPSS version 20 for further analysis.

Table 4.11. UNZA Author Address Field for an Honorary Academic staff

A cross-sectional study of bacterial vaginosis, intravaginal practices and HIV genital shedding; implications for HIV transmission and women's health

- Maria L Alcaide[1,]
- Maureen Chisembele[2],
- Emeria Malupande[2],
- Kristopher Arheart3,
- Margaret Fischl[1],
- Deborah L Jones4,
- *[1]Division of Infectious Diseases, University of Miami, Miller School of Medicine, Miami, Florida, USA*
- *[2]University of Zambia, University Teaching Hospital, Lusaka, Zambia*
- *[3]Department of Epidemiology and Public Health, University of Miami, Miller School of Medicine, Miami, Florida, USA*
- *[4]Department of Psychiatry and Behavioral Sciences, University of Miami, Miller School of Medicine, Miami, Florida, USA*

Malar J. 2005 Dec 15; 4:60.

The economic value of an improved malaria treatment programme in Zambia: results from a contingent valuation survey.

Masiye F[1], Rehnberg C.

Author Address Information

- [1]Department of Economics, University of Zambia, P.O. Box 32379, Lusaka, Zambia. fmasiye@yahoo.com

4.3.4.3 Semi-Structured Questionnaire Survey of the Academic staff

The semi-structured questionnaires were personally administered to the respondents by the researcher during the period May 2016 to January 2017. The administration of questionnaires was based on convenience; i.e. whoever the researcher could access in a specific academic rank and who were available when the researcher visited the various departments of the School of Medicine. Additionally, some questionnaires were administered in meetings where the targeted staff members could be available. In some instances, the participants indicated to the researcher to wait

for the questionnaires whilst they were filling it in, and in other instances the researcher was asked to come back on another day to collect the filled in questionnaire. Before asking the participants to volunteer to participate in the study, they were first asked by the researcher to respond to the consent form asking them to consent to participating in the study (*See Appendix C*).

After it became difficult to collect the questionnaire physically from some academic staff, the researcher converted the questionnaire into an online survey using Google forms (https://www.google.com/forms/about/) to collect data specifically among academic staff in the lowest rank; i.e. academic staff in the ACS 06 salary scales. Similarly, a consent form was attached in which they were asked to consent before filling in the questionnaire. This was a replica of the printed semi structured questionnaires that was distributed to the same category of respondents.

4.3.4.4 Semi-Structured Interviews of Key Informants

Semi – Structured Interviews were primarily held with (8) key informants in the month of June 2017. These interviews were held with key informants the researcher identified in various units of the university, namely the Directorate of Research and Graduate Studies (DRGS), Centre for Information and Communication Technology (CICT), Library, Quality Assurance Unit, and the University Press. A total of eight people, four from the library and one each from the other units identified. The interviews with the librarians were based on the unit they operated from, viz. the Deputy University Librarian's Office, Medical Library, Public Service department of the library and the Special Collections Department. The latter is the research wing of the library. At the time of the interviews, some interviewees (three) requested that instead of personally interviewing them, they wanted to complete the interview schedule in their own time; so, they were either given a printed interview schedule or sent the interview schedule to their email. These interviewees were either given a printed interview schedule or sent an electronic version for completion as requested. All completed interview schedules were either returned by email or through the internal postal mail service.

4.3.4.5 Documentary Sources

Data from documentary sources were collected and reviewed throughout the study period and reported mainly in chapter three, but also throughout the thesis.

4.4 Reliability and Validity of the Study

4.4.1 *Reliability of the Study*

Collis and Hussey (2003: 78) have argued that methodological triangulation reduces the potential of bias of a single method in a study. The mixed method analysis in this study was rooted in an interpretive and triangulation analysis framework for as noted by Onwuegbuzie and Johnson (2006: 53) quoting Greene et al. arguing that "seeking convergence and corroboration of findings from different methods that study the same phenomenon" is the goal of any qualitative research and also enhances the reliability of the findings. Methodological triangulation was therefore used to achieve reliability in this study. This was done by combining quantitative and qualitative approaches. In addition, the use of multiple data collection techniques and adopting a mixed methods analysis strategy enhanced the reliability of this case study.

Regarding sample size reliability, Onwuegbuzie and Leech (2007: 106), referencing Connolly (1998), argue that the aim of qualitative research is "not to make inferences about the underlying population, but to attempt to obtain insights into particular educational, social, and familial processes and practices that exist within a specific location and context". In the process, utilise purposeful sampling (Onwuegbuzie & Collins, 2007: 287). It therefore follows that with qualitative research the properties of the study sample are more important than the size, i.e. a sample that allows the researcher to have sufficient access and time to elicit depth information from the respondents. Hence, because the study was exploratory and descriptive in nature and predominately qualitative, it used a relatively small sample, namely one unit, the School of Medicine of the University of Zambia that was purposively selected for the research.

The choice of sample has also been informed by previous studies in Library and Information Science Research. As exemplified by these studies, the sample size in a qualitative research project does not determine the reliability of the data, but rather reliability is dependent on several factors such as attention to detail, explaining the phenomena as experienced by the subjects, understanding the socio-cultural context in which the phenomena are set and looking for patterns of occurrence that can explain what is happening and therefore allowing the researcher to make conclusions about the phenomena (Winget, 2005: 3) quoting Labuschange, (2003). Winget (2005: 3) further argues that "qualitative methods produce a lot of detailed data about a small number of cases, and provide a depth

of detail through direct quotation, precise description of situations, and close observation. The strength of qualitative research lies in the fact that it attempts to depict the fullness of experience in a meaningful and comprehensive way".

This type of sampling is in line with qualitative grounded research where "unlike the quantitative inquirer, the grounded theorist does not decide on the size of the sample population before the study begins. Participants are not recruited on a representative basis, but rather because of their expert knowledge of the phenomenon under inquiry", Thorogood as cited by Tavakol, Torabi and Akbar Zeinaloo (2006: 2). This means that even though a researcher might settle on a sampling frame when the study begins, this sampling frame may change according to what the researcher finds during the study. This change should further always be necessitated by the desire of the researcher to find cases with more insight into the phenomena that the researcher is investigating. In this instance; the original idea of the researcher was to investigate all the schools of the University and do a comparative analysis of the case. However, as the study progressed the researcher opted to do an in-depth study of the School of Medicine. This was informed by the fact that the researcher was, for many years, the Medical Librarian at the School of Medicine. In addition, the researcher has an interest in medical and health research after completing a one year post graduate fellowship at the United States of America National Library of Medicine from September 2004 to August 2005.

Additionally, although the researcher had set out to only use the author address field as the search strategy, it was later decided to search under each academic staff after it was realised that some authors were not including their addresses in the author field especially when they were not second authors. A comparison of these findings were then done.

4.4.2 *Validity of the Study*

For this study, pretesting the questionnaire was used as a tool for content validation. The questionnaire was pretested on 10 library staff who belong to the academic staff category, whilst the interview schedule was pretested on 4 people from various units within the library and the university. This was done to eliminate any ambiguities in the questions formulated in the questionnaire. The pretesting, furthermore, ensured that the questions in both the questionnaire

and interview schedule were appropriate and relevant to the problem of knowledge production practices and their attributes within a university environment.

4.5 Analysis of the Research Findings

The analysis of the research findings from the case further closely followed a mixed methods analysis strategy. As already indicated earlier, data from the qualitative stage of the study has been used to augment the findings from the quantitative part of the research even though data collection was done concurrently (Wisdom & Creswell, 2013: 1). Concurrently meant that there were was no sequential approach to data collection; between qualitative data and quantitative data. There four sets of data collected; Bibliometric, Semi-structured questionnaires, semi-structured-interviews and documentary Sources. The study adopted a concurrent triangulated analysis design as defined by Creswell (2009: 213) where he says in "a concurrent triangulation approach, the researcher collects both quantitative and qualitative data concurrently and then compares the two databases to determine if there is convergence, differences or some combination". This means that the study adopted both qualitative and quantitative research analysis techniques. According to Baxer & Jack (2008: 554) the case study approach is very unique: there is the ability to collect and integrate qualitative and quantitative data and then converging the analysis of data that was collected individually; and therefore adding robustfullness and stregnthe to the understanding of the phemenomena under study. In this connection, Yin (2003: 109) further states that in a aim of a case study lies in "examining, categorising, tabulating, testing, or otherwise recombining both quantitative and qualitative evidence to address the initial propositions of a study".

Qualitative analysis therefore entails systematically sifting through the data, identifying material that sheds light on the topic and then interpreting it in a way that is easy to understand and follow. Adopting a framework from an integrated and holistic perspective is therefore vital. An integrated approach of the study topic ensures that analyses of the different areas that guide the study are interlinked. It means drawing from the analysis of knowledge production, diffusion and utilisation perspectives and integrating them into an analytical framework that is premised on the conviction that by not understanding the knowledge production, diffusion and utilisation practices and processes of the HEIs in Zambia would not only limit the outcomes of teaching and research within

the universities themselves but also their roles as key players in the knowledge economy. This analysis also took cognisance of knowledge production practices in an increasingly digital context.

4.5.1 *Data Analysis Strategy*

Baxter and Jack (2008: 554) argue that in a qualitative case study, data collection and data analysis occur concurrently. From the onset, the researcher adopted this framework in analysing the data. This was to ensure that the "the theory that emerges from the study is derived from and grounded in data that has been collected in the field rather than taken from research literature" (Leedy & Ormrod, 1985: 154); a grounded approach to data analysis. See Table 4.12.

Table 4.12. Data Analysis Strategy

Research Question	Data Analysis Criteria	Unit (s) of Analysis	Thematic Analysis	Outcomes
What are the knowledge production patterns and their attributes in a university environment in Zambia?	Bibliometrics; Grounded Theory; Triangulation;	Literature Review; Keyword Extraction;	VOSviewer Software: Visualising; Clustering; Co-occurring;	Knowledge Production Patterns and their Attributes
What are the knowledge diffusion patterns in a university environment in Zambia*?*	Exploratory; Descriptive; Explanatory; Interpretive; Grounded Theory; Triangulation;	Literature Review; Within Group Analysis; Within Case Analysis;	Grounded Analysis Pattern Marching; Linking Data to Proposition; Explanation Building;	Knowledge Diffusion patterns
What are the knowledge utilisation patterns in a university environment in Zambia*?*	Exploratory; Descriptive; Explanatory; Interpretive; Grounded Theory; Triangulation;	Literature Review; Within Group Analysis; Within Case Analysis;	Grounded Analysis Pattern Marching; Linking Data to Proposition; Explanation Building;	Knowledge Utilisation patterns
What are the determinants to knowledge production, diffusion and utilisation in the university environment in Zambia?	Exploratory; Descriptive; Explanatory; Interpretive; Grounded Theory; Triangulation;	Literature Review; Within Group Analysis; Within Case Analysis;	Grounded Analysis Pattern Marching; Linking Data to Proposition; Explanation Building;	Knowledge Production, Diffusion and utilisation determinants
What policies relate to knowledge production, diffusion and utilisation in a university environment in Zambia?	Exploratory; Descriptive; Explanatory; Interpretive; Grounded Theory; Triangulation;	Literature Review; Within Group Analysis; Within Case Analysis;	Grounded Analysis Pattern marching; Linking Data to Proposition; Explanation Building;	Knowledge production, Diffusion and Utilisation policies

The importance of a case study research lies in understanding the social context of the case so as to enable the researcher to draw meaningful explanations of the case study (Cronholm &

Hjalmarsson, 2011: 89-91; Crowe et al., 2011: 1; Hashemi & Babaii. 2013: 842; Schiazza, 2013, x). In addition, the data analysis for this study was based on concurrent triangulation of data from different sources to make meaningful explanations of the responses to the research questions posed by the study. That is whyc Creswell (2009: 218) has argued that in mixed methods research "analysis occurs both within the quantitative (descriptive and inferential numeric analysis) and the qualitative (description and thematic text or image analysis) approach and often between the two approaches".

4.5.2 *Data Analysis Techniques Employed*

A contiguous approach to data integration was adopted by the study which involved the presentation of findings in one report with qualitative and quantitative data reported in different sections of the report. In this study, quantitative data (cf 1.3.1 under objective 1) was analysed first, followed by quantitative and qualitative data (cf 1.3.1 under objective 2, 3, 4 and 5) analysis. As already argued a contiguous approach to data analysis "involves the presentation of findings within a single report, [whilst] the qualitative and quantitative findings are reported in different sections" of the study (Fetters, Curry & Creswell, 2013: 2142). This meant that, data obtained from the PubMed/Medline database and questionnaires were analysed using the SPSS software. PubMed/Medline article subject analysis and collaborating networks were first put into themes using Microsoft excel and then further analysed using the VOSviewer software.

Quantitative data obtained from the Semi-Structured Questionnaires was computed and analysed using descriptive statistical methods. Open-ended questions from the questionnaires were isolated, themes extracted and analysed thematically. Likewise, data gathered by means of the semi-structured interviews and open-ended questions were thematically analysed using VOSviewer.

The researcher kept a diary record where information that was obtained from documentary sources was recorded. The researcher recorded the main gist of the document in relation to the research objectives together with the citation, including the page numbers. Several sources of information were examined. These included books, policy manuals and other grey literature produced by the University of Zambia and other documents relevant to the research objectives. The recorded notes in the diary were then categorised into thematic areas according to the research questions to form

a unit of analysis. After putting them into thematic areas, the researcher then proceeded to make linkages between the thematic areas and the research objectives. A grounded and triangulated approach to data analysis was then applied to themes that emerged from the study. The objective was to describe and explain the observed phenomena regarding knowledge production practices and their attributes as they relate to the School of Medicine at the University of Zambia.

4.6 Ethical Considerations

The study considered all ethical aspects that might affect the respondents. In the first instance permission was sought from the Registrar of the University of Zambia to enable the researcher to access human resources data for purpose of drawing a sample as well as to carry out research in the institution. In addition, this permission allowed the researcher to have access to University of Zambia documents (*cf Appendix E.1*). The Researcher also sought ethical clearance from the Humanities and Social Sciences Rescarch Ethics Committee (HSSREC) (*cf Appendix E.2*).

Secondly, the researcher provided the research participants with a "*Consent to participate in a Research Study*" form (*cf Appendix C*) which contained the following information:

1) Identification of the researcher and the institution where the researcher was studying
2) Objectives of the study
3) Procedures of the study
4) Risks associated with the study
5) Potential benefits of the study
6) Costs associated with the study
7) Payment to the research participants
8) Confidentiality of the research participants
9) Contact details of both the researcher and the supervisor

Thirdly, the questionnaire had the following disclaimer on the front page; indicating that the *"researcher was a PhD student in the Department of Library and Information Studies, fof Humanities at the University of Cape Town, South Africa and that she was conducting research on: Knowledge production practices in Higher Institutions of Learning: a case of the University of Zambia"*. The disclaimer further assured the respondents that any responses that they supplied

in response to the questionnaire would be used entirely for academic research purposes and their anonymity was fully guaranteed. In addition, the questionnaire provided for anonymity as the respondents were not required to disclose their names on it.

Lastly, when administering the questionnaires, the author proceeded to administer the questionnaire or interview only after those respondents who had agreed to participate had read the 'Informed Consent Form'. After a respondent confirmed voluntary participation in the study, they were assured from the outset that any information that they provided would be treated in the strictest confidence. In addition, respondents were assured that any information that they provided would not be linked to them and that any analysis done would be anonymous.

4.7 Chapter Four Summary

This chapter has discussed the research methodology and methods adopted for study. The research design adopted was a mixed methods case study, combing both qualitative and quantitative approaches. This approach was deemed appropriate for the study that explored and described knowledge production practices and their attributes within a university environment, using the University of Zambia Medical School as a case and the site of the investigation. Flyvbjerg (2006: 244) has argued that "good social science is problem-driven and not methodology-driven, in the sense that it employs those study research methods which for a given problematic best help answer the research questions at hand. Often, a combination of qualitative and quantitative methods will do the task". Indeed, it is the problem that should drive the adopted methodology to arrive at the appropriate answer.

The methodological gaps existing in the literature reviewed, where there was overwhelming use of qualititative or quantitative studies, each adopted on its own. This study had chosen a mixed method case study design; that used both quantitative and qualitative research methodology in a Convergent Concurrent Triangulation Design so as to strengthen the validity of the findings. Data collection was driven by using both quantitative and qualititave methods; bibliometrics, semi-structured questions, semi-structured interviews schedules and document reviews.

Chapter Five looks at the study findings.

CHAPTER FIVE

STUDY FINDINGS

5 Knowledge Production Patterns at UNZA School of Medicine

5.1 Introduction to Findings of the Study

Chapter five presents the research findings of the study. This incorporates the findings from the bibliometric study that involved analysing data from the PubMed/Medline as well as data collected from, academic staff, key informants within the university (primary sources) and data from secondary resources. Semi-structured questionnaires and semi-structured interview schedules were used to collect the requisite data from the respondents. These results are grouped into and reported according to the different thematic themes as outlined in the semi structured questionnaires and semi-structured interview schedules; in accordance with the research objectives as outlined below. In addition, documentary sources were used to elicit information on policies and other knowledge production factors, as well as knowledge diffusion and utilisation practices and processes within the institution. Findings from documentary sources has been reported throughout Chapter Five where it is appropriate to report it. The findings address the main research objectives of the study, viz. to explore and describe knowledge production practices and their attributes within a university environment. The research project, more specifically, focused on the School of Medicine at the University of Zambia as a Case of Study. The results of the study are organised and reported within the framework of the stated study objectives and questions as reflected in chapter one, sections 1.3.1 and 1.3.2. However, before reporting on the results derived from the analysis of the data obtained from the various sources outlined above, it is important to provide background information of the School of Medicine academic staff members. This background information on the School of Medicine University of Zambia is reported under 5.2.

5.2 The UNZA School of Medicine Academic Staff Profile

This section reports findings from data obtained from the University of Zambia Human Resource Information System. Details relating to academic staff as defined by the Zambian Higher Education Act No. 4 of 2013 has been outlined in Chapter Two of this thesis. As already indicated

in Chapter One (*cf 1.5.1*) the term 'academic staff or lecturer' is used in this study in preference to the term 'faculty' since it is the official name for such staff at the University of Zambia and most commonly used term. All members of staff involved with teaching and research fall under the 'academic staff' category and are employed under academic conditions of service. In addition to their core mandate of teaching and research, they are further required to engage with knowledge production and knowledge dissemination activities (University of Zambia, 2017b: 1). There are six levels of academic ranks at the University of Zambia; and these apply to the School of Medicine too. See Table 5.1. These ranks range from the lowest level of Lecturer III to the highest academic rank of Professor (University of Zambia, 2017b: 1).

Table 5.1. UNZA School of Medicine Academic Ranks

Academic Teaching Rank	*Academic Title*
ACS 01	Professor
ACS 02	Associate Professor
ACS 03	Senior Lecturer
ACS 04	Lecturer I
ACS 05	Lecturer II
ACS 06	Lecturer III

The UNZA School of Medicine[8] follows the same academic and promotional progression as those found in the overall University of Zambia employment structure. Academic staff establishments are created and controlled by the University of Zambia Council. Since the University of Zambia is a government owned learning institution, the University of Zambia Council therefore represents the Government of Zambia as the employing body of all academic staff. The University of Zambia Senate is the highest body in the university that regulates all academic matters that relate to teaching and research (Zambia. Ministry of Higher Education, 2013: 116). Another governing body in the School of Medicine, the Board of Studies, is the academic governing body of the School and has representation from all the relevant sectors of the school. Academic administration of the School of Medicine follows similar arrangements, processes and systems as those of other schools of the University of Zambia (University of Zambia, 2015: 71). Staff numbers in the various departments of the School are outlined in table 5.2.

[8] *Note: As of 2017, the School of Medicine had been divided into four schools namely, the School of Medicine, School of Health Sciences, School of Nursing Sciences and School of Public Health.*

Table 5.2. UNZA School of Medicine Academic Departmental Profiles

S/N	*Name of Department*	*No. of Staff*	*Percentage of Total No. of Staff*
1	Anatomy	2	2
2	Biomedical Sciences	12	10
3	Internal Medicine	2	2
4	Medical Education Development	2	2
5	Nursing Sciences	19	16
6	Obstetrics and Gynaecology	0	0
7	Paediatrics and Child Health	5	4
8	Pathology and Microbiology	12	10
9	Pharmacy	11	9
10	Physiological Sciences	7	6
11	Physiotherapy	8	7
12	Psychiatry	2	2
13	Public Health	26	22
14	Surgery	9	8
	Total	**117**[9]	**100%**

It can be seen from table 5.2, that the School of Medicine had a total of 117 academic staff at the time data was collected in April 2016 excluding those who were on extended leave. The six academic staff members who were on leave for more than one year or were on staff training leave of more than one year were not included in these numbers. The reason for this differentiation is that payroll data was used to determine the existing academic staff within the School of Medicine at that precise moment of data collection. It can further be seen from Table 5.3 that not all the approved staff positions in the various departments of the school were filled. This is partially accounted for by the six staff members who were on extended leave of more than a year. The variance between the approved staff establishment per department and actual staff currently employed at the UNZA School of Medicine was 127; i.e. 244[10] approved staff establishment according Mulla (2012: 5) as opposed to 117 staff that were in position in 2017; a deficit of 127 (52%) . The academic staff profile at the School of Medicine was predominantly made up of staff in the junior academic ranks as follows: Lecturer III ranks numbered 50 (43%), Lecturer II ranks were 21 (18%), and the lecturer I academic rank numbers were 20 (17%). In the senior ranks; those in the Senior Lecturer Rank were 13 (11%), Associate Professor Rank were 4 (3%) and Professor

[9] *This number excludes all those staff members who were on staff development leave or leave of absence of more than a year. If, however those on leave of more than one year are included, the total number of staff in the School of Medicine was 123 in April 2016.*

[10] *This number represents the 1998 Staff Establishment which is still in use. A Staff Establishment is approved staff position of an institution. It was difficult to get the actual new Staff Establishment. However, the data is indicative of low staffing levels when compared to the increasing student numbers shown in chapter two; especially looked at the year when the data was collected 2016.*

Rank were 9 (8%). These numbers indicate that the staff in the lower ranks (Lecturer I – III ranks) far outnumbered those in the senior ranks (Senior Lecturer, Associate Professor and Professor). See Figure 5.1.

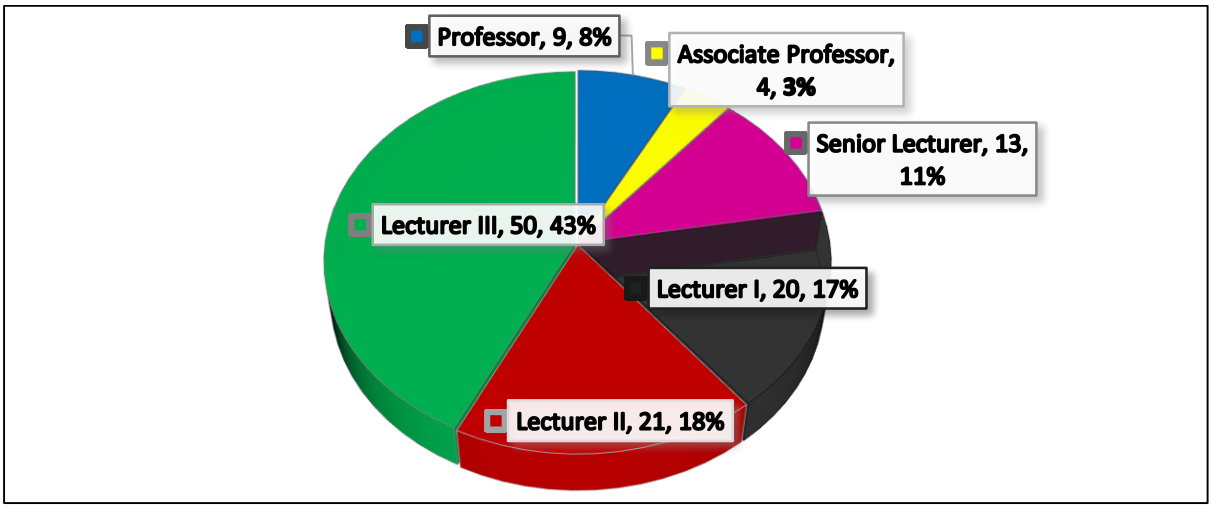


Figure 5.1. University of Zambia School of Medicine Academic staff – April 2016

It can also be seen from Table 5.3 below that the majority of the academic staff were younger than 47 years of age, i.e. 23% were between 28 and 37 years of age, while 28% were between 38 and 47 years of age. Forty nine percent were older than 47 years of age.

Table 5.3. Age Profile of UNZA School of Medicine Academic staff – April 2016 (N=117)

Years of Birth	*No. of Staff*	*Percentage*
1980-1989	27	23
1970-1979	33	28
1960-1969	26	22
1950-1959	20	17
1940-1949	10	9
1930-1939	1	1
Total	**117**	**100**

It is clear from Figure 5.2 below that the majority of the academic members of staff were male 69 (59%) and 48 (41%) were female.

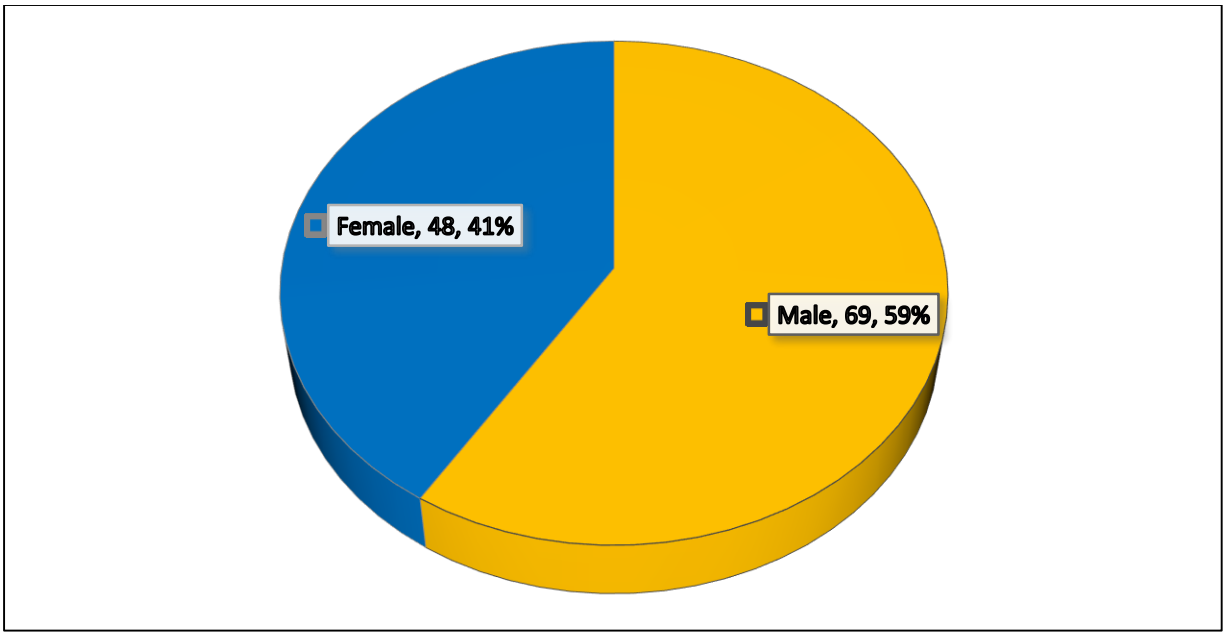


Figure 5.2. UNZA School of Medicine Gender Profile – 2016

It can also be discerned from Figure 5.3 below that by far the largest number of academic staff (47%) had worked for the School of Medicine University of Zambia for between 0 and 5 years at the time when data was collected in 2016. This was followed by 6-10 years (17%), 11 – 15 years (12%), and then 16-20 years (11%). Only 13% of the academic staff had worked for more than 20 years at the University.

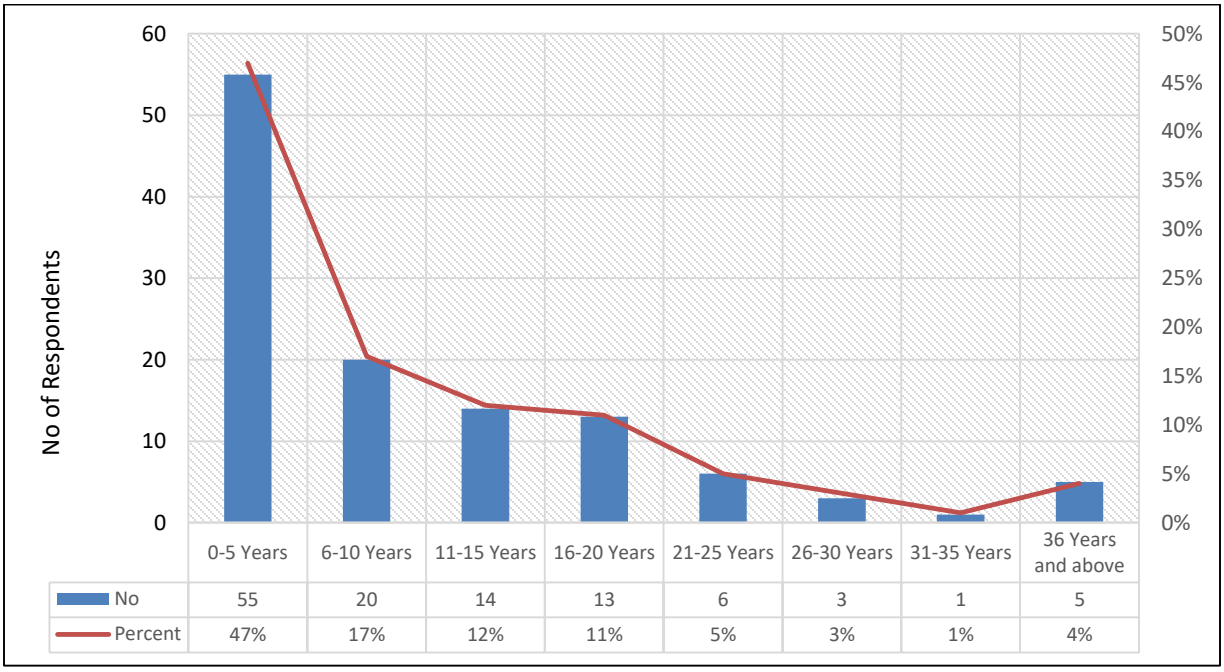


Figure 5.3. Years of Experience (N=117)

The study established that the overwhelming majority of the staff at the UNZA SOM were Zambians. A total of 101 (86%) of the academic staff were Zambians out of a total of 117. See Figure 5.4

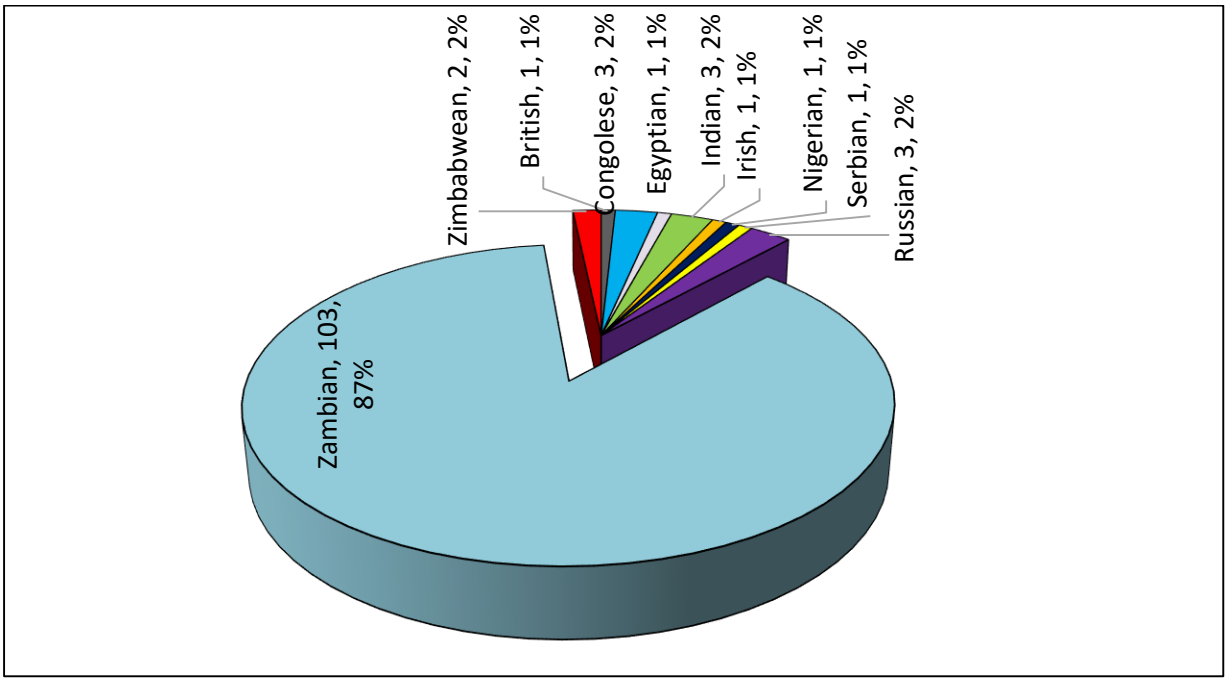


Figure 5.4. UNZA Medicine Academic staff Nationality - April 2016

5.3 Knowledge Productivity Patterns at the UNZA School of Medicine

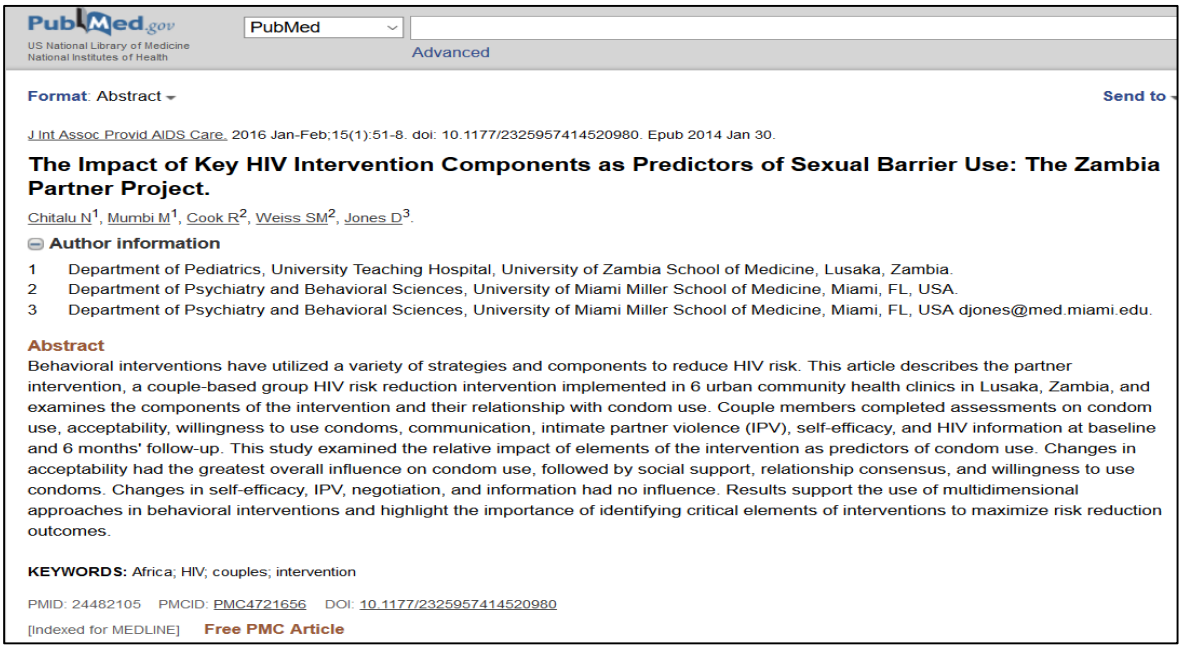
5.3.1 *Introduction*

This section presents the results of the research output of academic staff attached to the UNZA SOM as obtained from the PubMed/Medline database. The main objective was to investigate knowledge production patterns and their attributes during a twenty-year period from 1995 to 2015. The intention was to obtain an overview of the Knowledge Production Patterns and their Attributes at the School of Medicine of the University of Zambia.

5.3.2 *Primary Knowledge Production Patterns at the UNZA School of Medicine*

This section reports on the published research output of the academic staff of the UNZA School of Medicine. The initial sieving for identification of UNZA SOM authors was by checking in author address field on the Medline/PubMed and then checking on the article itself. These were then listed in an excel spreadsheet. Then, each author was individually compared with names obtained from the payroll data from the UNZA so as to exclude all those authors were from

different institutions but were collaborating with authors from the UNZA School of Medicine. However, it was sometimes difficult to establish the institution to which an author belonged between the University of Zambia and the University Teaching Hospital; especially since the records of payroll data used was for 2016. Therefore, a decision was made to individually check each article so as to ascertain affiliation field. Another challenge that the researcher encountered was that authors included several affiliations to identity themselves in an individual article. See Fig 5.5 – 5.9 for authorship affiliation conflicts and differences, and Table 5.4. Therefore only articles where the author listed the University of Zambia, School of Medicine were included in the authorship list, regardless of where they had listed other affiliations in addition to the UNZA SOM.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Format: Abstract

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J Int Assoc Provid AIDS Care. 2016 Jan-Feb;15(1):51-8. doi: 10.1177/2325957414520980. Epub 2014 Jan 30.

The Impact of Key HIV Intervention Components as Predictors of Sexual Barrier Use: The Zambia Partner Project.

Chitalu N[1], Mumbi M[1], Cook R[2], Weiss SM[2], Jones D[3].

Author information

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Abstract

Behavioral interventions have utilized a variety of strategies and components to reduce HIV risk. This article describes the partner intervention, a couple-based group HIV risk reduction intervention implemented in 6 urban community health clinics in Lusaka, Zambia, and examines the components of the intervention and their relationship with condom use. Couple members completed assessments on condom use, acceptability, willingness to use condoms, communication, intimate partner violence (IPV), self-efficacy, and HIV information at baseline and 6 months' follow-up. This study examined the relative impact of elements of the intervention as predictors of condom use. Changes in acceptability had the greatest overall influence on condom use, followed by social support, relationship consensus, and willingness to use condoms. Changes in self-efficacy, IPV, negotiation, and information had no influence. Results support the use of multidimensional approaches in behavioral interventions and highlight the importance of identifying critical elements of interventions to maximize risk reduction outcomes.

KEYWORDS: Africa; HIV; couples; intervention

PMID: 24482105 PMCID: PMC4721656 DOI: 10.1177/2325957414520980

[Indexed for MEDLINE] **Free PMC Article**

Figure 5.5. Authorship Affiliation Conflict – A

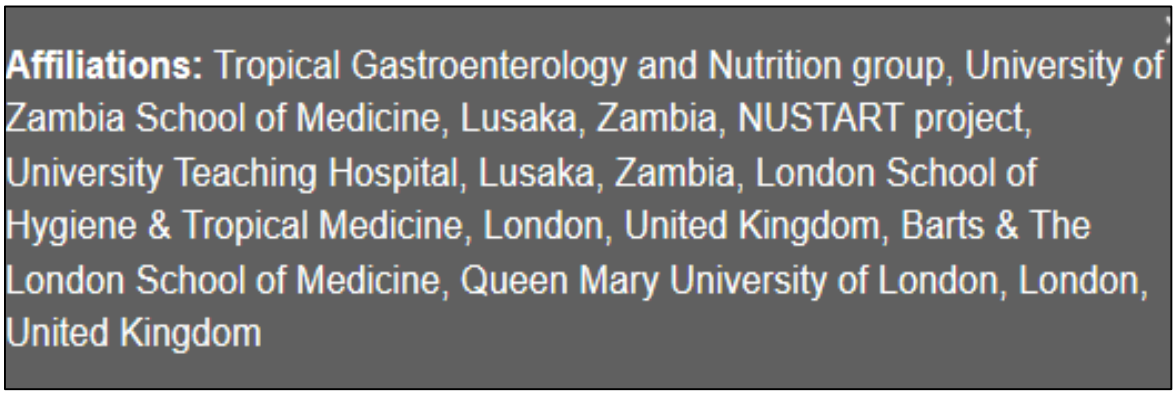

Figure 5.6. Authorship Affiliation Conflict – B

PLoS One. 2015 Nov 25;10(11):e0143075. doi: 10.1371/journal.pone.0143075. eCollection 2015.

Task-Shifting and Quality of HIV Testing Services: Experiences from a National Reference Hospital in Zambia.

Mwangala S[1,2], Moland KM[2], Nkamba HC[1], Musonda KG[1,3], Monze M[1], Musukwa KK[1], Fylkesnes K[2,4].

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1 Virology Laboratory, Department of Pathology and Microbiology, University Teaching Hospital, Lusaka, Zambia.
2 Centre for International Health, Department of Global Public Health and Primary Care, University of Bergen, Bergen, Norway.
3 Pathogen Molecular Biology Department, London School of Hygiene and Tropical Medicine, University of London, London, United Kingdom.
4 Department of Public Health, School of Medicine, University of Zambia, Lusaka, Zambia.

Figure 5.7. Authorship Affiliation Conflict - C

Table 5.4. Authorship Affiliation Conflict - A

Neonatal Sepsis and Antibiotic Resistance in Developing Countries
Bates, Matthew PhD; Kabwe, Mwila MSc; Zumla, Alimuddin MD, FRCP
The Pediatric Infectious Disease Journal: October 2014 - Volume 33 - Issue 10 - p 1097
doi: 10.1097/INF.0000000000000388

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University College London, UCL Hospitals NHS Foundation Trust, London, United Kingdom

Am J Trop Med Hyg. 2014 Dec;91(6):1074-8. doi: 10.4269/ajtmh.14-0054. Epub 2014 Sep 15.

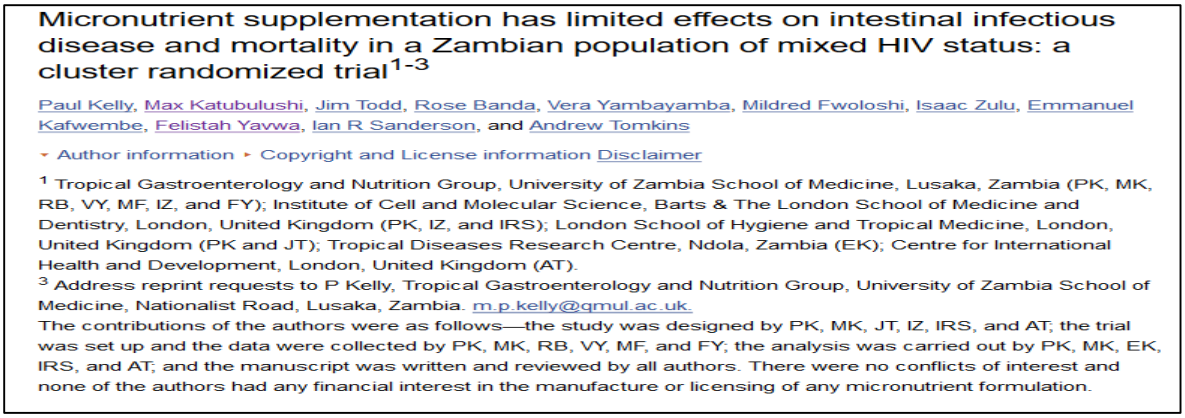
Modular laboratories--cost-effective and sustainable infrastructure for resource-limited settings.

Bridges DJ[1], Colborn J[2], Chan AS[2], Winters AM[2], Dengala D[2], Fornadel CM[2], Kosloff B[2].

Author information

1 Akros, Cresta Golfview Grounds, Lusaka, Zambia; President's Malaria Initiative, U.S. Centers for Disease Control and Prevention, Mozambique; Entomology Branch, Centers for Global Health, U.S. Centers for Disease Control and Prevention, Atlanta, Georgia; Abt Associates Inc., Bethseda, Maryland; President's Malaria Initiative, U.S. Agency for International Development, Washington, DC; London School of Hygiene and Tropical Medicine, Faculty of Tropical Infectious Diseases, Department of Clinical Research, London, United Kingdom; ZAMBART Project, University of Zambia School of Medicine, Lusaka, Zambia dbridges@akros.com.
2 Akros, Cresta Golfview Grounds, Lusaka, Zambia; President's Malaria Initiative, U.S. Centers for Disease Control and Prevention, Mozambique; Entomology Branch, Centers for Global Health, U.S. Centers for Disease Control and Prevention, Atlanta, Georgia; Abt Associates Inc., Bethseda, Maryland; President's Malaria Initiative, U.S. Agency for International Development, Washington, DC; London School of Hygiene and Tropical Medicine, Faculty of Tropical Infectious Diseases, Department of Clinical Research, London, United Kingdom; ZAMBART Project, University of Zambia School of Medicine, Lusaka, Zambia.

Figure 5.8. Author Affiliation Conflict – D



Micronutrient supplementation has limited effects on intestinal infectious disease and mortality in a Zambian population of mixed HIV status: a cluster randomized trial[1-3]

Paul Kelly, Max Katubulushi, Jim Todd, Rose Banda, Vera Yambayamba, Mildred Fwoloshi, Isaac Zulu, Emmanuel Kafwembe, Felistah Yavwa, Ian R Sanderson, and Andrew Tomkins

Author information ▸ Copyright and License information Disclaimer

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The contributions of the authors were as follows—the study was designed by PK, MK, JT, IZ, IRS, and AT; the trial was set up and the data were collected by PK, MK, RB, VY, MF, and FY; the analysis was carried out by PK, MK, EK, IRS, and AT; and the manuscript was written and reviewed by all authors. There were no conflicts of interest and none of the authors had any financial interest in the manufacture or licensing of any micronutrient formulation.

Figure 5.9. Author Affiliation Conflict – E

5.3.3 *Authorship Patterns of UNZA SOM Academic staff*

Figure 5.5 shows the yearly published research output from 1995 to 2015, a period of 20 years. A total of 281 scholarly papers were authored or co-authored by the academic staff at the UNZA School of Medicine within the period of review. The lowest number of papers published were recorded for 1997, 2000, and 2004, while the highest published research output recorded was for the years from 2013 to 2015. By far the highest annual output was 80 papers for the year 2015. Figure 5.10 further indicates that 85% of the period under review (1995-2012), recorded an extremely low research output, characterised by frequent small peaks and troughs, while from 2013 onwards, we see a steady increase in research output. The period 2013-2015 cumulatively recorded the highest research productivity of 145 publications, providing an average of 48.3 publications per year with a peak in 2015 with 80 publications. See appendix F.

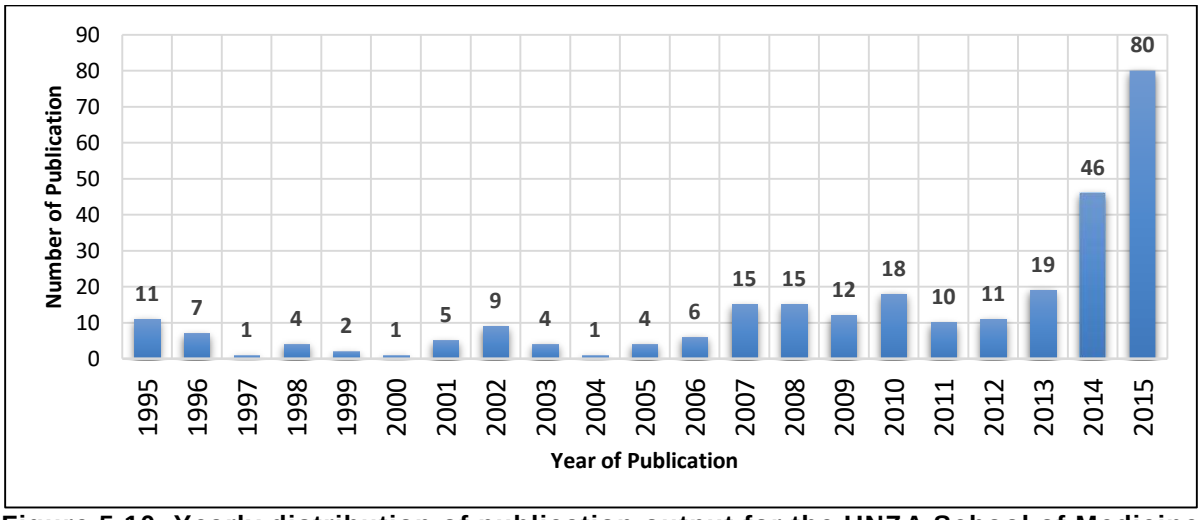

Figure 5.10. Yearly distribution of publication output for the UNZA School of Medicine

A total of seven hundred and thirty-three authors affiliated with the UNZA School of Medicine worked collaboratively to produce the 281 articles from 1995-2015. In terms of research output, Kelly, P was leading with 4.5% (33 articles) followed by Michelo, C with 3.82% (28 articles), Siziya, S with 3.41% (25 articles), then Ayles, H 2.59% (19 articles) and Mwaba P, 2.18% (16 articles). See Table 5.5. *cf appendix F.* for a list of all authors with an affiliation address of the University of Zambia, School of Medicine.

Table 5.5. Top Twenty Authors from @UNZA School of Medicine Address

S/N	*Author Name*	*Frequency*	*Cumulative Count*	*Percentage of Total*	*Cumulative Percent*
1	Kelly, P;	33	33	4.50	4.50
2	Michelo, C;	28	61	3.82	8.32
3	Siziya, S;	25	86	3.41	11.73
4	Ayles, H;	19	105	2.59	14.32
5	Mwaba, P;	16	121	2.18	16.51
6	Chintu, C;	15	136	2.05	18.55
7	Zumla, A;	13	149	1.77	20.33
8	Bates, M;	12	161	1.64	21.96
9	Atadzhanov, M;	11	172	1.50	23.47
10	Mutale, W;	11	183	1.50	24.97
11	Bond, VA;	10	193	1.36	26.33
12	Chomba, EN;	10	203	1.36	27.69
13	Sianongo, S;	10	213	1.36	29.06
14	Zulu, I;	10	223	1.36	30.42
15	Sinkala, E;	9	232	1.23	31.65
16	Mudenda, V;	8	240	1.09	32.74
17	Schaap, A;	8	248	1.09	33.83
18	Vwallika, B;	8	256	1.09	34.92
19	Zulu, JM;	8	264	1.09	36.02
20	Bowa, K;	7	271	0.95	36.97

Furthermore, the researcher again scrutinised the authorship list, by excluding those who were not on the payroll of the University of Zambia. However, although honorary lecturers appeared on the University of Zambia payroll, they are technically not employees of the University of Zambia; and were therefore removed. Here the researcher, was only interested in people who were categorised as employees of the University of Zambia as envisioned by the Higher Education Act No. 4 of 2013. The researcher again individually retrieved the results of each person named employee. This was after realising that some articles had no address for authors who were not first authors;

meaning that searching using the address field would not pick those academic staff from PubMed. Again this presents another challenge, those who were genuinely on the payroll of the University but had since left employment of the University would not be included as part of the UNZA SOM research put. The results in Table 5.6 (*cf appendix G*) indicate that the top leading authors are Chintu (16.5%), followed by Michelo (11.82%) and then Atadzhanov (5.67%).

Table 5.6. Authors with an affiliation address of the UNZA School of Medicine

S/N	*Author Name*	*Frequency*	*Percentage*	*Cumulative Count*	*Cumulative Percentage*
1	Chintu, C;	67	16.50	67	16.50
2	Michelo, C;	48	11.82	115	28.33
3	Atadzhanov, M;	23	5.67	138	33.99
4	Baboo, KS;	23	5.67	161	39.66
5	Chipeta, J;	20	4.93	181	44.58
6	Mutale, W;	17	4.19	198	48.77
7	Zulu, J;	17	4.19	215	52.96
8	Goma, F;	16	3.94	231	56.90
9	Maimbolwa, M;	13	3.20	244	60.10
10	Nzala, SH;	13	3.20	257	63.30
11	Chitanga, S;	8	1.97	265	65.27
12	Banda, Y;	7	1.72	272	67.00
13	Jovic, G;	7	1.72	279	68.72
14	Mwape, L;	7	1.72	286	70.44
15	Halwindi, H;	6	1.48	292	71.92
16	Kwenda, G;	6	1.48	298	73.40
17	Munsaka, S;	6	1.48	304	74.88
18	Banda, S;	5	1.23	309	76.11
19	Chongwe, G;	5	1.23	314	77.34
20	Kaile, T;	5	1.23	319	78.57

5.3.4 *Collaboration Patterns of the Academic staff*

The number of authors[11] per paper were calculated using the formula: x (x=1, 2, 3…) authors. Table 5.7 provides the number of publications that were authored by more than one author.

[11] In this instance, at least 1 author is from UNZA

Table 5.7. Number of Authors per Publication – (1995-2015)

Number of authors	*Frequency*	*Percent*	*Cumulative Percent*
1	25	8.9	8.9
2	17	6.0	14.9
4	25	8.9	38.1
3	40	14.2	29.2
5	31	11.0	49.1
>5	143	50.9	100.0
Total	**281**	**100.0**	

Papers authored by more than five researchers were the majority and totaled 143, followed by papers authored by three authors (40), five-author papers (31), one author-author papers and four-author papers (25 each). Two-author papers were the least (17). Several publications were authored by an unusually high number of authors; for instance, two papers were authored by 24 authors each while one paper was authored by 23 authors.

Figure 5.12 further shows that the period under review (1995-2015) has been dominated by multi-authored publications, except in 1997 and 2000 when there was only one publication recorded in PubMed/Medline in each year.

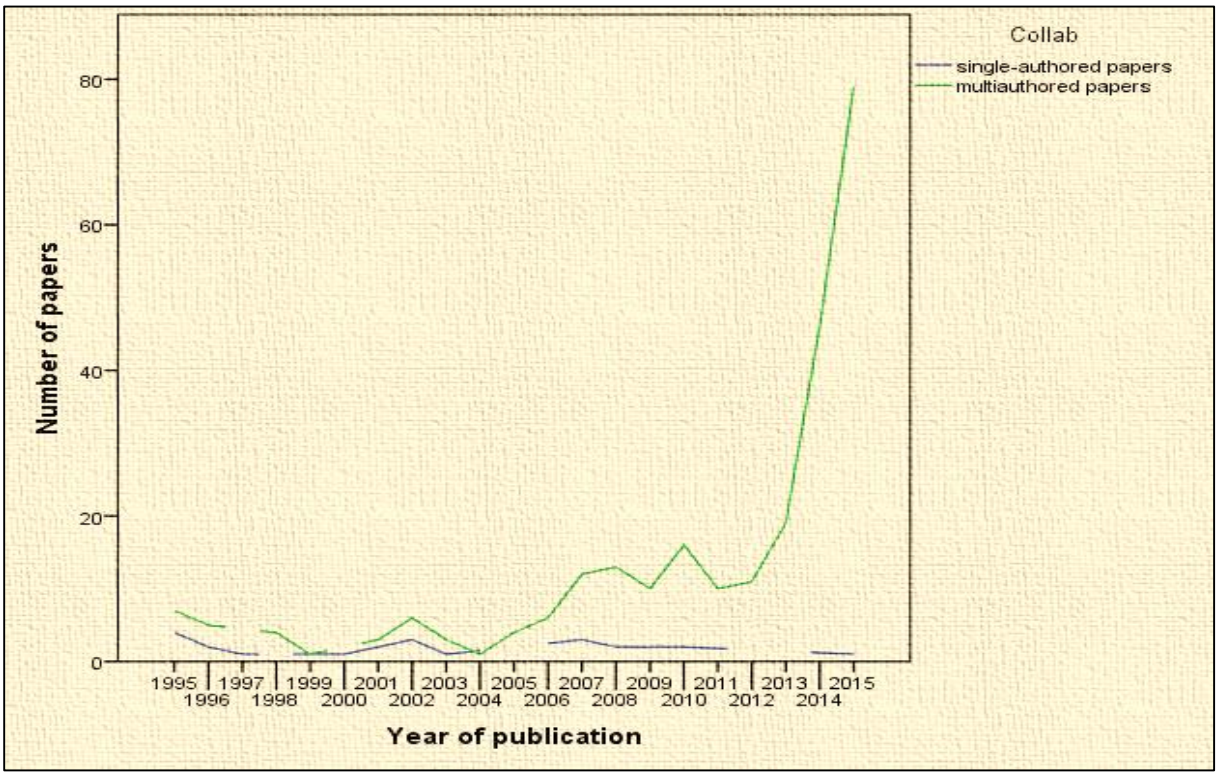

Figure 5.11. Author Collaboration Trends (1995-2015)

In these two years, both the papers were single authored; while the years 1998, 2004-2006, and 2011-2014 recorded no single authored paper. Interestingly, out of the 80 papers published in the year 2015 only one was single authored.

5.3.4.1 Year wise Degree of Collaboration of the Academic staff

According to Subramanyam (1983: 37), the Degree of Collaboration (DIC) is defined "as the ratio of the number of collaborative research papers to the total number of research papers published in the discipline during a certain period of time". The formula suggested by Subramanyam (1983) is widely used worldwide (Zafrunnisha & Pullareddy, 2009: 257; Khaparde & Pawar, 2013: 53; Velmurugan, 2013: 20; Jeyasekar & Saravanan, 2015: 138; Verma & Singh, 2017: 4) to measure the degree of collaboration in knowledge production studies. This is the formula used in this study to measure the DIC of the School of Medicine academic staff. In the formula below, the Degree of collaboration is obtained by dividing N_m = (Number of Multiple authored papers) with the value obtained after adding N_m (Number of Multiple authored papers with Ns = Number of Single author papers) where $C = N_m/N_m+N_s$, as suggested by Subramanyam (1983: 37). See Tables 5.8 and 5.9.

Table 5.8. Degree of Collaboration Calculation Formula

$DC = \frac{N_m}{N_m+N_s}$	
DC =	Degree of collaboration in a discipline
N_m =	Number of multiple-authored research papers in the discipline in a year
N_s =	Number of single papers in the discipline in a year
Total N_m	256
Total N_s	25
Total Papers	281

Table 5.9. Total Degree of Collaboration (1995-2015)

DC = Total number of multi authored papers / Total number of papers	256 / 256 + 25
Total DIC = 0.91	

An examination of the degree of collaboration (DIC) in Table 5.10 reveals that there is generally a high DIC over the whole period, with a few exceptional cases when the DIC was 0.00 (1997 and 2000). The years 1998, 2004-2006, and 2011-2014 recorded a 100% collaboration. As there were a total of **281** papers during the period under study (**256** multi-authored plus **25** single authored

papers) divided into **256** multi authored papers, the DIC for the School of Medicine over the whole period under study was 0.91 (*cf Table 5.12*).

Table 5.10. Year wise Degree of collaboration (1995-2015)

Year of Publication	*Single-authored papers*	*Multi-authored papers*	*Total*	*DIC*
1995	4	7	11	0.64
1996	2	5	7	0.71
1997	1	0	1	0.00
1998	0	4	4	1.00
1999	1	1	2	0.50
2000	1	0	1	0.00
2001	2	3	5	0.60
2002	3	6	9	0.67
2003	1	3	4	0.75
2004	0	1	1	1.00
2005	0	4	4	1.00
2006	0	6	6	1.00
2007	3	12	15	0.80
2008	2	13	15	0.87
2009	2	10	12	0.83
2010	2	16	18	0.89
2011	0	10	10	1.00
2012	0	11	11	1.00
2013	0	19	19	1.00
2014	0	46	46	1.00
2015	1	79	80	0.99
Total	**25**	**256**	**281**	**0.91**

5.3.4.2 Institutions that Collaborated with the UNZA School of Medicine

Researchers from one thousand, three hundred and twenty-eight (1328) institutions collaborated with UNZA SOM staff to produce the 256 co-published publications. Table 5.12 shows the top twenty (20) institutions with whom the UNZA SOM academic staff collaborated most frequently. These are the University of London, United Kingdom (294, 24.14%), University Teaching Hospital (UTH), Zambia (147, 11.07%), University of Malawi, Malawi (35, 2.64%), Centre for Infectious Disease Research in Zambia (33, 2.48%), Ministry of Health, Zambia (26, 1.96%), University of Alabama at Birmingham, United States of America (25, 1.88%) and the University of North Carolina at Chapel Hill, United States of America (24, 1.81%).

Together these institutions contributed 58.06% (771) of the publications co-authored with the UNZA Medical School staff. It is not surprising that the UTH is one the primary institutions with which the School of Medicine collaborates as every medical school must relate to a teaching

hospital to provide clinical practice for its students and staff and to conduct clinical research (*cf Table 5.11 and appendix H*).

Table 5.11. Institutions Collaborating with UNZA School of Medicine

S/N	*Name of Institution*	*Country*	*Frequency*	*Percent*	*Cumulative Frequency*	*Cumulative Percent*
1	University of London	UK	294	22.14	294	0.22
2	University Teaching Hospital	Zambia	147	11.07	441	0.33
3	University of Malawi	Malawi	35	2.64	476	0.36
4	Centre for Infectious Disease Research in Zambia	Zambia	33	2.48	509	0.38
5	Ministry of Health (Zambia)	Zambia	26	1.96	535	0.40
6	University of Alabama at Birmingham	USA	25	1.88	560	0.42
7	University of North Carolina at Chapel Hill	USA	24	1.81	584	0.44
8	Vanderbilt University	USA	24	1.81	608	0.46
9	University of Bergen	Norway	21	1.58	629	0.47
10	Imperial College London	UK	16	1.20	645	0.49
11	Karolinska Institute	Sweden	16	1.20	661	0.50
12	University of Cape Town	South Africa	15	1.13	676	0.51
13	Emory University	USA	13	0.98	689	0.52
14	Stellenbosch University	South Africa	13	0.98	702	0.53
15	University of Miami	USA	13	0.98	715	0.54
16	University College London Hospitals	UK	12	0.90	727	0.55
17	Centers of Disease Control and Prevention	USA	11	0.83	738	0.56
18	National Institutes of Health	USA	11	0.83	749	0.56
19	University of Washington	USA	11	0.83	760	0.57
20	World Health Organisation	Zambia	11	0.83	771	0.58

Table 5.12 reveals that fifteen countries collaborated with UNZA School of Medicine in research during the period under review. These countries are the United States of America (66, 28.09%), the United Kingdom (31. 13.19%), Canada (14, 5.96%), South Africa (14, 5.96%), Uganda (9, 3.83%), Nigeria (8, 3.40%), Tanzania (8. 3.40%) and Sweden (7, 2.98%).

France and Kenya Malawi and Switzerland had five publications, with a percentage of 2.13 each. The United States of America is the leading collaborator, followed by the United Kingdom and Canada. For further details (*cf Table 5.12 and appendix I*).

Table 5.12. Countries Collaborating with UNZA School of Medicine

S/N	*Country*	*Frequency*	*Percent*	*Cumulative Count*	*Cumulative Percent*
1	United States of America	66	28.09	66	28.09
2	United Kingdom	31	13.19	97	41.28
3	Canada	14	5.96	111	47.23
4	South Africa	14	5.96	125	53.19
5	Uganda	9	3.83	134	57.02
6	Nigeria	8	3.40	142	60.43
7	Tanzania	8	3.40	150	63.83
8	Sweden	7	2.98	157	66.81
9	France	5	2.13	162	68.94
10	Kenya	5	2.13	167	71.06
11	Malawi	5	2.13	172	73.19
12	Switzerland	5	2.13	177	75.32
13	Germany	4	1.70	181	77.02
14	India	4	1.70	185	78.72
15	Zimbabwe	4	1.70	189	80.43
16	Australia	3	1.28	192	81.70
17	Saudi Arabia	3	1.28	195	82.98
18	Sudan	3	1.28	198	84.26
19	Belgium	2	0.85	200	85.11
20	Botswana	2	0.85	202	85.96

5.3.5 *Journals used by Academic staff*

The University of Zambia School of Medicine academic staff and researchers published in a total of 159 journals (*cf Appendix J)* for a full list of the journals) over the twenty-year review period[12]. Table 5.14 presents a list of the top 30 journals in which the researchers most frequently published in a ranked order with the total number of publications for each journal. These 30 journals contributed 48.8% (142) of the total 291 publications produced by the School of Medicine academic staff and researchers in the period under review. Only one of these journals is an African journal, the *Medical Journal of Zambia,* which is published by the Zambia Medical Association of Zambia. The results reveal that PLoS OneE[13] recorded the highest number of publications with 13 publications, followed, by Tropical Doctor (*Trop Doc)* with 10 publications, the American Journal of Tropical Medicine and Hygiene (*Am J Trop Med Hyg)* 8 publications, BioMed Central Health Services Research (*BMC Health Serv Res)* with 7, BioMed Central Infectious Diseases (*BMC Infect)* with 7, BioMed Central Public Health *(BMC Public Health)* with 7, *Lancet* with 7, Clinical Infectious Diseases (*Clin Infect Dis)* with 6, International Journal of Tuberculosis and Lung Disease *(IJTLD) (Int J Tuberc Lung Dis)* with 6, and Malaria Journal *(Malar J)* with 6.

[12] *Books and other scholarly communication channels where excluded due to the database that the researcher used; PubMed/Medline which is freely available online but only indexes journals. However, the teaching staff were asked to indicate the scholarly communication channels they use.*

[13] Published by the Public Library of Science. PLoS One, the acronym has become the de facto title

Others are BioMed Central Research Notes (*BMC Research Notes)* with 5, Tropical Medicine and International Health (*Trop Med Int Health)* had (5), Epilepsy and Behavior *(Epilepsy Behav) with* (4), Health Research Policy and Systems *(Health Res Policy Syst)* had (4), Journal of Acquired Immune Deficiency Syndromes *(J Acquir Immune Defic Syndr)* with (4), and Medical Journal Zambia (4) and the Transactions of the Royal Society of Tropical Medicine and Hygiene with (4) each. The Impact Factor (IF) for each journal was retrieved from the website of Clarivate Analytics (http://ipscience-help.thomsonreuters.com/incitesLiveJCR/8275-TRS.html) based on their February 2017 IF calculations. The Lancet had the highest Impact Factor of 47.831, followed by Clinical Infectious Diseases with (8.216), then followed by the Journal of Acquired Immune Deficiency Syndromes with (3.935), then PLoS One (3.234), Tropical Medicine and International Health (2.85), Health Research Policy and Systems (2.271), BioMed Central Infectious Diseases (2.768), Malaria Journal (2.715), Epilepsy and Behavior (2.631), American Journal of Tropical Medicine and Hygiene (2.549), International Journal of Tuberculosis and Lung Disease (2.468), Transactions of the Royal Society of Tropical Medicine and Hygiene (1.931) and BioMed Central Health Services Research (1.827). *Cf Table 5.13, Appendix J and Figure 5.12.*

Table 5.13. Journals used by Academic staff

S/N	*Title of Journal*	*Freq*	*Percent*	*Cumulative*	*Cumulative*	*2017 [14] Imp*
1	PloS one	13	4.5	13	4.5	2.766
2	Tropical doctor	10	3.4	23	7.9	0.565
3	The American journal of tropical medicine and hygiene	8	2.7	31	10.7	2.564
4	BMC health services research	7	2.4	38	13.1	1.843
5	BMC infectious diseases	7	2.4	45	15.5	2.62
6	BMC public health	7	2.4	52	17.9	2.42
7	Lancet (London, England)	7	2.4	59	20.3	53.254
8	Clinical infectious diseases	6	2.1	65	22.3	9.117
9	Malaria journal	6	2.1	71	24.4	2.845
10	The international journal of tuberculosis and lung disease	6	2.1	77	26.5	2.392
11	BMC research notes[15]	5	1.7	82	28.2	n/a
12	Tropical medicine & international health	5	1.7	87	29.9	2.541
13	Epilepsy & behavior : E&B	4	1.4	91	31.3	2.6
14	Health research policy and systems / BioMed Central	4	1.4	95	32.6	2.179
15	Journal of acquired immune deficiency syndromes (1999)	4	1.4	99	34	4.116
16	Medical journal of Zambia[16]	4	1.4	103	35.4	n/a
17	Transactions of the Royal Society of Tropical Medicine & Hygiene	4	1.4	107	36.8	2.82
18	BMC gastroenterology	3	1	110	37.8	2.731

[14] Journal Citation Reports (JCR) based on Clarivate Analytics (2017 Selected Editions: SCIE,SSCI Selected Category Scheme: WoS)

[15] Source-Normalised Impact per Paper (SNIP), based on SCOPUS, Elsevier of 0.801

[16] Published by the Medical Association of Zambia, Lusaka, Zambia.

19	BMC international health and human rights	3	1	113	38.8	1.762
20	Bulletin of the World Health Organization	3	1	116	39.9	6.361
21	International journal of gynaecology and obstetrics	3	1	119	40.9	2.072
22	Journal of clinical microbiology	3	1	122	41.9	4.054
23	Journal of the International AIDS Society	3	1	125	43	5.131
24	Liver international: journal of the International Association for the Study of the Liver	3	1	128	44	4.5
25	Parasites & vectors	3	1	131	45	3.163
26	The Journal of infectious diseases	3	1	134	46	5.186
27	Acta tropica	2	0.7	136	46.7	2.509
28	African journal of primary health care & family medicine	2	0.7	138	47.4	n/a
29	African journal of psychiatry	2	0.7	140	48.1	n/a
30	AIDS (London, England)	2	0.7	142	48.8	4.914

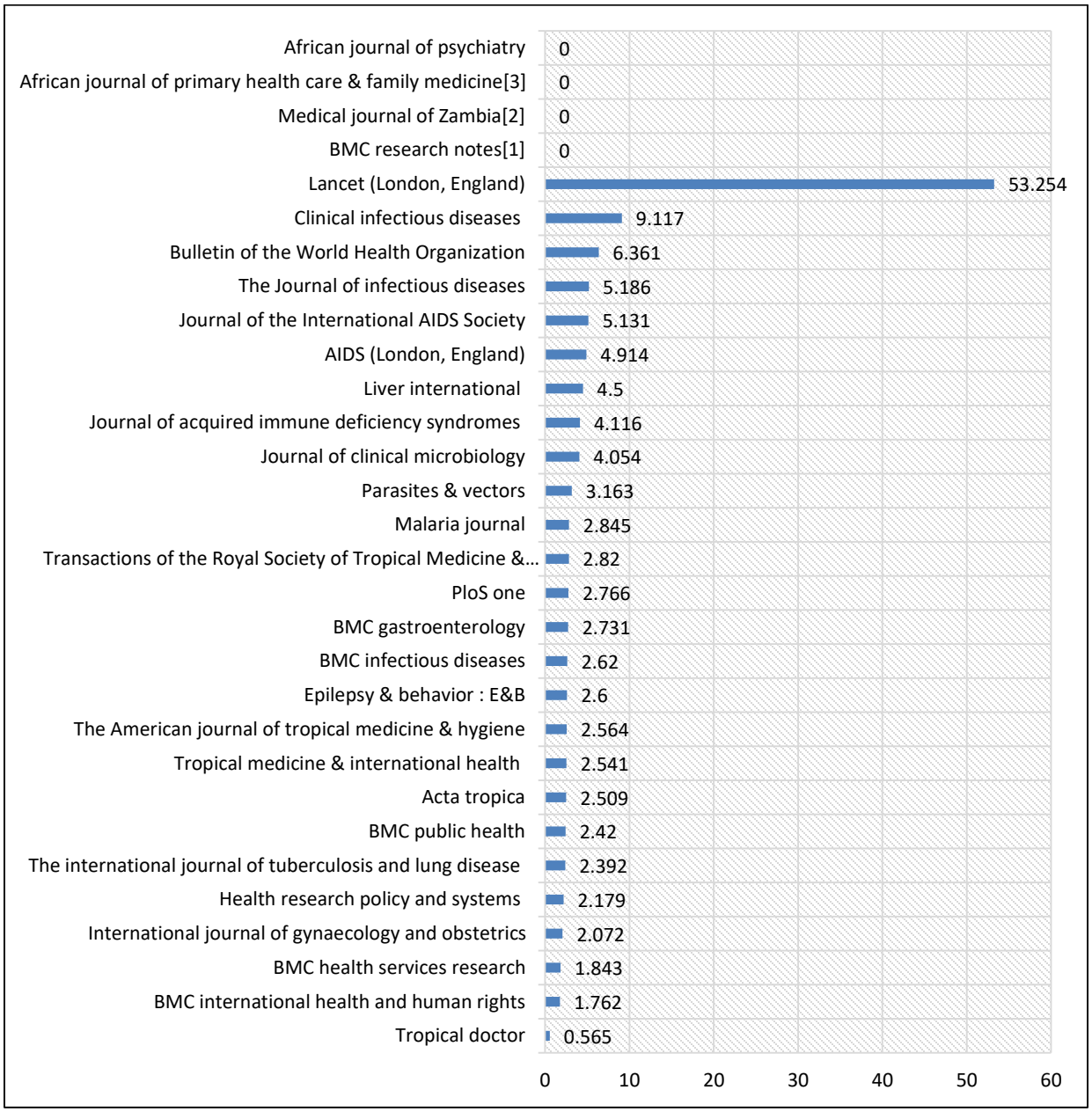

Figure 5.12. Impact Factors of Core Journals used by Academic staff

5.3.6 *Major Subject Areas Covered in the Journal Articles*

The major subject areas of the research output were individually examined and grouped into common thematic areas. HIV/AIDS was the most common subject area with a frequency of 93 (325), followed by tuberculosis with 22 (7.6%), Health Systems with 1495.2%), Cancer with 13 (4.5%), Cigarette Smoking with 10 (3.4%). The subject Malaria was at 8 (2.7%), followed by Diarrhoea 7 (2.4%), Epilepsy was at 5 91.7%, Mental Health at 5 (1.7%) and Respiratory Tract Infections at 5 (1.7%). See Table 5.14. For the full list of subject headings, *cf Appendix K*.

Table 5.14. Major Subject Areas

S/N	*Subject Area*	*Frequency*	*Percent*	*Cumulative Count*	*Cumulative Percent*
1	HIV/AIDS	93	31.96	93	31.96
2	Tuberculosis	22	7.56	115	39.52
3	Health Systems	15	5.15	130	44.67
4	Cancer	13	4.47	143	49.14
5	Cigarette Smoking	10	3.44	153	52.58
6	Malaria	8	2.75	161	55.33
7	Diarrhoea	7	2.41	168	57.73
8	Epilepsy	5	1.72	173	59.45
9	Mental Health	5	1.72	178	61.17
10	Respiratory Tract Infections	5	1.72	183	62.89
11	Helminth	4	1.37	187	64.26
12	Medical Abortion	4	1.37	191	65.64
13	Surgery	4	1.37	195	67.01
14	Trypanosomiasis	4	1.37	199	68.38
15	Diabetes	3	1.03	202	69.42
16	Gastrointestinal Pathology	3	1.03	205	70.45
17	Health Workers	3	1.03	208	71.48
18	Informed Consent	3	1.03	211	72.51
19	Measles	3	1.03	214	73.54
20	Mortality	3	1.03	217	74.57
21	Policy	3	1.03	220	75.60
22	Schistosomiasis	3	1.03	223	76.63
23	Anthrax	2	0.69	225	77.32
24	Cytomegalovirus	2	0.69	227	78.01
25	Health Education	2	0.69	229	78.69
26	Health Information	2	0.69	231	79.38
27	Hepatitis	2	0.69	233	80.07
28	Malnutrition	2	0.69	235	80.76
29	Medical Male Circumcision	2	0.69	237	81.44
30	Rheumatology	2	0.69	239	82.13

5.4 Section Two: Semi Structured Questionnaires

This part of the results of the study presents results from the questionnaire survey and interviews.

5.4.1 *Study Responses from Questionnaires*

Self-administered questionnaires (*cf Appendix A*) were distributed to 57 academic staff by the

researcher. The participants were selected by stratified purposeful sampling per academic rank. The sampling criteria of academic staff (lecturers) respondents was discussed in chapter four (*cf 4.3.3.1*). A total of 41 respondents responded to the questionnaire, giving a response rate of 72%, see Table 5.15. This table outlines the number and percentage (%) of staff per academic strata, as well as the actual study sample and percentage (%) per strata. Five (5) responses were obtained from the online questionnaire and thirty-six (36) were acquired from the distributed print questionnaire. The response rates were higher among the senior ranks.

Table 5.15. Study Respondents

S/N	*Academic Ranks*	*Staff per Strata*	*% of Staff per Strata*	*Sample per Strata*	*% Sample per Strata*	*No of Responses*	*% Respondents per Strata*
1	Professor	9	8	4	7	4	10
2	Associate Professor	4	3	2	4	2	5
3	Senior Lecturer	13	11	6	11	6	15
4	Lecturer I	20	17	10	18	8	20
5	Lecturer II	21	18	10	18	10	24
6	Lecturer III	50	43	25	44	11	27
	Total	**117**	**100**	**57**	**100**	**41**	**100**

5.4.2 ***Background Information***

5.4.2.1 Background Characteristics of the Respondents

To ground the responses in context, background characteristics of the respondents were sought. These included their demographic profiles, their digital information retrieval skills, Internet search skills, frequency of use of the Internet, purpose for use of the Internet and searching techniques used. The reason behind asking the question on digital information skills is explained under 5.4.3.

5.4.2.2 Demographic Profile of Respondents

The results from the study indicate that the respondents with PhD qualifications were 19 (46.3%) and those with Master's degree were 22 (53.7%). Eleven (26.8%) of the respondents were employed at the Lecturer III grade, 10 (24.4%) at the Lecturer II grade, 9 (22.0%) were at the Lecturer I grade, 3 (7.3%) were Senior Lecturers, 4 (9.8%) were Associate Professors and 4 (9.8%) were Professors.

In terms of work experience, the largest number of the respondents had worked for the institution for a period of 5-12 years (17, 41%). *cf Question One (1)* on Background Information with specific reference to question 1.1, 1.2 and 1.3. See Table 5.16.

Table 5.16. Demographic profile of respondents

	Qualification	*Frequency*	*Percent*	*Cumulative Percent*
Highest Level of Qualification	Masters	22	53.7	53.7
	PHD	19	46.3	100
	Total	**41**	**100.0**	
Academic Rank	Lecturer III	11	26.8	26.8
	Lecturer II	10	24.4	51.2
	Lecturer I	9	22.0	73.2
	Senior Lecturer	3	7.3	80.5
	Associate Professor	4	9.8	90.2
	Professor	4	9.8	100.0
	Total	**41**	**100.0**	
Work Experience	Less than 4 years	8	20	20
	5-12 years	17	41	61
	13-20 years	8	20	81
	More than 20 years	8	19	100.0
	Total	**41**	**100.0**	

5.4.2.3 Subject Specialisation

Respondents were asked to state their field of specialisation. The results are indicated in Figure 5.13. The concentration of the respondents had a specialisation in public health, followed by medical microbiology, pharmacology and child health. It was important to ask the respondents to state their subject specialisation as this may also have a bearing in measuring the research outputs.

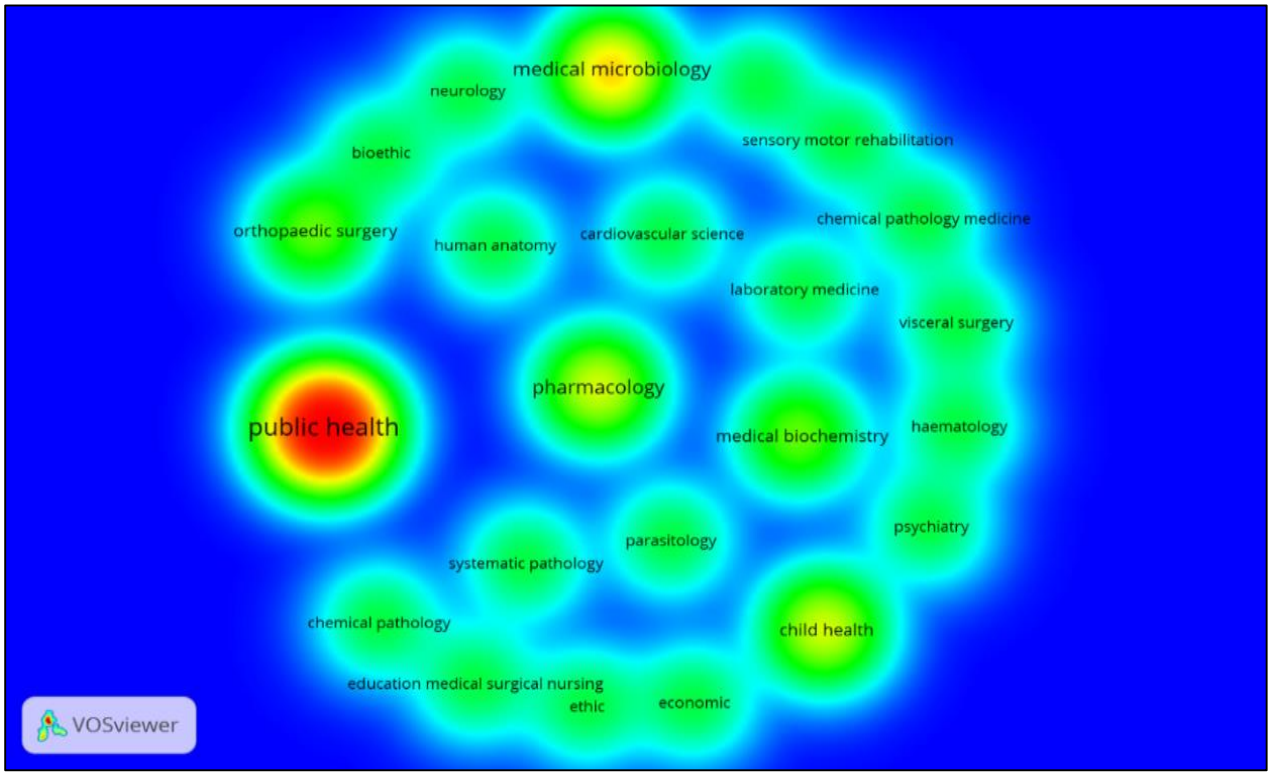

Figure 5.13. Subject Specialisation

5.4.3 *Digital Information Retrieval Skills*

5.4.3.1 Digital Information Retrieval Skills

To assess the respondent's digital information retrieval skills, they were asked on their Internet search skills, Frequency of Use of the Internet, Purpose for Use of the Internet and Searching Techniques used. In today's research landscape, possession of digital skills enables a researcher to comfortably retrieve information that is useful and relevant to their research and ultimately writing and publishing of their research output. In this context, a question was therefore posed to assess their digital literacy skills. *cf Question 2* of the Semi Structured Questionnaire (*cf Appendix A*) with specific reference to Questions 2.1, 2.2, 2.3 and 2.4.

5.4.3.2 Internet Search Skills

The results shown in Figure 5.14 indicate how the academic staff rated their Internet search skills. Eight (19.5%) respondents rated their Internet search skills as excellent and 18 (43.9%) indicated that their Internet search skills were very good. Thirteen (31.8%) said their Internet search skills were good, whilst 1 (2.4%) mentioned that their Internet search skills were fair and bad respectively.

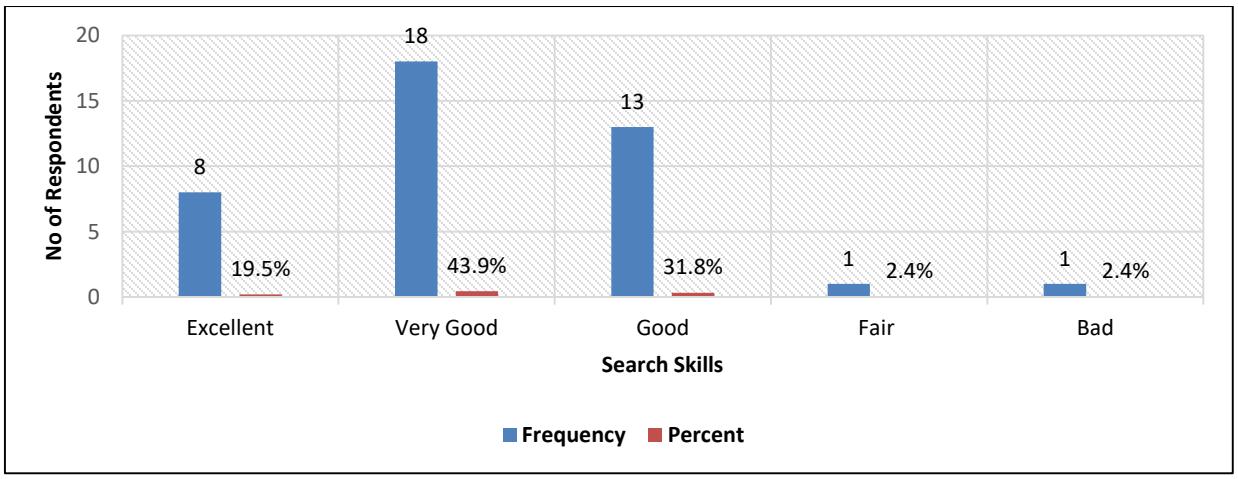

Figure 5.14. Internet Search Skills

5.4.3.3 Searching Techniques Used

Respondents were asked to state the search techniques that they used when searching the Internet. The question was such that the respondents could tick as many of the relevant response categories that related to the search techniques they generally use as possible. The results show that the search techniques most frequently used were searching by keywords (82.9%) and by topic (31.75%). See

Figure 5.15. To carry out an effective search, one requires skill and familiarity with the online environment as well as knowledge of search techniques.

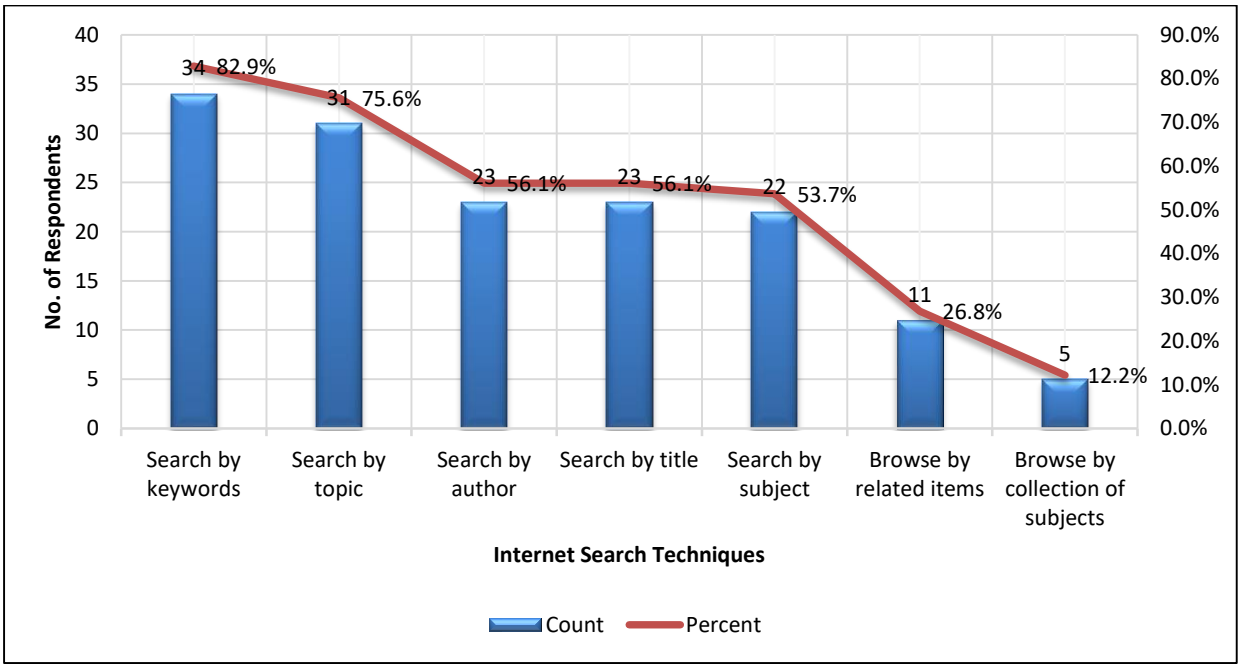

Figure 5.15. Commonly used Internet Search Techniques

5.4.3.4 Frequency of Use of the Internet

The researcher was interested in finding out how frequently the respondents used the Internet. The results indicate that there were 36 (87.8) respondents who used the Internet every day, 2 (4.9) used the Internet more than once in a week, 2 (4.9%) used the Internet once a week, and 1 (2.4%) used the Internet occasionally. See figure 5.16. The results therefore show that the vast majority of the respondents used the Internet daily.

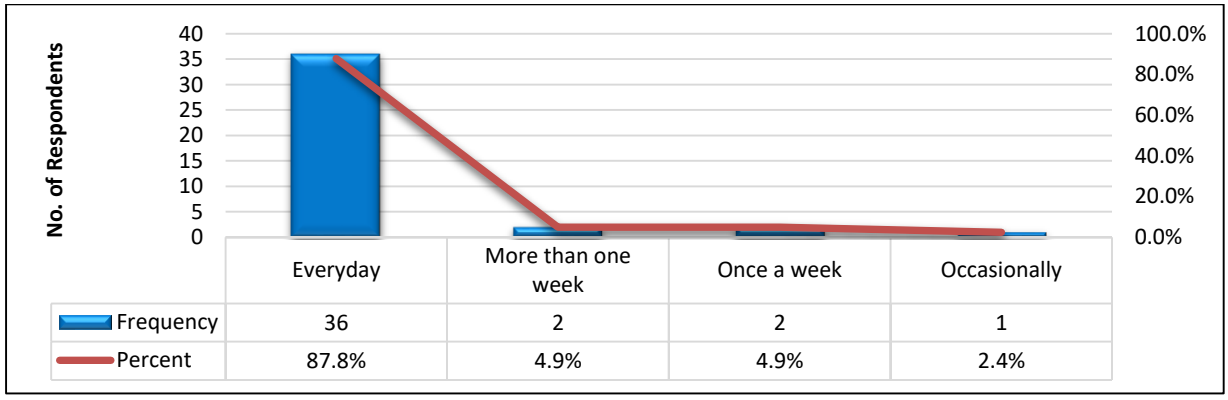

Figure 5.16. Frequency of Internet Use

5.4.3.5 Reasons why the Internet was Used

Respondents provided the following reasons on why they used the Internet. The responses are listed in a ranked order of the response most frequently obtained. An almost equal number of respondents, respectively 27 (67.5%) and 26 (65.0%), searched the Internet because it provided the digitised version of the information they wanted and because they deemed Internet resources to be reliable. A smaller proportion, 15 (37.5%), valued the Internet since they could also access digitised versions of historical materials, and finally 7 (17.5%) indicated that they could find the books they wanted to consult on the Internet. See Table 5.17. The results of the study show that digitised materials are used frequently and that these digitised materials are considered reliable sources of information.

Table 5.17. Reasons for using the Internet

Reasons for using the Internet	*Frequency*	*Percent*
Because I find the digitised version of documents that I need....	27	67.5%
Because they are reliable sources of information	26	65.0%
Because I can access the digitised versions of historical materials...	15	37.5%
Because I want to know where to find books...	7	17.5%

5.4.4 ***Knowledge Production Practices and their Attributes***

5.4.4.1.1 Knowledge Production Practices and their Attributes

The researcher wanted to establish the knowledge production practices and attributes of the academic staff at the University of Zambia SOM. Therefore, questions were phrased regarding the channel of communication in which knowledge was produced by academic staff, purpose for which knowledge is produced, attributes of the knowledge produced, information materials used in knowledge production and sources of information used in knowledge production. See Question 3 of the Semi Structure Questionnaire (cf *Appendix A*; *3.1, 3.2, 3.3 and 3.4*).

5.4.4.1.2 Type of Knowledge Output by the Academic staff

Knowledge outputs or research outputs are those products that academic researchers produce as the outcome of their research, in other words, they are the products of research (*cf 1.5.17*). These research outputs require a communication channel in order to reach their intended audience. Others have termed them as knowledge products and in a study on development of a knowledge readiness framework for medical research, knowledge product has been defined as "knowledge resulting from research with potential to improve individual or public health" (Engel et al., 2019: 1). In

asking this question the researcher was interested in finding out the knowledge outputs that the academic staff used to communicate their research findings.

By far the most frequently used channels that the respondents indicated they used to convey their knowledge output or knowledge produced were journal articles (95.0%), followed by Masters student dissertations (62.5%), PhD student theses (42.4%), research monographs (32.5%), refereed conference proceedings (27.5%), policy briefs (22.5%), unrefereed conference proceedings (17.5%) and the least used were newspaper articles (7.5%). *cf question 3.1*. See Table 5.18.

Table 5.18. Type of Research Output to Convey Knowledge Produced

	Frequency	*Percent*
Research journal articles	38	95.0
Masters student dissertations	25	62.5
PhD student dissertations/theses	17	42.5
Research books	13	32.5
Refereed conference proceedings	11	27.5
Policy briefs	9	22.5
Unrefereed conference proceedings	7	17.5
Newspaper articles	3	7.5

5.4.4.1.3 Purpose for which Knowledge is Produced

Respondents were asked to state for what purpose they produce knowledge. There were several responses, and these ranged from 35 (85.4%) respondents who indicated it was for research purposes, to 33 (80.5%) who said it was for academic promotion and to produce new knowledge, to 30 (73.2%) who said to improve teaching, to 25 (61.0%) to provide evidence, to 21 (51.2%) to change practice, to 17 (41.5%) to improve policy, to 17 (41.5%) for personal enrichment, and 10 (24.4%) for research funding. *cf question 3.2*.

The most favoured reasons as to why the respondents engaged with knowledge production were for research purposes, to produce new knowledge and for academic advancement. See Figure 5.17. below.

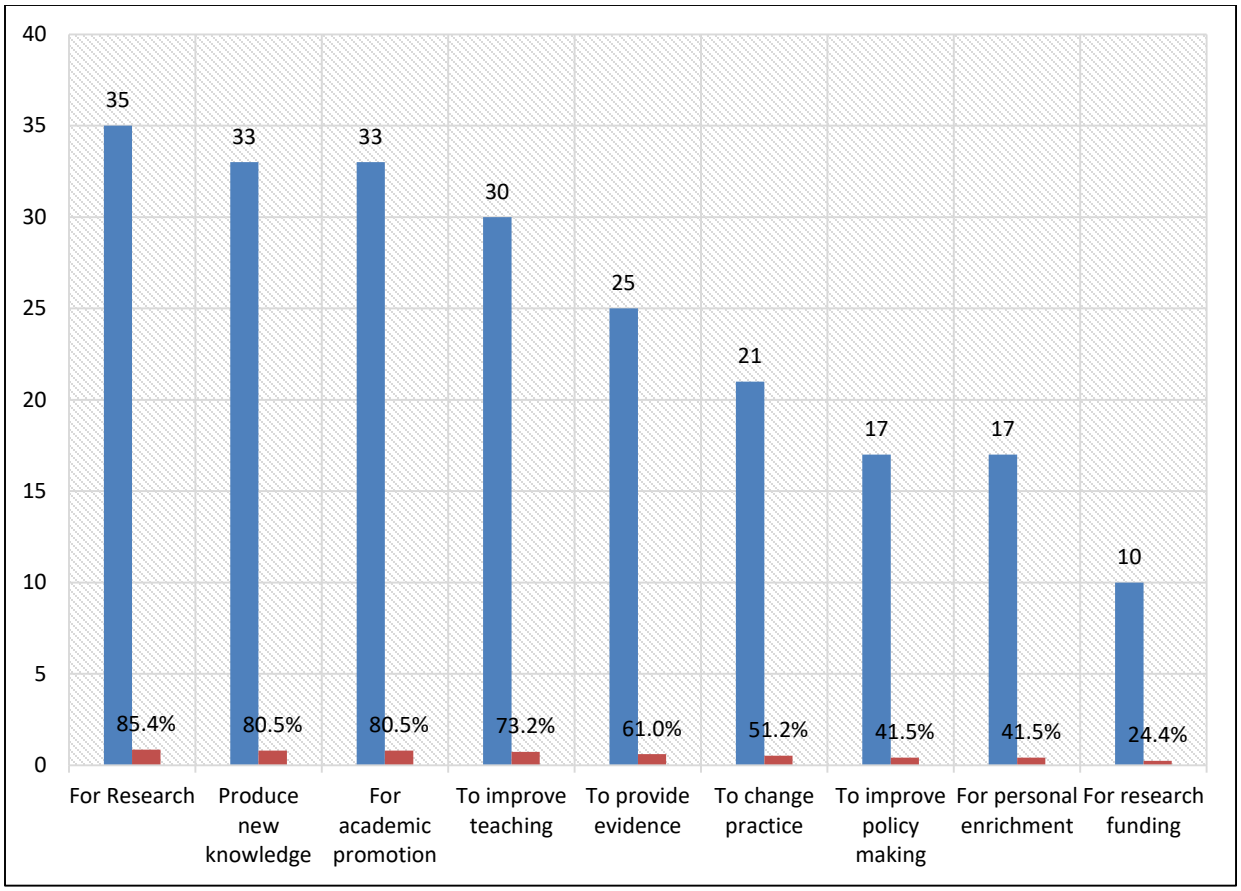

Figure 5.17. Purpose of Knowledge Production

5.4.4.1.4 Attributes of the Knowledge Produced

The attributes of the knowledge produced in the academic environment are important factors in the knowledge production cycle. Therefore, respondents were asked to indicate the attributes of the knowledge that they produce, *cf question 3.3.* The major attributes mentioned were that the knowledge they produced was ethically produced (34, 82.9 %|) and that it was evidence based (33, 80.5). A significant number indicated that the knowledge they produced advances critical scholarship (26, 63.4%) and that it was trustworthy (26, 63.4%). Sixteen respondents (39.0%) indicated that the knowledge they produced was socially beneficial and 15 (36.6%) specified that it can be transferred. Only six respondents (14%) each, stated that the knowledge that they produced can be preserved and that it was economically beneficial. See Figure 5.18. below.

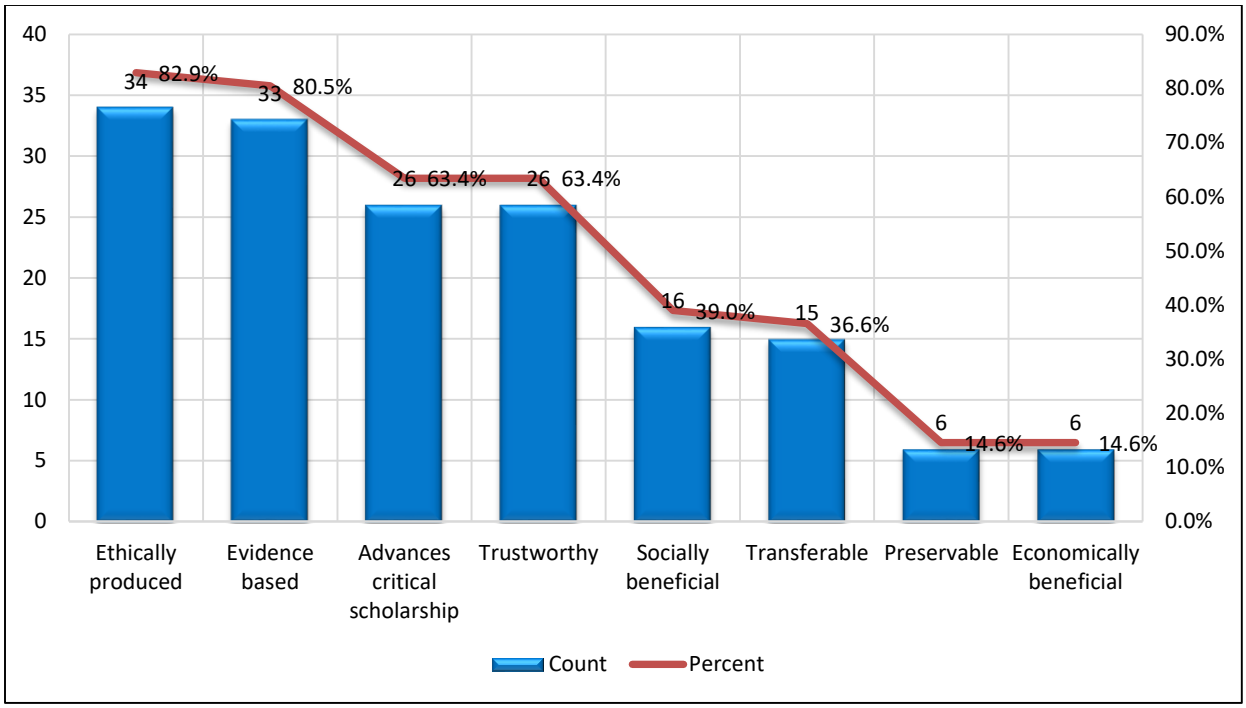

Figure 5.18. Attributes describing Knowledge Produced

5.4.4.2 Information Media and Sources used in Knowledge Production

A further factor that was important to determine was the information media that the academic staff used in the knowledge production process, *cf* 3.4. It is clear from the responses depicted in Figure 5.20 below that the largest proportion indicated they consulted electronic journals (37, 92.5%), followed by electronic books (25, 62.5%) and in equal proportion print journals (24, 60.0%) and print books at (24, 60.0%). See Figure 5.19.

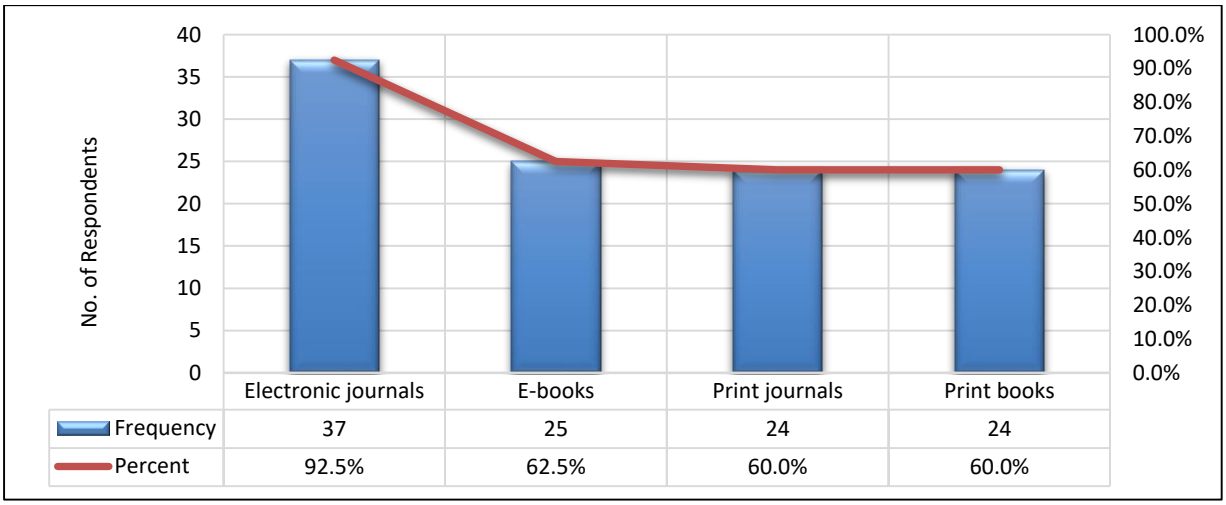

Figure 5.19. Information Media Consulted for Knowledge Production

5.4.4.3 Sources of Information

Upon being questioned further where the respondents found the information media, they indicated that they obtained the information they consulted from different sources. The significantly largest proportion was from the Internet (40, 97.6%), followed by the University Library (23, 56.1%), University departments (18, 43.9%), Personal Portable Devices (PDAs) (15, 36.6%), Colleagues (13, 31.7%) and Government departments (11, 26.8%). See Table 5.19.

Table 5.19. Sources of Information

	Frequency	*Percent*
Internet	40	97.6
Library	23	56.1
University departments	18	43.9
Personal portable devices (PDAs)	15	36.6
Colleagues	13	31.7
Government departments	11	26.8

5.4.5 ***Knowledge Production, Diffusion and Utilisation Patterns***

This section relates to aspects of knowledge production, diffusion and utilisation patterns answering the following objectives of the study in Chapter One section 1.3; cf 1.3.1.2 and 1.3.1.3.

- Knowledge production patterns in a university environment,
- Knowledge diffusion patterns in a university environment,
- Knowledge utilisation patterns in a university environment,

The researcher specifically focused on frequency of knowledge production, knowledge diffusion and frequency of use of knowledge products.

5.4.5.1 How often do you produce Knowledge Products in your work?

Respondents were asked to indicate the frequency with which they utilise knowledge products in their work. It is important that people who work in an industry where the mission is to create and produce knowledge in whatever format; as this may indicate their valuation of knowledge but also their willingness to contribute to that institution's knowledge production. See Table 5.20 for their responses. The results show that a large number of the respondents (19, 46.3%) were frequently producing knowledge products in the work environment. *cf question 4.1*

Table 5.20. Frequency of Knowledge Production in Work

		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	Rarely	2	4.9	5.0	5.0
	A few times	10	24.4	25.0	30.0
	Frequently	19	46.3	47.5	77.5
	Always	9	22.0	22.5	**100.0**
	Total	40	97.6	**100.0**	
Missing	System	1	2.4		
Total		**41**	**100.0**		

5.4.5.2 Frequency of diffusion of Knowledge Products

The respondents indicated that they diffused knowledge frequently 11(26.83%), Always 21 (51.22%), and rarely 2 (4.88%), while none said never, *cf. question 4.2.* See Table 5.21.

Table 5.21. Frequency of diffusion of Knowledge Products

	Frequency	*Percentage*
A Few Times	11	26.83
Frequently	21	51.22
Always	7	17.07
Never	0	0.00
Rarely	2	4.88
Total	**41**	**100.00**

5.4.5.3 Frequency of use of Knowledge Products

Regarding the frequency with which the academic staff were using knowledge products for knowledge production purposes, it was established that the majority of the respondents (24, 58.5%) frequently used knowledge products, 11 (26.8%) indicated always and only 6 (14.6%) indicated a few times, while none said never or rarely, *cf . question 4.3.* See Figure 5.20.

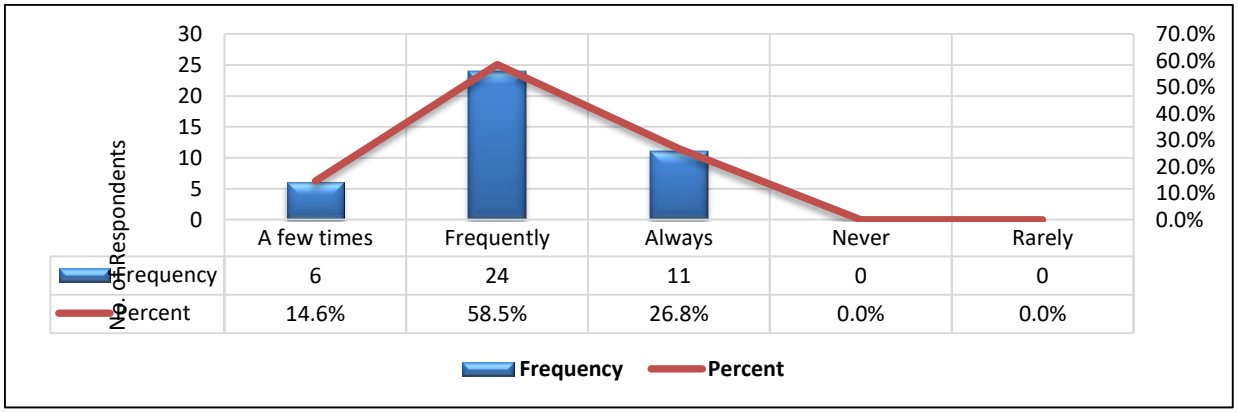

Figure 5.20. Frequency of Knowledge Products Use

5.4.5.4 Key Issues relating to Knowledge Production Patterns at UNZA School of Medicine

Respondents were asked to identify and outline the key issues they have encountered regarding knowledge production, diffusion and utilisation in a university environment, especially as it's relates to the UNZA SOM. The Respondents could list as many issues as they wished. The key issues that the respondents outlined were categorised into themes. The most frequently occurring terms were put into cognate clusters for analysis. See Figure 5.21 below. Inadequate funding, research facilities, supervision, access to books and journals had the highest concentrations indicating that were the issues that the respondents felt had a major bearing on knowledge production, diffusion and utilisation. Further, Figure 5.21 shows that funding, supervision, inadequate research facilities, books and journals were some of the issues that were of concern to the academic staff

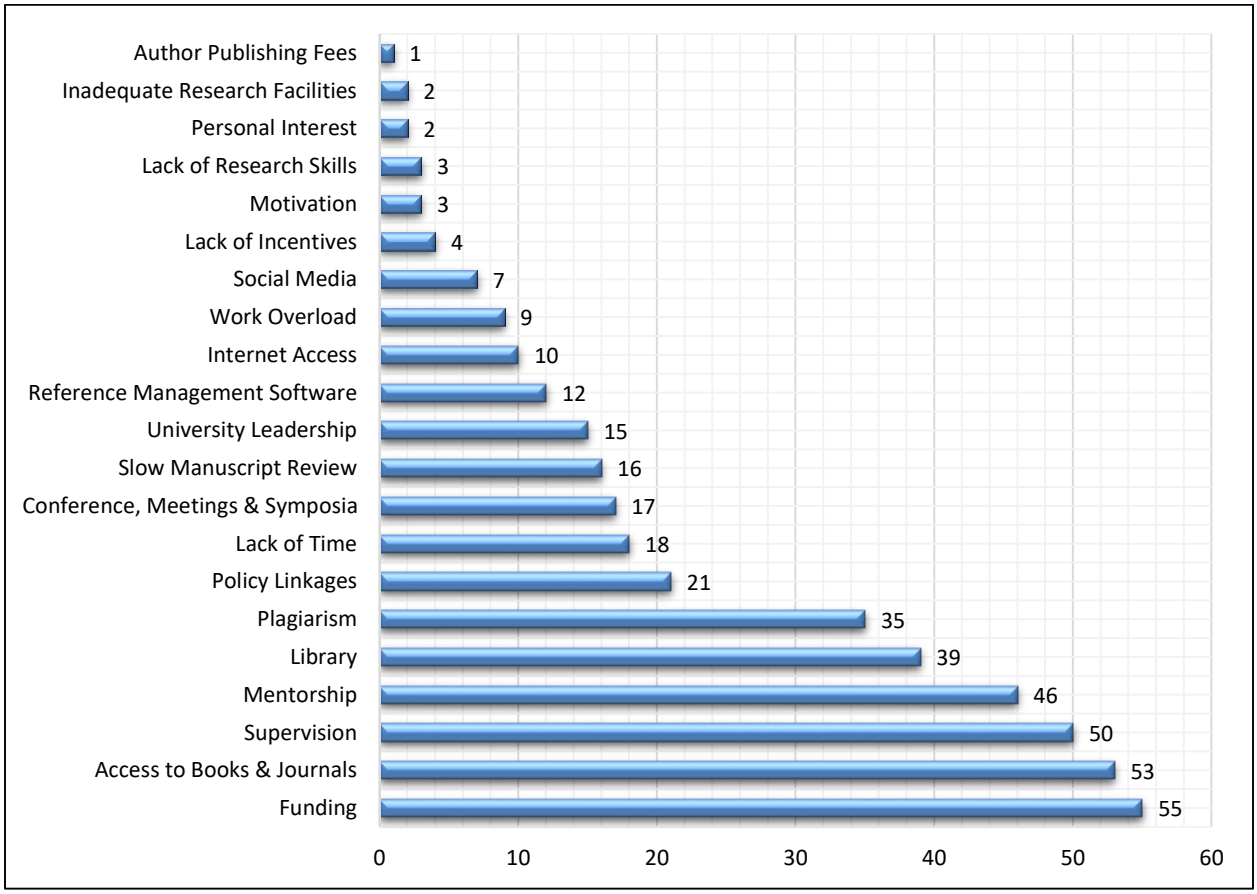

Figure 5.21. Key Issues in Knowledge Production, Diffusion and Utilisation

In Table 5.22 the researcher transcribed extracts from the respondents to further elucidate the significant issues relating to knowledge production, diffusion and utilisation in the UNZA SOM.

Table 5.22. Key Issues in Knowledge Production, Diffusion and Utilisation

"Textbooks are a good source of teaching, diffusion and use of knowledge"
"University administration does not demonstrate evidence-based practices thus setting a poor example"
"Incentives for knowledge production other than for promotions only"
"To be kept abreast of on what is happening elsewhere"
"Internet facilities need to be up-to-date and available"
" The university should have collaboration with various funding bodies"
"It is not easy to access referencing software"
"Too much plagiarism by students. This require use of anti-plagiarism software such as Turnitin"
"University produced journals take too long to review and publish the manuscripts"
"Lack of policy to mandate staff to give evidence based knowledge"
"Institutional culture more inclined to teaching role versus active researching"
"Limited institutional investments in facilities that promote knowledge production, diffusion and utilisation (e.g. low number of local journals, academic publishing equipment, libraries etc.)"
"UNZA research policy is in place but the only problem is that for the new comers it is difficult to get on board.
"Funding mechanism and how to access research fund is not very clear especially for newcomers"
"A number of good research work is being done at UNZA and findings are presented to policy makers, but actions or implementation is not immediate"

5.4.6 *Determinants of Knowledge Production, Diffusion and Utilisation*

This section relates to aspects of knowledge production, diffusion and utilisation patterns answering the following objectives of the study in Chapter One section 1.3; *cf 1.3.1.4* on exploring the determinants to knowledge productivity in a university environment.

5.4.6.1 Determinants to Knowledge Production, Diffusion and Utilisation

The respondents were requested to identify the most significant barriers that impeded knowledge production, diffusion and utilisation at UNZA SOM. The findings clearly indicate that the largest majority of them were most concerned with lack of funding (36, 87.8%) and insufficient time to engage in knowledge production, diffusion and utilisation (26, 63.4%).

The other barriers, although to a lesser extent, were that the institution did not provide sufficient incentives for knowledge production, diffusion and utilisation (19, 46.3%); lack of Internet access (16, 39.0%); lack of appropriate reading materials (11, 39.0%); lack of publication outlet (9, 22.0%); and lack of Internet research skills (7, 17.1%). Only 2 (4.9%) respondents indicated that they had no interest in knowledge production, diffusion and utilisation. See Table 5.23 and Figure 5.22.

Table 5.23. Barriers to Knowledge Production, Diffusion and Utilisation

	Frequency	*Percent*
Lack of funding	36	87.8
Insufficient time	26	63.4
No incentives for knowledge production, diffusion and utilisation	19	46.3
Lack of Internet access	16	39.0
Lack of appropriate reading materials	11	26.8
Lack of publication outlet	9	22.0
Lack of Internet research skills	7	17.1
No interest in knowledge production, diffusion and utilisation	2	4.9

Knowledge production diffusion and utilisation determinants are those factors, processes or activities that can either impede or foster knowledge production diffusion and utilisation. It was therefore important to ask the respondents what other issues they thought were cardinal to knowledge production, diffusion and utilisation. The responses to this question are depicted in Figure 5.15 below. It can be seen that 85.4% (35) of the respondents felt that funding was an issue, 75.6% (31) thought that access to current peer reviewed research was vital, 70.7% (29) highlighted collaborative partnerships as being important, whilst 65.9% (27) and 63.4% (26) respectively viewed technology and time to be significant determinants.

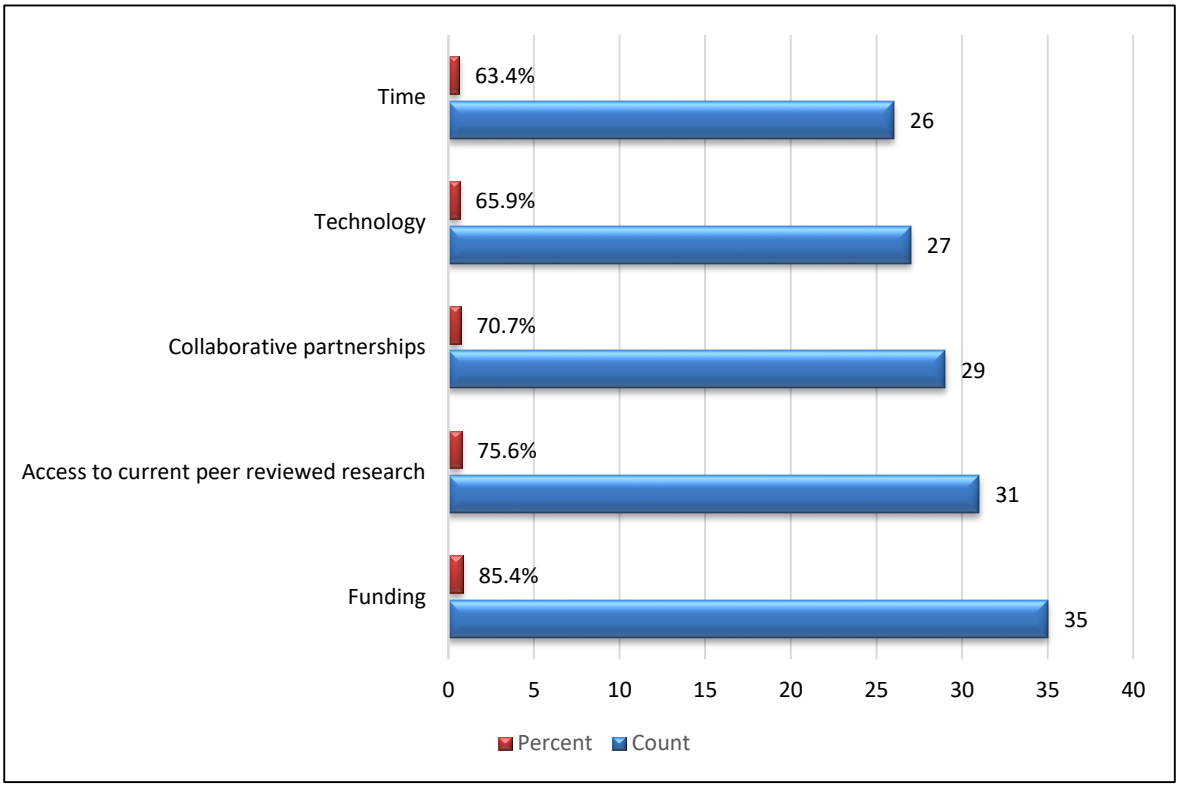

Figure 5.22. Determinants of Knowledge Production, Diffusion and Utilisation

5.4.7 ***Policy Context***

5.4.7.1 Knowledge Productivity Policies in a University Environment

The researcher asked the respondents to indicate with a Yes or No answer if they were aware of any knowledge production, diffusion and utilisation policies within the University of Zambia. If they answered 'Yes' they were further asked to list these policies. The results are as indicated in Figure 5.23. The largest majority said they were aware (68%) and 32% said no.

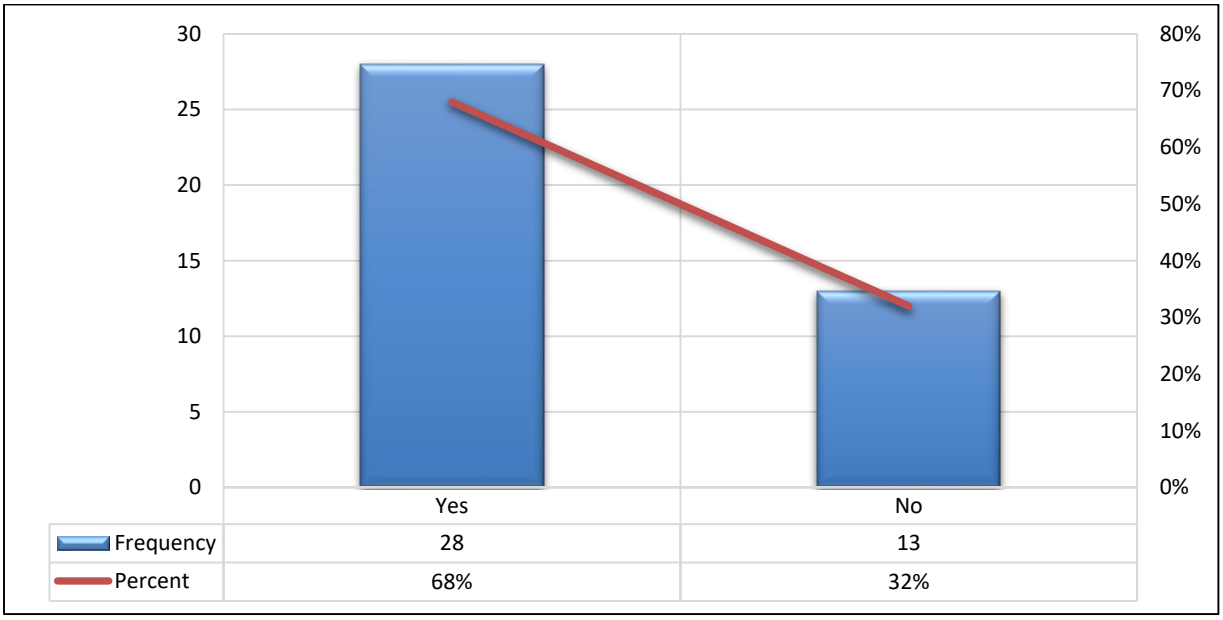

Figure 5.23. Knowledge of Knowledge Production Policies within UNZA

Thereafter, they were asked to express their opinions on what should be done to foster knowledge production, diffusion and utilisation within the university. A total of 33 respondents answered this open-ended question. This was open ended question where the respondents were asked to state any policy or policies related to knowledge production, diffusion and utilisation they were aware of in the University. The researcher then grouped their response into thematic areas. See Figure 5.24 below for their responses. However, upon further scrutiny only some of the respondents could exactly mention the names of the policies that relate to knowledge production, diffusion and utilisation in the university. The respondents who had mentioned UNZA Research Policy, (6, 18%), Intellectual Property Rights Policy (2, 6%), UNZA Institutional Policy (1, 3%), Promotions Policy (10, 31%), UNZA Publishing Policy (2, 6%), were able to identify some of the policies within the University that are meant to foster knowledge production, diffusion and utilisation within the university.

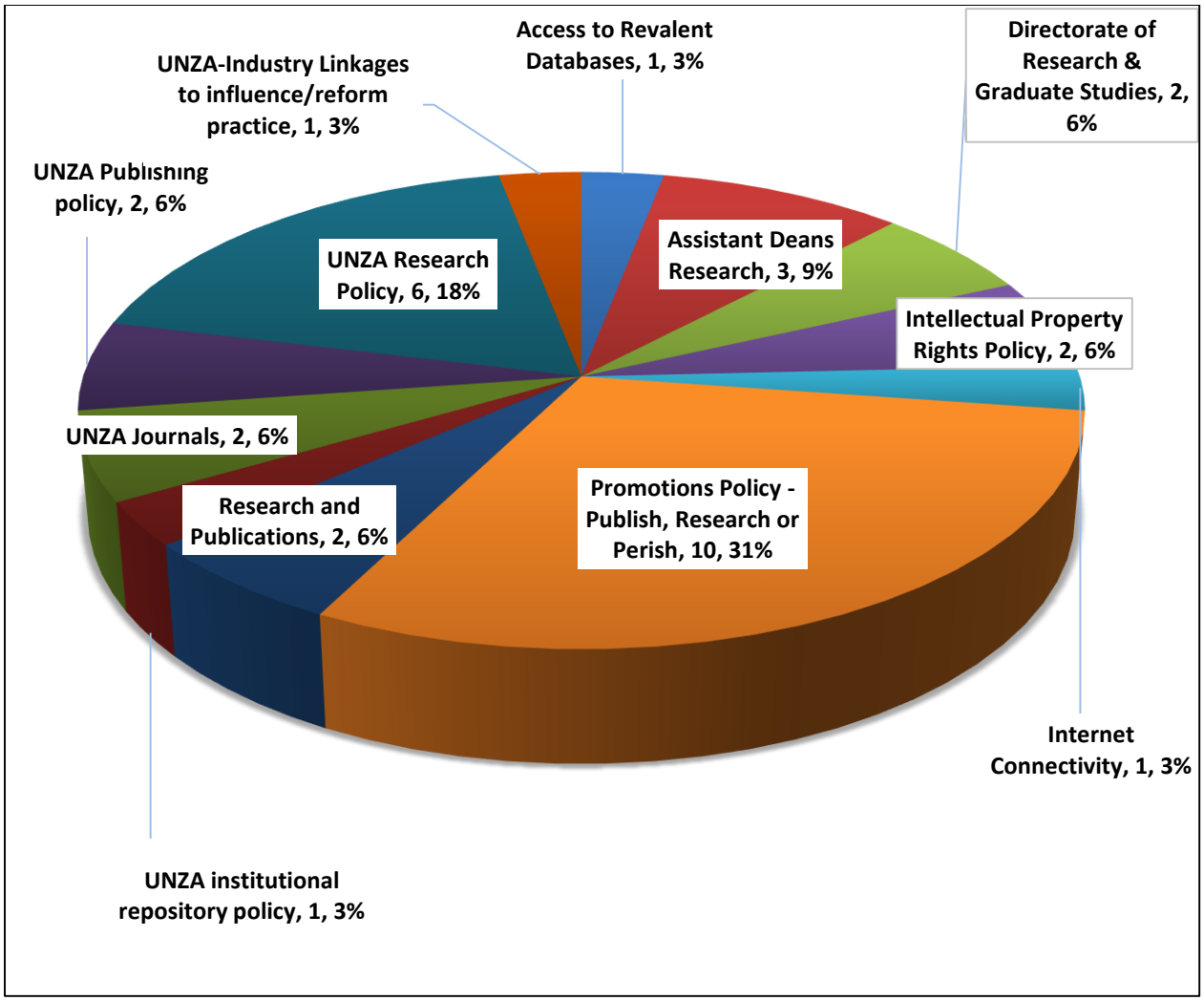

Figure 5.24. Knowledge of Policies of Knowledge Production within UNZA

5.4.7.2 Fostering Knowledge Production, Diffusion and Utilisation at UNZA School of Medicine

Respondents were further requested to indicate what they thought should be done to foster knowledge production, diffusion and utilisation within the University of Zambia School of Medicine. The content analysis of the responses to this open-ended question showed that funding for research was the overwhelming concern of the respondents. These responses are depicted in the density visualisation map in Figure 5.25 and it clearly shows a high concentration on research funding.

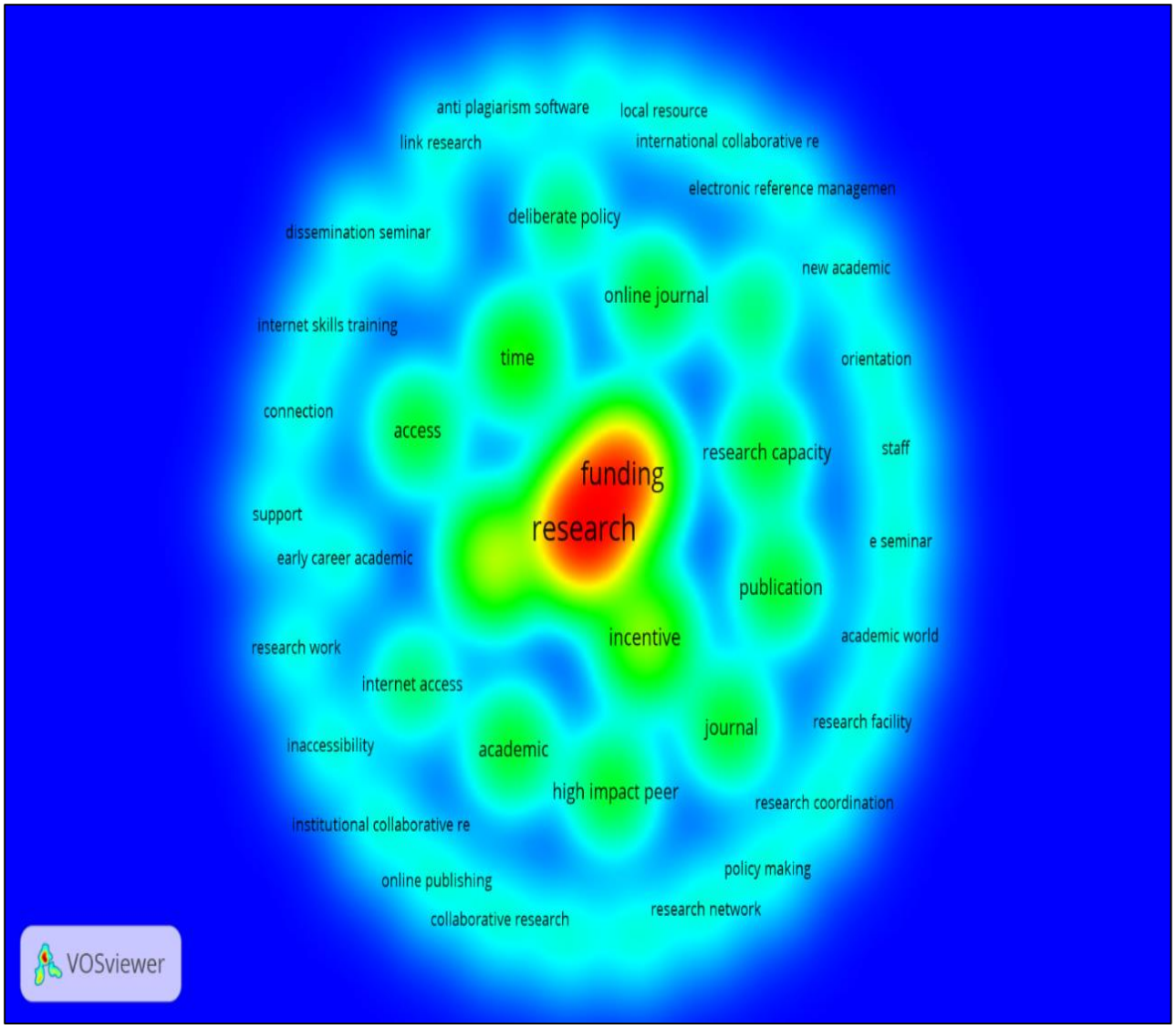

Figure 5.25. Views on Knowledge Production in UNZA

The frequency of responses was further calculated and represented in a bar chart in Figure 5.26. below. This bar chart reinforces the outcome of the density visualisation map and shows that the respondents were of the view that the most significant method to foster knowledge production, diffusion and utilisation would be to increase funding for research (21, 32.3%). All other methods were far less frequently mentioned and ranged from a frequency of (6, 9.2%) for incentives to encourage knowledge production and time for research, to a frequency of (1, 1,5%) for electronic reference management software, anti-plagiarism software, research coordination, improved research facilities, linking research to policy-making in government and online publishing of research output. See Figure 5.26.

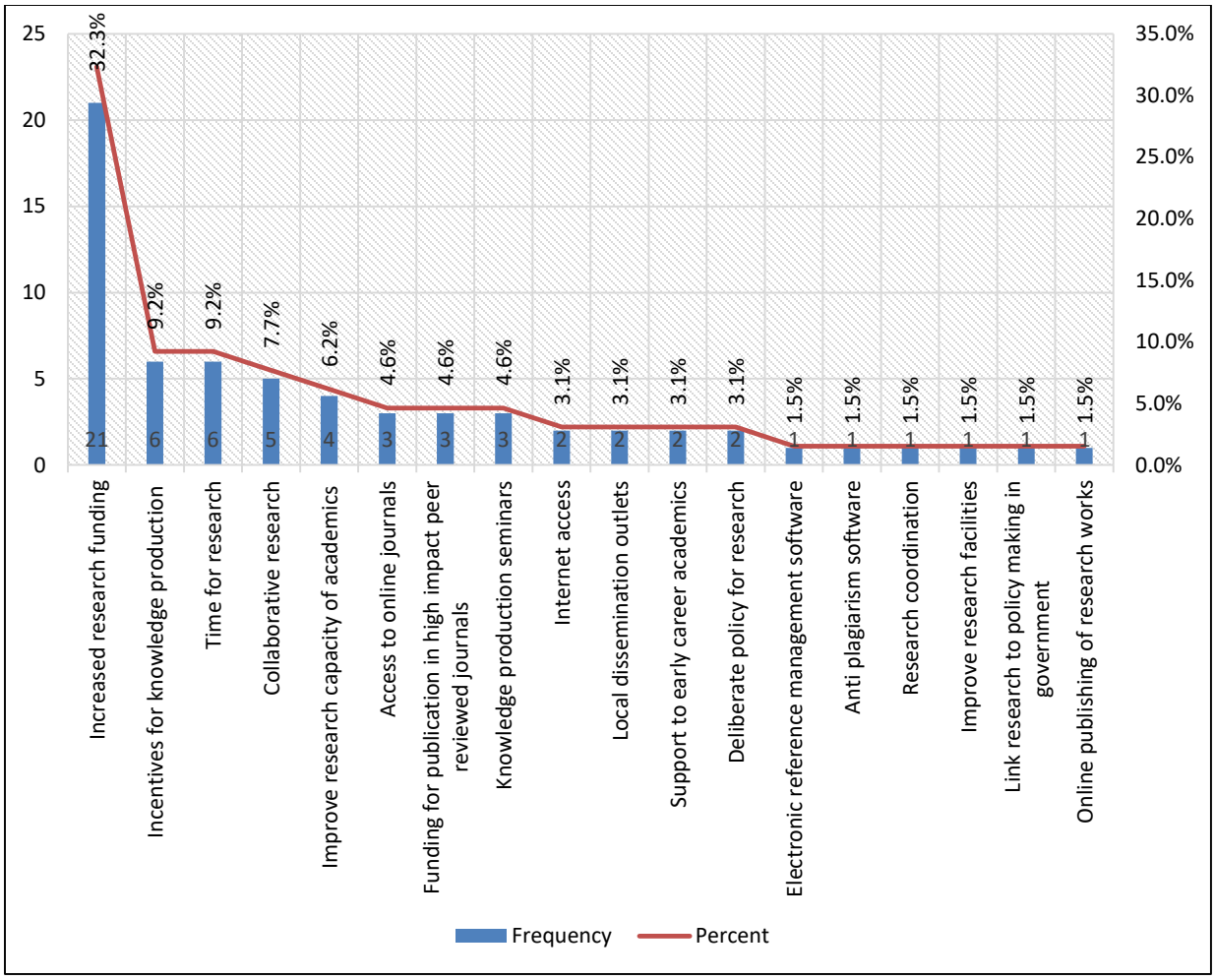

Figure 5.26. Opinions on Knowledge Production at UNZA

5.5 Results from the Semi-Structured Interviews

Interviews were held with key informants in five units in the University of Zambia that were deemed to have a direct relationship with knowledge production practices. The units that were identified were the University Library, the Centre for Information and Communication Technology (CICT), the Directorate of Research and Graduate Studies, the Quality Assurance Unit and the University of Zambia Press. This section, therefore presents the findings from these semi structured interviews and is categorised around the following themes: The role the unit plays in fostering knowledge production, diffusion and utilisation within the University of Zambia, challenges the unit faces in achieving these objectives, UNZA policies relating to the unit's role in knowledge production practices, and interviewees' opinions on how knowledge production practices should be fostered within UNZA. *Cf* A*ppendix B – Semi-Structured Interview Schedules for Purposefully Selected Units.*

5.5.1 *Role Unit Plays in fostering Knowledge Production in a University Environmnet*

5.5.1.1 The University of Zambia Press

An important factor in fostering knowledge production, diffusion and utilisation is the access academic staff have to knowledge and knowledge dissemination channels. It was, therefore, important to establish what dissemination channels were available within the University of Zambia. For these reasons, the researcher decided to approach the University of Zambia's publishing department, UNZA Press, to establish the role they play in disseminating the research output of the academic staff. Key informants from the University of Zambia Press indicated that they make an important contribution to this process by publishing selected research outputs which is then disseminated by means of media such as journals and books under the university's publishing imprint.

The research outputs published by UNZA Press are in a wide range of subject areas mirroring the subject profile of the academic staff employed at the University. The press publishes books such as the one shown in Figure 5.27. Among the oldest and most regular journal publications under the UNZA Press imprint are: African Social Research, Zango (Zambian Journal of Contemporary Issues), Journal of Humanities, Zambian Journal of History (ZJH), Journal of Science and Technology and Zambia Law Journal (ZLJ). An example is indicated under Figure Figure 5.28.

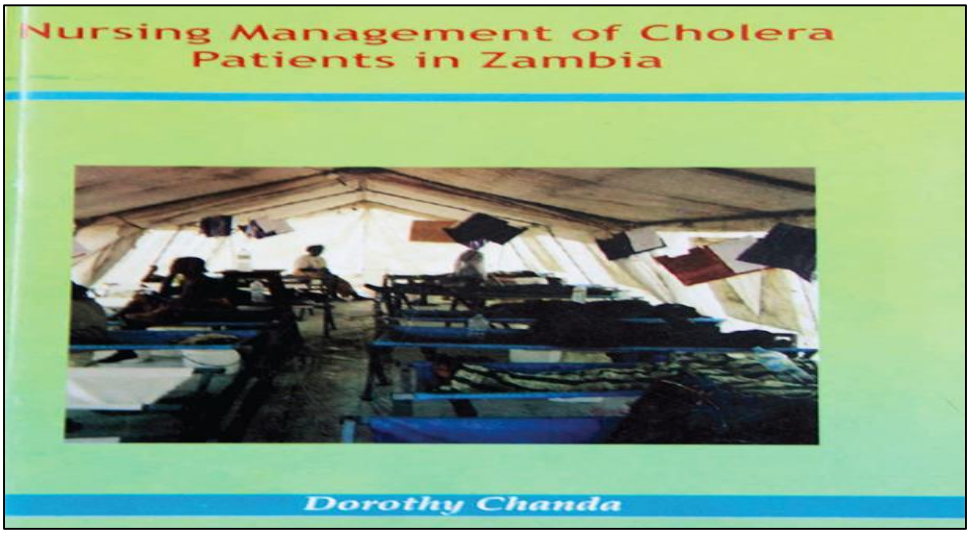

Figure 5.27. Nursing Management by UNZA SOM Academic staff
Zambia Daily Mail (2018)

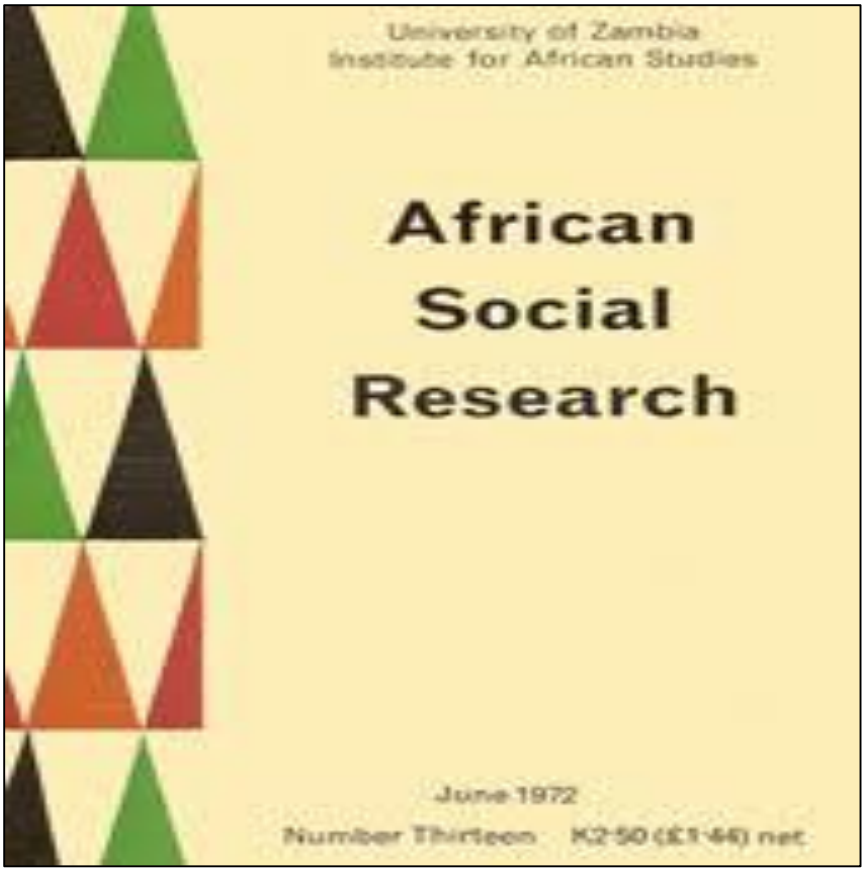

Figure 5.28. Cover Page of African Social Research
UNZA Press (n.d)

It is clear from this list of publications that UNZA Press does not publish a journal that is specifically dedicated to health-care or medical subject fields, the focus area of this study. The main knowledge dissemination channels therefore in the medical field in Zambia are the Medical Journal of Zambia (MJZ), a publication of the Zambia Medical Association and the Journal of Agricultural and Biomendical Sciences, published the University of Zambia Directorateof Research and Graduates Studies. The Medical Journal of Zambia journal generally contains a large number of articles written by UNZA School of Medicine academic staff. This correlates with the finding of this study that established that the Medical Journal of Zambia was one of the primary publications used by the academic staff to publish their research output (*cf 5.2.1.6* of this this chapter). See Fig 5.39.

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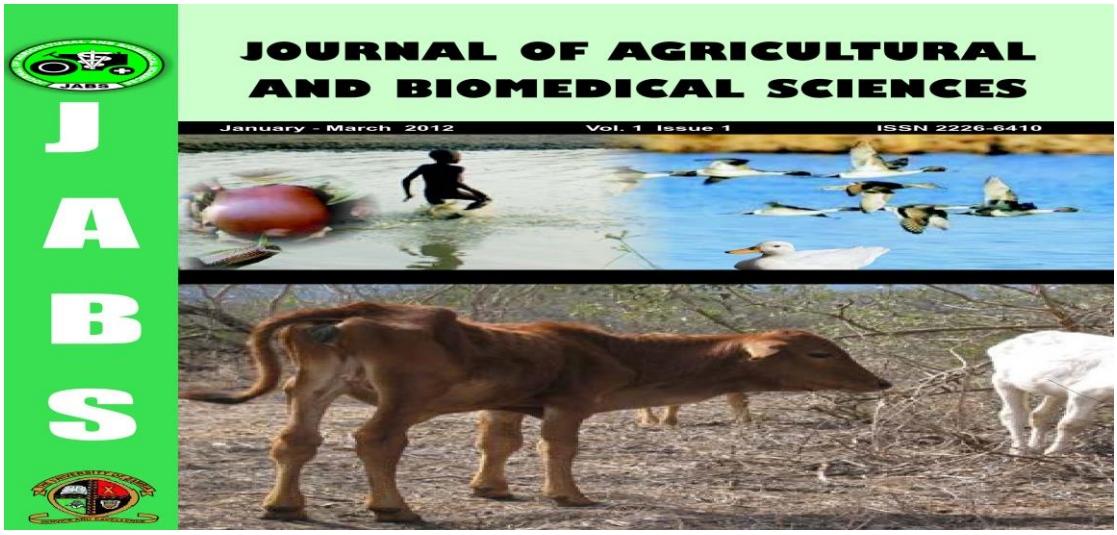
Figure 5.29. Cover Page of Medical Journal of Zambia
Zambia Medical Association (2018)

The Journal of Agricultural and Biomendical Sciences is a relatively new journal established in 2012 and published quarterly. See Figure 5.30.



JOURNAL OF AGRICULTURAL AND BIOMEDICAL SCIENCES

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JABS

Figure 5.30. Cover page of the Journal of Agricultural and Biomedical Sciences

Additionally, the publishing department indicated that, in order for them to more proactively engage in knowledge production process of the institution, it is important that the University of

Zambia publishing policy be approved, as well as find a solution to the many problems that affect the unit, such as that of inadequate staff, lack of a utility vehicle, incentives for peer reviewers to participate in the peer review process, and generally adequate financial support for the department from the university management.

5.5.1.2 The Centre for Information and Communication Technologies

The Centre for Information and Communication Technologies (CICT) was of the view that their role was primarily that of providing various ICT platforms to assist the producers of knowledge within the university in the creation, storage processing and dissemination of that knowledge. It was established "soon after the foundation of the University of Zambia to promote facilities for teaching, learning and research, and to satisfy the needs of the University Administration for data processing facilities" (University of Zambia, 2015: 449). The CICT offers a variety of services to support administrative and academic needs of the university community. One of the most important of those functions is to ensure that the university community has access to a high speed and reliable Internet service at all times. In this context, access to the Internet is a critical enabler to ensure effective knowledge production. The CICT further alluded to the fact their role is to continuously improve Internet services in the university, both in terms of bandwidth access and in availability. This has resulted in most sections and areas of the university having wireless connectivity, while all university employees have access to computers and the Internet by means of either a wireless connection or local area network (LAN).

5.5.1.3 The University of Zambia Library

The researcher interviewed key informants from the serials department, special collections department, collection development department, medical library and the university librarian's office to establish their views on the contribution that the library makes towards fostering knowledge production, diffusion and utilisation within the university. The Serials Department of the library believes that the library has an important role to play in fostering knowledge production, diffusion and utilisation within the university. This, they argue, is achieved by effectively organising library resources and providing easy access to these information resources. They also asserted that it was important for the library to teach students and researchers how to access both print and electronic resources found in the library as well as imparting skills to enable them to

efficiently utilise these knowledge resources in their research papers and other knowledge products. In the library, one informant stated that:

> "the Serials department has a mandate to contribute positively to creation, diffusion and use of knowledge through the provision of relevant, updated and quality scholarly literature (journals, reports, reviews, etc.) to support learning, teaching and research activities in the University. For example, the e-journal collection provides up-to-date international research findings that keep researchers updated with the latest findings at the frontiers of knowledge. As much as Serials can be used to support teaching and research in the University, they also serve as channels in dissemination of knowledge/research output of the University. Both the print and electronic collections are regularly evaluated to uphold recommended standards on how to provide access to information for the users. To ensure users are aware of and use the available resources, the department offers training to users on effective search strategies. The department further conducts surveys to establish specific information needs and challenges that students, lecturers and researchers face in the process of doing assignments, preparing teaching materials and conducting research. On several occasions, lecturers have been helped with retrieving articles they have had challenges accessing. Surveys are aimed at providing appropriate literature on building on already existing and new knowledge".

Another unit in the library, the Special Collections Department pointed out that their role in fostering knowledge production, diffusion and utilisation within university related to the following:

- "Collecting knowledge outputs produced by the university, academic staff, students, government agencies and the community at large;
- Cataloguing and preserving the knowledge outputs in the institutional repository for easy access by users;
- Using ICTs to provide access to and disseminate knowledge outputs held in the institutional repository to facilitate teaching, learning and research;
- Managing the library stock effectively to ensure that both student and researchers can easily retrieve relevant information;

- Giving professional advice to users to enable them to better access and utilise the knowledge output held in the library and in the process, enhance their new knowledge production capacity".

The Medical Library serves the information needs of the School of Medicine. It is physically located at the University Teaching Hospital. The respondent from the Medical Library indicated that by them being attached to a teaching hospital, it was imperative that they should provide information that supports clinical practice as well as supporting the research needs of the academic staff. They indicated that increasingly their library collection is shifting towards electronic information and emphasised that the researchers should have the relevant electronic information retrieval skills inorder to benefit from these information resources.

5.5.1.4 The Quality Assurance Unit

The Director of the Quality Assurance Unit indicated that their unit was responsible for ensuring that the university adheres to standards of Universities as established by relevant accrediting bodies such as the Higher Education Authority of Zambia (HEA). He emphasised that their role was to monitor standards in academic programme development and accreditation, as well as taking measures to ensure adherence to quality standards in whatever the university does. Within the Quality Assurance Framework, the Unit sees its role in fostering knowledge production, diffusion and utilisation as the assessment of the quality of the research output of the staff, as well as the contribution this makes to the university's yearly research output. These are measured using bibliometric indicators (University of Zambia Quality Assurance Unit, 2016: 58). Additionally, the Quality Assurance Unit is of the view that "one critical area to consider is the use of e-learning. This must be enhanced in the delivery and utilisation of knowledge of the University of Zambia".

5.5.1.5 The Directorate of Research and Graduate Studies

The Directorate of Research and Graduate Studies was of the view that they occupy a leadership position within the university that should facilitate and foster research by ensuring that all systems and processes are streamlined. They also saw their role in relation to identification of funding avenues, enactment of policies, identification of research agendas and priorities for the institution.

5.5.2 *Challenges faced by Unit in Knowledge Production, Diffusion and Utilisation*

The interviewees identified the following challenges with regard to knowledge production, diffusion and utilisation at the University of Zambia:

5.5.2.1 The University of Zambia Press

The University of Zambia Press stated that they were faced with several challenges when it comes to fostering knowledge production activities within the University of Zambia. They identified these challenges as:

- Lack of funding for purchasing of a vehicle for distribution of published materials as well as marketing the product. They argued that they needed transportation to effectively participate in marketing activities around the country. However, a cursory glance at the website indicated that they have not yet taken advantage of the online environment to publicise the research outputs they have published; especially when the increasing role of the Internet in promoting products in general is considered.
- Lack of financial support from management for publishing;
- Peer reviewers are difficult to find without incentives;
- Lack of a user-friendly website that can be accessed by the outside world, thereby rendering the publication output invisible;
- Lack of editors - although the unit has an approved staff establishment the university has not yet recruited and filled those positions that are necessary in expediting the publication process in the publication department.

5.5.2.2 The Centre for Information and Communication Technologies

The CICT department indicated that the concept of "knowledge" is not well defined at the University of Zambia. In addition to the poor conceptualisation and poor documentation of knowledge, there is also a lack of recognition of the value of knowledge to the success of an organisation even when that "knowledge" has been created within the organisation. They further pointed out that there was poor knowledge management within the institution; which was highlighted by the fact that the university did not have a knowledge manager. Besides, they identified outdated Information and Communication Technology systems as having a major impact on efficient information processing and hence causeg delays in work schedules in the university.

5.5.2.3 The University of Zambia Library

The Library stated that they faced several challenges in fostering knowledge production, diffusion and utilisation in the university, as well as in supporting lecturers in their knowledge production, diffusion and utilisation programmes and activities. The following aspects were specifically highlighted:

- Inadequate funding allocated to the library and this has affected the acquisition, provision and preservation of both the knowledge required and produced by UNZA staff;
- Lack of policies to emphasise the university library's role as national reference library. It was their view that this has prevented the university from collecting valuable knowledge produced by government agencies and the community at large;
- The shortage of library staff has impacted on the library's ability to foster knowledge production, diffusion and utilisation in many ways. For example, they have not had the human resource to identify and collect all of the valuable knowledge produced within the university and from government agencies and the Zambian community at large. The lack of suitably qualified library staff has further prevented them from conducting information needs studies to help identify and meet user needs;
- Lack of preservation and conservation planning polices with regard to knowledge production;
- Lack of tools to facilitate the processing of resources is another aspect, for example they alluded to the fact that they did not have access to Ulrich's Periodicals Directory; and that,
- The library was not large enough to accommodate all researchers and students who may want to use library materials for knowledge production purposes, and additionally, the number of print materials was inadequate to satisfy the needs of the current library users

5.5.2.4 The Quality Assurance Unit

This is a relatively new unit in the unit and they saw the challenges in terms of establishing the unit so that it can play a supportive role in providing quality assurance service to the research activities in the university. There biggest challenge was low staffing levels.

5.5.2.5 The Directorate of Research and Graduate studies

The major challenges being faced by the Directorate of Research ad Graduate Studies related to

lack of funding as well as inadequate staff. The specifically lamented that they lacked staff in the academic ranks as currently there were only two such staff; the Director and Assistant Director.

5.5.3 *Policies supporting Knowledge Production, Diffusion and Utilisation within UNZA*

5.5.3.1 The University of Zambia Press

The interviewees from the publishing department indicated that they were not aware of policies within the university that helps their department promote and foster knowledge production, diffusion and utilisation within the University of Zambia. They, however, indicated that there was a draft publishing policy as well as a draft copyright policy. They gued that the old publishing policy was very narrow jn scope and only covered journals and books that were published by the University of Zambia Press. In addition, its focus is mainly on print publications. Noting these weaknesses in the publishing policy, the University in 2016 embarked on the process of reviewing the policy so that it was aligned with today's scholarly communications environment.

5.5.3.2 The Centre for Information and Communication Technologies

The Centre for Information and Communication Technologies, in turn, referred to a CICT policy which was still in a draft format. The CICT believed that to foster knowledge production, diffusion and utilisation in the institution there was a need to develop a formal knowledge policy and that there should be a forum where "new knowledge" from the units and schools were shared and that this "knowledge" should be adequately archived in a specific locality.

5.5.3.3 The University of Zambia Library

In the library however, one of the units had a contrary view, and stated that indeed there were policies within the university that assists the Serials department in fostering knowledge production, diffusion and utilisation within the University of Zambia. These were highlighted as a publishing policy and a records management policy. Further, one of the interviewees indicated that their department was working on an Electronic Information Resources Policy that will outline how the department interacts with the online environment for the benefit of the institution. Another viewpoint that was expressed was that the number of print materials was inadequate to satisfy the needs of the current library users. "The department has for a long time experienced poor funding towards maintaining a collection of current print journals. This has led to non-restocking of most

print titles and poor participation in the exchange programme". Additionally, a respondent from one of the units in the library highlighted the importance of a collection development policy to guide and align the library acquisition of library materials to that of the institution's mission and vision.

Still, other interviewees in the library again felt that, while they were not aware of any policies as such, the university made it mandatory for all academic staff to be actively involved in research and to generate knowledge to support their teaching and learning activities. They emphasised that academic involvement in academic research was not only for promotional purposes but also for knowledge creation whose results were crucial in making informed decisions Therefore, the library has an important role to play to support that mandate and ensure that it was the focal centre for research at the University. In this context, it was argued that a policy should be put in place to support knowledge production, not only for teaching purposes, but also for the university to attain recognition for its research output. Moreover, one unit in the library felt that the university; and individual researchers should investigate ways to fund research activities to encourage research and publishing among staff. They also indicated that there should be a deliberate policy to encourage academics and researchers to be more actively involved in collaborative research and have their research findings published in scholarly platforms. In addition, they claimed that research and publishing should be one of the key benchmarks according to which staff are promoted.

5.5.3.4 The Quality Assurance Unit

The Quality Assurance Unit revealed that there was a Quality Assurance framework; and this framework would guide the institution in achieving quality.

5.5.3.5 The Directorate of Research and Graduate Studies

The Directorate of Research and Graduate Studies pointed to the Research and Intellectual Policy and Intellectual Property Rights of 2009 whose rationale was to "guide and regulate the conduct of research for academic members of staff, postgraduate and under graduate students"(University of Zambia, Directorate of Research and Graduate Studies, 2009: xii) .

5.5.4 *Strategies to foster Knowledge Production, Diffusion and Utilisation @ UNZA*

5.5.4.1 The University of Zambia Press

UNZA Press was of the opinion that there should be more funding by the University to the University Press as well as employment of adequate staff, more especially editors. They further alluded to the fact that their staff lacked skills to enable them fulfil their role of publishing. Additionally, they felt that if they used modern online publishing tools, they would be able to take advantage of electronic communication networks existing at the University of Zambia. Furthermore, the publishing department indicated that there was a need to finalise the publishing policy as the policy that was in existence was inadequate to deal with modern issues affecting the publishing industry. They also advocated for finding a solution to the problems of lack of a utility vehicle, incentives for peer reviewers and financial support for the department from the university management.

5.5.4.2 The Centre for Information and Communication Technologies

The CICT holds the view that increased funding to the institution would enable them to fulfil their role of implementing technology that would enable units to increase their knowledge production activities. In addition, they argued that the general public needed to have enhanced access to the knowledge produced at UNZA. They further reported that it was critical to provide incentives for 'knowledge creators" to foster knowledge creation so as to ensure the success of the knowledge production process at the University of Zambia.

5.5.4.3 The University of Zambia Library

Interviewees from the library emphasised the role they play in supporting research in general and more specifically knowledge production. Opinions expressed were that the university and individual researchers should work on ways of funding research activities to encourage research and publishing among staff. They also indicated that there should be a deliberate policy to encourage scholars to actively be involved in collaborative research and have their research findings published in scholarly platforms. In addition, they argued that research and publishing should be one of the key benchmarks according to which staff are promoted. Other interviewees felt that the following recommendations could further foster knowledge production, diffusion and utilisation within the university:

a) Develop a policy for the enhancement of the university as national reference library that would enable the library to acquire knowledge produced within the institution, government agencies and the community at large;
b) Develop a policy on conservation and preservation of the local knowledge produced to enable better dissemination and utilisation of local knowledge;
c) Conduct awareness campaigns of the knowledge that is available in the library to encourage better utilisation of the knowledge;
d) Lobby for funding to acquire new knowledge that is produced within the university and the community at large.

5.5.4.4 The Quality Assurance Unit

The focus of the Quality Assurance Unit would be to ensure that the research that is produced by both the Academic Teaching and Postgraduate Students was of quality so that it could enhance the research credibility of the institution. Additionally, they were of the view that "one critical area to consider is the use of e-learning. This must be enhanced in the delivery and utilisation of knowledge of the University of Zambia".

5.5.4.5 The Directorate of Research and Graduate Studies

The Directorate of Research and Graduate Studies said they would concentrateon promoting research in the University so that the University increases its research output but also that the research is visible both locally and internationally.

5.5.5 ***Chapter Summary***

This chapter has presented the findings of the study as they relate to the objectives and research questions of the study. The findings were developed through the retrieval and analysis of PubMed/Medline Citation data, and the analysis of the responses to the semi structured questionnaires and semi structured interviews, as well as from documentary sources.

The primary productivy patterns show an increase in the knwoledge produced in the period 1995-2015 with mostly multiple authors. The knowledge has been produced collaborately and published in both local and international journals with either an impact factor or none. The subject areas of

the knowledge produced are mostly concentrated in TB, HIV and AIDS and Cancer, mirroring closely the country's disease patterns.

Although the study found that digital literacy skills were high; it furhter established that academic teaching staff did not have sufficient internet search skills. Knowledge was produced frequently and consisted of peer reviewed journal articles, student disserations and theses, books, conference proceedings, policy briefs and newspapers articles. There was a high frequency of use of knowledge. The sudy further established that inadequate funding, time, research facilities, books and journals, publication outlets had an impact on knowledge production, diffusion and utilisation. The study found the existence of policies necessary for the advancement of knowledge production, diffusion and utilisation.

The next chapter (six) presents the discussion and interpretation of the findings found in chapter five. The ensuing chapter contains the conclusions and recommendations arising from this study.

CHAPTER SIX

DISCUSSION AND INTREPRETATION OF THE FINDINGS

6 Introduction to Discussion and Interpretation of the Findings

Chapter six presents the discussion and interpretation of the study findings. The discussion and analysis of the results of the study are organised around the stated study questions as reflected in chapter one, *cf 1.3.1* specific objectives. The discussions and interpretations of the findings are further presented according to the different themes as outlined in the semi structured questionnaires (*cf Appendix A)* and semi-structured interview schedules (*cf Appendix B)* in accordance with the study's research objectives and research questions. Additionally, the chapter comprises discussions and analyses of the data obtained from the bibliometric study as well as data that was collected from the Human Resources Information System of the University of Zambia.

The matters under examination, exploration and analysis are: primary knowledge production practices and their attributes in a university environment in Zambia; knowledge diffusion patterns in the university environment in Zambia; knowledge utilisation patterns in a university environment in Zambia; determinants of knowledge production in a university environment in Zambia and policies relating to knowledge production in a university environment in Zambia. Further, the discussions and analysis of the findings from PubMed/Medline database, Questionnaires, Interview Schedules and Documentary Sources have been merged and grouped into the following broad thematic groups:

a) The University of Zambia School of Medicine Academic Staff Profile
b) Digital Information Retrieval Skills
c) Knowledge Production Practices and their Attributes
d) Knowledge Production, Diffusion and Utilisation Patterns
e) Determinants of Knowledge Production, Diffusion and Utilisation
f) Policy Context
g) Fostering knowledge production, diffusion and utilisation at University of Zambia School of Medicine.

6.1 The University of Zambia School of Medicine Academic Staff Profile

The University of Zambia School of Medicine Academic Staff Profile results coming from the Human Resources Information System are related to the Background Characteristics questions on the semi-structure questionnaire that was administered to the respondents. This section discusses the findings from 5.2 and 5.4.2.1 – 5.4.2.3. These are background characteristics of the study population; one arising from information retrieved from the Human Resource Information System of the University of Zambia (*cf Appendix D and Appendix E.1*) and also information obtained from the semi-structured questionnaire survey of lecturers (*cf Appendix A).* The background characteristics discussed and analysed are characteristics such as educational qualifications, age, gender, work experience and nationality.

6.1.1 *Departmental Lecturer Staffing Levels*

The study has observed that the University of Zambia School of Medicine has been experiencing low staffing levels that may have an impact on the management of the school; on the delivery of academic programmes and more especially on research output. The impact of these low staffing levels on the academic and research performance of the school has been exacerbated by the growing numbers of students as already indicated in chapter two under section 2.3.4. According to Simuyemba et al. (2014: 100), they have contended that the UNZA SOM has struggled to recruit and retain staff. They further claim that this shortage of staff has affected both old and new training programmes in that, in general there is "an insufficient number of fculty to teach and support the growing numbers of students. This bottleneck is particularly felt in the basic sciences, which form the foundation for all health professions training programmes" at the institution (Simuyemba et al., 2014: 100). This is because in instances where the university does not have staff, UNZA SOM have resorted to utilising the staff from the University Teaching Hospital, especially in the clinical departments. In this regard, the university offers the University Teaching Hospital staff honorary lectureship. However, this is really a symbiotic partnership because without a school of Medicine, there would be no University Teaching Hospital and vice versa. It is thus, in the best interests of everyone in both the UNZA SOM and the UTH to strength their collaborative partnerships in all areas, such as knowledge production, teaching and clinical care. These collaborative partnerships in knowledge production are further elaborated upon under section 5.2.2.3 where the University Teaching Hospital is the top collaborative institution for the University of Zambia. And the fact

that the staff indicate both addresses of UNZA SOM and UTH on their journal articles in the address field is a strong indication of the collaborative partnership, where UTH staff see themselves as belonging to both institutions. See 5.3.4.

6.1.2 *Academic Rank of UNZA SOM Staff*

It is generally believed that academic rank may have a bearing on knowledge production in knowledge institutions. These findings are comparable to other previous studies that speak to academic rank having a bearing on knowledge production, be it negative or positive. In Saudi Arabia a study found that younger academic staff were more likely to be publishing more research than their senior colleagues; as well as those involved in administrative activities in the institutions (Alghanim & Alhamali, 2011: 1300). However in Australia and Hong Kong, staff in the higher academic ranks were found to have produced more research output when compared to their junior colleagues (Ramsden, 1994: 218; Jung, 2012: 8). In Zambia, there were perceptions that academic rank has a relationship with research output; with the assumption that staff in higher academic ranks, were more likely to produce more research output (Kulyambanino, 2016: 45). The findings in this study were that junior academic staff at UNZA SOM were not as knowledgeable as their senior colleagues on the processes and procedures of research in the institution and, therefore, may not have been as productive as their senior colleagues who were more knowledgeable of those knowledge production processes. Not knowing the processes and procedures involved in knowledge production is a clear indication that one is not fully engaged in the knowledge production activities of the institution and, yet, this is a requirement for any of the staff to be able to move up on their academic career ladder. However, there may be explanations as to why junior academic staff were not adequately knowledgeable on the knowledge production process of the institutions as they were still trying to find their way in the world of academia.

Results from the questionnaire responses also mirrors the results from the data that was retrieved from the Human Resources Information System of the University of Zambia; that there were younger academic members of staff in the school, with many of them having served fewer years at UNZA SOM (with only 8 staff members having served more than 21 years at the institution). In addition, the academic ranks of Senior Lecturer, Associate Professor and Professor; which were senior academic ranks within UNZA SOM, had less staff as compared to the junior ranks

of Lecturer III, Lecturer II and Lecturer I. The respondents with PhD and Masters were almost equal (22, Masters and 19, PhD). Again, this has implications on both the quality and quantity of the knowledge produced by the institution as well as the replication of academic staff as there are not enough senior academic staff to reproduce themselves by mentoring younger academic academic staff.

6.1.3 *Age Profile of Academic staff*

Table 5.4 presenting data from the Human Resource Information System found a dangerously lopsided age profile of the academic staff of the school with a predominantly young population; creating serious challenges on the knowledge production activities of the institution. The majority of the younger academic staff still required more time to mature in academia and knowledge production systems. The results from respondents echoed that of the Human Resource Information System. It established that the majority of the academic staff were younger than 47 years of age, i.e. 23% were between 28 and 37 years of age, while 28% were between 38 and 47 years of age. Forty nine percent were older than 47 years of age. It has often been argued that most researchers are more productive in their younger years and become less productive as they age (Gingras et al., 2008: 1). This is because as researchers advance in age and academic career, academia is structured in such a way that they are supposed to mentor younger researchers. Additionally, perhaps with age, one becomes fatigued as well not interested in doing the same work. Further, their study found that "the average scientific impact of professors decreases steadily from the beginning of their careers until about 50 years old, and then increases again. Also, older professors tend to publish fewer first-authored papers and move closer to the end of the list of co-authors" as they age (Gingras et al., 2008: 6). Still, other researchers have argued that research productivity reduces as one advances in age and career. These findings are similar to other studies for instance in Saudi Arabia (Alzuman, 2015: 61) where the researcher found that the "majority of faculty members were assistant professors (46%), followed by associate professors (28%), and lastly 26% were the full professors". Howevert, a study in Mexico found that age had no significance impact on the research productivity of researchers (Gonzalez-Brambila & Veloso, 2007). Nonetheless, what is of importance in the case of the School of Medicine at the University of Zambia is that; there is a seamless transition between the young researchers and the older ones; and that should be the focus of the school – putting in policies and programmes that will deal with the age gap and experience

as its impacts the knowledge production activities of the institution.

6.1.4 *Gender Profile*

Although, the numbers of male academic staff is higher at (69, 59%), UNZA SOM is not doing particularly badly with the employment of female academic staff at (48, 41%). The University of Zambia has an equal opportunities employment policy that states that "male and female academic staff shall be appointed on the same terms and conditions related to their qualifications [and that] the institution "shall relentless pursue a policy of equal opportunity employer" (University of Zambia, 2017c: 4). However, it has been established by other researchers that in general, Zambia is not doing well in terms of female representation in academia. Hampwaye and Mweemba (2012: 109), in their study indicated wide gender disparities with "with only 25 per cent of academic and research staff members being female". The study did not delve further into research productivity of males and females but studies elsewhere such as in Nigeria and Saudi Arabia show that females generally tend to have low research productivity when compared to their male counterparts (Oloruntoba & Ajayi, 2006: 88; Prozesky, 2006: 361; Alghanim, S.A. & Alhamali, 2011: 1301). However, in a study among academic staff of Moi University, Eldoret, Kenya, 77 (39.8%) of males and 35 (18.1%) of females "reported that gender had no effect on their ability to conduct research" (Sulo et al., 2012: 478). Equally, these differences in males and females regarding research productivity may sometimes be a result of societal structures. Another study claims that this could be just a function of having more males than females in the institution as alluded to by Ramsden (1994: 219).

6.1.5 *Number of Years of Experience with UNZA*

In terms of work experience, from the questionnaire survey, the largest number of the respondents had worked for the institution for a period of 5-12 years (17, 41%). This number is similar to results from the HRIS where the largest majority (75, 64%) of academic staff had worked for between zero and ten years; meaning from both data sets, the length of years of experience was low, impacting on knowledge production as the majority of the staff were still finding their way into academia. These numbers of staff with less experience (years of service within the institution) has vast implications on knowledge production. A number of studies have indicated that the number of years of experience has an effect on research productivity; with variations across

disciplines (Jung, 2012: 9). It is generally believed that senior tenured academic staff have several roles that they play in academia; a) teaching, b) research, c) public service, and in relation to this study one of those critical roles is knowledge production. For, it has been argued that as people progress in academia in both years of services and experience, they also harness and master the skills of grant writing, research and more importantly turning raw data into journal articles and books. In addition, there is one significant role they play within academia; that of mentoring junior academic staff into the knowledge production industry. At the University of Zambia, one of the most successful programmes in this regard has been the Staff Development Programme; where potential academic staff are identified within the undergraduate programmes and ear-marked for training and recruitment into academia immediately after undergraduate training. Once a person has been identified, the university undertakes to support them during their postgraduate training programmes with a promise of employment in academia; albeit dependent on their performance during the training phase. Simuyemba (2014: 102, 100) reports that during the years 2010-2013, the UNZA SOM had 35 staff development fellows that were supported by the Medical Educational Partnership Initiative (MEPI); a programme that was designed to "address faculty recruitment, training, and retention". It was envisaged that at the end of the programme a total of 49 staff development fellows will have been recruited and trained. These are but a few of the programmes that exist within the School of Medicine aimed at developing and recruiting relevant academic staff.

6.1.6. Nationality of Staff at UNZA SOM

The overwhelming majority of the staff at the UNZA School of Medicine were Zambian citizens. A total of 101 (86%) of the academic staff were Zambians. Academia values diversity in everything it does, be it in the student population or academic staff. Diversity adds value to the programmes and activities of any university as each staff or student brings in something that contributes to the uniqueness of that institution. The findings of the study agree with other studies done in Africa, where foreign nationals made a small percentage of the total academic staff of a university. These low foreign national staffing levels at universities in sub-Saharan Africa are usually a result of the inability of institutions not being able to pay competitive salaries that would have attracted foreign staff. These findings have been established by other researchers, Hampwaye and Mweemba (2012: 109) who found that 95% of all surveyed staff in their study where

Zambians; whilst only 1% were staff from the SADC countries and 4% were staff from other countries outside the SADC region. These findings are similar to the studies done in some SADC countries; Malawi (Mahlaha, 2012a: 46), Mauritius (Mahlaha, 2012b: 52), Mozambique (Mahlaha, 2012c: 60), Swaziland (Mahlaha, 2012d: 90, Namibia (Mahlaha, 2012e: 66),) and Zimbabwe (Mawoyo, 2012: 120) were foreign staff were insignificant. The only exception were universities in Botswana (Malete & Kobedi, 2012: 18) with "102 were citizens of other SADC countries, and 190 were from non-SADC countries" and South Africa (Fongwa, 2012: 79) with 8,330 foreign staff.

6.1.6 *Qualification and Knowledge Production*

The study findings were that the majority of academic staff surveyed had only Master's degree qualifications, this being 22 (53.7 %), whilst those with PhD qualifications were 19 (46.3%). Again, academic qualifications have implications for knowledge production in a university environment. Even at the University of Zambia, a Master's degree is an entry level qualification among the academic staff category; one would therefore argue that such an employee is only beginning on their academic journey. Inthis regard they would be in need of mentorship programmes that would enable them gain research and article writing skills in order for them to contribute to the overall knowledge production of the whole institution. Evidence from Moi University in Kenya has shown that educational qualifications has a direct relationship with overall research output of academic staff (Chepkorir, 2018: 618).

6.1.7 *Subject Specialisation and Knowledge Production*

There was a high concentration of Public Health Specialists; which is supported by evidence from the semi-structured interviews which found that the majority of the respondents had a public health specialisation. The public health department had the largest number of staff at 26 (22%); followed by medical microbiology, pharmacology and child health. This is also evidence that public health impacts all medical conditions. An overall trend analysis study of public health research output in sub Saharan Africa concluded that public health research output had increased due to responses to HIV/AIDs (Chuang et al., 2011: 4), a major public health concern in the region.

6.2 Knowledge Productivity Patterns at the UNZA School of Medicine

This section presents discussions and interpretation of the findings of the study, specifically focusing on a) published research output of the academic staff, b) authorship patterns of the academic staff, collaborative patterns of the academic staff, journals into which the academic staff are publishing, and the subject areas covered by the published works.

6.1.1. Research Output

The study established that the lowest number of papers published were recorded in 1997 (1 paper), 2000 (1 paper), and 2004 (1 paper), while the years, 2013 had (19 papers), 2014 (46 papers) and 2015 (80 papers) show the highest number of papers per year. *cf 1.3.1.1 (a).* The findings are consistent with findings from different studies that show that the research output of most academic staff members in various universities across the world is on the upswing both in the developed and the developing world. The results also show that the developing world is largely lagging behind the research output numbers of the developed countries. Several authors have reported on the low research output in developing countries including reports published by Geyskens, Steenkamp and Kumar (1998); Farley and Lehmann (2001) and Adams et al., (2011). In sub Saharan Africa (SSA), quite a few researchers have pointed out that research output has been steadily increasing over the years in the region (Tijssen, 2007, 2015; Uthman & Uthman, 2007; Hofman et al., 2009; World Bank, 2014; Uthman et al., 2015; Nwagwu, 2016). Bunting, Cloete and van Schalkwyk (2014: 1) in their study of eight flagship universities, i.e. University of Botswana in Botswana, University of Cape Town in South Africa, University of Dar es Salaam in Tanzania, Eduardo Mondlane University in Mozambique, University of Ghana in Ghana, Makerere University in Uganda, University of Mauritius in Mauritius and University of Nairobi in Kenya concluded that research output of these countries doubled from 1,148 in 2001 to 2,574 in 2011. They further indicate that, amongst these universities, University of Cape Town, University of Nairobi and Makerere University dominated the research article output, "producing 80% of the total in 2001 and 81% in 2011" (Bunting, Cloete & van Schalkwyk, 2014: 20). Indeed, the findings of this study are consistent with trends in several African countries which show repeated increases in their research productivity as the case is with UNZA SOM. This growth in research output should be celebrated and should be encouraged not only at the UNZA SOM but the whole institution.

6.2.1 *Authorship Patterns*

Findings reveal that papers authored by more than five researchers were the majority and totaled 143 followed by papers authored by three authors (40), five-author papers (31), one-author papers and four-author papers (25 each). Two-author papers were the least (17). These findings are consistent with results of other studies that show increases in co-authorship patterns (Akakandelwa, 2007; Ocholla & Ocholla, 2007; Onyancha & Ocholla, 2007; Onyancha, 2009; Kebede et al., 2014; Cloete & Maassen, 2015; Kelaher et al., 2016). Other studies such as Strange (2008) indicate that from the 1600 up until the 1920's scientific authorship was mainly that of an individual – i.e. sole authorship was the norm. However, these patterns of authorship in the biomedical field have changed, and perhaps with more and more authors co-authoring their works as has been observed in this study as well in other studies such those done by (Clarke, 1964; Chew, 1988; Powers, 1988; Weeks, Wallace & Kimberly, 2004; Greene, 2007; Shaban & Aw, 2009; Osareh, Chakoli & Keshvari, 2010; Barão et al., 2011; Vinther & Rosenberg, 2012; Yousefi et al., 2012; Cordell, 2013; Ghajarzadeh, Mohammadifar & and Safari, 2013; Dang et al., 2015; Brunson, Wang & Laubenbacher, 2017) is becoming the norm. All these authors have written on how authorship patterns have shifted from a single author to multiple authorship from the early 1900s to the present, with the present showing increasing co-authorship patterns of knowledge production. There are various reasons that could be advanced for multiple authorship: for instance, some institution may give more credit for multiple authored papers so as to encourage collaboration. Other institutions may encourage multiple authorship so they can attract funding from the collaborating institutions. Fundamentally, medical schools exist in a highly globalised and interconnected world; that it is almost impossible to work in isolation if one were to aim to produce knowledge that has an impact on not only one's immediate society but the whole world. Certainly, most of the diseases and conditions that affect people in one society have implications for people in other societies. So, lessons learnt in one society may be of benefit to people in other parts of the world.

Communicable diseases such as cholera, ebola, haemorrhagic fever, malaria, measles, meningitis and tuberculosis all have global presences. The same goes for conditions such as HIV/AIDS, diabetes and cancer. Working in multiple teams from different institutions on non-communicable diseases such as cancer, cardiovascular diseases, chronic kidney disease, diabetes, chronic lung

disease, heart disease, malnutrition and stroke is critical for society to pool the expertise of researchers and come up with solutions for the whole planet; and this can come in the form of knowledge.

6.2.2 *Collaboration Patterns*

Collaboration Patterns of the Academic Staff at the UNZA SOM seems to be following in the footsteps of other researchers in the knowledge production field of academia, which is predominantly dominated by multiple authorships. This multiple authorship has mainly been motivated by various factors such as funding patterns of the funder where they prefer proposals from across disciplines and even from different countries. In a study by Fari and Ocholla (2016: 12) that looked at DIC of selected universities[17] in Nigeria and South Africa, the study found that the overall DIC for Nigeria was 0.91 and that of South Africa making them significantly meaningful. Similarly they found that these collaborations are ideal for not just knowledge production but also knowledge sharing; finding that there was a "close link between co-authorship and research collaboration on the one hand, and research collaboration with knowledge sharing, on the other" signifying that there is more sharing of knowledge in co-authored papers (Fari and Ocholla, 2016: 19). Further findings from the study indicate that the school of Medicine at the University of Zambia has been following similar studies in knowledge production with a lot of emphasis on collaboration. See Table 6.1.

Table 6.1. Degree of Collaboration of the Six Selected Universities in Nigeria and South Africa

University	Total No. of Papers	No. of Papers	Average Authors per paper	Single and Multiple Authored Percentages				Degree of Collaboration
				Single Author	*%*	*Multiple Author*	*%*	
UKZN	1,554	7,539	4.85	8	0.51	1546	99.49	0.99
DUT	206	711	3.45	25	2.14	181	87.86	0.88
UZ	344	1,193	3.47	28	8.14	316	91.86	0.92
ABU	456	1,797	3.94	24	5.26	432	94.74	0.95
FUT	137	478	3.49	15	10.95	122	89.05	0.89
UMYU	23	131	5.70	0	0.00	23	100	1.00

Fari and Ocholla (2016: 12)

[17] *UKZN – University of KwaZulu-Natal (South Africa); DUT – Durban University of Technology (South Africa); UZ – University of Zululand (South Africa); ABU – Ahmadu Bello University (Nigeria), FUT -Federal University of Technology Minna (Nigeria) and UMYU -Umaru Musa Yar'adua University*.

In another study of published journals in South Africa; with a predominance of the Arts and Humanities fields, collaborative publishing accounted for a quarter of all the papers with 15% of those collaborations occurring with institutions that are outside the university system meaning people were collaborating with non-university actors, with co-authorship being more prevalent in agriculture, chemical sciences and the biological sciences (Academy of Science of South Africa (ASSAf), 2019: 69). It is also important to note that there is diversity in the institutions that the UNZA SOM was collaborating with, both local and international. However, what was not very prominent is the collaboration with regional and African institutions, and this confirms the general lack of cooperation and interaction in general amongst African countries especially, where there is a lack of linkages in terms of air transport, road transportation, trade and economic linkages. Even though these linkages exist, most of them are insufficiently linked as well as being inconvenient to the citizens of Africa. The results agree with those of Ettarh (2016: 194) who in his study found that "the number of publications involving multiple SSA countries over this period accounted for less than 10% of the total number of multi-country publications including at least one SSA country. Collaboration patterns reflected dominance by countries in Europe and North America, with South Africa accounting for the bulk of scientific collaboration in CVR within SSA". In a study on 'Mapping the health research landscape in Sub-Saharan Africa: a study of trends in biomedical publications' it was established that South African institutions were collaborating more with the European counterparts when compared to their regional counterparts (Hofman et al., 2009); again, this is similar to the situation with the UNZA SOM. It is for this reason, that Tijssen (2015: 63) has argued that "university-specific growth trajectories are at least also partly driven by international collaboration and the increased production of internationally co-authored publications". This really speaks to the issues of those institutions that depend so much on international funding for all their research (as there is no local funding); the drivers of the subject areas for research may be decided by the interests of the funder and not really the needs of the local institution or country.

Incidentally, Tijssen (2015: 65) further elucidates that collaboration with African countries is minimal, even if it has been steadily increasing. This goes for collaboration between African countries themselves. A study by Boshoff (2009: 426) in Central Africa found a significant number of "regionally co-authored papers involve a non-African country address (85% of all papers and

71%–89% of field-based papers). Only 26% of regionally co-authored papers involve collaboration by another African country although the figure is higher in the health sciences (37%). European countries participate in 77% of regionally co-authored papers and the colonial powers in 57% of cases".

However, some have argued that these are not collaborations that Africa should be satisfied with, for the collaboration levels between developed and developing countries are not equitable. In this vein Owusu-Nimo and Boshoff (2017: 1099) in a study in Ghana on collaboration have argued that "collaborators within Ghana were largely involved in the collection of data or fieldwork. Collaborators from outside Africa played instrumental roles in providing resources and securing research funds". In the words of former President Kenneth Kaunda, this is a relationship of a rider and a horse. Anamela-Gundersen (2002) quotes the former President repeating the same statement at an Open Forum in Oslo, Norway in 2002 where he reiterated this unbalanced relationship between developed countries and countries in the South that the "current system of globalisation can only be seen in terms of a slave and master relationship, horse and rider" where the horse does all the work and the credit goes to the rider. And yet other have argued that this type of collaboration is the reason why African authors are not visible as most often they are only involved in the data collection and not as contribution to knowledge generation.

Certainly, over the years, the University of Zambia has been collaborating with a number of institutions both locally, regionally and the world over. Among some of the notable collaboration programmes and partnerships that UNZA SOM has are the following; 1) the Medical Education Partnership Initiative (MEPI) -- a programme led by the Office of the U.S. Global AIDS Coordinator (OGAC) and supported by the US National Institutes of Health (NIH); 2) the Norwegian Programme for Development, Research and Education through a partnership with the University of Norway; 3) the US Centres of Disease Control and Prevention (CDC) under the President's Emergency Plan For AIDS Relief (PEPFAR/Emergency Plan); 4) UK's Wellcome Trust; 5) JICA; 6) SIDA; 7) DFID; 8) UNFPA; and 9)WHO, amongst many others. Additionally, in this process of collaboration they have worked with several institutions such as: the University of Alabama at Birmingham, the University of Miami, the University of Nebraska, Vanderbilt University, University of North Carolina, UCLM, UTH, CIRDZ, ZAMBART, Emory University

and LSHTM. Some of the top collaborative countries have been the USA, UK, Japan, South Africa, Malawi, France, Nigeria, Canada, Tanzania, Botswana, Central African Republic, Mozambique, Norway, Sweden and Uganda. The collaborative partnerships that UNZA SOM has are at several levels; individual, programme, institution and country levels. Although UNZA collaboration patterns are impreesives, they confirm other findings that there is more collaboration with authors from outside the continent when compared to authors within the continent, within country or institutions (Boshoff, 2009, 2010; Onyancha, 2011; Onyancha & Maluleka, 2011; Onyancha & Ocholla, 2007).

6.2.3 *Journals of Publication*

The University of Zambia School of Medicine academic staff and researchers have published in a total of 159 journals. Kebede et al. (2014: 107), in their study that looked at the 'research output of health research institutions and its use in 42 sub-Saharan African countries', found that books and book chapters were leading as favourite publication channels for the scientists in the 42 countries. However, this study established that the favoured publication channel for the academic staff were journals. The study findings are in line with the findings of Kebede et al. (2014) who in their study established that academic staff were publishing in a mix of both print and online journals, with a trend towards online publishing. The journals in which the academic staff of the School of Medicine were publishing are in a mix of both print and online journals as well as those which are a combination of print and online. The journals in which the academic staff were publishing in were spread out all over the world; Asia, Africa, Europe and North America. The journals themselves are also a combination of both high impact factor journals such as the *PLoS One*, *American Journal of Tropical Medicine and Hygiene*, *International Journal of Tuberculosis and Lung Disease (IJTLD)*, *The Lancet*, *Malaria Journal* and those with no impact factor like the *Medical Journal of Zambia*. The findings indicate that impact might not necessarily be a driver in choosing the publication channel. This is important because Thomson Reuter's Impact Factor is supposed to measure article usage and, therefore, one would expect that knowing the impact factor of a journal might attract more article submission to the journal. However, journal impact factor might not necessarily translate into article level impact. According to Rehn et al., (2014: 12) the "Thomson Reuters Impact Factor for a scientific journal is a mean value that corresponds to how many times an average article published in the journal has been cited". In this regard it is thought

of as a measure of how important that journal is in that field (Garfield, 2006; Jain, 2011; Malathi & Thappa, 2012; Tressoldi et al., 2013; Sharma et al., 2014; Rehn et al., 2014). However, at times impact factor has been criticised: namely, that it should not be the only measure of the quality of articles. It has further been argued that every now and then impact factor may be manipulated by a journal to show that the journals' articles are highly cited and used (Jain, 2011: 289-290). Thus, the usage of impact factor should be approached with caution, taking cognisance of the fact that sometimes it is impossible to come up with a true measure of the importance of an article as the situational circumstances of use may differ from institution to institution or indeed country to country, and from individual to individual. It has also been argued that, doing so, favours those in the developed world. Other journal such as the local journal *Medical Journal of Zambia* published by the Zambia Medical Association does not have an impact factor. However, arguments can be made of its relevance to the local health profession and health care services in the country as it has more reach than any other journal published elsewhere. It also reports on conditions and diseases and that are of direct impact to the health care professionals in the country. Hence, its article usage might be likely higher than those articles from high impact factor journals.

6.2.4 *Research Subject Areas*

Institutions set their own research agenda, which are normally in line with missions and visions of the institutions. These research agendas are set out to respond to societal problems as they may exist from time to time, usually from the perspective of that particular organisation. The research output of the academic staff of the School of Medicine show cognisance of the diseases and conditions that are a major health burden on the country. The results indicate that HIV and Aids, Malaria and Tuberculosis are the most reported diseases and conditions. These diseases and conditions are also the leading cause of death among Zambians. In the 2015-2021 National Health Strategic Plan, the Ministry of Health confirms that the country is characterised by "high prevalence and impact of preventable and treatable communicable diseases, particularly malaria, HIV and AIDs, Sexually Transmitted Infections (STIs) and TB" with Malaria and ARI/Pneumonia topping the list of causes of mortality (Government of the Republic of Zambia, Ministry of Health, n.d.: 7). These findings indicate that much of the research that has been done by the UNZA SOM is responding to the health and medical research needs of the country.

In general, research output tends to be much higher in the STEM subject areas, of which Medicine is a part. In the SADC region the dominant fields of study were: "environmental and occupational health, tropical medicine, infectious diseases, veterinary sciences, immunology, environmental sciences and plant sciences" (Abrahams, Burke & Mouton, 2009: 28); again, these are subject areas into which health and medicine fall. It has been argued by UNESCO, that subject areas covered by the countries they surveyed in terms of publishing generally mirrored the academic orientation of their institutions. And in this instance most countries showed an overwhelming strength in the STEM fields which largely outweighed the research output from the humanities and social sciences (United Nations Educational Scientific and Cultural Organisation, 2015b: 545). The study by Hofman et al., (2009) found that cancer, HIV/AIDS, malaria, parasitic diseases, and cardiovascular diseases were the most researched subject areas in SSA. In another study by Akakandelwa and Rousseau (2016: 37) done on Zambia, recognised that medicine and health sciences were the dominant research areas "followed by public/environmental occupation health, and tropical medicine". In one more study that was conducted in Uganda at Makerere University College of Health Sciences (MakCHS) "up to 57% of research was in infectious diseases, followed by non-communicable diseases (20%), and maternal child health (11%) (Nakanjako et al., 2017: 1). In Uganda, again researchers have contended that the 'number of peer-reviewed publications by MakCHS academic staff has been growing, with over 837 publications from 2005-2009, with two-thirds of the publications lying within the priority disease conditions outlined in the current Ugandan HSSP, largely HIV/AIDS, malaria, and maternal child health" (Pariyo et al., 2011: 5).

It appears that in the main, research output in most African countries has been growing; and the growth has been in the areas of health and medicine that are of critical importance to the countries such as shown in the case of Uganda. The situations described above is also a comparable to Zambia. As already posited, research concentration in certain subject areas may also be driven by funding patterns of funding agencies whether locally or internationally on the areas that they are interested in funding. Most often this happens when an institution may not have the funding resources to spend on research; and possibly will for that reason be dependent on collaborative partners to fund its research. Nonetheless, sometimes, collaborative partners may have their own research interest areas; but, then, these research areas may be at variance with the priority research areas of the institution or country.

6.3 Digital Information Retrieval Skills

In today's context, it is important for people in academia to have the relevant digital information retrieval skills as this is the link to the information they require to effectively navigate the online environment; which has massive information that may be relevant to the knowledge production process. Digital information retrieval skills are a component of information literacy which has been defined as the "the adoption of appropriate information behaviour to obtain, through whatever channel or medium, information well fitted to information needs, together with a critical awareness of the importance of wise and ethical use of information in society" (Johnston and Webber, 2003: 336). Digital literacy itself which is close to digital information retrieval has been defined as the "the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills" (American Library Association, 2013: 1). This definition deliberately uses digital information retrieval skills as these are the associated skills that are relevant to knowledge production in the present day. Digital information retrieval skills are skills that enable a person to comfortably and effectively engage with the online environment. Incidentally, the researcher was interested in knowing the digital information retrieval skills of the academic staff and enquired about their Internet search skills, the searching techniques they used when searching the Internet, the frequency with which they used the Internet and the reasons why they used the Internet. Generally, the results point out that the digital information retrieval skills of the academic staff were high, meaning they are able to engage comfortably with the online environment. This is important because most of the current information that the academic staff are engaging with, and will in the future utilise, is in the online environment. This is demonstrated by the fact that the UNZA Library, in responding to the information from all University of Zambia users has stopped purchasing print journals and now concentrates only on online journal subscriptions in its collection development of library materials. Additionally, it has also started the purchase of e-books; although print books are still purchased on a very small scale. Indeed, several studies indicate that nowadays most researchers possess the necessary digital skills required to retrieve information from online sources that could be used for several purpose to support the researcher's needs. A study in Nigeria found that there was a "significant correlation between accessibility and utilisation of electronic resources and productivity of respondents at the University of Ibadan (Ani, Ngulube & Onyancha, 2014:169), further arguing that increased use of the electronic information may have led to increased

knowledge production (Ani, Ngulube & Onyancha, 2014). However, in Tanzania, a study found respondents had interest in both online and print information. The reason for the interest was because the information sources were readily available and not affected by power outages. In a study in Tanzania, "a majority preferred both an online and a physical library because of Internet problems with very slow, or no, connectivity. Some preferred only an online library because it could provide easily accessible and updated information. However, most respondents reported that they do not have skills for using online information and report problems with network connections" (Haruna et al., 2016: 919) and further reported that a majority of the health information professionals surveyed had rudimentary digital information retrieval skills with only a few of the respondents indicating that they had adequate Internet navigational skills (Haruna et al., 2016: 918). It could be surmised that lack of digital information retrieval skills may have a negative effect on the way users interact with the online environment and also have an impact on the knowledge production process.

6.3.1 *Internet Search Skills*

Knowledge production requires digital literacy skills that can assist researchers to access the information to use in the process of creating knowledge. The study established (Figure 5.9) that digital literacy skills of the respondents where relatively advanced with the majority of them (39, 95.2%) indicating that their skills were good to excellent. Only 2 (48) were observed to have low digital literacy skills levels. Information searching may be different at several levels; from people with very basics skills to those with advanced skills; and it can be surmised therefore that their experiential information searching will be different and vary according to the skills level along with the context in which that searching is carried out (Ellis, Cox & Hall, 1993; Choo, Detlor & Turnbull, 2000). In a study by Nwosu, Obiamalu and Udem (2015: 102) of Nnamdi Azikiwe University, Awka, in Nigeria, they observed a relationship between a researcher's literacy levels and their research output. In that study they observed the value of Pearson correlation coefficient of "($\sigma = 0.633$, $p = 0.000$), which showed a positive correlation" (Nwosu, Obiamalu & Udem, 2015: 102). Further, they conclude that "the academic staff with high information literacy skills often find it easier to publish their research work than those with lower skills" (Nwosu, Obiamalu & Udem, 2015: 104). Sumpter (2006) in the United States of America, Sampath Kumar and Manjunath (2013) in India; Bhukuvhani, Chiparausha and Zuvalinyenga (2012) in Zimbabwe;

Okiki (2013), Uluocha and Mabawonku (2014), and Anunobi and Udem (2015) in Nigeria have all concluded in their studies that there is a correlation between information literacy skills and research productivity. Madu and Dike (2012: 184) found that amongst academic staff in Nigerian Universities in North Central Geographical Zone, there was a link between high information literacy levels and research output observing that "the more information literacy competencies possessed by the academic staff the higher his academic productivity level is likely to be". Others have observed that "awareness and acquaintance with electronic resources, which is a healthy sign towards seeking of information utilising e-resources" (Kumar, 2018: 10). However, it has been argued that what is of paramount importance in searching techniques is not knowledge of every database that is available worldwide but rather "the skills to search interface meta search engines such as Google that can harvest information from other databases and aggregate the results for the user" (Makondo, Kanyengo & Kakana, 2018: 730). This is because navigating the Internet is a skill that is so relevant in today's electronic age and that is "important to learn the basic process and techniques of searching the exact information over the Internet to improve the search effectiveness of users" (Pattanaik & Pattanaik, 2011: 10). It can therefore be concluded that informational retrieval skills are important in increasing researcher's knowledge production. These are the skills that have been summed up by Azdeh and Ghasemi (2015: 29) as information retrieval skills, information valuation skills, information organising skills and information interchange skills.

6.3.2 *Searching Techniques Used*

Searching techniques refer to search strategies that the researchers use to retrieve online information. The results show that the search techniques most frequently used were searching by keywords (82%) and by topic (75.6%). The findings are line with studies done in other countries. For instance, in India it was established that academic staff at North Orissa University primarily used search strategies that were keyword based. This, they argued was meant to narrow their search to a specific topic and thereby retrieve search results that were as close to what they were researching as possible (Pattanaik & Pattanaik, 2011: 18). Evidence again shows that users when searching, although using keywords, do not follow traditional library search techniques such as those of using Boolean logic. They may use Google search engines but usually create search strategies that they are comfortable with (Sellan & Sornam, 2018: 65). It has been observed that

users always choose search techniques that are easier and comfortable for them and thus "understanding search behaviour is an important component for libraries, as it establishes the basis upon which they can tailor their information literacy programmes as well as services" (Makondo, Kanyengo & Kakana, 2018: 730). Makondo, Kanyengo and Kakana (2018) describe three search techniques that can be used in information seeking namely; formal system strategies, informal resources strategies, interactive one involving consulting human connections.

6.3.3 *Frequency of Use of the Internet*

Frequency of use of the Internet denotes the necessity in which the user requires access to the facility in order to carry out their day to day functions. Frequency of use of the Internet may be an indicator of someone's research productivity. In this respect, the Nalanda Open University academic staff in India were found to be frequent users of the Internet, with the surveyed members all accessing the Internet as well as being comfortable navigators of the Internet (Pattanaik & Pattanaik, 2011: 18). Frequency of use of the Internet is also a pointer to something that has become part of one's life; a finding that was recognised in Uganda among university academic staff and their use of the Internet (Ukech, 2014: 45). These findings endorse the undeniable fact that the Internet has become an integral part of the world and that academic staff are no exception in requiring access to the Internet as part of the core activity of knowledge production within universities.

6.3.4 *Reasons why the Internet was Used*

The study findings established that the Internet as a source of information was utilised more because it provided users with digitised versions of sources which were easily accessible as long as access to the Internet was available. Today most researchers find the Internet more convenient as a source of information. The results of the study agree with a study in Nigeria that found that academic staff within the professorial ranks used online e-resources primarily for teaching and research purposes (Nwone & Mutula, 2018: 25). Teaching and research is at the core of any university; and these two functions are the reasons why universities spend huge financial resources in either recruiting or mentoring the best academic staff. A study by Kumar (2018: 10) found that the major reason given for using the Internet by those they surveyed was to support their information use in relation to their research work. In Uganda, Ukech found that the majority of

the academic staff used the Internet primarily for research information (Ukech, 2014: 32). To this end, we can conclude that lecturers in universities use the Internet in order to access research information that will be used in knowledge production. The Internet as a source of information is more readily accessible to researchers as long as the institutions within which they are located have access to the Internet. Additionally, the Internet becomes an attractive source of information due to the fact that it has a diversity of information that is relevant to most situations.

6.4 Knowledge Production Practices and their Attributes

The researcher wanted to establish the knowledge production practices and attributes of the academic staff at UNZA SOM. Accordingly, questions were asked about the type of knowledge produced by academic staff, purpose for which knowledge is produced, attributes of the knowledge produced, information materials used in knowledge production and sources of information used in knowledge production make (*cf 5.4.4*).

6.4.1 *Type of Knowledge Output by the Academic staff*

The type of knowledge produced by academic staff of the University of Zambia is consistent with other findings such as those from Akakandelwa and Rousseau (2016). In their study, they established that the "majority of the research output document types were journal articles (68.6%), followed by book reviews (12.3%), and meeting abstracts (5.3%) (Akakandelwa & Rousseau, 2016: 24). The journal article form of communicating knowledge was still leading. Other scholars looking at research output of universities in Africa have come to the same conclusion: that the journal is the leading choice amongst researchers and academic staff (Ahmed, Kanyengo & Akakandelwa, 2010; Kebede et al., 2014; Nwagwu, 2016). Indeed, the journal article is usually the goal for any researcher to publish in. This is motivated by several factors and primarily because journal articles contribute more to a researcher's overall publication output than any other publication format when it comes to career promotions. As argued by Tijssen (2015: 62) "research publications in peer- reviewed scholarly and technical journals are often seen as the prime output of high-quality scientific knowledge production". In a similar vein, Musiige and Maassen (2015: 120) assert that the "use of refereed journals (internal and external) in research dissemination is a key determinant of an academic's career progress as far as research is concerned, since publishing in journals renders individual academics visible nationally or internationally". Further, this may

also be a function of the networking opportunities and impact that the journal brings to one's field or discipline.

6.4.2 *Purpose for which Knowledge is Produced*

Malapela (2014: 164) in his study on the 'availability of and access to electronic journals for teaching and research by the academic staff at the Academic staff of Agriculture, University of Zimbabwe' found that in general academic staff were more involved in teaching and research and therefore used information from electronic sources to support these activities. In the study, he found that 48 (100%) used the information for research, 46 (95.8%) for teaching, 12 (25%) for student supervision, 8(16.6%) for consultancy, whilst 2 (4%) cited other reasons for using electronic information (Malapela, 2014: 164). As postulated by Ferreira (2013: 405), "the publication of research results is an important broadcast device that expands the possibilities for its application, as it allows the other students to consume the knowledge being produced, debate, refute, replicate and apply. A survey is not complete if you have not published their results. A bound research, without visitation and citation, lies lonely and go [sic] down in history as an unfinished work". It is very well to publish research output in various publication channels, however, unless that research makes an impact on people's lives it is a futile exercise. In the end such an endeavour would defeat the very foundation upon which knowledge production is based and is critical to the existence of universities and other knowledge producing institutions.

6.4.3 *Attributes of the Knowledge Produced*

Academic knowledge attributes are an important aspect of the knowledge production cycle and complex. This is especially true for knowledge that is produced from universities as people have come to expect certain standards from the knowledge produced. To the extent that knowledge produced should be trusted, it is critical for people to trust the process of that knowledge production, especially since the outcomes of that knowledge have implications for society. For instance, drugs produced out of that knowledge may be used in the treatment of people or production of seeds for farming. In fact, changes in government's policies may have far reaching consequences for society if it is based on a false premise; and for that reason, government policy should always be evidence-based. The study findings indicate that all the attributes of the knowledge produced by the University of Zambia School of Medicine academic staff point to

gaining endearing trust and confidence from society. They point to the fact that the knowledge was ethically produced, evidence-based, an advance of critical scholarship, trustworthy, socially beneficial, transferable, preservable and economically beneficial to society. From this perspective, Ferreira (2013: 405) argues that "social responsibility and commitment by the researcher with the diffusion and application of knowledge produced is an important expression of the ethics of research, the producer should not settle for their product and be satisfied with the success of the results, only by the scope of the theoretical production. As part of the social responsibility of the researcher, the satisfaction must be collective, arising out the potential of its application and its effective transfer to a practical level, in an attempt of which has scientific and social impact with what was produced". Indeed it is the responsibility and duty of those involved in the knowledge production process to ensure that throughout this process, they hold themselves accountable to not only themselves and their institution but ultimately to society.

6.4.4 *Information Media used in Knowledge Production*

A further factor that was important to determine was the information media that the academic staff used in the knowledge production process, *cf 3.4.* It is clear from the responses depicted in figure 5.14 that the largest proportion indicated they consulted electronic journals (37, 92.5%), followed by electronic books (25, 62.5%) and in equal proportion print journals (24, 60.0%) and print books at (24, 60.0%). These information media, for use in both research work as well as in the production of their knowledge products, such as books and journals, are an important component of the knowledge production process. Increasingly, the materials used are either in electronic or print forms but we have seen, increasingly, the move to electronic digital sources all over the world. In universities and research institutions such as the University of Zambia, journals seem to be the preferred choice of medium in which research output is published; this finding confirms what other previous studies on knowledge production have found (Ahmed, Kanyengo & Akakandelwa, 2010; Kebede et al., 2014; Musiige & Maassen, 2015; Tijssen, 2015; Akakandelwa & Rousseau, 2016; Nwagwu, 2016); Section 6.2. discusses the increase in knowledge production at the University of Zambia as observed from bibliometric findings. The findings agree with those of Nwone and Mutula attesting to the fact that the many respondents in their study preferred publishing their research output in subscription based journals and fee-based open access journals (Nwone & Mutula, 2018: 26) again confirming the attraction of journals as a publication outlet for academic

staff. The journal is a well trusted outlet that has been there for some time making it a favourite publication medium with universities everywhere and accepting that reliable journals follow the required quality assurance rigour that is accepted by universities worldwide.

6.4.5 *Sources of Information used in Knowledge Production*

Sources of information for researchers to use in both research work as well as in the production of their knowledge products, such as books and journals, are an important component of the knowledge production process. Nowadays, these sources are not only found in the library. Yes, the library is still important in facilitating access to these sources more especially in developing countries where widespread access to the Internet is still mired in a host of problems. Upon being questioned further, the place where they found the information they needed for the knowledge production activities, they indicated that they obtained the information from different sources. In their responses they point out that their sources of information were the Internet (40, 97.6%), followed by the University Library (23, 56.1%), University departments (18, 43.9%), Personal Portable Devices (PDAs) (15, 36.6%), colleagues (13, 31.7%) and government departments (11, 26.8%). However, it is important to note that although print materials are still very prevalent in most African countries such as Zambia, there is a general move worldwide to electronic digital sources even in African countries. Similar findings were found by Nwone and Mutula in their study, where their results showed that online databases and electronic journals were used extensively for "seeking information for teaching and research" (Nwone & Mutula, 2018: 28). Still in Nigeria, Ahiauzu and Ani (2015:93), Ani, Ngulube, and Onyancha (2015) found that the Internet was the most popular source of information for the lecturers from Rivers State University of Science and Technology (RSUST), Port Harcourt. In their work on *"Finding organising and using health information: a training manual for students, researchers and health workers in Africa*", Ajuwon et al. divided these sources of information into four groups namely; human sources (colleagues and peers), archives, libraries and the Internet. They further explain, that these are sources where one goes to get information (Ajuwon et al., 2011: 13). However, at Madonna University, the majority of academic staff there primarily used the library (53.6%) as a source of information (Nnadozie & Nnadozie, 2008: 4) and in the library used mainly print materials, and this might have been a case when the Internet was still in its infancy in most African countries. The findings of this study and the literature cited generally confirm to a universal phenomenon,

that increasingly most research and knowledge producers are relying on the Internet as a source of information.

6.5 Knowledge Production, Diffusion and Utilisation Patterns

6.5.1 *Frequency of Production of Knowledge Products*

Respondents were asked to show the frequency with which they produce knowledge products in their work. Frequency of production of knowledge products by researchers in institutions where the mission is to create and produce knowledge in whatever format may indicate their appreciation of knowledge and their willingness to contribute to that institution's knowledge production. See Table 5.21 for their responses. The results show that a large number of the respondents (19, 46.3%) were frequently producing knowledge products in the work environment. The findings point to the fact that the majority of academic staff at the School of Medicine, University of Zambia, used knowledge products in the production of knowledge, diffusion and utilisation of knowledge. It is apparent that knowledge products are required at all stages of the knowledge production cycle. The frequency with which academic staff produce knowledge, diffuse knowledge and utilise knowledge may also have a bearing on an individual researcher's research output and this may similarly impact their academic promotion as well as their visibility both locally and internationally. Equally, this frequency of knowledge production, diffusion and utilisation by academic staff may affect an institution's visibility, its ability to attract increased grant funding and overall ranking in the world university rankings.

6.5.2 *Frequency of Diffustion of knowledge products in work processe*

The study established that the majority of the respondents used knowledge products in their work. Knowledge production is a full circle, requiring diffusion and utilisation after knowledge has been produced. Diffusion of knowledge is always purposeful and targeted to the recipient audienc. Chagnon et al. (2010: 3) has argued that "diffusion efforts that are adapted specifically to targeted user groups by the producers of research knowledge are relatively uncommon" as it is a fruitless exercise. Additionally, this process needs to be undertakern inorder for the knowledge cycle to be fulfilled. The Book and the Journal are still some of the popular methods of knowledge diffusion (Ani, Ngulube & Onyancha, 2014); despite them being non interactive. Additionally, collaborative networks are essential in the knowledge diffusion process especially among academia.

6.5.3 *Frequency of Knowledge Utilisation by the Academic staff*

Knowledge utilisation is critical in the knowledge production enterprise. They study revealed that the academic staff at UNZA SOM frequently utilised knowledge products in their work. The finding are similar to to other studies that allude to knowledge utilisation being dependent on the information medium, the information content itself and how relevant that content is to the user. In this context, Chagnon et al. (2010: 3) has posited that "knowledge utilisation needs, as well as the appropriate messages and formats for transmitting knowledge, differ greatly depending on whether users are practitioners, programme administrators, or political decision-makers" and that the likelihood of knowledge being utilised more is greater when the knowledge is ralted to the users needs (Chagnon et al., 2010: 6). In this study, the differences in knowledge utilisation are a result of the academic ranking of the academic staff member, the age, and perhaps the subject specialisaiton of that academic staff member. The frequency of use of the knowledge and relevance in what one is doing is key to that knowledge being utilised. Asian Development Bank (2012) says that staff were frequently using publications of the bank frequently in their work. They argue that they staff believed the bank's publication had influence on have argued that the "about 90% of respondents indicated that the ADB publications they read and used had influenced their thinking about development issues"; meaning that they knowledge consulted were useful in the work the were doing as the bank was involved in developmend work (Asian Development Bank, 2009: 120).

6.5.4 *Key Issues in knowledge production, diffusion and utilisation in the University of Zambia*

There were various issues that came out prominently amongst the respondents as being some of the impediments to increased research output in academic institutions. These included, among others, institutional culture which is predominantly a teaching culture as opposed to a research culture, plagiarism, knowledge production policies, reference management software, incentives for knowledge production, Internet and library facilities and locally produced journals. The issues raised above on research have all been highlighted by various researchers that have looked at the knowledge production process. Several authors have indicated that some of the above may have a bearing on the research productivity of individual researchers and ultimately have an impact on the research output of the both the researcher and the institution (Owolabi, Bower & Ogunniyi, 2007; Abrahams, Burke & Mouton, 2009; Chagnon et al., 2010; Cloete et al., 2011; Woodiwiss, 2012). That is why the research environment must be alive to current developments in the

knowledge production industry and be able to respond so that there is increased research output.

6.6 Determinants of Knowledge Production, Diffusion and Utilisation

There were various determinants that came out prominently amongst the respondents as being some of the impediments to increased research output, diffusion and utilisation. The established barriers to knowledge productivity in the university environment are hereby listed, analysed and discussed.

6.6.1 *Lack of funding*

The findings indicate that 36 (87.8) of the respondents lacked funding to carry out research. Access to adequate financial resources is major contributor to research productivity (Sulo et al., 2012: 478; Muia & Oringo, 2016: 1790). Kulyambanino (2016: 52) states that funding is one of the research supporting systems that are needed to increase research output. What is generally agreed is that most institutions in Africa require funds in order to set up the necessary infrastructure to support research. In Portuguese speaking African countries of Angola, Cape Verde, Guinea Bissau, Mozambique and São Tomé and Príncipe, the state of inadequate funding for higher education (Langa, 2014: 96) is comparable to that being faced by other countries on the continent. Conversely, in her study, Kulyambanino (2016: 62) surmises that the Directorate of Research and Graduate Studies felt that even though funding for research was a major hindrance, there was another impediment: "the poor quality of the manuscripts produced by some academic members as well as produced by the students. The manuscripts had not been packaged the way they should if they were to compete favourably, on the international market for publication". This means that even if funding were to be available for publishing, the manuscripts were of such poor quality to meet the standards accepted for publishing without major revisions being done to the submitted papers. Another major hurdle in relation to funding was that almost all research funding (70-90%) available in the region was from foreign agencies (Trotter et al., 2014: 38), making the universities in the Southern African Development Community countries dependent upon such sources. However, it is very important for academic staff at the School of Medicine not to solely focus on funding coming to the University or from the Government but rather that, in addition, to advocating for increases in research funding from the Universityor Government, it is critical that the academic staff, themselves proactively look towards other funding agencies to finance their knowledge

production activities.

6.6.2 *Lack of sufficient time*

About 26 (63.4%) of the respondents had indicated that they lacked sufficient time to do research. Research is a time-consuming activity and yet lecturers are required to perform several functions: lecturing, community service, administrative functions in addition to actually carrying out research. As if that were not enough, after the research has been carried out, their research needs to find itself in different publication outlets such as books and journals. All these activities require an investment of time and lack of it has been a major barrier to research output in several universities (Sabzwari, Kauser & Khuwanja, 2009: 6; Okendo, 2018: 205).

6.6.3 *Lack of incentives for knowledge production, diffusion and utilisation*

Incentives for knowledge production, diffusion and utilisation are critical to the success of any university that wants to count itself as a research institution. The study findings show that 19 (46.3%) of the respondents felt that there were no incentives for knowledge production, diffusion and utilisation. At the University of Nairobi in Kenya, incentivisation was recognised as a predictor for research production. As a result, it instituted measures that recognised those academic staff who had excelled in research activities. The measures instituted included amongst others; "appreciation letters, financial rewards or promotion (Muia & Oringo, 2016: 1790). Against this background, the University of Zambia gives incentives for increased research output, cardinal among them is academic promotion which is also linked to increased salary earnings once someone has been promoted. The university also grants staff who have worked for more than five years sabbatical leave, which can be spent at an institution of their choice. It is expected that during that one year of sabbatical leave, such staff will be engaged in activities that lead to research publications. Similarly, in Kenya, it was further contended that in order to encourage research productivity, staff needed to have lower workloads, a conducive work environment, perform less administrative functions, and to be given leave to carry out research. In addition university authorities are required to provide funds to its academic staff members to conduct research (Muia & Oringo, 2016: 1790).

6.6.4 *Lack of Internet access*

Knowledge production requires access to the Internet. Some respondents (16 39%) indicated that they lacked access to the Internet and as a result their research productivity was affected. One of the key ingredients in knowledge production is access to relevant research output that should feed in the process; and some of the information resources that has been used heavily in the past is the library. However, interviews with staff from the CICT department indicates that almost all staff have internet access points in their offices connected either through wireless or LAN as indicated in 6.8.2 ; perhaps what is lacking might the computers or indeed laptops to connect to the internet. In today's digital environment, the Internet has in a way become the library where people can access the requisite knowledge. Consequently, the Internet has become a factor in research productivity in any university. In a study on research productivity in the Internet age, it was found that there is a positive relationship between the Internet and the increased research output of researchers (Barjak, 2006: 357). In recognition of the important role that the Internet plays in an institution's life, the Geneva Declaration of Principles and Plan of Action was adopted at the World Summit on the Information Society in December 2013. In that declaration, the members agreed and the signatories affirmed that they would "promote affordable and reliable high-speed Internet connection for all universities and research institutions to support their critical role in information and knowledge production, education and training, and to support the establishment of partnerships, cooperation and networking between these institutions" (World Summit on the Information Society (WSIS), 2003: 25).

6.6.5 *Lack of appropriate reading materials*

Knowledge production, diffusion and utilisation requires access to the appropriate reading materials. Knowledge production in essence is a cycle which require the input of the relevant knowledge before new knowledge can be produced. Several respondents (11, 26.8%) thought that lack of appropriate reading materials is what was preventing them from engaging in knowledge production activities. A study in Tanzania agreed with this finding, that access to library facilities has an influence on knowledge productivity (Okendo, 2018: 207). In this respect, it has been claimed that:

> Web of Science and Medline journals are not readily available to Southern African universities, either in libraries or on the Internet. Thus academics, researchers and

> students face a triple bind: (a) low accessibility in relation to academic journals in general; (b) low accessibility to journals from the region; and (c) low accessibility of subject matter relevant to regional development concerns (Abrahams, Burke & Mouton, 2009: 28).

In an acknowledgement of this lack of access to reading materials especially in the developing world the World Summit on the Information Society in 2003 reaffirmed the need for access when they declared that, in recognition of this lack of access to reading materials especially in the developing world, it was necessary to:

> Promote electronic publishing, differential pricing and open access initiatives to make scientific information affordable and accessible in all countries on an equitable basis; Promote the use of peer-to-peer technology to share scientific knowledge and pre-prints and reprints written by scientific authors who have waived their right to payment (World Summit on the Information Society (WSIS), 2003: 25).

6.6.6 *Lack of publication outlets*

Publication outlets are always a problem for authors from the developing world especially those from Africa. In the study findings, some respondents (9, 22%) felt that they did not have access to the relevant publication outlets and therefore this was impacting negatively on their publishing potential. In academia the prevalent form of publication outlets are journals, conferences and books in that order. However, publishing avenues in most of the countries are lacking. If they are there, the journals are not published frequently and most often the information they contain is outdated by the time they appear; making it very difficult for researchers to trust the local journals as their publication frequency is not guaranteed. As a result, academic staff are forced to look elsewhere for publication outlets, most ofter abroad.

Publishing in top rated academic journals is not just prestigious for academic staff, but it has implications on academic promotions and consequently the amount of salary one earns. This is because some universities may award more points for high rated scholarly journals. Nevertheless, getting a paper published in these high rated journals is not an easy task, as there is a very high competition; again, as already argued, the journal is very appealing as a publication outlet because

its turnaround is faster than the book. That is why they are the supreme publication mediums and most researchers strive to "publish in rated international journals, despite the challenges of having an article accepted. This view appears to apply across all disciplines" (Abrahams, Burke & Mouton, 2009: 29). It has further been argued that "many scholars from sub–Saharan Africa never get to publish their articles in top refereed international journals, leading to invisibility of scholarly publishing from sub–Saharan Africa" (Ondari-Okemwa, 2007). This invisibility may result in low research impact (Abrahams, Burke & Mouton, 2009: 28). These challenges may lead to frustrations amongst academic staff and researchers in general.

6.6.7 *Lack of Internet research skills*

A small percentage of academic staff (7, 17.1%) indicated that they lacked Internet research skills. Internet research skills are important in today's context as these are the skills that are key to researchers in producing publications. In Nigeria, there was a general low-level training in the use of information services for research as well as the training in research skills amongst surveyed scientists in research and development organisations. Additionally, they had challenges accessing the Internet as over 80% of them had to access the Internet from cyber cafes, a situation that is not tenable and conducive to knowledge production (Adeyinka, 2014: 57). This is an indication that the institutions are not putting investments into Internet access as a tool that could be utilised by the institution to not only improve research productivity but also to be utilised for other purposes such as communication and collaboration. Indeed, as contended by Sooryamoorthy and Shrum (2007: 734) "collaboration occurs among scientists from different continents and cultures through a spectrum of technologies, producing a mix of knowledge, products, and solutions. In the research process, collaboration is viewed as producing results through the transfer and sharing of information, skills, and expertise".

6.6.8 *Lack of interest in knowledge production, diffusion and utilisation*

There was lack of interest in knowledge production, diffusion and utilisation (2, 4.9%), although relatively small in number. This finding is very problematic as it is a requirement for all persons employed as academic staff to be involved in research and knowledge production, and it is hoped this engagement in research may eventually lead to increased research output for both the individual researcher and the institution as a whole. Indeed, the academic promotions tool of the

University of Zambia places emphasis on research and research output in addition to other criteria. A study in Vietnam also found that some of the academic staff surveyed took research as an "obligation (normative motivation) rather than because of a research interest and passion" (Nguyen, 2015b: 197). They were really not interested in research per se, and indicated that their university was primarily a research oriented university. This lack of interest may have forced some researchers with demonstrable exceptional performance to not apply themselves fully and may have resulted in their own individual scientific work not translating into institutional research capacity over time (Abrahams, Burke & Mouton, 2009: 32). However, these individual endeavours may later act as a springboard for research platforms in their various institutions.

6.6.9 *Heavy workload*

Indeed the literature reviewed indicates that a heavy workload of a lot of students to teach combined with the responsibilities of lecturing, tutoring, examinations and supervision made it extremely difficult for the academic staff to allocate some of their time to be engaged in knowledge production activities. Certainly, views expressed by the respondents were that they had little time for research as most of the time they had was spent on teaching. This has been exacerbated by the huge numbers of students that keep on increasing every year (*cf Chapter two*). This assertion was explored by Trotter et al. and they determined that "heavy teaching and administrative loads hinder research production in Southern African universities" (Trotter et al., 2014: 224); which is also similar to the findings by Kulyambanino (2016: 52) who alludes to the fact that 129 (78.7%) respondents in her research mentioned that overloads in teaching had impacted on the research abilities of academic staff at the University of Zambia.

6.6.10 *Lack of peer reviewers and editors for locally produced knowledge products*

Peer review is important in establishing a quality assurance mechanism for all scholarly published research. This is more so for African authored and published papers as they struggle to find their presence on the international academic scene. However, the study findings indicate that the peer reviewers are not always responsive on time and therefore cause a lot of delays in publishing of journal issues. It has already been established as far back as the 1990s that this is a major hindrance to up to date scholarly publishing in many African countries, leading some to assert that "editors and their peer review process are a reason for the death of new knowledge generation of

scholarship" (Sebola, 2018: 10) in Africa.

6.6.11 *Lack of Mentorship*

Mentorship of the young is necessary in order for the young researchers to gain skills in research, authorship and scholarly publishing. However, most often there is a lack of mentorship at African universities. Young researchers are often left alone to learn the processes of academic publishing. It has been highlighted that there is a general lack of mentorship programmes, and if there is any mentorship activity taking place, it is often ad hoc, and haphazard, without any formal institutional plans. As a result there is no knowledge of what is formally expected of the mentors and mentees; and often there is no time that is allocated, so both mentee and mentors complained of lack of time (Nakanjako et al., 2011: 3–6; Kumwenda et al., 2017: 2; Ssemata et al., 2017: 4–8). The solutions suggested for these challenges on a global level are to offer "more level playing fields for new health researchers globally, changing mindsets in institutions that do not have a culture of mentorship and building collaboration not competition" (Cole et al., 2016: 1093). Nevertheless, the success of any mentorship programme will be dependent on the commitment of both the mentee and mentor with the support of a conducive institutional environment (Sambunjak, Straus & Marusic, 2010: 77).

6.6.12 *Synthesis discussion of determinants to knowledge production, diffusition and utilisation*

The determinants of knowledge production, diffusion and utilisation, analysed and discussed above, are similar to findings from other researchers elsewhere who have documented barriers that researchers, especially in most developing countries face in the knowledge production process cycle. Musiige and Maassen (2015: 113) identified these factors that have a bearing on research productivity falling under: individual factors, organisational factors, funding and research culture as the main barriers to research production. Alrahlah (2016: 448), in a study in Saudi Arabia, claimed that "lack of proper funding and support along with a lack of research facilities" as some of the major barriers to research productivity. Rahman and Fukui (2003: 277–278) have also argued that "most of the developing countries tend to have difficulty in contributing to new developments and in applying new knowledge for their benefit due to a myriad factors, including scarce government funding, an insufficient number of scientists and physicians, miniscule private

investment, the negative attitude of public policymakers towards research and development, and the brain-drain to developed countries". Less funding to health research in developing countries has been a matter that has dominated the world health research community; with a call for increased funding made at various fora. Woodiwiss (2012), Cloete et al. (2011), Abrahams, Burke and Mouton (2009), and Owolabi, Bower and Ogunniyi (2007) have all pointed out that some of the barriers above may have a bearing on the research productivity of individual researchers and ultimately have an impact on the research output of the both the researcher and the institution. Others such as Iqbal and Mahmood (2011: 191) found heavy teaching load and administrative duties influenced research productivity. These factors impinge on the researcher's time that they can spend on research and therefore write and publish knowledge outputs. However, what is critical is for the research environment to be alive to current challenges and developments; and to be able to respond to the challenges so that there is increased research output. In a study across various African countries of Nigeria, Senegal, Ghana, Malawi, Zambia, Tanzania, Benin, Zimbabwe, Kenya, and the Democratic Republic of the Congo, the challenges of young African researchers were "scarcity of mentors, lack of funding, lack of writing skills, lack of motivation, and low demand for research by policymakers" (Kumwenda et al., 2017: 4). In this context, Muia and Oringo (2016: 1786) summarises these determinants of research productivity as broadly falling in four categories namely: research culture, institutional factors, research environment and resource factors. There is a general recognition that inorder to improve research performance and research output, it was important to improve the general research environment and infrastructure.

6.7 Policy Context

6.7.1 *Policies that Foster Knowledge Productivity in the University Environment*

The researcher asked the respondents to indicate with a Yes/No answer if they were aware of any knowledge production, diffusion and utilisation policies within the University of Zambia. If they answered 'Yes' they were further asked to list these policies. The results, as indicated in Figure 5.19, were that 28 (68) said yes and 13 (32%) said no. There can be no argument that knowledge production policies are important in an institution. Justifications have been made that institutional knowledge production policies should draw from both "international best practices and national, contextual factors" (Cloete & Bunting, 2013a: 7). Policies are important in setting a guiding framework which guides the individual researchers and the institution at large, on how to behave and operate in the knowledge production process. These policies must be all-encompassing and

deal with all aspects of the knowledge production complex; production, diffusion and utilisation.

The UNZA School of Medicine operates under various legislative regulatory frameworks and policies; both at institutional and national levels. The regulatory frameworks are mutually reinforcing; usually the local policies derive guidance drawn from national legislation and policies. National instruments be they laws or policies in most cases, take cognisance of best practice worldwide, but the aim, always, is to ensure that the best solutions for the country and the institution are taken care of. It is, therefore, important for the academic staff to know some of the regulatory frameworks and policies within which the University of Zambia operates and the specific policies at the University that foster knowledge production, diffusion and utilisation. All health research must adhere to the ethical guidelines as stipulated under the Health Research Act No. 2. 2013 of the Laws of Zambia; i.e. each research must be approved by an Ethics Review Board/Committee which itself is a member of the National Health Research Authority (Chanda-Kapata et al., 2015: 5). Knowledge of these policies enables the academic staff to utilise the guidance from these policies so that they can flourish in their knowledge production activities. In order to comply with these regulations the University of Zambia has operationalised them at institutional levels by coming up with its own Ethics Review Boards. These are: the Biomedical Research Ethics Committee (UNZABREC), the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the Natural and Applied Sciences Research Ethics Committee (NASREC) in conjunction with other institutional policies.

6.8 Fostering knowledge production, diffusion and utilisation at University of Zambia School of Medicine

This section discusses some the key issues pertinent to knowledge production, diffusion and utilisation. The researcher posed the question of how to foster knowledge production, diffusion and utilisation at the University of Zambia, both to the semi-structured questionnaire and the semi-structured interview respondents, respectively. Their views were varied: raning from funding, Internet access, shortage of staff, insufficient time, no incentives, appropriate reading materials, lack of publication outlets, inadequate peer review support system and knowledge production policies.

6.8.1 *Research Culture*

Research has always been a core mission of the University of Zambia from the time the University was established in 1966. In a statement from the Lockwood report, whose mandate was to make recommendations to the new government of the Republic of Zambia in 1965, there was emphasis on research capacity as being one of the cornerstones of any university. This call was re-echoed in the several strategic plans of the University of Zambia. For instance, in the University of Zambia Strategic Plan of (2012a: 12) , again research comes out prominently and the University set out to "ensure that research claims its rightful position in the University. In this regard, they argued that:

> in addition to learning, the University of Zambia is expected to provide an environment in which one is able to discover, create and innovate. It is the University's major responsibility to create knowledge through various research activities, the results of which are crucial in making informed decisions and policies by industry, Government and society at large. Research is also expected to generate knowledge, which should provide the basis for teaching and learning (University of Zambia, 2012a: 2–3).

The position of research at the centre of the university's activities and programmes has again been re-stressed in the University of Zambia Strategic Plan of 2018-2022 where they plan to enhance excellence in research and publishing through having:

a) an improved research and publications policy,
b) established a system for awarding outstanding research outputs,
c) enhanced institution - wide Intellectual Property Rights (IPR) management system,
d) increased the number of research publications in reputable journals, and;
e) developed flagship research partnerships with international organisations (University of Zambia, 2018b: 25–26).

One can note from the above stated goals that the University of Zambia aims to improve its research output by putting in place processes and systems that will enhance the research culture of the institution, both at the individual and institutional levels. Research Culture is critical to knowledge production, diffusion and utilisation for it "provides a supportive context in which research is uniformly expected, discussed, produced, and valued" (Hanover Research, 2014: 5).

The overarching role of fostering research at the University of Zambia is the preserve of the Directorate of Research and Graduate Studies, overseeing all research activities at the institution. This role was identified in the 1994-1998 University Strategic Plan with a need to create a link "between postgraduate education and research by establishing a Directorate of Research and Graduate Studies" (University of Zambia, 2015: 414). This action, was a result of the university recognising that research within the university was disjointed and therefore there was a need for the university to streamline its research operations framework (University of Zambia, 2015: 414). Indeed its 2009 Research Policy and Intellectual Property Rights policy provides for guidelines that "promote and foster the academic and managerial environment conducive for undertaking research" (University of Zambia Directorate of Research and Graduate Studies, 2009: xiii). Policies shape the institutional research culture that can push for demonstrable evidence of actions that have to deal with funding and training in order to enhance research output within an institution (Muia & Oringo, 2016: 1786). In this regard, after realising the shortcomings of the environment in which research was being carried, South Africa set up an innovation fund responding to the issue of equity in research with the sole aim of empowering both staff and students to be engaged in research (Wadesango, 2014: 61).

6.8.2 *Technology and Internet Access*

Technology and Internet access are essential to increasing the growth of the University of Zambia's research output. Technology and Internet access are coordinated by the Centre for Information and Communication Technology. The Centre for Information and Communication Technology has continued to improve its Internet services provision both in terms of bandwidth access and also in availability to all staff, to the extent that most sections and areas of the university have wireless connection as well as LAN connection. Most of the university employees have access toa computer and Internet, either connected through a wireless or local area network (LAN). These facilities allows all the academic staff to use the technology and make it easier for them to engage in collaborative research. In addition, improved Internet access enables the staff to gain access to current literature that is essential to their knowledge production programmes. A study in South Africa found that the use of the Internet was closely associated with collaboration and that there was a relationship between a scientist's use of email and research productivity (Sooryamoorthy & Shrum, 2007: 746). However in Nigeria, a study conducted at two universities, University of

Calabar and University of Ibadan, established that there was no relationship between access to electronic information resources with research productivity at the University of Calabar whilst there was a positive relationship at the University of Ibadan (Ani, Ngulube & Onyancha, 2014: 170). Indeed the University of Ibadan is ranked number two in Nigeria according to the 2019 Times Higher Education World University Rankings; where "Covenant University and University of Ibadan occupy fifth and sixth position respectively on the table of all the 28 African ranked institutions for the 2019 ranking" (Ukpong, 2018: para 3 & 6).

6.8.3 *Funding for Research*

Research funding is an important cornerstone of successful research programmes in any University. The University of Zambia has struggled with access to adequate funding for a long time. This inadequate funding to the institution has been reported in several fora. The findings of the study indicate that that both the respondents from the questionnaire survey and the interviews indicated that funding was a major obstacle to knowledge production, diffusion and utilisation in the insitution. In this regard, the Kalila-led report of the Committee on Education Science and Technology of the Zambian Parliament for the second session of the eleventh National Assembly, appointed on 27th September 2012, stated that "with regards to staff development, capital development and libraries, there has not been any allocation specifically for such developments. Consequently, staff development has suffered heavily. Infrastructure and library development has not expanded for a long time" (Government of the Republic of Zambia. National Assembly, 2012: 5). The Committee further itemised the funding that the University of Zambia had received from the government as indicated in Table 6.2. During the same period funding for services and operations had continued to be very low, with negative variance experienced in grant realised to the institution by the government against what was budgeted. The numbers show that in all the years 2005-2012 being reported on, there has always been a variance of more 300% between what was budgeted for the institution and what was actually released to the institution. It follows therefore that with reduced funding to the institution some of the institutional plans could suffer from no funding.

Table 6.2. Government Annual Funding to UNZA (2005-2012)

Year	*UNZA's Budget including outstanding bills (K'billion)*	*Budget (K'Billion)*	*Grant Released (re-current and dismantling of arrears) plus supplementary (K'billion)*	*Variance (%)*
2005	133.9	56.8	52.3	-156%
2006	346.8	191.7	66.8	-375%
2007	488.5	270.5	74.97	-419%
2008	587.8	310.8	94.5	-522%
2009	662.4	380.9	129.6	-411%
2010	912.2	355.4	112.2	-713%
2011	976.9	383.2	166.9	-485%
2012	1,429.70	531.4	225.3	-535%

In the 2016 budget, the University allocated a total of 1% towards research as indicated in Figure 6.1 whilst personal emoluments were allocated at 49% for academic staff and 33% for other staff, meaning the total cost of funding towards emoluments for all staff at the University of Zambia in the 2017 budget was 83%. General operations attracted 12%; Capital expenditure which includes infrastructure development and expansion expenditure was 0%. Table 6.3 shows a variance of -31% of funding for research in the same year. From the funding trends in Figure 6.1 below, it shows that research funding from the university is very low and does not match the aims and objectives of the University towards achieving excellence in research as stated in various polices and documents discussed above.

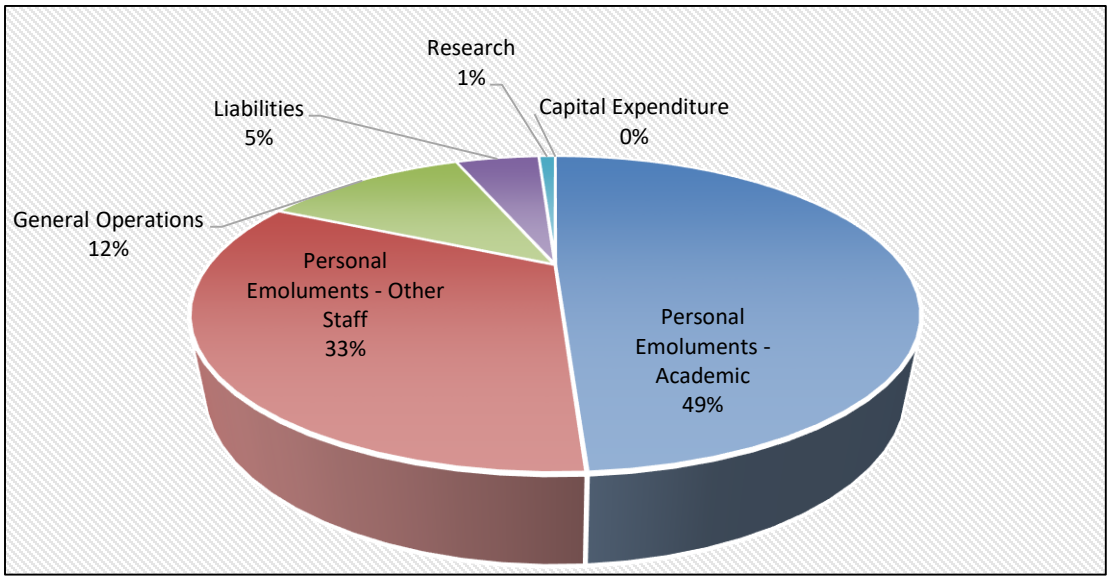

Figure 6.1. Actual Expenditure for 2016 by percentage
University of Zambia **(**2017a**)**

Table 6.3. 2016 Budget Performance

	2016 Budget (K'm)	*2016 Actual (K'm)*	*Variance*	
			(K'm)	*%*
Personal Emoluments	847.29	830.12	17	2%
Research	9.37	13.65	-4	-31%
General Operations	133.47	117.63	15.84	13%
Liabilities	56.18	50.26	117.63	12%
Capital Expenditure	24.7	5.33	19.37	344%
Total	**1,070.91**	**1,016.98**	**54**	**5%**

University of Zambia (2017a: 6)

6.8.4 *Publishing Outlets*

One of the major complaints expressed by the academic staff was a lack of publishing opportunities. This view was expressed by the University of Zambia Press, although UNZA Press was looking at a perspective where they, as a university unit, are enabled to publish knowledge outputs emanating from the entire University of Zambia community. In this regard, Thhe University of Zambia Press, the University of Zambia Library and the Directorate of Research and Graduate Studies working collaboratively have embarked on a project of publishing all the UNZA Press journals by using an Online Publishing Platform called Open Journal System (OJS). This way, it is hoped UNZA Press and those journals anchored in various departments of the University would be able to remain current in terms of journal publishing outputs, unlike the current situation where they are lagging behind in the publishing of the journals. It is also envisaged that by putting all UNZA journals online, it will increase the visibility of both the journals and journal articles and as well leading to the improved usage of the journal articles.

6.9 Chapter summary

This chapter has looked at the research outputs of the UNZA SOM, the determinants of knowledge productivity, knowledge diffusion and knowledge utilisation patterns; examined barriers to knowledge production, diffusion and utilisation; identified and discussed policies that foster knowledge productivity. The overall findings are that the knowledge produced by the School of Medicine is predominantly Mode 1 and Mode 2 knowledge that is characterised by multiple authorship patterns. It follows a typical scientific enquiry; emphasising both discipline specific knowledge production for mode 1 and context specific that values its relevance to society for mode

2. Its major contribution to knowledge is the illumination of health research output the University of Zambia School of Medicine. Additionally the knowledge produced had attributes similar to that knowledge produced in academia, relevance to society, produced in an ethical manner, beneficial to society, was based on evidence and advances knowledge in society. These emerging attributes are linked to the attributes of knowledge highlighted at the beginning of the study.

The next chapter looks at the summary of the findings, conclusions and recommendations.

CHAPTER SEVEN

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

7 Introduction

The section gives the summary of the findings, conclusions, recommendations and suggestions for further studies. The main objective of the study was to explore and describe knowledge production practices and their attributes within a university environment using the case of the School of Medicine at the University of Zambia. The summary of the findings is presented as indicated in the objectives.

The study adopted a case study methodological framework that was both quantitative and qualitative in nature. The research instruments utilised for data collection were: bibliometrics, questionnaires, interview schedules and documentary research. Research data was analysed both quantitatively and qualitatively; using the software package SPSS version 20 for quantitative data and VOSviewer for qualitative data. In addition other qualitative data was analysed thematically; and the results presented in graphs and tables; after which a discussion of the findings was done supported by relevant literature from both print and online sources.

7.1.1 *Knowledge Productivity Patterns and their attributes in a University Environment*

The study sought to investigate the primary knowledge production patterns and their attributes in a University Environment. It was established that the overall research output of the School had increased during the years under study, a period of twenty years from 1995-2015. In this regard, overall authorship patterns showed that there was also increased collaboration which tended to increase the research output. These increased research collaboration patterns might have been driven by funding patterns and the general shift in authorship patterns in the scientific fields where knowledge production is increasing and becoming much more of a collaborative venture than a

sole process. Incidentally, the study established that papers authored[18] by more than five researchers were the majority followed by papers authored by three authors; as revealed by the increase in multiple authorship over the study period. Furthermore, the study also found that there were inconsistencies in the way people identified authors' names that appeared on papers as well as their institutional affiliations, potentially impacting overall knowledge production. Finally, considering the major subject areas of research interest of the academic staff of the UNZA School of Medicine as reflected in their research and writing were: HIV/AIDS, Tuberculosis, Health Systems, Cancer and Malaria. These were amongst the top diseases and conditions of interest. This emphasises the significance of these topics within the African, and particularly Zambian context.

7.1.2 *Knowledge Diffusion Patterns in a University Environment*

The study sought to establish the knowledge diffusion patterns in a university environment. It was determined by the study that the journal article was the most prevalent form of scientific communication of ideas and research results in the School of Medicine. The main journals in which academic staff were publishing their research output were still predominantly foreign journals, although the *Medical Journal of Zambia*, a journal published by the Zambia Medical Association was one of the few local journals that made it to the top twenty.

7.1.3 *Knowledge Utilisation Patterns in a University Environment*

The study sought to analyse the knowledge utilisation patterns of the academic staff. The study findings revealed that the utilisation of knowledge was a frequent activity amongst the academic staff, clearly showing that staff were engaged in one of the major principal activities of academia. The study further established that research output produced by the academic staff was produced ethically for the purposes of use in the academic world as well as to the benefit of Zambian society and the world. Likewise, in the knowledge production process, the study found that academic academic staff had used various knowledge products both in print and electronic; which were obtained from a variety of sources.

[18] In this instance, at least one author is from UNZA

7.1.4 *Determinants of Knowledge Production, Diffusion and Utilisation*

The study sought to explore the determinants of knowledge production, diffusion and utilisation in a university environment. The study affirmed that lack of funding was one of the major impediments to knowledge production, diffusion and utilisation in the University of Zambia. It observed complaints from the academic staff as well as other units of the university, that the government and consequently the University of Zambia were not allocating and disbursing enough funds for research. It was further noted that lack of funding has been a recurrent problem at the University of Zambia and it is mostly likely, that this trajectory, of lack of funding from government and the University of Zambia for research, would continue in the near future. The academic staff also expressed a concern at the lack of sufficient time to engage in research as most of the time they were teaching due to the increased numbers of enrolments of students versus the available academic staff. Moreover, it was established that there was a general lack of adequate skilled staff and inadequate access to current peer reviewed research, both critical inputs in the knowledge production process. Knowledge management culture in the institution was poor and this has had a negative effect on knowledge production, diffusion and utilisation. Other challenges identified were chaotic distribution and marketing of knowledge products produced by the University of Zambia, shortage of peer reviewers and editors for locally produced knowledge products as there was no incentives (monetary) for the activities. Nonetheless, the university does recognise this type of work in its promotion criteria. It was also further found that the locally produced academic journals were not visible and discoverable locally or internationally. Further, mentorship of junior academic staff was also not available.

7.1.5 *Knowledge Production, Diffusion and Utilisation Policies*

Identifying and discussing policies that foster knowledge production, diffusion and utilisation in a university environment was one of the objectives of the study. The study has noted that there was a general lack of knowledge amongst academic staff on institutional policies that promoted knowledge production, diffusion and utilisation, even when the institution had knowledge production policies in place. The study further observed that there was a general consensus amongst the academic staff about the need for institutional support for fostering knowledge production, diffusion and utilisation. This support could be expressed in various ways such as in improved funding for knowledge production activities within the institution as well as increasing

the visibility of the already produced research output.

7.2 Recommendations

Knowledge production is a core activity of any higher learning institution, for it is one of the criteria that are used to measure the rankings of universities. These recommendations are made to foster knowledge production, diffusion and utilisation at the University of Zambia in general and specifically to the School of Medicine. The recommendations here proposed arise out of the findings of the study.

7.2.1 *Research Capacity*

This is a complex process, which involves multiple stakeholders, both within and outside the institution. Development of a research capacity strategy by the institution will guide the various academic schools to operationalise the strategy highlighting the uniqueness of their schools. Training in grant and research management will address some of the inadequate research management skills. Additionally, establishment of research mentorship programmes will assist young and upcoming academic staff to gain the necessary skills to be able to engage in meaningful research and assist them in ascending the academic ladder and allowing for the regeneration of the institution.

7.2.2 *Funding*

Amongst strategies to increase funding for research activities is for the academic staff themselves to take proactive steps in sourcing and securing funds from funding bodies both locally and internationally. In addition, the University could create a space for sharing information on available funding awards that may include an online digital space.

7.2.3 *Knowledge Production Policies*

The study demonstrated that there are many knowledge production policies that exist both within the university and at governmental level. However, it is evident from the findings that some of the concerned people were not aware of these policies; it was especially evident that the existence of these policies was not widely known amongst academic staff. Due to the lack of knowledge on knowledge production policies, the School of Medicine should adopt and implement knowledge

production promotion programmes for the academic staff. It is further submitted that more sensitisation could be done to promote awareness of these policies amongst the University of Zambia community. Such awareness promotion programmes could utilise all marketing and promotional methods that are available within the university:

- Social Media
- Face to face meetings especially taking advantage of regularly scheduled meeting like Boards of Studies meetings and research meetings.

7.2.4 *Online Publishing*

The University of Zambia Press should consider publishing all the University's research output in the online environment. This would eliminate the constant need for funds to print the research output products. Moreover, publishing online using open access publishing models could potentially increase both accessibility and visibility of the research outputs.

7.2.5 *Peer Review*

Peer reviewing was identified as an impediment to rapid knowledge production as reviewers took long to review documents or they just never bothered to respond to review requests. It is recommended that the University introduces a system of recognising reviewers with letters of acknowledgement; and publishing the names of the reviewers of that year in the last issue of each year or even publishing the names of the reviewers in each issue. Alternatively, provision of a certificate for each reviewed article would provide the reviewers with evidence that they indeed were reviewers of a particular article in a particular journal. This can be used as a motivation in addition to providing evidence for s during their applications for academic promotions. In this connection, the University has, since 2018, introduced rewards on the academic promotion instrument with peer reviewing and refereeing garnering some points.

7.2.6 *Editorial Staff at the University of Zambia Press*

The observation of the University of Zambia Press was that they did not have adequate editorial staff and, consequently, work tended to lag behind schedule. The unit is encouraged to persuade university management to advertise the vacant positions and fill the positions. In addition, the Press should work with the university administration to establish incentives for people who are co-opted

from within the university to assist the department in its editorial activities.

7.2.7 *Digital Literacy*

There are few initiatives that they could reinforce skills for research and publishing such as information literacy training – digital literacy training. Therefore, the Library is encouraged to develop courses that could promote digital literacy among academic staff.

7.2.8 *Consistency and Uniformity in Author Identification*

The study suggests that the University of Zambia should conduct training on the implications of consistency in identifying oneself; i.e. which names to adopt as an author as well as how to affiliate oneself with an institution as these identificationa can have implications on the overall count of a person's research output, especially when it comes to online indexing services such as Google Scholar, Microsoft Academic, Scopus and Web of Science. This activity can be carried out by the Library in conjunction with the School of Medicine as well as the whole institution.

7.2.9 *UNZA Institutinal Digital Repository*

There is already an existing University of Zambia Institutional Digital Repository which is meant to house all publications coming out of the university, however it is deficient is many ways. For instance it currently does not archive all peer review journal articles that are published in foreign journals or even some journal articles published by the university. Its major focus has been the archiving of dissertations and thesis. There is need to strength the archiving capabalities of the institutional repository so that all research output emanating from the university is archive in it.

7.3 Further research

There are several future research implications that arise from this study. Suggestions for further research are made in relation to the School of Medicine, even though there is need for further studies on knowledge production, diffusion and utilisation within the wider University of Zambia context and country. The research study makes the following research recommendations:

a) The impact of research output is important to fulfilling the mission of any higher institution of learning. Therefore an impact study of the University of Zambia School of Medicine

research output might shed light on how this research output has been utilised over the years.

b) What is the relationship between UNZA Medical School Knowledge Production and policy in the health sector in Zambia?

c) An investigation of author affiliations of health researchers in Zambia and their impact on measuring the research output of an institution or an individual.

7.4 Chapter summary

This chapter summarises the conclusions of the research conducted at the School of Medicine, University of Zambia, provides recommendations and suggests areas for further research. The study focused on knowledge production patterns and their attributes, knowledge diffusion patterns, knowledge utilisation patterns, determinants of knowledge production, diffusion, and utilisation, as well as policies that foster knowledge production, diffusion and utilisation in a university environment.

The study's overall conclusion is that the research output at the School of Medicine has been steadily increasing over the years, with growth in multiple authorship patterns as well as collaborations. The study has also established that knowledge production is affected by inadequate funding, time, availabily of appropriate reading materials, incentives, publication outlets etc. Although they study found that digital literacy skills were high; it further found that academic staff did not have sufficient internet search skills, appropriate enough to excel in a university research research environment. Such an environment requires versatility in digitally literacy to expertly navigate the internet and retrieve the appropriate research information that support academic research and knowledge production, diffusion and utilisation. The study has further identified areas that the university needs to address in order to foster knowledge production, such as improving the research culture, technology, internet access and skills, funding for research and widening the avenues for publishing options to include both print and online platforms.

Some of the themes that emerged out of the study mirror closely the themes that were identified in

chapters one, two and three; such as the importance of research to the core existence of a university, that universities produce knowledge that is relevant to the society in which the university is located in and that its role is to produce human resource and research outputs relevant to the community. Clearly one can see a convergence of the root themes and those themes that emerged out of the study findings.

Lastly, the study further infers that the importance and scope of an institution's research output can best be demonstrated and illuminated by means of in-depth studies that utilise bibliometric methods that are combined with qualitative approaches; as has been shown in this study.

8 References

Abiolu, O.A. 2013. Studies in family planning journal (2003 to 2009): a bibliometric study. *Library Philosophy and Practice (e-journal).* (977):1–24. Available: http://digitalcommons.unl.edu/libphilprac/977 [2019, July 12].

Abouchedid, K. & Abdelnour, G. 2015. Academic staff research productivity in six Arab countries. *International Review of Education*. 61(5):673–690. DOI: 10.1007/s11159-015-9518-5.

Abrahams, L., Burke, M. & Mouton, J. 2009. Research productivity-visibility-accessibility and scholarly communication in Southern African universities. *African Journal of Information and Communication*. 10:20–36. DOI: 10.23962/10539/19768.

Abrahams, L., Burke, M., Gray, E. & Rens, A. 2008. *Opening access to knowledge in Southern African universities*. (Study Series 2008). Johannesburg, South Africa: Southern African Regional Universities Associations (SARUA). Available: http://www.sarua.org/files/publications/OpeningAccess/Opening_Access_Knowledge_2008.pdf [2019, January 10].

Academy of Science of South Africa (ASSAf). 2019. *Twelve years later: second ASSAf report on research publishing in and from South Africa*. Pretoria, South Africa: Academy of Science of South Africa (ASSAf). DOI: 10.17159/assaf.2018/0030.

Adams, J., King, C., Pendlebury, D., Hook, D. & Wilsdon, J. 2011. *Middle East exploring the changing landscape of Arabian, Persian and Turkish research*. Leeds, UK: Thomson Reuters.

Adeyinka, F.M. 2014. Information services and scientists' research productivity in Nigeria: evidence from research and development institutions. *Information and Knowledge Management.* 4(11):54-61–61.

Adoyo, C.A. 2015. Factors influencing research outputs in Kenya: the case of selected public universities. MA (Project Planning and Management) dissertation. University of Nairobi. Available: http://erepository.uonbi.ac.ke:8080/xmlui/handle/11295/89865 [2018, October 03].

Ahiauzu, B.E. & Ani, O.E. 2015. A survey of information seeking-behavior of academic staff in a Nigerian university in digital age. *Science Journal of Education*. 3(4):89–94. DOI: 10.11648/j.sjedu.20150304.14.

Ahmed, Y., Kanyengo, C.W. & Akakandelwa, A. 2010. Mapping postgraduate research at the University of Zambia: a review of dissertations for the Master of Medicine programme. *Medical Journal of Zambia*. 37(2):52–57.

Ajuwon, G., Ada, Anne, A., Malapela, T., Kanyengo, C.W., Kamau, N., Mbaga, S., Horta, C. & Chikonzo, A. 2011. *Finding, organising and using health information: a training manual*. Nairobi: Network of African Medical Librarians & Deans Secretariat. Available: http://www.academia.edu/1263852/Finding_Organising_and_Using_Health_Information_A_training_Manual [2019, June 23].

Akakandelwa, A. 2007. An informetric analysis of research at the University of Zambia with reference to the provision of library and information resources. Ph.D. Thesis. University of Antwerp.

Akakandelwa, A. 2009. Author collaboration and productivity at the University of Zambia, 2002-2007. *African Journal of Library, Archives & Information Science*. 19(1):13–23.

Akakandelwa, A. & Rousseau, R. 2016. A synopsis of fifty years of research at the University of Zambia. In *Tracing the footprints of the University of Zambia's research output, 1966-2016*. A. Akakandelwa, F.N.S. Makondo, W.C. Kanyengo, & Y. Ahmed, Eds. Lusaka, Zambia: UNZA Press. 17–42.

Akakandelwa, A., Kanyengo, C.W., Lumpa, M., Moyo, F.N. & Ahmed, Y. 2016. Postgraduate research output of the University of Zambia: an analysis of dissertations and theses. In *Tracing the footprints of the University of Zambia's research output, 1966-2016*. A. Akakandelwa, F.N.S. Makondo, C.W. Kanyengo, & Y. Ahmed, Eds. Lusaka, Zambia: UNZA Press.

Akakandelwa, A., Makondo, F.N.S., Kanyengo, C.W. & Ahmed, Y. (Eds). 2016a. Preface. In *Tracing the footprints of the University of Zambia's research output, 1966-2016*. Lusaka, Zambia: UNZA Press.

Akakandelwa, A., Makondo, F.N.S., Kanyengo, C.W. & Ahmed, Y. (Eds). 2016b. *Tracing the footprints of the University of Zambia's research output, 1966-2016*. Lusaka, Zambia: UNZA Press.

Alavi, M. & Leidner, D.E. 2001. Review: knowledge management and knowledge management systems: conceptual foundations and research issues. *MIS Quarterly*. 25(1):107-136. DOI: 10.2307/3250961.

Alghanim, S.A. & Alhamali, M.R. 2011. Research productivity among academic staff members at medical and health schools in Saudi Arabia: prevalence, obstacles, and associated factors. *Saudi Medical Journal*. 32(12):1297–1303. Available: https://pdfs.semanticscholar.org/3709/e2f6971450db7663fb11e1f42e790d40e9e4.pdf [2019, June 22].

Allan, G. 2003. A critique of using grounded theory as a research method. *Electronic Journal of Business Research Methods*. 2(1):1–10. Available: *www.ejbrm.com/issue/download.html?idIssue=16* [2019, June 22].

Alrahlah, A., A. 2016. The impact of motivational factors on research productivity of dental academic staff members: a qualitative study. *Journal of Taibah University Medical Sciences*. 11(5): 448–455. DOI: 10.1016/j.jtumed.2016.06.006.

Alvi, M.H. 2016. *A manual for selecting sampling techniques in research.* (Munich Personal RePEc Archive - MPRA Paper No. 70218). Available: https://mpra.ub.uni-muenchen.de/70218/1/MPRA_paper_70218.pdf [2018, March 25].

Alzuman, A. 2015. Academic staff research productivity in Saudi Arabian public universities: a human capital investment perspective. Ph.D. Thesis. Virginia Commonwealth University. Available: https://scholarscompass.vcu.edu/cgi/viewcontent.cgi?article=5065&context=etd [2018, November 12].

American Library Association. 2013. *Digital literacy, libraries, and public policy: report of the Office for Information Technology Policy's Digital Literacy Task Force*. (Unpublished).

Washington, D.C., United States of America: American Library Association Office for Information Technology Policy. Available: https://districtdispatch.org/wp-content/uploads/2013/01/2012_OITP_digilitreport_1_22_13.pdf [2018, July 07].

Anamela-Gundersen, E. 2002. Kaunda Calls for a More Humane IMF, World Bank. Global Policy Forum. AllAfrica, June 24. Available: https://www.globalpolicy.org/component/content/article/209/42990.html [2018, November 12].

Ani, O.E., Ngulube, P. & Onyancha, B. 2014. Effect of accessibility and utilisation of electronic information resources on productivity of academic staff in selected Nigerian universities. *Science Research*. 2(6):166–171. DOI: 10.11648/j.sr.20140206.13.

Ani, O.E., Ngulube, P. & Onyancha, B. 2015. Perceived effect of accessibility and utilisation of electronic resources on productivity of academic staff in selected Nigerian universities. *SAGE Open*. 5(4):1-7. DOI: 10.1177/2158244015607582.

Anunobi, C. & Udem, O.K. 2015. Information literacy competencies of library and information science postgraduate students in South East Nigeria Universities: a focus on the knowledge and skill Level. *Information and Knowledge Management*. 5(2):20–30. Available: https://www.iiste.org/Journals/index.php/IKM/article/download/19880/20180 [2019, January 22].

Appleyard, M.M. & Kalsow, G.A. 1999. Knowledge diffusion in the semiconductor industry. *Journal of Knowledge Management*. 3(4):288–295. DOI: 10.1108/13673279910304032.

Archambault, É. & Gagné, É.V. 2014. *The use of bibliometrics in the social sciences and humanities*. (Final Report). Montreal: Social Sciences and Humanities Research Council of Canada (SSHRCC). Available: http://www.science-metrix.com/pdf/SM_2004_008_SSHRC_Bibliometrics_Social_Science.pdf [2019, January 28].

Arora, N. 2010. *PubMed2XL*. [Web page]. Available: http://blog.humaneguitarist.org/projects/pubmed2xl/ [2018, March 21].

Asian Development Bank. 2012. *Special evaluation study* - k*nowledge products and services: building a stronger knowledge institution*. Corporate and Thematic Evaluation Studies. Available: https://www.adb.org/sites/default/files/evaluation-document/35981/files/ses-kps.pdf [2019, March 21].

Asongu, S. & Nwachukwu, J.C. 2017. Mobile phones in the diffusion of knowledge and persistence in inclusive human development in Sub-Saharan Africa. *Information Development*. 33(3):289–302. DOI: 10.1177/0266666916655189.

Assefa, S., Alemneh, D.G. & Rorissa, A. 2014. Diffusion of scientific knowledge in agriculture: the case for Africa. *Agricultural Information Worldwide*. 6:34-47. Available: https://hdl.handle.net/1813/58278 [2019, May 27].

Assessment Capacities Project (ACAPS), Emergency Capacity Building Project (ECB) and Practical Action Publishing. 2014. *Humanitarian needs assessment: the good enough guide*. Rugby, Warwickshire: Practical Action & Norwegian Refugee Council. DOI: 10.3362/9781780448626.

Association of College and Research Libraries. 2013. *Intersections of scholarly communication and information literacy: creating strategic collaborations for a changing academic environment*. Chicago, IL, United States of America: Association of College and Research Libraries. Available: http://acrl.ala.org/intersections [2017, December 22].

Austin, Z. & Sutton, J. 2014. Qualitative research: getting started. *The Canadian Journal of Hospital Pharmacy*. 67(6):436–440.

Azadeh, F. & Ghasemi, S. 2015. Investigating information-seeking behavior of academic staff members based on Wilson's Model: case study of PNU University, Mazandaran, Iran. *Global Journal of Health Science*. 8(9): 26–36. DOI: 10.5539/gjhs.v8n9p26.

Babbie, E. & Mouton, J. 2003. *The practice of social research*. Cape Town: Oxford University Press Southern Africa.

Badat, S. 2009. The role of higher education in society: valuing higher education. (Unpublished paper). Available: http://hdl.handle.net/10962/d1006571 [2018, November 23].

Bai, L. 2010. Enhancing research productivity of TEFL academics in China. Ph.D. Thesis. Queensland University of Technology. Available: https://eprints.qut.edu.au/41732/1/Li_Bai_Thesis.pdf [2018, October 03].

Barão, V.A.R., Shyamsunder, N., Yuan, J.C.C., Lee, D.J., Assunção, W.G. & Sukotjo, C. 2011. Authorship, collaboration, and funding trends in implantology literature: Analysis of five journals from 2005 to 2009. *Implant Dentistry*. 20(1):68–75. DOI: 10.1097/ID.0b013e3181fce302.

Barbour, R.S. 2001. Checklists for improving rigour in qualitative research: a case of the tail wagging the dog? *BMJ: British Medical Journal*. 322(7294): 1115–1117.

Barjak, F. 2006. Research productivity in the Internet era. *Scientometrics*. 68(3):343–360. DOI: 10.1007/s11192-006-0116-y.

Bateman, C. 2011. SA's clinical research output in crisis. *SAMJ: South African Medical Journal*. 101(9):614–616.

Baxter, P. & Jack, S. 2008. Qualitative case study methodology: study design and implementation for novice researchers. *The Qualitative Report*. 13(4):544–559.

Beaman, L. & Dillon, A. 2018. Diffusion of agricultural information within social networks: Evidence on gender inequalities from Mali. *Journal of Development Economics*.133: 147–161. DOI: 10.1016/j.jdeveco.2018.01.009.

Bello, A. n.d. LIB 803 Research methodology in library and information science. (Course Module). Lagos, Nigeria: National Open University of Nigeria. Available: http://nou.edu.ng/uploads/fileuploads/VhOMy7YY821438349939.pdf [2018, March 16].

Bennett, W.J. & Wilezol, D. 2013. *Is college worth it? A former United States Secretary of Education and a liberal arts graduate expose the broken promise of higher education*. Nashville, TN, USA: Thomas Nelson.

Bhojaraju, G. 2005. Knowledge management: why do we need it for corporates. *Malaysian Journal of Library & Information Science*. 10(2):37–50.

Bhukuvhani, C., Chiparausha, B. & Zuvalinyenga, D. 2012. Effects of electronic information resources skills training for lecturers on pedagogical practices and research productivity. *International Journal of Education and Development using ICT*. 8(1):16–28.

Blaxter, L., Hughes, C. & Tight, M. 1996. *How to research*. Milton Keynes, United Kingdom: Open University Press.

Blaxter, L., Hughes, C. & Tight, M. 2001. *How to research*. 2nd ed. Milton Keynes, United Kingdom: Open University Press.

Blaxter, L., Hughes, C. & Tight, M. 2010. *How to research*. 4th ed. Milton Keynes, United Kingdom: Open University Press.

Boehm, C. 2015. *Engaged universities, Mode 3 knowledge production & the impact agendas of the REF*. London, United Kingdom: Manchester Metropolitan University. Available: https://e-space.mmu.ac.uk/595960/ [2019, May 14].

Borry, P., Schotsmans, P. & Dierickx, K. 2006. Author, contributor or just a signer? A quantitative analysis of authorship trends in the field of bioethics. *Bioethics*. 20(4):213–220. DOI: 10.1111/j.1467-8519.2006. 00496.x.

Boshoff, N. 2009. Neo-colonialism and research collaboration in Central Africa. *Scientometrics.* 81(2): 413-434. DOI: 10.1007/s11192-008-2211-8.

Boshoff, N. 2010. South–South research collaboration of countries in the Southern African Development Community (SADC). Scientometrics. 84(2):481-503.DOI: 10.1007/s11192-009-0120-0

Bowa, K., Goma, F., Yikona, J.I.N.M., Mulla, F. & Banda, S. 2008. A review of outcome of postgraduate medical training in Zambia. *Medical Journal of Zambia*. 35(3):88–93.

Brown, A.D. 1990. Information, communication and organisational culture: a grounded theory approach. Ph.D. Thesis. University of Sheffield. Available: https://core.ac.uk/download/pdf/9554311.pdf [2019, May 16].

Brunson, J.C., Wang, X. & Laubenbacher, R.C. 2017. Effects of research complexity and competition on the incidence and growth of coauthorship in biomedicine. *PloS One*. 12(3):1–23. DOI: 10.1371/journal.pone.0173444.

Bunting, I., Cloete, N. & van Schalkwyk, F. 2014. *An empirical overview of eight flagship universities in Africa: 2001–2011. A report of the Higher Education Research and Advocacy Network in Africa (HERANA).* Cape Town: Centre for Higher Education Transformation (CHET). Available: https://www.chet.org.za/download/file/fid/720 [2019, May 16].

Bunting, I., Cloete, N., Wah, H.L.K. & Nakayiwa-Mayega, F. 2015. Assessing the performance of African flagship universities. In *Knowledge production and contradictory functions in African Higher Education*. N. Cloete, P. Maassen, & T. Bailey, Eds. (African Minds Higher Education Dynamics Series Vol. 1). Cape Town: African Minds. 32–60. Available: https://zenodo.org/record/824655 [2018, November 24].

Carayannis, E.G. & Campbell, D.F.J. 2012. *Mode 3 Knowledge production in quadruple helix Innovation systems: 21st-century democracy, innovation, and entrepreneurship for*

development. (Springer Briefs in Business). New York: Springer-Verlag. Available: //www.springer.com/us/book/9781461420613 [2018, March 30].

Carayannis, E.G., Barth, T.D. & Campbell, D.F. 2012. The Quintuple Helix Innovation Model: global warming as a challenge and driver for innovation. *Journal of Innovation and Entrepreneurship*. 1(1):1-12. DOI: 10.1186/2192-5372-1-2.

Carayannis, E.G., Campbell, D.F.J. & Rehman, S.S. 2016. Mode 3 knowledge production: systems and systems theory, clusters and networks. *Journal of Innovation and Entrepreneurship*. 5(17):1-24. DOI: 10.1186/s13731-016-0045-9.

Carmody, B. 2004. *The evolution of education in Zambia*. Lusaka, Zambia: Book World.

Case, D.O. 2007. *Looking for information: a survey of research on information seeking, needs, and behavior*. 2nd ed. Amsterdam, The Netherlands: Elsevier.

Castells, M. 2009. The role of universities in development, the economy and society: transcript of a lecture given by Manuel Castells at the University of the Western Cape. [Lecture, 7th August 2009]. Cape Town: University of the Western Cape. Available: *www.uchile.cl/documentos/lecture-on-higher-education_113390_49_1026.pdf* [2018, March 30].

Chagnon, F., Pouliot, L., Malo, C., Gervais, M.-J. & Pigeon, M.-È. 2010. Comparison of determinants of research knowledge utilisation by practitioners and administrators in the field of child and family social services. *Implementation Science*. 5(41): 1-12. DOI: 10.1186/1748-5908-5-41.

Chan, R., Brown, G.T. & Ludlow, L. 2014. What is the purpose of higher education? A comparison of institutional and student perspectives on the goals and purposes of completing a bachelor's degree in the 21st century. In *Proceedings of the Annual American Education Research Association (AERA) Conference, "The Power of Education Research for Innovation in Practice and Policy"*. Philadelphia, PA, USA, 3-7 April 2014. Available: https://www.dal.ca/content/dam/dalhousie/pdf/clt/Events/Chan_Brown_Ludlow [2017, April 23].

Chanda-Kapata, P., Kapata, N., Moraes, A.N., Chongwe, G. & Munthali, J. 2015. Genomic research in Zambia: confronting the ethics, policy and regulatory frontiers in the 21st Century. *Health Research Policy and Systems*. 13(60):1–7. DOI: 10.1186/s12961-015-0053-4.

Charmaz, K. 2006. *Constructing grounded theory: a practical guide through qualitative analysis*. London, United Kingdom: Sage.

Chen, C. & Hicks, D. 2004. Tracing knowledge diffusion. *Scientometrics*. 59(2):199–211.

Chen, J.C., Shyu, J.Z. & Huang, C.Y. 2017. Configuring the knowledge diffusion policy portfolio of higher education Institutes. *Eurasia Journal of Mathematics, Science and Technology Education*. 13(8):5685–5734. DOI: 10.12973/eurasia.2017.01022a.

Chepkorir, K.R. 2018. Effect of academic staff qualification on research productivity in Kenyan Public Universities: evidence from Moi University. *International Journal of Economics, Commerce and Management*. VI(2):609–620.

Chew, F.S. 1988. Coauthorship in radiology journals. *American Journal of Roentgenology*. 150(1):23–26.

Chipeta, J. 2016. Research progress report: School of Medicine. January – June 2016 (Quarters 1 and 2, 2016). Reported to the Research Audit, Implementation Monitoring Committee (RAIC), Directorate of Research and Graduate Studies, University of Zambia. Lusaka: Directorate of Research and Graduate Studies, University of Zambia. Unpublished.

Choguill, C.L. 2005. The research design matrix: a tool for development planning research studies. *Habitat International*. 29(4):615–626. DOI: 10.1016/j.habitatint.2005.06.001.

Choo, C.W., Detlor, B. & Turnbull, D. 2000. *Web work: information seeking and knowledge work on the World Wide Web*. Norwell, Massachusetts, United States of America: Kluwer Academic.

Chreim, S., Williams, B.E. & Hinings, C.R. 2007. Inter level influences on the reconstruction of professional role identity. *The Academy of Management Journal*. 50(6):1515–1539.

Chuang, K.Y., Chuang, Y. C., Ho, M. & Ho, Y. S. 2011. Bibliometric analysis of public health research in Africa: the overall trend and regional comparisons. *South African Journal of Science*. 107(5/6):1-6. DOI: 10.4102/sajs.v107i5/6.309.

Clark, B. 1998. *Creating entrepreneurial universities: organisational pathways of transformation*. Oxford: Pergamon & IAU Press.

Clarke, B.L. 1964. Multiple authorship trends in scientific papers. *Science*. 143(3608):822–824.

Cloete, N. & Bunting, I. 2013a. *Strengthening knowledge production in universities: five South African case studies*. Programme on Innovation, Higher Education and Research for Development (IHERD). Cape Town, South Africa: OECD. Available: https://www.oecd.org/sti/Strengthening%20knowledge%20production.pdf [2018, April 03].

Cloete, N. & Bunting, I. 2013b. *Challenges and opportunities for African Universities to increase knowledge production.* Programme on Innovation, Higher Education and Research for Development (IHERD). Cape Town, South Africa: OECD. Available: https://www.oecd.org/sti/Challenges%20and%20opportunities%20to%20increase%20knowledge%20production-%20Draft-%20Nico%20Cloete.pdf [2018, April 09].

Cloete, N. & Maassen, P. 2015. Roles of universities and the African context. In *Knowledge production and contradictory functions in African higher education*. (African Minds Higher Education Dynamics Series Vol. 1). N. Cloete, P. Maassen and T. Bailey, Eds. Somerset West, South Africa: African Minds. 1-17. Available: *https://www.chet.org.za/download/file/fid/840 [2019, June 06]*.

Cloete, N., Bunting, I. & Maassen, P. 2015. Research universities in Africa: an empirical overview of eight flagship universities. In *Knowledge production and contradictory functions in African higher education*. N. Cloete, P. Maassen and T. Bailey, Eds. Somerset West, South Africa: African Minds. 18-33. Available: *https://www.chet.org.za/download/file/fid/840 [2019, June 06]*.

Cloete, N., Maassen, P., & Bailey, T. (Eds.). 2015. *Knowledge production and contradictory functions in African higher education*. (African Minds Higher Education Dynamics Series

Vol. 1). Somerset West, South Africa: African Minds. Available: *https://www.chet.org.za/download/file/fid/840 [2019, February 09]*.

Cloete, N., Bailey, T., Pillay, P., Bunting, I. & Maassen, P. 2011. *Universities and economic development in Africa*. Cape Town, South Africa: Centre for Higher Education Transformation (CHET). Available: https://chet.org.za/download/file/fid/70 [2019, December 12].

Coffman, J., Chanda-Kapata, P., Marais, B.J., Kapata, N., Zumla, A. & Negin, J. 2017. Tuberculosis among older adults in Zambia: burden and characteristics among a neglected group. *BMC Public Health*. 17(1, 804):1–6. DOI: 10.1186/s12889-017-4836-0.

Cohen, L., Manion, L. & Morrison, K. 2000. *Research methods in education*. 5th ed. London, United Kingdom: Routledge.

Cole, D. C., Johnson, N., Mejia, R., McCullough, H., Turcotte-Tremblay, A. M., Barnoya, J., & Falabella Luco, M. S. 2016. Mentoring health researchers globally: diverse experiences, programmes, challenges and responses. *Global Public Health*. *11*(9):1093–1108. DOI:10.1080/17441692.2015.1057091.

Collis, J. & Hussey, R. 2003. *Business research: a practical guide for undergraduate & postgraduate students*. 2nd ed. New York, NY, United States of America: Palgrave Macmillan. Available: https://trove.nla.gov.au/work/13991820 [2018, March 22].

Cordell, R. 2013. Information literacy and digital literacy: competing or complementary? *Communications in Information Literacy*. 7(2):177–183. DOI: 10.15760/comminfolit.2013.7.2.150.

Cordero, R.J.B., de León-Rodriguez, C.M., Alvarado-Torres, J.K., Rodriguez, A.R. & Casadevall, A. 2016. Life science's average publishable unit (APU) has increased over the past two decades. *PloS One*. 11(6):1–14. DOI: 10.1371/journal.pone.0156983.

Creswell, J.W. 2009. *Research design: qualitative, quantitative and mixed method approaches*. 3rd ed. London, United Kingdom: Sage.

Cronholm, S. & Hjalmarsson, A. 2011. Experiences from sequential use of mixed methods. *The Electronic Journal of Business Research Methods*. 9(2): 87-95.

Crowe, S., Cresswell, K., Robertson, A., Huby, G., Avery, A. & Sheikh, A. 2011. The case study approach. *BMC Medical Research Methodology*. 11(100):1–9. DOI: 10.1186/1471-2288-11-100.

Daka, F.M. 2015. Are the current Zambian constitutional provisions sufficient in preventing abuse of power by the executive organ of government? LL.M (Laws) dissertation. University of Cape Town. Available: https://open.uct.ac.za/handle/11427/15210 [2018, July 04].

Danermark, B. 2003. Book Reviews. *Acta Sociologica*. *46*(2), 166–169. DOI: 10.1177/0001699303046002006.

Dang, W., McInnes, M.D.F., Kielar, A.Z. & Hong, J. 2015. A comprehensive analysis of authorship in radiology journals. *PLoS One*. 10(9):1–15. DOI: 10.1371/journal.pone.0139005.

Davenport, T.H. & Prusak, L. 1998. *Working knowledge: how organisations manage what they know*. Boston, Massachusetts, United of States of America: Harvard Business School Press.

Dawson, C. 2002. *Practical research methods: a user-friendly guide to mastering research techniques and projects*. Oxford, United Kingdom. Available: http://www.modares.ac.ir/uploads/Agr.Oth.Lib.21.pdf [2019, January 22].

De Vaus, D.A. 2001. *Research design in social research*. London, United Kingdom: Sage.

Degu, G. & Yigzaw, T. 2006. Research methodology: lecture notes for health science students. [Lecture]. Gondar, Ethiopia: University of Gondar. In collaboration with the Ethiopia Public Health Training Initiative, the Carter Center, the Ethiopia Ministry of Health, and the Ethiopia Ministry of Education. Available: https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/health_science_students/ln_research_method_final.pdf [2018, June 09].

DiCicco-Bloom, B. & Crabtree, B.F. 2006. The qualitative research interview. *Medical Education*. 40(4):314–321. DOI: 10.1111/j.1365-2929.2006.02418.x.

Dillon, A., Olney, D., Ruel, M., Nielsen, J., Ouedraogo, M., Rouamba, H., Vebamba, O. & Yago-Wienne, F. 2014. *The diffusion of health knowledge through social networks: an impact evaluation of health knowledge asymmetries on child health in Burkina Faso.* (3ie Grantee final report). New Delhi, India: International Initiative for Impact Evaluation (3ie).

Döring, T. & Schnellenbach, J. 2006. What do we know about geographical knowledge spillovers and regional growth? A survey of the literature. *Regional Studies*. 40(3):375–395. DOI: 10.1080/00343400600632739.

Durieux, V. & Gevenois, P.A. 2010. Bibliometric indicators: quality measurements of scientific publication. *Radiology*. 255(2):342–351. DOI: 10.1148/radiol.09090626.

Dzamba, T. & Future, C.T.T. 2012. Factors affecting knowledge production in open and distance learning in Zimbabwe: case of Zimbabwe Open University. *International Journal of Asian Social Science*. 2(11):1906–1914.

Edewor, N. 2013. An analysis of a Nigerian library and information science journal: a bibliometric analysis. *Library Philosophy and Practice (e-journal)*. (October, 7)1004:1-13. Available: https://digitalcommons.unl.edu/libphilprac/1004 [2019, June 09].

Edwards, L.A. 1991. *Using knowledge and technology to improve the quality of life of people who have disabilities: a prosumer approach*. Available: http://codi.tamucc.edu/archives/pubs/articles/.edwards/index.html [2018, June 09].

Elango, B. & Rajendran, P. 2012. Authorship trends and collaboration pattern in the marine sciences literature: a scientometric study. *International Journal of Information Dissemination and Technology*. 2(3):166–169.

Eldredge, J. D. 2004. Inventory of research methods for librarianship and informatics. *Journal of the Medical Library Association*. 92(1):83–90. PubMed PMID: 14762467; PubMed Central PMCID: PMC314107.

Elfil, M. & Negida, A. 2017. Sampling methods in clinical research: an educational review. *Emergency*. 5(1):e52. PubMed PMID: 28286859; PubMed Central PMCID: PMC5325924.

Ellis, D. 1993. Modelling the information-seeking patterns of academic researchers: a grounded theory approach. *Library Quarterly*. 63(4):469–86. https://www.jstor.org/stable/4308867.

Ellis, D., Cox, D. & Hall, K. 1993. A comparison of the information seeking patterns of researchers in the physical and social sciences. *Journal of Documentation*. 49(4):356–369. DOI: 10.1108/eb026919.

Engel, C., Silberglitt, R., Chow, B., Morgan Jones, M. & Grant, J. 2019. *Development of a Knowledge Readiness Level Framework for medical research*. Santa Monica, CA, United States of America: RAND Corporation. DOI: 10.7249/RR2127.

Estabrooks, C.A., Scott, S., Squires, J.E., Stevens, B., O'Brien-Pallas, L., Watt-Watson, J., Profetto-McGrath, J., McGilton, K., et al. 2008. Patterns of research utilisation on patient care units. *Implementation Science*. 3(31):1-16. DOI: 10.1186/1748-5908-3-31.

Ettarh R. R. 2015. Institution-level collaboration in cardiovascular research in sub-Saharan Africa. *Cardiovascular diagnosis and therapy*. *5*(4):11–315. DOI:10.3978/j.issn.2223-3652.2015.07.04.

Ettarh R. R. 2016. Patterns of international collaboration in cardiovascular research in sub-Saharan Africa. *Cardiovascular Journal of Africa*. 27(3): 194-200. DOI: 10.5830/CVJA-2015-082.

Fairthorne, R.A. 1969. Empirical hyperbolic distributions (Bradford-Zipf-Mandelbrot) for bibliometric description and prediction. *Journal of Documentation*. 25(4):319–343. DOI: 10.1108/eb026481.

Fari, S. A. & Ocholla, D. N. 2016. Nature, patterns and trends of research collaboration among academics in Nigeria and South Africa. *Mousaion*. 34(1):1-22. DOI: 10.25159/0027-2639/885.

Farley, J.U. & Lehmann, D.R. 2001. The important role of meta-analysis in international research in marketing. *International Marketing Review*. 18(1):70–79. DOI: 10.1108/02651330110382005.

Fawzi, H. & Al-Hattami, A. 2017. Academic staff production of research papers: challenges and recommendations. *International Journal of Humanities and Social Science*. 7(2):221–228. Available: https://www.ijhssnet.com/journals/Vol_7_No_2_February_2017/29.pdf [2018, June 17].

Feder, G., Murgai, R. & Quizon, J.B. 2004. The acquisition and diffusion of knowledge: the case of pest management training in farmer field schools, Indonesia. *Journal of Agricultural Economics*. 55(2):221–243. DOI: 10.1111/j.1477-9552.2004.tb00094.x.

Ferreira, M. de A. 2013. Production of knowledge and responsibility of the researcher. *Escola Anna Nery*. 17(3):405–408. DOI: 10.1590/S1414-81452013000300001.

Fetters, M.D., Curry, L.A. & Creswell, J.W. 2013. Achieving integration in mixed methods designs -- principles and practices. *Health Services Research*. 48(6 Pt 2):2134–2156. DOI: 10.1111/1475-6773.12117.

Fisher, J.R.B., Montambault, J., Burford, K.P., Gopalakrishna, T., Masuda, Y.J., Reddy, S.M.W., Torphy, K. & Salcedo, A.I. 2018. Knowledge diffusion within a large conservation organisation and beyond. *PLoS One*. 13(3):e0193716. DOI: 10.1371/journal.pone.0193716.

Flanagin, A., Carey, L.A., Fontanarosa, P.B., Phillips, S.G., Pace, B.P., Lundberg, G.D. & Rennie, D. 1998. Prevalence of articles with honorary authors and ghost authors in peer-reviewed medical journals. *JAMA*. 280(3):222–224. DOI: 10.1001/jama.280.3.222.

Flyvbjerg, B. 2006. Five misunderstandings about case-study research. *Qualitative Inquiry*. 12(2):219–245. DOI: 10.1177/1077800405284363.

Fongwa, F. N. 2012. South Africa. In *A profile of higher education in Southern Africa: national perspectives*. 2nd ed. V. 2. P. Kotecha, M. Wilson-Strydom, & S.M. Fongwa, Eds. Johannesburg, South Africa: SARUA. 75–85. Available: https://www.sarua.org/files/publications/SARUA%20leadership%20Dialogue%20Series/SARUA%20Profiles%20of%20HE%20Vol%202.pdf [2019, April 30].

Frantz, J.M., Rhoda, A., Struthers, P. & Phillips, J. 2010. Research productivity of academics in a physiotherapy department: a case study. *African Journal of Health Professions Education*. 2(2):17–20. Available: http://hdl.handle.net/10566/1237 [2019, June 01].

Garfield, E. 2006. The history and meaning of the journal impact factor. *Journal of the American Medical Association (JAMA)*. 295(1):90–93. DOI: 10.1001/jama.295.1.90.

Gasparyan, A.Y., Ayvazyan, L. & Kitas, G.D. 2013. Authorship problems in scholarly journals: considerations for authors, peer reviewers and editors. *Rheumatology International*. 33(2):277–284. DOI: 10.1007/s00296-012-2582-2.

Georghiou, L. (2015). *Value of research: Policy Paper by the Research, Innovation, and Science Policy Experts (RISE).* Brussels, Belgium: European Commission. Available at: https://ec.europa.eu/research/innovation-union/pdf/expert-groups/rise/georghiou-value_research.pdf [2019, January 26].

Geyskens, I., Steenkamp, J.B.E.M. & Kumar, N. 1998. Generalisations about trust in marketing channel relationships using meta-analysis. *International Journal of Research in Marketing*. 15(3):223–248. DOI: 10.1016/S0167-8116(98)00002-0.

Ghajarzadeh, M., Mohammadifar, M. & Safari, S. 2013. How to define an author? Awareness of authorship criteria. *Anesthesiology and Pain Medicine*. 3(1):226–227. DOI:10.5812/aapm.10877

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P. & Trow, M. 1994. *The new production of knowledge: the dynamics of science and research in contemporary societies*. London, United Kingdome: Sage.

Gingras, Y., Larivière, V., Macaluso, B. & Robitaille, J. P. 2008. The effects of aging on researchers' publication and citation patterns. *PloS One*. 3(12):e4048. DOI: 10.1371/journal.pone.0004048.

Glaser, B.G. & Strauss, A.L. 1967. *The discovery of grounded theory: strategies for qualitative research*. London, United Kingdom: Aldine Transaction. Available at: http://www.sxf.uevora.pt/wp-content/uploads/2013/03/Glaser_1967.pdf [2019, January 17].

Glaser, B.G. 1992. *Basics of grounded theory analysis*. Mill Valley, CA, United States of America: Sociology Press. Available: https://trove.nla.gov.au/version/12345308 [2019, January 14].

Godden, B. 2004. Sample size formulas. [Lecture note] Available: http://www.williamgodden.com/samplesizeformula.pdf [2018, March 20].

Goede, R. & Villiers, C. 2003. The applicability of grounded theory as research methodology in studies on the use of methodologies in IS practices. In *Proceeding SAICSIT '03 Proceedings of the 2003 annual research conference of the South African institute of computer scientists and information technologists on Enablement through technology*. Johannesburg, South Africa, 17-19 September 2003. Eloff, J. et al. (Eds). Pretoria: South African Institute for Computer Scientists and Information Technologists. 208–217.

Gonzalez-Brambila, C. & Veloso, F.M. 2007. The determinants of research output and impact: a study of Mexican researchers. *Research Policy*. 36(7):1035–1051. DOI: 10.1016/j.respol.2007.03.005.

González-Teruel, A. & Abad-García, M.F. 2012. Grounded theory for generating theory in the study of behavior. *Library & Information Science Research*. 34(1):31–36. DOI: 10.1016/j.lisr.2011.02.006.

Gorman, R. & Clayton, P. 2005. *Qualitative research for the information profession: a practical handbook*. 2nd ed. London, United Kingdom: Facet.

Government of the Republic of Zambia, Ministry of Health. n.d. *Zambia National Health Strategic Plan 2017 – 2021*. Lusaka: Ministry of Health. Available: http://www.nationalplanningcycles.org/sites/default/files/planning_cycle_repository/zambia/zambianhsp.pdf [2018, November 02].

Government of the Republic of Zambia. National Assembly. 2012. *Report of the Committee on Education Science and Technology for the second Session of the Eleventh National Assembly, appointed on 27th September 2012.* Available: http://www.parliament.gov.zm/sites/default/files/documents/committee_reports/EDUCATION%20REPORT%202013_0.pdf [2017, April 26].

Grand Canyon University, Center for Innovation in Research and Teaching. n.d. *When to use mixed methods*. Available: https://cirt.gcu.edu/research/developmentresources/research_ready/mixed_methods/when_to_use [2018, July 25].

Greene, M. 2007. The demise of the lone author. *Nature*. 450(7173):1165-1165. DOI: 10.1038/4501165a.

Greyson, D. 2015. Health information triangulation: a complex and agentic practice among young parents. *Proceedings of the American Society for Information Science and Technology*. 52(1):1–3. DOI: 10.1002/pra2.2015.1450520100132.

Greyson, D. 2018. Information triangulation: a complex and agentic everyday information practice. *Journal of the Association for Information Science and Technology*. 69(7):869–878. DOI: 10.1002/asi.24012.

Grobbelaar, S.S. 2015. *Literature review on knowledge utilisation*. (DRUSSA Handbook series). London, United Kingdom: Association of Commonwealth Universities, Development Research Uptake in Sub-Saharan Africa [DRUSSA]. Available: https://www.acu.ac.uk/publication/download?publication=604 [2019, May 26].

Guetterman, T.C., Fetters, M.D. & Creswell, J.W. 2015. Integrating quantitative and qualitative results in health science mixed methods research through joint displays. *Annals of Family Medicine*. 13(6):554–561. DOI: 10.1370/afm.1865.

Hadjinicola, G.C. & Soteriou, A.C. 2006. Factors affecting research productivity of production and operations management groups: an empirical study. *Advances in Decision Sciences*. 2006:1–16. DOI:10.1155/JAMDS/2006/96542.

Halpern, R., Eaker, C., Jackson, J. & Bouquin, D. 2015. #DitchTheSurvey: expanding methodological diversity in LIS Research. *In the Library with the Lead Pipe*. 11 March: 1-13. Available: http://www.inthelibrarywiththeleadpipe.org/2015/ditchthesurvey-expanding-methodological-diversity-in-lis-research/. [2019, June 16].

Hampwaye, G. & Mweemba, L. 2012. Zambia. In *A profile of higher education in Southern Africa: national perspectives*. (2nd ed). (Volume 2). P. Kotecha, M. Wilson-Strydom, & S.M. Fongwa, Eds. Johannesburg, South Africa: SARUA. 105–113. Available: https://www.sarua.org/files/publications/SARUA%20leadership%20Dialogue%20Series/SARUA%20Profiles%20of%20HE%20Vol%202.pdf [2019, April 30].

Hanover Research. 2014. *Building a culture of research: recommended practices*. Available: https://www.hanoverresearch.com/media/Building-a-Culture-of-Research-Recommended-Practices.pdf [2018, September 19].

Hardon, A., Hodgkin, C. & Fresle, D. 2004. *How to investigate the use of medicines by consumers*. Geneva, Switzerland: World Health Organisation and University of Amsterdam. Available: https://www.who.int/drugresistance/Manual1_HowtoInvestigate.pdf [2019, June 16].

Haruna, H., Mtoroki, M., Gerendasy, D. D. & Detlefsen, E. G. 2016. Health libraries and information services in Tanzania: a strategic assessment. *Annals of Global Health*. 82(5):912-921.e3. DOI: 10.1016/j.aogh.2016.10.003.

Harvard Medical School OMBUDS Office. (1999). *Authorship Guidelines*. Adopted December 17. Available: https://hms.harvard.edu/sites/default/files/assets/Sites/Ombuds/files/AUTHORSHIP%20GUIDELINES.pdf.

Hashemi, M., & Babaii, E. (2013). Mixed methods research: toward new research designs in applied linguistics. *The Modern Language Journal.* 97(4): 828-852. DOI: http://www.jstor.org/stable/43651724.

Hazarika, T., Sarma, D. & Sen, B. K. 2010. Scientometric portrait of Nayana Nanda Borthakur: a biometeorologist. *Annals of Library and Information Studies*. 57(1):21–32. Available: http://nopr.niscair.res.in/handle/123456789/8282 [2019, June 18].

Heinsch, M., Gray, M. & Sharland, E. 2016. Re-conceptualising the link between research and practice in social work: a literature review on knowledge utilisation. *International Journal of Social Welfare*. 25(1):98–104. DOI: 10.1111/ijsw.12164.

Hessels, L.K. & van Lente, H. 2008. Re-thinking new knowledge production: a literature review and a research agenda. *Research Policy*. 37(4):740–760. DOI: 10.1016/j.respol.2008.01.008.

Hill, L.H. 1998. From global consciousness to social action: an examination of adult education theory. In *Proceedings of the 39th Adult Education Research Conference*. San Antonio, TX, 15-16 May 1998. Kimmel, J. C. (Ed). San Antonio, TX: University Of The Incarnate Word. Available: http://newprairiepress.org/aerc/1998/papers/31 [2019, May 25].

Hofman, K. J., Kanyengo, C. W., Rapp, B. A. & Kotzin, S. 2009. Mapping the health research landscape in Sub-Saharan Africa: a study of trends in biomedical publications. *Journal of the Medical Library Association (JMLA)*. 97(1):41–44. DOI: 10.3163/1536-5050.97.1.007.

Hume, E. W. 1922. Statistical Bibliography in Relation to the Growth of Modern Civilization: Two Lectures delivered in the University of Cambridge in May 1922. Nature, 112, 585-586. DOI: 10.1038/112585a0.

Hume, E. W. 1923. *Statistical bibliography in relation to the growth of modern civilization.* London: Butler & Tanner Grafton.

Huizing, B. 2014. Lean library communication: mind the customer. *European Scientific Journal*. 10(28):1–8. Available: *https://eujournal.org/index.php/esj/article/view/4383* [2019, April 20].

Iddris, F. 2017. Examining the research output of lecturers in selected public universities in Ghana. Kumasi, Ghana: In: *Proceedings of the 1st International Conference on Competency-Based Training and Research (ICCBTR), University of Education, Winneba & College of Technology Education*, Kumasi, Ghana, 13-15 September, 2017*:* Okai, R. (Ed.). Kumasi, Ghana: University of Education, Winneba. 207–215. Available: diva2:1142186 [2019, April 20].

Imhonopi, D. & Urim, U. M. 2013. Factors affecting scholarly research output in Nigeria: perception of academics in South-Western universities. *Unilag Sociological Review (USR).* X: 24–58. Available: http://eprints.covenantuniversity.edu.ng/id/eprint/4420 [2019, May 07].

International Committee of Medical Journal Editors. 2018. *Defining the role of authors and contributors*. Available: http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html [2018, October 09].

Iqbal, M. Z. & Mahmood, A. 2011. Factors related to low research productivity at higher education level. *Asian Social Science*. 7(2):188–193. DOI: 10.5539/ass.v7n2p188.

Iroaganachi, M. A., Itsekor, V. & Osinulu, I. 2014. Citation analysis of social science research: a case study of bachelor degree research project reports of a Nigerian university 2009-2013. *Library Philosophy and Practice*. 1096:1–29. Available: http://digitalcommons.unl.edu/libphilprac/1096 [2019, May 16].

Isaak, D. 2016. PubMed2XL (version 2.01). *Journal of the Medical Library Association (JMLA).* 104(1):92–94. DOI: 10.3163/1536-5050.104.1.023.

Isfandyari-Moghaddam, A., Hasanzadeh, M. & Ghayoori, Z. 2012. A study of factors affecting research productivity of Iranian women in ISI. *Scientometrics*. 91(1):159–172. DOI: 10.1007/s11192-011-0585-5.

Ishak, I.S. & Alias, R.A. 2005. Designing a strategic information system planning methodology for Malaysian institutes of higher learning (ISP-IPTA). *Issues in Information Systems*. VI(1):325–331. Available: http://*iacis.org/iis/2005/Ishak_Alias.pdf [2019, May 17]*.

Ismail, S., Nason, E., Marjanovic, S. & Grant, J. 2012. Bibliometrics as a tool for supporting prospective R&D decision-making in the health sciences: strengths, weaknesses and options for future development. *Rand Health Quarterly*. 1(4):11.

Isola, O. O., Siyanbola, W. O. & Ilori, M. O. 2011. Research productivity in selected higher education institutions in Nigeria. In *2011 Proceedings of PICMET '11: Technology Management in the Energy Smart World (PICMET)*. Portland, OR, United States of America, 31 July-4 August 2011. Piscataway, NJ: IEEE. 1–6. Available: https://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=6008221 [2018, October 03].

Isotalo, J. n.d. Basics of statistics. [Lecture notes]. University of Tampere, Finland. Available: https://www.mv.helsinki.fi/home/jmisotal/BoS.pdf [2019, February 15].

Jackson, D., Daly, J. & Davidson, P. 2008. Interviews. In *Nursing research design and methods*. R. Watson, S. McKenna, S. Cowman, & J. Keady (Eds). Edinburgh, United Kingdom: Churchill Livingston. 281–297.

Jain, A.K. 2011. Impact factor: Measure of quality of research publication. *Indian Journal of Orthopaedics*. 45(4):289–290. DOI: 10.4103/0019-5413.82330.

Jansen, B. 2003. The state of higher education in South Africa: from massification to mergers. In *State of the Nation: South Africa 2003–2004*. J. Daniel, R. Southall, R, & A. Habib, (Eds). Pretoria: HSRC Press. 290–311.

Jeyasekar, J.J. & Saravanan, P. 2015. Impact of collaboration on Indian forensic science research: a scientometric mapping from 1975 to 2012. *Journal of Scientometric Research*. 4(3):135–142. DOI: 10.4103/2320-0057.174863.

Johnson, B., & Christensen, L. B. (2014). *Educational research: Quantitative, qualitative, and mixed approaches.* 5th ed. Thousand Oaks, CA: Sage Publications.

Johnston, B. & Sheila Webber, S. 2003. Information literacy in higher education: a review and case study, studies in higher education. 28(3): 335-352. DOI: 10.1080/03075070309295.

Joint United Nations Programme on HIV and AIDS. 2010. *An Introduction to triangulation*. Geneva, Switzerland: Joint United Nations Programme on HIV and AIDS. Available: http://www.unaids.org/sites/default/files/sub_landing/files/10_4-Intro-to-triangulation-MEF.pdf [2017, December 15].

Jung, J. 2012. Academic staff research productivity in Hong Kong across academic discipline. *Higher Education Studies*. 2(4):1-13. DOI: 10.5539/hes.v2n4p1.

Kamalski, J. 2009. Small countries lead international collaboration. *Research Trends.* 14:7–9. Available: https://www.researchtrends.com/issue14-december-2009/country/ [2019, July 12].

Kaniki, A. M. 1989. Agricultural information needs in Zambia: a study of a two-way information flow. P.hD Thesis. University of Pittsburgh, United States of America.

Kapata, N., Chanda-Kapata, P., Ngosa, W., Metitiri, M., Klinkenberg, E., Kalisvaart, N., Sunkutu, V., Shibemba, A., et al. 2016. The prevalence of tuberculosis in Zambia: results from the first national TB prevalence survey, 2013–2014. *PLoS One*. 11(1):e0146392. DOI: 10.1371/journal.pone.0146392.

Karpati, A. 2011. *Digital literacy in education*. Moscow, Russia: UNESCO Institute for Information Technologies in Education. Available: http://unesdoc.unesco.org/images/0021/002144/214485e.pdf [2018, July 07].

Kasa, M. G., Ibrahim, U. & Momoh, K. A. 2014. Bibliometric analysis of publication output patterns of academic staff members of Agriculture and Veterinary Complex of a Nigerian university. *The Information Manager*. 14(1–2):21–28. Available: https://www.ajol.info/index.php/tim/article/view/118028/107629 [2019, April 16].

Kebede, D., Zielinski, C., Mbondji, P. E., Sanou, I., Kouvividila, W. & Lusamba-Dikassa, P. S. 2014. Research output of health research institutions and its use in 42 sub-Saharan African countries: results of a questionnaire-based survey. *Journal of the Royal Society of Medicine*. 107(1 Suppl):105–114. DOI: 10.1177/0141076813517681.

Keena, S. & Johnston, C. 2011. *Concise dictionary of library and information science*. 2nd ed. Munich, Germany: Saur.

Kelaher, M., Ng, L., Knight, K. & Rahadi, A. 2016. Equity in global health research in the new millennium: trends in first-authorship for randomised controlled trials among low and middle-income country researchers 1990-2013. *International Journal of Epidemiology*. 45(6):2174–2183. DOI: 10.1093/ije/dyw31.

Kelly, M. J. 1999. *The origins and development of education in Zambia: precolonial times to 1996 a book of notes and readings*. Lusaka: Image.

Kendagor, S., Kosgei, D., Tuitoek, D. & Chelangat, S. 2011. Factors affecting research productivity in public universities of Kenya: the case of Moi University, Eldoret. *Journal of Emerging Trends in Economics and Management Sciences (JETEMS)*. 3(5):475–484. Available: http://*jetems.scholarlinkresearch.com/articles/Factors%20Affecting%20Research.pdf [2019, February 18]*.

Khaparde, V. & Pawar, S. 2013. Authorship pattern and degree of collaboration in information technology. *Journal of Computer Science*. 1(1):46–54. Available: http://*jcsitnet.com/journals/jcsit/Vol_1_No_1_June_2013/3.pdf [2019, February 18]*.

Kohn, L. T. 1997. *Methods in case study analysis*. (Technical Publication 2). Washington D.C., United States of America: The Center for Studying Health System Change. Available: https://pdfs.semanticscholar.org/3aec/796b904aa86367ee04909f5c4851ec7e8730.pdf [2018, March 19].

Kombo, D. K. & Tromp, L. D. 2006. *Proposal and thesis writing: an introduction*. Nairobi: Paulines Publications Africa.

Kornhaber, R. A., McLean, L. M. & Baber, R. J. 2015. Ongoing ethical issues concerning authorship in biomedical journals: an integrative review. *International Journal of Nanomedicine*. 10:4837–4846. DOI: 10.2147/IJN.S87585.

Kothari, C. R. 2004. *Research methodology: methods and techniques*. 2nd ed. New Delhi, India: Age International.

Kpolovie, P. J. & Onoshagbegbe, E.S. 2017. Research productivity: h-index and i10 index of academics in Nigerian universities. *International Journal of Quantitative and Qualitative Research Methods*. 5(2):62–123. Available: http://www.eajournals.org/wp-content/uploads/Research-Productivity-h-Index-and-I10-Index-of-Academics-in-Nigerian-Universities.pdf [2019, April 20].

Kulyambanino, C. 2016. Academic staff productivity at the University of Zambia: exploring research and publication. MEd. (Education) dissertation. University of Zambia. Available: http://dspace.unza.zm:8080/xmlui/bitstream/handle/123456789/4899/Main%20Document.pdf?sequence=1&isAllowed=y [2019, February 22].

Kumar, A. 2018. Online information seeking behaviour of academic staff and research scholars on e-resources of Babasaheb Bhimrao Ambedkar University, Lucknow, India. *Library Philosophy and Practice (e-journal).* (1925):1–11. Available: *https://digitalcommons.unl.edu/libphilprac/1925* [2019, June 13].

Kumwenda, S., Niang, E.H.A., Orondo, P.W., William, P., Oyinlola, L., Bongo, G.N. & Chiwona, B. 2017. Challenges facing young African scientists in their research careers: a qualitative exploratory study. *Malawi Medical Journal*. 29(1):1–4. PMID: 28567188; PMCID: PMC5442483.

Lajoie-Paquette, D. 2005. Diffusion theory. In *Theories of Information Behavior*. K.E. Fisher, L. McKechnie, & S. Erdelez, (Eds). Medford, NJ, United States of America: Information Today. 118–122.

Langa, P.V. 2014. *Higher education in Portuguese speaking African countries: a five country baseline study*. Somerset West, South Africa: African Minds. Available: https://muse.jhu.edu/book/30915/ [2019, July 07].

Leedy, P.D. & Ormrod, E.J. 1985. *Practical research: planning and design*. 8th ed. Upper Saddle River, New Jersey, United States of America: Pearson Education.

Leiden University, Centre for Science and Technology Studies. 2019. VOSviewer - visualising scientific landscapes. [Web page]. Available: http://www.vosviewer.com/ [2019, February 15].

Lertputtarak, S. 2008. An investigation of factors related to research productivity in a public university in Thailand: a case study. Ph.D. Thesis. Victoria University, Melbourne, Australia. Available: https://core.ac.uk/download/pdf/10827081.pdf [2019, February 19].

Lesi, O.A., Orenuga, O.O., Roberts, A. and A. & O, O. 2009. Research productivity of junior academic staff at a tertiary medical college in south west Nigeria. *Nigerian Quarterly Journal of Hospital Medicine*. 19(2):119–24. PMID: 20836313.

Li, Z., Qiong, J. & Xiao, Y. 2009. Information technology strategy in knowledge diffusion lifecycle. In *Encyclopedia of Information Science and Technology*. 2nd ed. M. Khosrow-Pour, (Ed). Hershey, New York, United States of America: Information Science Reference. 2036–2041. Available: https://www.igi-global.com/chapter/information-technology-strategy-knowledge-diffusion/13858 [2018, February 26].

Lin, M. 2006. Substance, attribute, and mode in Spinoza. *Philosophy Compass*. 1(2):144–153. DOI: 10.1111/j.1747-9991.2006.00015.x

Mack, N., Woodsong, C., MacQueen, K., M., Guest, G. & Namey, E. 2005. *Qualitative research methods: a data collector's field guide*. Research Triangle Park, NC, United States of America: Family Health International. Available: https://www.fhi360.org/sites/default/files/media/documents/Qualitative%20Research%20Methods%20-%20A%20Data%20Collector%27s%20Field%20Guide.pdf [2018, March 19].

Madden, A.D. 2000. A definition of information. *Aslib Proceedings*. 52(9):343-349. DOI: 10.1108/EUM0000000007027.

Madu, E.C. & Dike, V.W. 2012. An assessment of the relationship between information competencies and academic productivity amongst staff in Nigerian Universities in North Central Geographical Zone. *Journal of Emerging Trends in Computing and Information Sciences*. 3(2):179–185. Available: http://www.cisjournal.org/journalofcomputing/archive/vol3no2/vol3no2_8.pdf [2019, June 11].

Mahlaha, N. 2012a. Malawi. In *A profile of higher education in Southern Africa: national perspectives*. 2nd ed. Volume 2. P. Kotecha, M. Wilson-Strydom, & S.M. Fongwa, (Eds). Johannesburg, South Africa: SARUA. 43-48. Available: https://www.sarua.org/files/publications/SARUA%20leadership%20Dialogue%20Series/SARUA%20Profiles%20of%20HE%20Vol%202.pdf [2019, April 30].

Mahlaha, N. 2012b. Mauritius. In *A profile of higher education in Southern Africa: national perspectives*. 2nd ed. olume. 2. P. Kotecha, M. Wilson-Strydom, & S.M. Fongwa, Eds. Johannesburg, South Africa: SARUA. 49-55. Available: https://www.sarua.org/files/publications/SARUA%20leadership%20Dialogue%20Series/SARUA%20Profiles%20of%20HE%20Vol%202.pdf [2019, April 30].

Mahlaha, N. 2012c. Mozambique. In *A profile of higher education in Southern Africa: national perspectives*. 2nd ed. Volume 2. P. Kotecha, M. Wilson-Strydom, & S.M. Fongwa, Eds. Johannesburg, South Africa: SARUA. 57–62. Available: https://www.sarua.org/files/publications/SARUA%20leadership%20Dialogue%20Series/SARUA%20Profiles%20of%20HE%20Vol%202.pdf [2019, April 30].

Mahlaha, N. 2012d. Swaziland. In *A profile of higher education in Southern Africa: national perspectives*. 2nd ed. Volume 2. P. Kotecha, M. Wilson-Strydom, & S.M. Fongwa, Eds. Johannesburg, South Africa: SARUA. 87–93. Available: https://www.sarua.org/files/publications/SARUA%20leadership%20Dialogue%20Series/SARUA%20Profiles%20of%20HE%20Vol%202.pdf [2019, April 30].

Mahlaha. N. 2012e. Namibia. In *A profile of higher education in Southern Africa: national perspectives*. 2nd ed. Volume 2. P. Kotecha, M. Wilson-Strydom, & S.M. Fongwa, Eds. Johannesburg, South Africa: SARUA. 75–85. Available: https://www.sarua.org/files/publications/SARUA%20leadership%20Dialogue%20Series/SARUA%20Profiles%20of%20HE%20Vol%202.pdf [2019, April 30].

Makondo, F.N.S., Kanyengo, C.W. & Kakana, F. 2018. Online search behaviour of University of Zambia Library and Information Studies students. *Library Hi Tech*. 36(4):720–732. DOI: 10.1108/LHT-03-2017-0058.

Makri, A. 2018. Pakistan and Egypt had highest rises in research output in 2018. *Nature* [blog 27 December]. DOI: 10.1038/d41586-018-07841-9.

Malapela, T. 2014. A study into the availability of and access to electronic journals for teaching and research by the academic staff at the Academic staff of Agriculture, University of Zimbabwe. MPhil. (Library and Information Studies) dissertation. University of Cape Town. Available: https://open.uct.ac.za/bitstream/handle/11427/13108/thesis_hum_2014_malapela_t.pdf [2019, March 15].

Malathi, M. & Thappa, D.M. 2012. The intricacies of impact factor and mid-term review of editorship. *Indian Journal of Dermatology, Venereology and Leprology*. 78(1):1–4. DOI: 10.4103/0378-6323.90938.

Malete, L. & Kobedi, K. 2012. Botswana. In *A profile of higher education in Southern Africa: national perspectives*. 2nd ed. Volume 2. P. Kotecha, M. Wilson-Strydom, & S.M. Fongwa, Eds. Johannesburg, South Africa: SARUA. 13–22. Available: https://www.sarua.org/files/publications/SARUA%20leadership%20Dialogue%20Series/SARUA%20Profiles%20of%20HE%20Vol%202.pdf [2019, April 30].

Mansourian, Y. 2006. Adoption of grounded theory in LIS research. *New Library World.* 107 (9/10):386-402. DOI: 10.1108/03074800610702589.

Marginson, S. & van der Wende, M. 2009. The new global landscape of nations and institutions. In *Higher Education to 2030*. Volume 2. Paris: Organisation for Economic Co-operation and Development. 17–62. Available: http://www.oecd-ilibrary.org/content/chapter/9789264075375-3-en [2019, March 25].

Martin, B. 2009. Research productivity: some paths less travelled. *Australian Universities' Review*. 51(1):14–10. Available: https://documents.uow.edu.au/~bmartin/pubs/09aur.pdf [2019, July 13].

Mason, D. & Lamain, C. 2007. *Nau mai haere mai ki Aotearoa: information seeking behaviour of New Zealand immigrants*. (A research report commissioned by The New Zealand Federation of Ethnic Councils). Wellington, New Zealand: The Centre for Applied Cross-cultural Research, Victoria University of Wellington. Available: https://www.victoria.ac.nz/cacr/research/migration/info-seeking-behaviour-of-new-zealand-immigrations/Info-seeking-behaviour-of-NZ-immigrants.pdf [2019, June 06].

Masukume, G. 2012. A 54-year analysis of articles from Mpilo Central Hospital, Bulawayo, Zimbabwe – 168 articles cited 999 times: a short report. *Malawi Medical Journal*. 24(2):36–8. PMCID: PMC3588217; PMID: 23638269.

Matthew, B.M. & Huberman, A.M. 1994. *Qualitative data analysis*. Thousand Oaks, CA, United States of America: Sage.

Mawoyo, I. 2012. Zimbabwe. In *A profile of higher education in Southern Africa: national perspectives*. 2nd ed. Volume 2. P. Kotecha, M. Wilson-Strydom, & S.M. Fongwa, Eds. Johannesburg, South Africa: SARUA. 115–123. Available:

https://www.sarua.org/files/publications/SARUA%20leadership%20Dialogue%20Series/SARUA%20Profiles%20of%20HE%20Vol%202.pdf [2019, April 30].

Meho, L.I. 2007. The rise and rise of citation analysis. *Physics World*. 20(1):32–37. DOI: 10.1088/2058-7058/20/1/33.

Menkhoff, T. & Evers, H.-D. 2013. Knowledge diffusion through good knowledge governance: the case of Singapore's marine cluster. In *Human capital formation and economic growth in Asia and the Pacific*. Dobson, W. (Ed). London, United Kingdom: Routledge. 163-185. Available: http://www.eaber.org/sites/default/files/paftad/chp%209%20Menkhoff%20Evers_final.pdf [2019, May 21].

Mertens, D.M. 2010. *Research and evaluation in education and psychology: integrating diversity with quantitative, qualitative, and mixed methods*. Thousand Oaks, California, United States of America: Sage.

Migosi, J.A., Migiro, S.O. & Ogula, P. 2011. Factors that motivate business academic staff in Kenya to conduct research. *International Journal of Education Administration and Policy Studies*. 4(10):198–204. Available: http://hdl.handle.net/123456789/188 [2019, May 21].

Miles, M. B., & Huberman, A. M. 1994. *Qualitative data analysis: An expanded sourcebook*. 2nd ed. Sage Publications, Inc.

Milton, N. 2018. What is a knowl9ge product? Available: http://www.nickmilton.com/2018/01/what-is-knowledge-product.html [2019, January 15].

Mitev, H., Ridley, G. & Wills, D. 2013. Research productivity of accounting academics in changing and challenging times. *Journal of Accounting & Organizational Change*. 9(1):4–25. DOI: 10.1108/18325911311307186.

Monde, M.W., Akakandelwa, A. & Kanyengo, C.W. 2017. Nurses and use of research information in clinical practice: a case study of the University Teaching Hospital in Zambia. *Library Philosophy and Practice (e-journal).* (1560):1-15. Available: *https://digitalcommons.unl.edu/libphilprac/1560/* [2019, January 19].

Monde, M.W., Kanyengo, C.W. & Akakandelwa, A. 2017. Challenges of accessing and seeking research information: its impact on nurses at the University Teaching Hospital in Zambia. *The International Journal of Multi-Disciplinary Research*. 1–8. Available: http://www.multiresearch.net/cms/publications/CFP4092017.pdf [2019, January 19].

Morse, J.M. & Niehaus, L. 2009. *Mixed methods design: principles and procedures*. New York, United States of America: Routledge, Taylor & Francis. Available: https://www.crcpress.com/rsc/downloads/9781598742978_chapter_2_final.pdf [2019, April 22].

Muia, A.M. & Oringo, J.O. 2016. Constraints on research productivity in Kenyan universities: case study of University of Nairobi, Kenya. *International Journal of Recent Advances in Multidisciplinary Research*. 3(8): 1785–1794. Available: http://ir-library.ku.ac.ke/handle/123456789/15141 [2019, April 22].

Muijs, D. 2010. *Doing quantitative research in education with SPSS*. 2nd ed. London, United Kingdom: Sage.

Mulla, Y. 2012. Increasing student numbers through in-country collaborations, growth of nationwide class. *UNZA-MEPI. MEPI Annual Symposium*. Addis Ababa, Ethiopia. Available: http://www.mepinetwork.org/component/k2/item/1048-increasing-the-student-numbers-through-in-country-collaborations-growth-of-a-nationwide-class.html [2018, August 15].

Mumba, L.E. 2017. Context setting: institutional diagnosis workshop: University of Zambia. Fresh View Lodge, Siavonga.

Mumba, L.E. 2018. Vice Chancellor's message: the 100 Kwacha project. *UNZA Journal*. (January):1-1.

Munodawafa, D. 2008. Communication: concepts, practice and challenges. *Health Education Research*. 23(3):369–370. DOI: 10.1093/her/cyn024.

Muntaner, C., Chung, H., Murphy, K. & Ng, E. 2012. Barriers to knowledge production, knowledge translation, and urban health policy change: ideological, economic, and political considerations. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*. 89(6):915–924. DOI: 10.1007/s11524-012-9699-1.

Musiige, G. & Maassen, P. 2015. Academic staff perceptions of the factors that influence research productivity at Makerere University. In *Knowledge Production and Contradictory Functions in African Higher Education*. N. Cloete & P. Maassen, Eds. (African Minds Higher Education Dynamics Series Vol. 1). Cape Town: African Minds. 109–127. Available: https://www.chet.org.za/download/file/fid/848 [2018, March 02].

Musoke, G.N.M. 2016. *Informed and healthy: theoretical and applied perspectives on the value of information to health care*. Amsterdam, The Netherlands: Elsevier.

Mutongi, C. & Marume, S.B.M. 2016. Information policy advocacy and lobbying. *IOSR Journal of Humanities and Social Science (IOSR-JHSS)*. 21(7):42–47. DOI: 10.9790/0837-2107034247.

Nachimias, D. & Nachimias, C. 1981. *Research methods in the Social Sciences.* 2nd ed. New York: St. Martin's Press.

Nakanjako, D., Akena, D., Kaye, D.K., Tumwine, J., Okello, E., Nakimuli, A., Kambugu, A., McCullough, H., et al. 2017. A need to accelerate health research productivity in an African University: the case of Makerere University College of Health Sciences. *Health Research Policy and Systems*. 15(1):1–10. DOI: 10.1186/s12961-017-0196-6.

Nakanjako, D., Byakika-Kibwika, P., Kintu, K., Aizire, J., Nakwagala, F., Luzige, S., Namisi, C., Mayanja-Kizza, H., et al. 2011. Mentorship needs at academic institutions in resource-limited settings: a survey at Makerere University College of Health Sciences. *BMC Medical Education*. 11:53. DOI: 10.1186/1472-6920-11-53.

National Joint Committee for the Communicative Needs of Persons with Severe Disabilities. 1992. *Guidelines for meeting the communication needs of persons with severe disabilities*. Rockville, MD, United States of America: American Speech-Language-Hearing Association. PMID: 1350439.

Newman, A. & Jones, R. 2006. Authorship of research papers: ethical and professional issues for short-term researchers. *Journal of Medical Ethics*. 32(7):420–423. DOI: 10.1136/jme.2005.012757.

Nguyen, L.C. 2015a. Establishing a participatory library model: a grounded theory study. *The Journal of Academic Librarianship*. 41(4):475–487. DOI: 10.1016/j.acalib.2015.03.018.

Nguyen, M.Q.H. 2015b. Factors influencing the research productivity of academics at the research-oriented university in Vietnam. Ph.D. Thesis. Griffith University. Available: https://www120.secure.griffith.edu.au/rch/file/9374790b-a710-4f05-9d6c-7d76c3d74262/1/Nguyen_2015_02Thesis.pdf [2018, October 03].

Nnadozie, C.O. & Nnadozie, C.D. 2008. The information needs of academic staff members in a Nigerian private university: a self-study. *Library Philosophy and Practice (e-journal)*. 196:1–10.

Nokkala, T. 2007. *Network building, motivation and learning in inter-organisational R&D collaboration projects-theoretical considerations*. Guildford: Surrey, United Kingdom: University of Surrey. Available: http://epubs.surrey.ac.uk/1571/1/fulltext.pdf [2019, May 16].

Nonaka, I. 1994. A dynamic theory of organisational knowledge creation. *Organisation Science*. 5(1):14–37. Available: https://www.jstor.org/stable/2635068 [2019, May 19].

Nowotny, H., Scott, P. & Gibbons, M. 2003. Introduction: `Mode 2' revisited: the new production of knowledge. *Minerva*. 41(3):179–194. DOI: 10.1023/A:1025505528250.

Nowotny, H., Scott, P. & Gibbons, M.T. Eds. 2001. *Re-thinking science: knowledge and the public in an age of uncertainty*. London: Polity Press.

Nwagwu, W.E. 2007. Patterns of authorship in the biomedical literature of Nigeria. *LIBRES - Library and Information Science Research Electronic Journal*. 17(1):1–28. Available: https://cpb-us-e1.wpmucdn.com/blogs.ntu.edu.sg/dist/8/644/files/2014/06/Vol17_I1_NwagwuPatterns.pdf [2019, May 22].

Nwagwu, W.E. 2016. Ten years of biomedical research in West Africa. *Malaysian Journal of Library & Information Science*. 21(2):41–65. DOI: 10.22452/mjlis.vol21no2.4.

Nwone, S. & Mutula, S. 2018. Information seeking behaviour of the professoriate in selected federal universities in southwest Nigeria. *South African Journal of Libraries and Information Science*. 84(1):20–34. DOI: 10.7553/84-1-1733.

Nwosu, C.O., Obiamalu, A.R. & Udem, K.O. 2015. Relationship between information literacy skills and research output of academic staff in Nnamdi Azikiwe University Awka, Nigeria. *Journal of Applied Information Science and Technology*. 8(1):89–108. Available: https://www.jaistonline.org/vol8_no1_Nwosu_Obiamalu_Udem.pdf [2019, May 13].

Nylenna, M. 2015. Authorship and co-authorship in medical and health research. [Website]. Oslo, Norway: Norwegian National Research Ethics Committee. Available: https://www.etikkom.no/en/library/topics/authorship-and-co-authorship/authorship-and-co-authorship-in-medical-and-health-research/ [2018, October 10].

Ocholla, D.N. & Ocholla, L. 2007. Research in library and information science in South Africa : an analysis of journal research output from 1993-2006. *South African Journal of Libraries and Information Science*. 73(2):109–118. DOI: 10.7553/73-2-1344.

Ocholla, D.N, Ocholla, L. & Onyancha, B.O. 2013. Insight into research publication output of academic librarians in Southern African public universities from 2002 to 2011. *African Journal of Library, Archives and Information Science*. 23(1):5–22. Available: https://core.ac.uk/download/pdf/79171067.pdf [2019, March 28].

Okendo, O.E. 2018. Constraints of research productivity in universities in Tanzania: a case of Mwenge Catholic University, Tanzania. *International Journal of Education and Research*. 6(3):201–2010. Available: https://www.ijern.com/journal/2018/March-2018/21.pdf [2019, April 20].

Okiki, O.C. 2013. Research productivity of teaching academic staff members in Nigerian federal universities: an investigative study. *Chinese Librarianship: an International Electronic Journal*. 36:99–118. Available: https://works.bepress.com/olatokunbo_okiki/12/ [2019, April 17].

Oliver, D., Whymark, G. & Romm, C. 2005. Researching ERP adoption: an Internet-based grounded theory approach. *Online Information Review*. 29(6):585–603. DOI: 10.1108/14684520510638052.

Oloruntoba, A. & Ajayi, M.B. 2006. Gender and research attainment in Nigerian Agricultural universities. *Journal of Higher Education in Africa*. 4(2):83–98. Available: https://www.jstor.org/stable/24486261 [2019, July 06].

Ondari-Okemwa, E. 2007. Scholarly publishing in sub-Saharan Africa in the twenty-first century: challenges and opportunities. *First Monday*. 12(10). DOI: 10.5210/fm.v12i10.1966.

Onwuegbuzie, A.J. & Collins, K.M.T. 2007. A typology of mixed methods sampling designs in social science research. *The Qualitative Report*. 12(2):281–316. Available: https://nsuworks.nova.edu/tqr/vol12/iss2/9/ [2019, February 17].

Onwuegbuzie, A.J. & Johnson, B.R. 2006. The validity issue in mixed research. *Research in the Schools*. 13(1):48–63. Available: http://www.msera.org/docs/rits-v13n1-complete.pdf *[2019, March 06]*.

Onwuegbuzie, A.J. & Leech, L.N. 2007. A call for qualitative power analyses. *Quality and Quantity*. 41(1):105–121. DOI 10.1007/s11135-005-1098-1.

Onyancha, O.B. 2009. Towards global partnerships in research in Sub-Saharan Africa: an informetric study of the national, regional and international country collaboration in HIV / AIDS literature in eastern and southern Africa. *South African Journal of Libraries and Information Science*. 75(1):84–97. Available: http://hdl.handle.net/10500/5275 [2019, April 09].

Onyancha, O. B. 2011. Research Collaborations between South Africa and Other Countries, 1986-2005: An Informetric Analysis. *African Journal of Library, Archives and Information Science*. 21(2):87-97.

Onyancha, O. B & Maluleka, J. R. 2011. Knowledge production through collaborative research in sub-Saharan Africa: how much do countries contribute to each other's knowledge output

and citation impact? *Scientometrics*. 87(2):315-336. DOI: 10.1007/s11192-010-0330-5.

Onyancha, O.B. 2014. Can informetrics shape biomedical research? A case study of the HIV/AIDS research in sub-Saharan Africa. *Inkanyiso: Journal of Humanities and Social Sciences*. 6(1):49–65. Available: https://www.ajol.info/index.php/ijhss/article/download/105747/95756 [2019, April 26].

Onyancha, O.B. & Ocholla, D.N. 2007. Country-wise collaborations in HIV/AIDS research in Kenya and South Africa, 1980–2005. *Libri*. 57(4):169–235. DOI: 10.1515/LIBR.2007.239.

Ordoñez, M. & Serrat, O. 2009. Disseminating knowledge products. In *Knowledge solutions: tools, methods and approaches to drive organizational performance*. Serrat, O. (Ed). Singapore: Springer. 871-878.

Orlikowski, W.J. 1993. CASE tools as organisational change: investigating incremental and radical changes in systems development. *Management Information Systems Quarterly*. 17(3):309–40. DOI: 10.2307/249774.

Osareh, F., Chakoli, N.A. & Keshvari, M. 2010. Co-authorship of Iranian researchers in science, social science, art and humanities citation indexes in the web of science between 2000 and 2006. *Information Science Technology*. 25(4):573–595. Available: http://jipm.irandoc.ac.ir/article-1-1142-en.html [2019, June 02].

Owolabi, M.O., Bower, J.H. & Ogunniyi, A. 2007. Mapping Africa's way into prominence in the field of neurology. *Archives of Neurology*. 64(12):1696–1700. DOI: 10.1001/archneur.64.12.1696.

Owusu-Nimo, F. & Boshoff, N. 2016. Research collaboration in Ghana: patterns, motives and roles. *Scientometrics*. 110(3): 1099-1121. DOI: 10.1007/s11192-016-2221-x.

Oyewole, O. 2010. Africa and the global knowledge domain. In *Higher education and globalization: challenges, threats and opportunities for Africa*. Teferra, D. and Greijn, H. (Eds). Maastricht, The Netherlands: Centre for International Cooperation in Academic Development (MUNDO). 19–30.

Pace, S. 2004. A grounded theory of the flow experiences of web users. *International Journal of Human-Computer Studies*. 60(3). DOI: 10.1016/j.ijhcs.2003.08.005.

Padma, P. and R. & Ramasamy, K. 2013. Scientometric portrait of Dr. S. Perumal, Department of Chemistry, Madurai Kamaraj University, Madurai. *Asian Journal of Library and Information Science*. 5(4):48–62. Available: http://www.escienceworld.in/index.php/ajlis/article/view/13/13 [2019, May 22].

Palinkas, L.A., Horwitz, S.M., Green, C.A., Wisdom, J.P., Duan, N. & Hoagwood, K. 2015. Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health*. 42(5):533–544. DOI: 10.1007/s10488-013-0528-y.

Pandey, P. & Pandey, M.M. 2015. *Research methodology: tools and techniques.* Buzau, Al. Marghiloman, Romania: Bridge Center. Available: http://*www.euacademic.org/BookUpload/9.pdf [2019, June 09]*.

Pang, T., Sadana, R., Hanney, S., Bhutta, Z. A., Hyder, A. A. & Simon, J. (2003). Knowledge for better health: a conceptual framework and foundation for health research systems. *Bulletin*

of the World Health Organization. 81(11): 815–820.

Paraboo, K. 2008. Questionnaires. In *Nursing research design and methods*. Watson, R. et al. (Eds). Edinburgh, United Kingdom: Churchill Livingstone.

Pariyo, G., Serwadda, D., Sewankambo, N.K., Groves, S., Bollinger, R.C. & Peters, D.H. 2011. A grander challenge: the case of how Makerere University College of Health Sciences (MakCHS) contributes to health outcomes in Africa. *BMC International Health and Human Rights*. 11(1):1–8. DOI: 10.1186/1472-698X-11-S1-S2.

Pastor, J.M. & Serrano, L. 2016. *The research output of universities and its determinants: quality, intangible investments, specialisation and inefficiencies*. (SPINTAN Project: Smart Public Intangibles SPINTAN Working Paper Series No. 5). Australia: Instituto Valenciano de Investigaciones Económicas, S.A. Available: http://www.spintan.net/wp-content/uploads/public/WP_05_Pastor_Serrano.pdf [2018, March 26].

Pattanaik, B. & Pattanaik, B.B. 2011. E-Information search strategy by Academic staff of Science Department, North Orissa University: a case study. *International Journal of Digital Library Services*. 1(2). Available: http://journaldatabase.info/articles/-_information_search_strategy_by.html [2019, June 28].

Patton, M.Q. 1999. Enhancing the quality and credibility of qualitative analysis. *HSR: Health Services Research*. 34(5 Part II):1189–1208. PMCID: PMC1089059; PMID: 10591279.

Pau, A., Omar, H., Khan, S., Jassim, A., Seow, L.L. & Toh, C.G. 2017. Factors associated with academic staff participation in research activities in dental schools. *Singapore Dental Journal*. 38:45–54. DOI: 10.1016/j.sdj.2017.08.001.

Polit, D.F. & Beck, T.C. 2010. Generalisation in quantitative and qualitative research: myths and strategies. *International Journal of Nursing Studies*. 47(11):1451–1458. DOI: 10.1016/j.ijnurstu.2010.06.004.

Polit, D.F. & Hungler, B.P. 1999. *Nursing research: principles and methods*. 6th ed. Philadelphia, PA, United States of America: Lippincott Williams & Wilkins. Available: https://trove.nla.gov.au/version/46494081 [2018, March 21].

Pollock, R. 2009. *Exploring patterns of knowledge production*. Available: https://rufuspollock.com/papers/patterns.pdf [2018, August 23].

Powell, R.R. 1999. Recent trends in research: a methodological essay. *Library & Information Science Research*. 21(1):91–119. DOI: 10.1016/S0740-8188 (99)80007-3.

Powers, R.D. 1988. Multiple authorship, basic research, and other trends in the emergency medicine literature (1975 to 1986). *The American Journal of Emergency Medicine*. 6(6):647–650. DOI: 10.1016/0735-6757(88)90111-8.

Prasad, H.N. 2000. Information needs and users. –. *Forinf@.Revista Iberoamericana sobre Usuarios de Información*. 8(April-June):5–11.

Pritchard, A. 1969. Statistical bibliography or bibliometrics? *Journal of Documentation*. 25(4):348–349.

Prozesky, H.E. 2006. Gender differences in the publication productivity of South African scientists. Ph.D. Thesis. University of Stellenbosch. Available: https://scholar.sun.ac.za:443/handle/10019.1/17330 [2019, July 05].

Punch, K.F. 2005. *Introduction to social research: quantitative and qualitative approaches*. London, United Kingdom: Sage. Available: https://trove.nla.gov.au/work/28009666 [2018, March 19].

Punch, K.F. 2011. *Introduction to research methods in education*. Los Angeles, CA, United States of America: Sage. Available: https://www.researchgate.net/publication/261944579_Introduction_to_Research_Methods_in_Education_by_KEITH_F_PUNCH [2018, March 22].

Rahman, M. & Fukui, T. 2003. Biomedical publication–global profile and trend. *Public Health*. 117(4):274–80. DOI: 10.1016/S0033-3506(03)00068-4.

Rajasekar, S., Philominathan, P. & Chinnathambi, V. 2013. *Research methodology*. Available: https://arxiv.org/pdf/physics/0601009v3.pdf. [2018, March 16].

Ramsden, P. 1994. Describing and explaining research productivity. *Higher Education*. 28(2):207–226. DOI: 10.1007/BF01383729.

Rehn, C., Gornitzki, C., Larsson, A. & Wadskog, D. 2014. *Bibliometric handbook for Karolinska Institutet*. Stockholm, Sweden: Karolinska Institutet. Available: https://kib.ki.se/sites/default/files/bibliometric_handbook_2014.pdf [2019, May 22].

Rizk, N. & Shaver, L. Eds. 2010. *Access to knowledge in Egypt: new research on intellectual property, innovation and development*. London: Bloomsbury Academic.

Robert Wood Johnson Foundation. 2008. Triangulation. Qualitative guidelines [Web site]. Princeton, NJ, United States of America: Robert Wood Johnson Foundation. Available: http://www.qualres.org/HomeTria-3692.html [2018, February 12].

Roemer, R.C. & Borchardt, R. 2015. *Meaningful metrics: a 21st-century librarian's guide to bibliometrics, altmetrics, and research impact*. Chicago, IL, United States of America: Association of College and Research Libraries. Available: http://www.ala.org/acrl/sites/ala.org.acrl/files/content/publications/booksanddigitalresources/digital/9780838987568_metrics_OA.pdf [2018, July 19].

Rose, S., Spinks, N. & Canhoto, A.I. 2015. *Management research: applying the principles*. London, United Kingdom: Routledge.

Rotich, D.C. & Onyancha, O.B. 2017. Trends and patterns of medical and health research at Moi University, Kenya, between 2002 and 2014: an informetrics study. *South African Journal of Libraries and Information Science*. 82(2):20–33. DOI: 10.7553/82-2-1626.

Ruben, B.D. 1988. *Communication and behaviour*. New York, NY, United States of America: Macmillan.

Rubin, H. & Rubin, I. 2018. *Qualitative interviewing: the art of hearing data*. 2nd ed. Thousand Oaks, CA, United States of America: Sage. DOI: 10.4135/9781452226651.

Sabzwari, S., Kauser, S. & Khuwaja, A.K. 2009. Experiences, attitudes and barriers towards research amongst junior academic staff of Pakistani medical universities. *BMC Medical Education*. 9(68):1–7. DOI: 10.1186/1472-6920-9-68.

Sambunjak, D., Straus, S.E. & Marusic, A. 2010. A systematic review of qualitative research on the meaning and characteristics of mentoring in academic medicine. *Journal of General Internal Medicine*. 25(1):72–78. DOI: 10.1007/s11606-009-1165-8.

Sampath Kumar, B. t. & Manjunath, G. 2013. Internet use and its impact on the academic performance of university teachers and researchers: a comparative study. *Higher Education, Skills and Work-Based Learning*. 3(3):219–238. DOI: 10.1108/HESWBL-09-2011-0042.

Sangeda, R.Z. & Lwoga, E.T. 2017. Research growth and citation impact of Tanzanian scholars: a 24 year's scientometric study. *International Journal of Library and Information Science*. 9(8):66–77. DOI: 10.5897/IJLIS2017.0786.

Savanur, K. & Srikanth, R. 2010. Modified collaborative coefficient: a new measure for quantifying the degree of research collaboration. *Scientometrics*. 84(2):365–371. DOI: 10.1007/s11192-009-0100-4.

Schiazza, D. M. 2013. A case study of a mixed methods study engaged in integrated data analysis. Ph.D. Thesis. Chicago, IL: Loyola University, USA. Available: https://ecommons.luc.edu/luc_diss/686 [2020, October 16].

Schemm, Y. 2013. Africa doubles research output over past decade, moves towards a knowledge-based economy. *Research Trends*. 35:11–12.

Schoonenboom, J. & Johnson, R. B. (2017). How to Construct a Mixed Methods Research Design. *Kolner Zeitschrift fur Soziologie und Sozialpsychologie*. 69(Suppl 2): 107–131. DOI: 10.1007/s11577-017-0454-1

Schwandt, T.A. 1997. *Qualitative inquiry: a dictionary of terms*. Thousand Oaks, CA, United States of America: Sage. Available: https://experts.illinois.edu/en/publications/qualitative-inquiry-a-dictionary-of-terms [2018, February 23].

Sebola, M.P. 2018. Peer review, scholarship and editors of scientific publications: the death of scientific knowledge in Africa. *Koers - Bulletin for Christian Scholarship*. 83(1):1–13. DOI: 10.19108/KOERS.83.1.2314.

Seldén, L. 2005. On grounded theory – with some malice. *Journal of Documentation*. 61(1):114. DOI: 10.1108/00220410510578041**.**

Sellan, Y. & Sornam, S.A. 2018. Information search strategies among theological academic staff members in Tamil Nadu. *The Christian Librarian*. 61(1):57–67. Available: http://digitalcommons.georgefox.edu/tcl/vol61/iss1/ [2019, May 28].

Shaban, S. & Aw, T.-C. 2009. Trend towards multiple authorship in occupational medicine journals. *Journal of Occupational Medicine and Toxicology*. 4(3):1–6. DOI: 10.1186/1745-6673-4-3.

Sharma, M., Sarin, A., Gupta, P., Sachdeva, S. & Desai, A.V. 2014. Journal Impact Factor: its use, significance and limitations. *World Journal of Nuclear Medicine*. 13(2):146. DOI: 10.4103/1450-1147.139151.

Shaughnessy, T. 1976. Library research in the 70's: problems and prospects. *California Librarian*. 37:42–52.

Shein, N. 2009. The false dichotomy between objective and subjective interpretations of Spinoza's theory of attributes. *British Journal for the History of Philosophy*. 17(3):505-532. DOI: 10.1080/09608780902986631.

Shein, N. 2018. *Spinoza's theory of attributes*. In *Stanford encyclopedia of philosophy.* Zalta, E. N. et al. (Eds). Stanford, CA: Stanford University. Available: https://plato.stanford.edu/entries/spinoza-attributes/. [2019, June 11].

Sife, A.S. & Lwoga, E.T. 2014. Publication productivity and scholarly impact of academic librarians in Tanzania: a scientometric analysis. *New Library World*. 115(11/12):527–541. DOI: 10.1108/NLW-04-2014-0038.

Sikwibele, A. 2007. The contribution of higher education to national education systems: the case of Zambia. Paper presented at the *Regional seminar "The contribution of higher education to national education systems: current challenges for Africa"* Accra, Ghana, 22-24 March 2007. Available: http://unesdoc.unesco.org/images/0015/001541/154192e.pdf [2018, July 04].

Simukanga, S. 2009. Foreword. In *Research policy and intellectual property rights*. Lusaka, Zambia: Directorate of Research and Graduate Studies. viii. Available: http://*graduate.unza.zm/images/files/research_policy.pdf [2019, February 18]*.

Simuyemba, M., Talib, Z., Michelo, C., Mutale, W., Zulu, J., Andrews, B., Nzala, S., Katubulushi, M., et al. 2014. Strengthening academic staff recruitment for health professions training in basic sciences in Zambia. *Academic Medicine: Journal of the Association of American Medical Colleges*. 89(8 Suppl):S98–S101. DOI: 10.1097/ACM.0000000000000352.

Smith, E., Hunt, M. & Master, Z. 2014. Authorship ethics in global health research partnerships between researchers from low or middle-income countries and high-income countries. *BMC Medical Ethics*. 15(1):42. DOI: 10.1186/1472-6939-15-42.

Smith, J.G. 2016. Applying concepts & principles of KM in local government. In *Knowledge Management & Innovation Learning Exchange MILE*, eThekwini Municipality, 17 –19 May 2016. Kwa Zulu Natal, South Africa: eThekwini Municipality. Available: http://www.mile.org.za/QuickLinks/News/KM%20Learning%20Exchange%202016/Day%201.2-Dr%20Gretchen%20Smith.pdf [2018, January 15].

Smith, L. 1981. Citation Analysis. *Library Trends*. 30(1):83–106. Available: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.172.9584&rep=rep1&type=pdf

Smith, R. 2012. Let's simply scrap authorship and move to contributorship. *British Medical Journal*. 344: e157. DOI: 10.1136/bmj.e157.

Sooryamoorthy, R. & Shrum, W. 2007. Does the Internet promote collaboration and productivity? Evidence from the scientific community in South Africa. *Journal of Computer-Mediated Communication*. 12(2):733–751. DOI: 10.1111/j.1083-6101.2007.00347.x.

Soto, S. 1992. Using grounded theory analysis to study the information-seeking behaviour of dental professionals. *Information Research News*. 3(1):1–12. DOI: 10.1111/1475-6773.12275.

Sousa, S.B. 2011. The transformation of knowledge production and academy community: playing the game and (still) being an academic. *Educação Sociedade & Culturas*. 32:55–71. Available: https://www.fpce.up.pt/ciie/revistaesc/ESC32/Artigos_32_BrancoSousa.pdf [2019, March 22].

Squires, J.E., Estabrooks, C.A., Gustavsson, P. & Wallin, L. 2011. Individual determinants of research utilisation by nurses: a systematic review update. *Implementation Science*. 6(1):1-20. DOI: 10.1186/1748-5908-6-1.

Ssemata, A.S., Gladding, S., John, C.C. & Kiguli, S. 2017. Developing mentorship in a resource-limited context: a qualitative research study of the experiences and perceptions of the Makerere University student and academic staff mentorship programme. *BMC Medical Education*. 17(1): 1-9. DOI: 10.1186/s12909-017-0962-8.

Sseruyange, J. & Bulte, E. 2018. Do incentives matter for the diffusion of financial knowledge? Experimental evidence from Uganda. *Journal of African Economies*. 27(5): 612–631. DOI: 10.1093/jae/ejy006.

Star, S.L. 1998. Grounded classification: grounded theory and faceted classification. *Library Trends*. 47(2): 218–32. Available: https://www.ideals.illinois.edu/bitstream/handle/2142/8215/librarytrendsv47i2e_opt.pdf?sequence=1&isAllowed=y [2019, January 12].

Stephens Balakrishnan, M. 2013. Methods to increase research output: some tips looking at the MENA region. *International Journal of Emerging Markets*. 8(3): 215–239. DOI: 10.1108/17468801311330301.

Strange, K. 2008. Authorship: why not just toss a coin? *American Journal of Physiology Cell Physiology*. 295(3): 567–575. DOI: 10.1152/ajpcell.00208.2008.

Strauss, A. & Corbin, J. 1990. *Basics of qualitative research: grounded theory procedures and techniques*. Newbury Park, CA, United States of America: Sage.

Street, J.M., Rogers, W.A., Israel, M. & Braunack-Mayer, A.J. 2010. Credit where credit is due? Regulation, research integrity and the attribution of authorship in the health sciences. *Social Science & Medicine*. 70(9): 1458–1465. DOI: 10.1016/j.socscimed.2010.01.013.

Strohmaier, M. 2014. Mode 3 knowledge production: or the differences between a blog post and a scientific article. Intentialicious: Markus Strohmaier's Weblog [blog 17 February]. Available: https://mstrohm.wordpress.com/2014/02/17/mode-3-knowledge-production-or-the-differences-between-a-blog-post-and-a-scientific-article/ [2018, March 25].

Subotzky, G. & Cele, G. 2004. New models of knowledge production and acquisition: peril or promise for developing countries. In *African universities in the twenty-first century*. Zeleza, P. T. & Alukoshi, A. (Eds). V. II Knowledge and Society. Dakar: CODESRIA. 341–362.

Subramanyam, K. 1983. Bibliometric studies of research collaboration: a review. *Journal of Information Science*. 6(1):33–38. DOI: 10.1177/016555158300600105.

Sulo, T., Kendagor, R., Kosgei, D., Tuitoek, D. & Chelangat, S. 2012. Factors affecting research productivity in public universities of Kenya: the case of Moi University, Eldoret. *Journal of Emerging Trends in Economics and Management Sciences*. 3: 475–484. Available:

http://*jetems.scholarlinkresearch.com/articles/Factors%20Affecting%20Research.pdf [2019, April 16]*.

Sumpter, J. 2006. A baseline assessment of information literacy competencies of students in the School of Public Health at the University of North Carolina at Chapel Hill. MSc. (Library Sciences) dissertation. University of North Carolina at Chapel Hill. Available: https://cdr.lib.unc.edu/concern/masters_papers/0z709135h?locale=en [2019, June 28].

Suttiposuwan, B. 2000. A Study of communication channel in implementing "suggestion program" at Company "y". MBA. (Business Communication) dissertation. The University of the Thai Chamber of Commerce. Available: http://eprints.utcc.ac.th/3223/1/190958.pdf [2019, October 28].

Sutton, J. & Austin, Z. 2015. Qualitative research: data collection, analysis and management. *Canadian Journal of Hospital Pharmacy*. 68(3): 226–231. DOI: 10.4212/cjhp.v68i3.1456.

Tague-Sutcliffe, J.M. 1992. An introduction to informetrics. *Information Processing and Management*. 28(1):1–3. DOI: 10.1016/0306-4573 (92)90087-G.

Tavakol, M., Torabi, S. & Akbar Zeinaloo, A. 2006. Grounded theory in medical education research. *Medical Education Online*. 11(1): 1-6. DOI: 10.3402/meo.v11i.4607.

Taylor, D. 2017. Knowledge product [blog] Available: https://doriantaylor.com/lexicon/knowledge-product [2018, February 26].

Tella, A. & Olabooye, A.A. 2014. Bibliometric analysis of *African Journal of Library, Archives and Information Science* from 2000-2012. *Library Review*. 63(4/5): 305–323. DOI: 10.1108/LR-07-2013-0094.

Tess, B.H., Furuie, S.S., Castro, R.C.F., Barreto, M.C. C. & Nobree, M.. R.C. 2009. Assessing the scientific research productivity of a Brazilian healthcare institution: a case study at the Heart Institute of São Paulo, Brazil. *Clinics*. 64(6): 571–576. DOI: 10.1590/S1807-59322009000600013.

Thomson Reuters. 2008. *Whitepaper using bibliometrics: a guide to evaluating research performance with citation data.* [S. l.] : Thomson Reuters. Available: http://science.thomsonreuters.com/m/pdfs/325133_thomson.pdf [2018, December 06].

Tijssen, R.J. 2007. Africa's contribution to the worldwide research literature: New analytical perspectives, trends, and performance indicators. *Scientometrics*. 71(2):3 03–327. DOI: 10.1007/s11192-007-1658-3 [2017.

Tijssen, R.J. 2015. Research output and international research cooperation in African flagship universities. In *Knowledge production and contradictory functions in African higher education*. Cloete, N. Maassen, P. & Bailey, T. (Eds). (African Minds Higher Education Dynamics Series Vol. 1). Cape Town: African Minds. 61–74. Available: https://zenodo.org/record/824658 [2018, November 24].

Tress, B., Tress, G. & Fry, G. 2005. Defining concepts and the process of knowledge production in integrative research. In *From landscape research to landscape planning : aspects of integration, education and application : proceedings of the Frontis workshop from landscape research to landscape planning: aspects of integration, education and application,* The Netherlands 1-6 June 2004. Tress, B. (Ed). (Wageningen UR Frontis

series : Vol. 12). Wageningen, the Netherlands: Wageningen UR, Frontis. 13–26. Available: http://edepot.wur.nl/44294.

Tressoldi, P.E., Giofré, D., Sella, F. & Cumming, G. 2013. High impact = high statistical standards? Not necessarily so. *PLoS One*. 2(1–7): 1-7. DOI: 10.1371/journal.pone.0056180.

Trotter, H., Kell, C., Willmers, M., Gray, E. & King, T. 2014. *Seeking impact and visibility: scholarly communication in Southern Africa*. Cape Town, South Africa: African Minds, for the Scholarly Communication in Africa Programme, University of Cape Town. Available: http://www.africanminds.co.za/wp-content/uploads/2014/05/9781920677510-content2.pdf [2019, May 06].

Ukech, S. 2014. Information seeking behaviour of academic staff and use of the Internet at Gulu University Library, Kampala, Uganda. MA. (Information Technology) dissertation. University of Pretoria. Available: http://hdl.handle.net/2263/41000 [2019, July 04].

Ukpong, C. 2018. Three Nigerian universities ranked among World's best. *Premium Times Nigeria* (Abuja). 2 September. Available: https://www.premiumtimesng.com/news/top-news/286731-three-nigerian-universities-ranked-among-worlds-best.html [2018, November 05].

Uluocha, A. & Mabawonku, I. 2014. Legal information resources availability and utilisation as determinants of Law lecturers research productivity in Nigerian Universities. *Information and Knowledge Management*. 4(9):50-58–58. Available: https://www.iiste.org/Journals/index.php/IKM/article/view/15651/16031 [2019, February 23].

United Nations Educational, Scientific and Cultural Organisation. 2015a. *Scholarly communications*. Paris, France: UNESCO. Available: https://unesdoc.unesco.org/ark:/48223/pf0000231938 [2019, January 30].

United Nations Educational Scientific and Cultural Organisation. 2015b. *UNESCO science report: towards 2030*. Paris, France: UNESCO. Available: http://uis.unesco.org/sites/default/files/documents/unesco-science-report-towards-2030-part1.pdf [2019, February 18].

United Nations. n.d. *Framework Convention on Climate Change*. Bonn, Germany: United Nations. Available: https://unfccc.int/process-and-meetings/the-convention/what-is-the-united-nations-framework-convention-on-climate-change [2018, October 02].

United States of America. Centers for Disease Control and Prevention. 2009. *Evaluation briefs*. Washington, DC, United States of America. Centers for Disease Control and Prevention. Available: https://www.cdc.gov/healthyyouth/evaluation/pdf/brief17.pdf [2018, March 22].

United States of America. Department of Health and Human Services. 2009. *Protection of human subjects: title 45 Code of federal regulations Part 46*. V. 45. Washington, DC: United States of America: Department of Health and Human Services. Available: https://www.hhs.gov/ohrp/sites/default/files/ohrp/humansubjects/regbook2013.pdf.pdf [2017, May 16].

United States of America. National Institutes of Health. 2016. *Guidelines and policies for the conduct of research in the intramural research program at NIH*. (5th Edition). Bethesda, Maryland, United States of America: United States of America. National Institutes of Health. Available: https://oir.nih.gov/sites/default/files/uploads/sourcebook/documents/ethical_conduct/guidelines-conduct_research.pdf [2016, October 09].

United States of America. National Library of Medicine, National Center for Biotechnology Information. 2019. *PubMed Help. [Updated 2019 Feb 6]*. Bethesda, MD, United States of America: National Library of Medicine. Available: https://www.ncbi.nlm.nih.gov/books/NBK3827/pdf/Bookshelf_NBK3827.pdf [2019, February 11].

University of Cape Town, Academic staff of Humanities. n.d. Guide to research ethics research with human participants. Cape Town, South Africa. Available: http://www.humanities.uct.ac.za/sites/default/files/image_tool/images/2/HumAcademic staff%20Ethics%20Guidebook%20August%20l%202016%281%29.pdf [2019, May 22].

University of Namibia. 2013. University of Namibia scholarly communications policy at the University of Namibia. Windhoek, Namibia: University of Namibia. Available: http://www.idea-phd.net/images/UNAM-Scholarly-Communication-Policy.pdf [2018, January 12].

University of South Dakota. 2017. Citation analysis: LibGuides at University of South Dakota. Available: http://libguides.usd.edu/c.php?g=752879&p=5393453 [2018, February 24].

University of Zambia. 2009. *The University of Zambia calendar 2009 - 2010*. Lusaka, Zambia: UNZA Press.

University of Zambia. 2012a. *University of Zambia strategic plan of 2013-2017*. Lusaka, Zambia: UNZA Press.

University of Zambia. 2012b. *The University of Zambia calendar 2011-2013*. Lusaka, Zambia: UNZA Press.

University of Zambia. 2014. *A guide to policy development*. (Unpublished). Lusaka, Zambia: University of Zambia.

University of Zambia. 2015. *The University of Zambia calendar 2014-2016*. Lusaka, Zambia: UNZA Press. Available: https://www.unza.zm/international/media/files/course_catalogue.pdf [2018, July 04].

University of Zambia. 2016. *University of Zambia staff records*. (Unpublished). Lusaka, Zambia: University of Zambia.

University of Zambia. 2017a. *Budget 2017 - University of Zambia*. Lusaka, Zambia: University of Zambia. Unpublished.

University of Zambia. 2017b. *The University of Zambia lecturers' and researchers' union (UNZALARU)*. (Unpublished). Lusaka, Zambia: University of Zambia.

University of Zambia. 2018a. *UNZA splits School of Medicine into four schools*. Available: https://www.unza.zm/uncategorised/unza-splits-school-of-medicine-into-four-schools [2018, July 06].

University of Zambia. 2018b. *University of Zambia strategic plan 2018 - 2022*. Lusaka, Zambia: UNZA Press. Available: https://www.unza.zm/sites/default/files/article_files/2018-08/Strategic_Plan_2018-22.pdf [2018, January 16].

University of Zambia Confucius Institute. 2018. *Introduction*. Lusaka, Zambia: UNZA Press. Available: https://www.unza.zm/confucius/about/introduction [2018, July 04].

University of Zambia Directorate of Research and Graduate Studies. 2009. *Research policy and intellectual property rights*. Lusaka, Zambia: UNZA Press. Available: http://graduate.unza.zm/images/files/research_policy.pdf [2018, August 02].

University of Zambia Quality Assurance Unit. 2016. *Quality assurance framework*. Lusaka, Zambia: UNZA Press.

University of Zambia School of Medicine. 2012. *School of Medicine strategic plan*. Lusaka, Zambia: UNZA School of Medicine.

UNZA Press. n.d. *About us*. Available: https://www.unza.zm/units/press [2018, November 03].

Usang, B., Akuegwu, B., Udida, L. & Udey, F.U. 2007. Academic staff research productivity: a study of universities in South-South Zone of Nigeria. *Educational Research and Review*. 2(5):103–108.

Uthman, O.A. & Uthman, M.B. 2007. Geography of Africa biomedical publications: an analysis of 1996–2005 PubMed papers. *International Journal of Health Geographics*. 6(46): 1–11. DOI: 10.1186/1476-072X-6-46 [2017.

Uthman, O.A., Wiysonge, C.S., Ota, M.O., Nicol, M., Hussey, G.D., Ndumbe, P.M. & Mayosi, B.M. 2015. Increasing the value of health research in the WHO African Region beyond 2015—reflecting on the past, celebrating the present and building the future: a bibliometric analysis. *British Medical Journal Open*. 5(3): 1–8. DOI: 10.1136/bmjopen-2014-006340.

Vargas-Hernandez, J., Noruzi, M.R. & Haj, I.F.N. 2011. What is policy, social policy and social policy changing? *International Journal of Business and Social Science*. 2(10): 287–291. Available: *https://hal.archives-ouvertes.fr/hal-00817798/document [2019, January 20]*.

Velmurugan, C. 2013. Bibliometric analysis with special reference to authorship pattern and collaborative research output of annals of Library and Information Studies for the year 2007 - 2012. *International Journal of Digital Library Services*. 3(3):13–21. Available: http://www.ijodls.in/uploads/3/6/0/3/3603729/c._velmurugan_13-21.pdf [2019, January 28].

Verma, N. & Singh, K. 2017. Authors productivity and degree of collaboration in *Journal of Librarianship and Information Science (JOLIS)* 2010-2016. *International Journal of Library and Information Studies*. 7(4):1–6. Available: *ijlis.org/img/2017_Vol_7_Issue_4/1-6.pdf [2019, April 06]*.

Vidiani. 2019. Zambia map with provinces. Zambia map with the provinces name. [Web site]. *Vidiani.com*. Available: http://www.vidiani.com/zambia-map-with-provinces/ [2019, January 15].

Vinther, S. and R. & Rosenberg, J. 2012. Authorship trends over the past fifty years in the *Journal of the Danish Medical Association*. *Danish Medical Bulletin*. 59(3):1–4. Available: http://ugeskriftet.dk/files/scientific_article_files/2018-12/a4390.pdf [2019, June 17].

Wadesango, N. 2014. Publish or perish: impediments to research output and publication. *International Journal of Educational Sciences*. 6(1):57–63. DOI: 10.1080/09751122.2014.11890118.

Wager, E. 2007a. Authors, ghosts, damned lies, and statisticians. *PLoS Med*. 4(1):0005-006. DOI: 10.1371/journal.pmed.0040034.

Wager, E. 2007b. Do medical journals provide clear and consistent guidelines on authorship? *Medscape General Medicine*. 9(3):16-16. PMID: 18092023; PMCID: PMC2100079.

Wager, E. 2009. Recognition, reward and responsibility: why the authorship of scientific papers matters. *Maturitas*. 62(2):109-112. DOI: 10.1016/j.maturitas.2008.12.001.

Wager, L. 2010. Authorship—more than just writing, but how much more? *The Write Stuff*. 19(1):19–21.

Walke, R. 2013. Use of e-Journals by researchers in science and technology: a study of CSIR libraries. Ph.D. Thesis. Delhi: University of Delhi, India. Available: http://hdl.handle.net/10603/26627 [2019, June 22].

Waltman, L. & Noyons, E. 2018. *Bibliometrics for research management and research evaluation*. Leiden, the Netherlands: University of Leiden. Available: https://www.cwts.nl/pdf/CWTS_bibliometrics.pdf [2018, August 08].

Weaver, W. 1949. *Recent contributions to the mathematical theory of communication*. Available: http://waste.informatik.hu-berlin.de/Lehre/ss11/SE_Kybernetik/reader/weaver.pdf [2019, January 02].

Weeks, W.B., Wallace, A.E. & Kimberly, B.C.S. 2004. Changes in authorship patterns in prestigious US medical journals. *Social Science & Medicine (1982)*. 59(9): 1949–1954. DOI: 10.1016/j.socscimed.2004.02.029.

White, H.D. & McCain, W.K. 1989. Bibliometrics. *Annual Review of Information Science and Technology*. 24: 119–186.

Whiting, L.S. 2008. Semi-structured interviews: guidance for novice researchers. *Nursing Standard*. 22(23): 35–40. DOI: 10.7748/ns2008.02.22.23.35.c6420.

Wikipedia contributors. 2019. Districts of Zambia. *Wikipedia*. Available: https://en.wikipedia.org/w/index.php?title=Districts_of_Zambia&oldid=878048243 [2019, January 16].

Wilson, T.D. 2000. Human information behavior. *Informing Science*. 3(2): 49–56. Available: http://*inform.nu/Articles/Vol3/v3n2p49-56.pdf [2019, June 17]*.

Winget, M.A. 2005. Annotation of musical scores: interaction and Use Behaviours of Performing Musicians. Ph.D. Thesis. North Carolina at Chapel Hill. Available: https://cdr.lib.unc.edu/indexablecontent/uuid [2019, March 22].

Wisdom, J. & Creswell, J.W. 2013. *Mixed methods: integrating quantitative and qualitative data collection and analysis while studying patient-centered medical home models*. (AHRQ Publication No. 13-0028-EF). Rockville, Maryland, United States of America: Agency for Healthcare Research. Available: https://pcmh.ahrq.gov/page/mixed-methods-integrating-quantitative-and-qualitative-data-collection-and-analysis-while [2019, July 23].

Woodiwiss, A.J. 2012. Publication subsidies: challenges and dilemmas facing South African researchers. *Cardiovascular Journal of Africa*. 23(8): 421–427. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3721321/pdf/cvja-23-421.pdf [2019, June 17].

Wootton, R. 2013. A simple, generalisable method for measuring individual research productivity and its use in the long-term analysis of departmental performance, including between-country comparisons. *Health Research Policy System*. 11(2): 1–14. DOI: 10.1186/1478-4505-11-2.

World Bank. 2013. *International Development Association, International Finance Corporation and Multilateral Investment Guarantee Agency country partnership strategy for the Republic of Zambia for the period FY13-FY16.* (Report No: 75089-ZM). Washington D.C., United States of America. Available: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/04/05/000350881_20130405104746/Rendered/PDF/750890CORRIGEN0IC00IDA0R20130002703.pdf [2019, January 12].

World Bank. 2014. *A decade of development in sub-Saharan African science, technology, engineering & mathematics research*. Washington D.C., USA. Available: http://documents.worldbank.org/curated/en/237371468204551128/pdf/910160WP0P126900disclose09026020140.pdf [2018, October 02].

World Health Organisation, Regional Office for South-East Asia. 2008. *Leadership and strategic management for TB control*. Manila, Philippines: WHO Regional Office for South-East Asia. Available: http://www.who.int/iris/handle/10665/205426 [2018, February 24].

World Health Organisation, Western Pacific Region. 2005. *Health service planning and policy-making : a toolkit for nurses and midwives*. Manila, Philippines: WHO Regional Office for the Western Pacific. Available: http://www.wpro.who.int/publications/docs/hsp_mod4_1E08.pdf [2018, October 02].

World Health Organisation. 2015. *2015 Global tuberculosis reports*. Geneva, Switzerland: World Health Organisation. Available: http://www.who.int/tb/publications/global_report/gtbr15_main_text.pdf [2017, January 13].

World Summit on the Information Society (WSIS). 2003. *The Geneva declaration of principles and plan of action of the World Summit on the Information Society (WSIS) held in Geneva 10-12 December 2003*. International Telecommunication Union. Available: http://www.itu.int/net/wsis/docs/promotional/brochure-dop-poa.pdf [2019, June 12].

Yang, J.C.C. 2017. A study of factors affecting university professors' research output: perspectives of Taiwanese professors. *Journal of College Teaching & Learning (TLC)*. 14(1): 11–20. DOI: 10.19030/tlc.v14i1.9968.

Yin, R.K. 1994. Discovering the future of the case study: method in evaluation research. *Evaluation Practice*. 15(3): 283–290. DOI: 10.1177/109821409401500309.

Yin, R.K. 2003. *Case study research: design and methods*. 3rd ed. Thousand Oaks, CA, United States of America: Sage.

Yin, R.K. 2009. *Case study research: design and methods*. 4th ed. Los Angeles, CA, United States of America: Sage.

Young, R. 2009. What is knowledge management? *Knowledge-management-online.*com [blog]. Available: http://www.knowledge-management-online.com/what-is-Knowledge-Management.html [2018, January 15].

Yousefi, A., Hemmat, M., Gilvari, A. & Shahmirzadi, T. 2012. Citation analysis and co-authorship of Iranian researchers in the field of immunology in ISI web of science: a brief report. *Tehran University Medical Journal*. 70(3): 188–193. Available: http://tumj.tums.ac.ir/article-1-137-en.html [2019, June 02].

Zafrunnisha, N. & Pullareddy, V. 2009. Authorship pattern and degree of collaboration in psychology. *Annals of Library and Information Studies (ALIS)*. 56(4): 255–261. Available: http://nopr.niscair.res.in/handle/123456789/7264 [2019, June 02].

Zainal, H. & Zainab, A.N. 2011. Biomedical and health sciences publication productivity from Malaysia. *Health Information and Libraries Journal*. 28(3): 216–225. DOI: 10.1111/j.1471-1842.2011.00943.x.

Zambia Daily Mail. 2018. Better cholera patient management – book review. Nursing Management of Cholera Patients in Zambia by Dorothy Osigwe Chanda and published UNZA Press. *Zambia Daily Mail,* 3 November. Available: http://www.daily-mail.co.zm/better-cholera-patient-management-book-review/ [2018, November 03].

Zambia Medical Association. 2018. *Medical Journal of Zambia*. Available: https://www.mjz.co.zm/index.php/mjz [2018, November 03].

Zambia. Central Statistics Office. 2014. *Zambia in figures: 1964 – 2014*. Lusaka, Zambia: Central Statistics Office. Available: http://www.zamstats.gov.zm/phocadownload/Dissemination/Zambia%20in%20Figure%202018.pdf [2018, October 16].

Zambia. Central Statistical Office, Zambia. Central Board of Health & ORC Macro. 2003. *Zambia demographic and health survey 2001-2002*. Calverton, Maryland, United States of America: Central Statistical Office, Central Board of Health, and ORC Macro. Available: https://www.zamstats.gov.zm/phocadownload/Demography/ZDHS%20Repot%202001-2.pdf [2018, October 17].

Zambia. Central Statistical Office, Zambia. Ministry of Health & ICF International. 2014. *Zambia Demographic and Health Survey 2013-14.* Rockville, Maryland, USA: Central Statistical Office, Ministry of Health, and ICF International.

Zambia. Central Statistics Office, Zambia. Ministry of Health & ICF International. 2014. *Zambia demographic and health survey 2013-14*. Rockville, Maryland, United States of America: Central Statistical Office, Ministry of Health, and ICF International. Available: https://www.dhsprogram.com/pubs/pdf/fr304/fr304.pdf [2018, November 06].

Zambia. Central Statistics Office, Zambia. Ministry of Health, University of Zambia & MEASURE Evaluation. 2010. *Zambia sexual behaviour survey 2009*. Lusaka, Zambia: Central Statistical Office and MEASURE Evaluation. Available: https://www.measureevaluation.org/resources/publications/tr-10-73/at_download/document [2019, January 15].

Zambia. Central Statistics Office. 2012a. *2010 census of population and housing: national analytical report*. Lusaka, Zambia: Central Statistics Office. Available: https://www.zamstats.gov.zm/phocadownload/2010_Census/2010%20Census%20of%20Population%20National%20Analytical%20Report.pdf [2018, October 16].

Zambia. Central Statistics Office. 2012b. *2010 census of population and housing: population summary report*. Lusaka, Zambia: Central Statistics Office. Available: https://www.zamstats.gov.zm/phocadownload/2010_Census/2010%20Census%20of%20Population%20National%20Analytical%20Report.pdf [2018, October 16].

Zambia. Central Statistics Office. 2013. *2010 census of population and housing: population and demographic projections 2011 – 2035*. Lusaka, Zambia: Central Statistics Office. Available: https://www.zamstats.gov.zm/phocadownload/Zambia%20Census%20Projection%202011%20-%202035.pdf [2018, October 12].

Zambia. Central Statistics Office. 2015. *Zambia 2015 living conditions monitoring survey: key findings*. Lusaka, Zambia: Central Statistics Office. Available: https://www.zamstats.gov.zm/phocadownload/Living_Conditions/2015%20Living%20Conditions%20Monitoring%20Survey%20Report.pdf [2018, October 15].

Zambia. Central Statistics Office. 2018. *Zambia in figures 2018*. Lusaka, Zambia: Central Statistics Office. Available: http://www.zamstats.gov.zm/phocadownload/Dissemination/Zambia%20in%20Figure%202018.pdf [2018, January 15].

Zambia. Ministry of Education, Science, Vocational Training and Early Education. 2011. *Zambia Qualifications Authority Act No. 13 of 2011*. Available: http://www.ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=90115 [2018, July 04].

Zambia. Ministry of Education, Science, Vocational Training and Early Education. 2015. *Zambia: Education for all 2015 national review*. Lusaka, Zambia: Ministry of Education, Science, Vocational Training and Early Education. Available: https://unesdoc.unesco.org/ark:/48223/pf0000231573 [2018, September 16].

Zambia. Ministry of Education. 2011. *Education sector national implementation framework III, 11 – 2015: implementing the sixth national development plan*. Lusaka, Zambia: Ministry of Education. Available: http://planipolis.iiep.unesco.org/sites/planipolis/files/ressources/zambia_education_sector_nif_iii_2011_2015_final_draft.pdf [2018, September 16].

Zambia. Ministry of Health. 1970. *The Nurses and Midwives Act: Chapter 300 of the Laws of Zambia*. Available: http://www.parliament.gov.zm/sites/default/files/documents/acts/Nurses%20and%20Midwives%20Act.pdf [2018, July 04].

Zambia. Ministry of Health. 2009. *The Health Professions Act*. Available: http://www.parliament.gov.zm/sites/default/files/documents/acts/Health%20Professions%20Act%2C%202009.pdf [2018, July 04].

Zambia. Ministry of Health. 2012. *National health policy: a nation of healthy and productive people*. Lusaka, Zambia: Ministry of Health. Available: http://www.moh.gov.zm/docs/healthpolicy.pdf [2019, January 15].

Zambia. Ministry of Health. 2015. *Zambia national malaria indicator survey 2015*. Lusaka, Zambia: Ministry of Health. Available: http://www.makingmalariahistory.org/wp-content/uploads/2017/06/Zambia-MIS2015_Jan20-nosigs.pdf [2018, July 04].

Zambia. Ministry of Health. n. d. *National tuberculosis prevalence survey 2013-2014*. Lusaka, Zambia: Ministry of Health. Available: http://www.moh.gov.zm/docs/tbsurvey.pdf [2018, July 04].

Zambia. Ministry of Higher Education. 2013. *The Higher Education Act No. 4 of 2013*. Available: https://www.zambialii.org/zm/legislation/statutory-instrument/2013/72/si_2013_72.pdf [2018, February 24].

Zambia. Ministry of Science and Technology. 1998. *Technical Education, Vocational and Entrepreneurship Training Act*. Available: www.parliament.gov.zm/node/7418 [2018, December 14].

Zhang, X. 2014. Factors that motivate academic staff to conduct research and influence research productivity in Chinese project 211 universities. Ph.D. Thesis. University of Canberra, Australian Capital Territory, Australia. Available: http://www.canberra.edu.au/researchrepository/file/0814ee30-680b-401e-b059-3905b0b686cc/1/full_text.pdf [2018, October 03].

9 Appendices

9.1 Appendix A. Semi-Structured Questionnaire for Lecturers

The University of Cape Town

Department of Library and Information Studies

Dear Respondent,
I am a PhD student in the Department of Library and Information Studies at the University of Cape Town, South Africa. I am conducting research on **"Knowledge Production Practices in Higher Institutions of Learning in Zambia: a case of the University of Zambia"**. You have been randomly selected to participate in this study by way of this questionnaire. The questionnaire has several questions to which you are requested to supply a wide range of responses.

The responses that you will supply in this questionnaire will be used for entirely academic purposes and your anonymity is hereby fully guaranteed.

Instruction(s)

- Kindly give your responses by ticking (√) in the boxes and giving responses in the spaces provided (.....).
- Please do not write your name or any mode of personal identification to the questionnaire or questions asked.

Thank you,

Christine W. Kanyengo.

QUESTION **1: BACKGROUND INFORMATION**

1.1. Highest Level of Qualification

Masters	PHD

1.2. Academic Rank

Lecturer III	Lecturer II	Lecturer I	Senior Lecturer	Associate Professor	Professor

1.3. How long have you worked at the University of Zambia?

Less than 4 years	5-8 years	9-12 Years	13-16 Years	17-20 Years	21-24 Years	More than 25 Years

1.4. Subject Specialisation

QUESTION 2: DIGITAL INFORMATION RETRIEVAL SKILLS

2.1. How do you rate your Internet search skills? *(Please tick all that apply).*

Excellent	
Very Good	
Good	
Fair	
Bad	

2.2. How often do you use the Internet? (*Please tick all that apply)*

Every day	
More than one a week	
Once a Week	
Once a month	
Occasionally	
Rarely	
Never	

2.3. Why do you use the Internet? (*Please select the answer or answers that best explain your motivation for using them).*

Because they are reliable sources of information	
Because I want to know where to find books or their items in a physical library	
Because I find the digitised versions of documents that I need, which is more convenient	
Because I can access the digitised versions of historic material, whose originals are not available for the public	
Other, please state why:	

2.4. Which searching technique do you use most commonly when searching for information on the Internet? (*Please tick all that apply).*

Search by Author	
Search by Title	
Search by Topic	
Search by Key Words	
Browse by Subject	
Browse by collection of subjects	
Browse by related items	

QUESTION 3: KNOWLEDGE PRODUCTION PRACTICES AND THEIR ATTRIBUTES

3.1 What type of Knowledge Output do you produce? *(Please tick all that apply).*

Research Journal Articles (Print/Online)	
Research Books (Print/Online)	
Masters Student Dissertations/Thesis	
PhD Student Dissertations/Thesis	
Refereed Conference Proceedings	
Un Refereed Conference Proceedings	
Policy Briefs	
Newspaper Articles	

3.2. For what purpose do you produce this knowledge? *(Please tick all that apply).*

Produce New Knowledge	
Academic Promotion	
Provide Evidence	
Improve Policy	
Change Practice	
Research funding	
Personal Enrichment	
Improve Teaching	
Research	

3.3. What attributes describes this knowledge that you produce? *(Please tick all that apply).*

Ethically produced	
Advances critical Scholarship	
Trustworthy	
Evidence Based	
Transferable	
Preservation	
Socially Beneficial	
Economically Beneficial	

3.4 What Information Medium do you use to publish your knowledge Outputs? *(Please tick all that apply)*

Print Journals	
Electronic Journals	
Print Books	
E-Books	
Other (state)	

3.5 From which sources do you get information from? *(Please tick all that apply)*

Internet	
Library	
Friends	
Personal Portable Devices (PDAs)	
Government Departments	
University Department	
Other	

QUESTION 4: WHAT ARE THE PRODUCTION, DIFFUSION AND UTILISATION PATTERNS?

4.1. How often do you produce knowledge in your work? *(Please Tick all that apply).*

Never	
Rarely	
A few times	
Frequently	
Always	

4.2 How often do you diffuse knowledge in your work? *(Please tick all that apply).*

Never	
Rarely	
A few times	
Frequently	
Always	

4.3. How often do you utilise knowledge products in your work? *(Please tick all that apply)*

A few times	
Frequently	
Always	
Never	
Rarely	

4.5. What are the Key Issues in the Knowledge Production, Diffusion and utilisation within a University Environment**?**

4.5.1……...

……...……

4.5.2……...

……...……

4.5.3……...

……...……

4.5.4……..

……...……

4.5.5……..

……..

QUESTION 5: DETERMINANTS OF KNOWLEDGE PRODUCTION, DIFFUSION AND UTILISATION

5.1 What are the barriers you face in knowledge production, diffusion and utilisation? *(Please Tick all that apply)*

Lack of Funding	
Insufficient Time	
Lack of appropriate reading materials	
Lack of Internet Access	
Lack of Internet Research Skills	
Lack of Publication Outlet	
The institution has no incentives for knowledge production, diffusion and utilisation	
Generally no interest in knowledge production, diffusion and utilisation	

5.2 What are the determinants of knowledge production, diffusion and utilisation in your institution?

(Please tick all that apply)

Funding	
Time	
Collaborative Partners	
Access to Current Peer Reviewed Research	
Technology	
Other	

QUESTION 6: POLICY CONTEXT

6.1. Are there any policies within the University of Zambia that supports your work in terms of knowledge production, diffusion and utilisation?

Yes	
No	

6.2. If yes, list some of these policies

6.2.1……

……

……

6.2.2……

……

……

6.2.3……

……

……

6.2.4……

……

……

6.2.5……

……

…..……..……

6.3. In your opinion what should be done to foster Knowledge Production, diffusion and utilisation in the university?

……

……

……

……

……

9.2 Appendix B. Semi-Structured Interview Schedule for Purposefully Selected Units

The University of Cape Town

Department of Library and Information Studies

Dear Respondent,

I am a PhD student in the Department of Library and Information Studies at the University of Cape Town, South Africa. I am conducting research on **"Knowledge Production Practices in Higher Institutions of Learning in Zambia: a case of the University of Zambia"**. The questionnaire has several questions to which you are requested to supply a wide range of responses.

The responses that you will supply in this questionnaire will be used for entirely academic purposes and your anonymity is hereby fully guaranteed.

Instruction(s)

- Kindly give your responses in the spaces provided (.....).
- Please do not write your name or any mode of personal identification to the questionnaire or questions asked.

Thank you,

Christine W. Kanyengo.

QUESTIONS

1. What role does your unit play in fostering Knowledge production, diffusion and utilisation within the University of Zambia?

2. Are there any challenges that your unit faces in fulfilling this role of fostering Knowledge production, diffusion and utilization within the University of Zambia?

3. Are there any policies within the University of Zambia that supports your work in terms of fostering knowledge production, diffusion and utilisation?

Yes	
No	

If yes, list some of these policies

4. In your opinion what should be done to foster Knowledge production, diffusion and utilisation in the University of Zambia?

9.3 Appendix C. Consent to participate in a PhD Research Study

THE UNIVERSITY OF CAPE TOWN

DEPARTMENT OF LIBRARY AND INFORMATION STUDIES

CONSENT TO PARTICIPATE IN A PHD RESEARCH STUDY[19]

Dear Respondent,

My name is Christine W. Kanyengo. I am a PhD student in the Department of Library and Information Studies, Academic staff of Humanities at the University of Cape Town, South Africa. I am conducting research on **"Knowledge Production Practices in Higher Institutions of Learning in Zambia: a case study of the University of Zambia"**. The research is only targeting employees of the University of Zambia, School of Medicine who are employed as lecturers. The results of this research will contribute to the award of a PhD degree in Library and Information Science from the University of Cape Town, South Africa.

The questionnaire has a number of questions to which you are requested to supply a wide range of responses. You were selected to participate in the study because you are employed as a Lecturer at the University of Zambia, School of Medicine.

Objective of the Study

The objective of this PhD research study is to explore and describe knowledge production practices and their attributes within a university environment taking the School of Medicine at the University of Zambia as a Case Study.

Procedures

If you elect to participate in the study, you will be asked to fill in this self-administered questionnaire which has a total of 16 questions. Some questions are closed ended; whilst other

[19] *Note: Adapted from the Consent Forms; Department of Religious Studies, Academic staff of Humanities and Human Research Ethics Committee, Academic staff of Health Sciences University of Cape Town, South Africa* (University of Cape Town, Academic staff of Humanities, n.d)**.**

questions are open ended.

It is expected that filling in the questionnaire might take a maximum of 30 minutes.

Participant's involvement:

What's involved:	
Risks:	There might be potential risks and discomforts whilst participating in this study. These might relate to the time it might take to fill in the questionnaire and therefore might inconvenience the respondent. Since, this is a self-administered questionnaire, the respondent may tell the researcher when to collect the filled in questionnaire.
Potential Benefits:	The benefits of participating in the study is the advancement of knowledge on knowledge productivity within the University of Zambia and specifically the School of Medicine. This knowledge may benefit both the institution and the individual in responding to some of the issues on research output within a university environment.
Costs:	All costs related to this research study are covered by the Principal Investigator.
Payment:	There is no payment for participating in this study.
Confidentiality	Only the researcher and the supervisor has access to the research data. Any information obtained from this research study will remain confidential and will only be used in the course of this PhD research study. Disclosure of the data will only be with the consent and permission of the respondent or as required by law.

Therefore by filling out this questionnaire:

- I agree to participate in this research study.
- I have read this consent form and the information it contains and had the opportunity to ask questions about them.
- I agree to my responses being used for education and research on condition my privacy is respected, subject to the following: - *(tick as appropriate)*

	Yes	No
My name may be used in the published research		
My personal details (e.g. age, occupation, position) may be included in the published research		
My responses can only be used in a way that I cannot be personally identifiable		

- I understand that I am under no obligation to take part in this research study.
- I understand that I have the right to withdraw from this research study at any stage.
- I understand that this research might be published in a research journal or book. In the case of thesis/dissertation research, the document will be available to readers in a university library in printed form, and possibly in electronic form as well.

For further information regarding this research; please contact the following:

Principal Investigator and PhD Student	**Supervisor**
Christine W. Kanyengo University of Zambia Main Library P.O Box 32379 Lusaka, Zambia. Office: 260 211 250845 Mobile:260 978 448509 ckanyengo@yahoo.com ckanyengo@unza.zm	Dr. Gretchen J. Smith Department of Library and Information Studies, University of Cape Town Private Bag X03 RONDEBOSCH, 7701, Cape Town South Africa http://www.lisc.uct.ac.za Tel: +27 82 4114 944; +27 21 913 0506 gretchen.smith@telkomsa.net gretchen@knowlead.co.za

Name of Participant _____ Date _____ Signature _____

Name of Investigator _____ Date _____ Signature _____

Note: Adapted from the Consent Forms; Department of Religious Studies, Academic staff of Humanities and Human Research Ethics Committee, Academic staff of Health Sciences University of Cape Town, South Africa (University of Cape Town, Academic staff of Humanities, n.d)**.**

9.4 Appendix D. Letter to UNZA Registrar on Accessing HRIS Data

THE UNIVERSITY OF ZAMBIA

UNIVERSITY LIBRARY

To : The Registrar

From : Christine W. Kanyengo

Date : Sunday, 21 July 2013

SUBJECT : ACCESS TO PERSONNEL DATA FOR RESEARCH PURPOSES

I am a registered student at the University of Cape Town, South Africa where I am pursuing PhD in Library and Information Science by research. My mode of learning is primarily distance learning with one or two visits to the University of Cape Town in a year.

My topic of investigation is: **Knowledge Production Practices in Higher Institutions of Learning in Zambia: a Case study of the University of Zambia**.

The personnel data of interest is that of academic members of staff.

It is hoped the research will help in understanding the knowledge production, diffusion and utilisation practices and processes at the University of Zambia.

The data collected and research output will be anonymous and will have no link to identifiable individual persons.

Thank you,

Signature Removed

Christine W. Kanyengo

Cc: University Librarian

9.5 Appendix E.1. Letter from UNZA Registrar

THE UNIVERSITY OF ZAMBIA

OFFICE OF THE REGISTRAR

Internal Memorandum

TO : Ms Christine W. Kanyengo, Main Library

FROM : Registrar

DATE : 25th July, 2013

SUBJECT : **ACCESS TO PERSONNEL DATA FOR RESEARCH PURPOSES**

Reference is made to your memorandum dated 22nd July, 2013 on the matter captioned above.

Your request to access University personnel data for research purposes has been granted. This is to enable you complete your research project for your PhD studies entitled **"Knowledge Production Practices in Higher Institutions of Learning in Zambia: a Case Study of the University of Zambia,"** which you are undertaking with the University of Cape Town, South Africa.

Signature Removed

Dr. K. E. Yambayamb
REGISTRAR

c.c. Vice-Chancellor
Deputy Vice-Chancellor
University Librarian
Deputy Registrar (Administration)

9.6 Appendix E.2. Ethical Clearance

THE UNIVERSITY OF ZAMBIA
DIRECTORATE OF RESEARCH AND GRADUATE STUDIES

Telephone: +260 -1- 290258/291777 Ext. 2208
Fax: +260-1-290258/253952
Zambia
E-mail drgs@unza.zm

P O Box 32379
Lusaka,

3rd May, 2016

Ms. Christine W. Kanyengo
C/o The University of Zambia
Library
P.O Box 32379
LUSAKA

Dear Ms. Kanyengo,

RE: FULL ETHICAL CLEARANCE

With reference to your research proposal entitled: **"Knowledge Practices in Higher Institutions of Learning in Zambia: A Case Study of the University of Zambia,"** you are hereby given full ethical clearance to proceed with your research.

ACTION:	**APPROVED**
DECISION:	**3rd May, 2016**
EXPIRATION DATE:	**2nd May, 2017**

However, it is recommended that all data to be collected should be kept confidential and that if there are plans for publication or dissemination of results, the names of the participants should not be linked with the research in order to ensure confidentiality.

Please note that you are expected to submit to the Secretariat a Progress Report and a copy of the full report on completion of the project.

Finally, and more importantly, take note that notwithstanding ethical clearance given by the HSSREC, you must also obtain authority from the Permanent Secretary of the appropriate Ministry before conducting your research.

Yours sincerely,

Signature Removed

Prof. C. M. Namafe
ACTING CHAIRPERSON
HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE

cc: Director, Directorate of Research and Graduate Studies
Assistant Director, Directorate of Research and Graduate Studies
Assistant Registrar (Research), Directorate of Research and Graduate Studies

9.7 Appendix F. Authors with an affiliation address of the UNZA School of Medicine

S/N	*Author Name*	*Frequency*	*Percentage*	*Cumulative Count*	*Cumulative Percentage*
1	Kelly, P;	33	4.50	33	4.50
2	Michelo, C;	28	3.82	61	8.32
3	Siziya, S;	25	3.41	86	11.73
4	Ayles, H;	19	2.59	105	14.32
5	Mwaba, P;	16	2.18	121	16.51
6	Chintu, C;	15	2.05	136	18.55
7	Zumla, A;	13	1.77	149	20.33
8	Bates, M;	12	1.64	161	21.96
9	Atadzhanov, M;	11	1.50	172	23.47
10	Mutale, W;	11	1.50	183	24.97
11	Bond, VA;	10	1.36	193	26.33
12	Chomba, EN;	10	1.36	203	27.69
13	Sianongo, S;	10	1.36	213	29.06
14	Zulu, I;	10	1.36	223	30.42
15	Sinkala, E;	9	1.23	232	31.65
16	Mudenda, V;	8	1.09	240	32.74
17	Schaap, A;	8	1.09	248	33.83
18	Vwallika, B;	8	1.09	256	34.92
19	Zulu, JM;	8	1.09	264	36.02
20	Bowa, K;	7	0.95	271	36.97
21	Chipeta, J;	7	0.95	278	37.93
22	Katubulushi, M;	7	0.95	285	38.88
23	Muyoyeta, M;	7	0.95	292	39.84
24	Mwanamwenge, MT;	7	0.95	299	40.79
25	Andrews, B;	6	0.82	305	41.61
26	Haworth, A;	6	0.82	311	42.43
27	Kayamba, V;	6	0.82	317	43.25
28	Luo, NP;	6	0.82	323	44.07
29	Musheke, M;	6	0.82	329	44.88
30	Nzala, SH;	6	0.82	335	45.70
31	Siddiqi, OK;	6	0.82	341	46.52
32	Amadi, B;	5	0.68	346	47.20
33	Mwape, L;	5	0.68	351	47.89
34	Mwiya, M;	5	0.68	356	48.57
35	Sitali, L;	5	0.68	361	49.25
36	Baboo, KS	4	0.55	365	49.80
37	Banda R;	4	0.55	369	50.34
38	Chitalu, N;	4	0.55	373	50.89
39	De Haas, P;	4	0.55	377	51.43
40	Goma, FM;	4	0.55	381	51.98
41	Halwiindi, H;	4	0.55	385	52.52
42	Jellis, JE	4	0.55	389	53.07
43	Kabwe, M;	4	0.55	393	53.62
44	Kankasa, C;	4	0.55	397	54.16
45	Kasese, N;	4	0.55	401	54.71
46	Kwenda, G;	4	0.55	405	55.25
47	Lakhi, S;	4	0.55	409	55.80
48	Moyo, M;	4	0.55	413	56.34
49	Mwansa, J;	4	0.55	417	56.89
50	Patil, PS;	4	0.55	421	57.44
51	Shanaube, K;	4	0.55	425	57.98
52	Tembo, J;	4	0.55	429	58.53
53	Ahmed Y	3	0.41	432	58.94
54	Asombang, AW;	3	0.41	435	59.35
55	Bem, C;	3	0.41	438	59.75
56	Chilukutu, L;	3	0.41	441	60.16
57	Chipimo, PJ;	3	0.41	444	60.57

58	Chongwe, G;	3	0.41	447	60.98
49	Desai, G	3	0.41	450	61.39
60	Kaile, T;	3	0.41	453	61.80
61	Kapulu, MC;	3	0.41	456	62.21
62	Kosloff, B	3	0.41	459	62.62
63	Mkumba, G;	3	0.41	462	63.03
64	Musonda, P;	3	0.41	465	63.44
65	Mwanahamuntu, M;	3	0.41	468	63.85
66	Mwanza-Lisulo, M;	3	0.41	471	64.26
67	Mweemba, A;	3	0.41	474	64.67
68	Mwinga, A	3	0.41	477	65.08
69	Ndulo, J;	3	0.41	480	65.48
70	Pobee, JO;	3	0.41	483	65.89
71	Sikwese, A;	3	0.41	486	66.30
72	Zulu, R;	3	0.41	489	66.71
73	Athale, UH;	2	0.27	491	66.98
74	Banda, J;	2	0.27	493	67.26
75	Banda, SS	2	0.27	495	67.53
76	Besa, E;	2	0.27	497	67.80
77	Bhat, G;	2	0.27	499	68.08
78	Chilufya, M;	2	0.27	501	68.35
79	Chisele, S;	2	0.27	503	68.62
80	Chisembele, M;	2	0.27	505	68.89
81	Chisenga, CC;	2	0.27	507	69.17
82	Chomba, M;	2	0.27	509	69.44
83	Dambe, R;	2	0.27	511	69.71
84	Elem, B	2	0.27	513	69.99
85	Elliott, AM;	2	0.27	515	70.26
86	Imasiku, M;	2	0.27	517	70.53
87	Kaluwaji, J;	2	0.27	519	70.80
88	Kaonga, P;	2	0.27	521	71.08
89	Kapata, N;	2	0.27	523	71.35
90	Kasolo, FC;	2	0.27	525	71.62
91	Likwa, RN;	2	0.27	527	71.90
92	Lishimpi, K;	2	0.27	529	72.17
93	Lisulo, MM;	2	0.27	531	72.44
94	Malupande, E;	2	0.27	533	72.71
95	Manankov, A	2	0.27	535	72.99
96	Maswahu, D;	2	0.27	537	73.26
97	Mbewe E,	2	0.27	539	73.53
98	Mbewe, NJ;	2	0.27	541	73.81
99	Milimo, D;	2	0.27	543	74.08
100	Mudenda, B;	2	0.27	545	74.35
101	Mukomena, PN;	2	0.27	547	74.62
102	Mulenga, L;	2	0.27	549	74.90
103	Munalula-Nkandu, E	2	0.27	551	75.17
104	Musenge, EM;	2	0.27	553	75.44
105	Musuku, J;	2	0.27	555	75.72
106	Mwaba, MH;	2	0.27	557	75.99
107	Mwanamakondo, S;	2	0.27	559	76.26
108	Mwanza, W;	2	0.27	561	76.53
109	Mweemba, P	2	0.27	563	76.81
110	Mwenge, L;	2	0.27	565	77.08
111	Ngwenya, B;	2	0.27	567	77.35
112	Nunn, A;	2	0.27	569	77.63
113	Simuyandi, M;	2	0.27	571	77.90
114	Simuyemba, M;	2	0.27	573	78.17
115	Tembo, G;	2	0.27	575	78.44
116	Watuka, A;	2	0.27	577	78.72

117	Yambayamba, V;	2	0.27	579	78.99
118	Zimba, L;	2	0.27	581	79.26
119	Zyaambo, C;	2	0.27	583	79.54
120	Zyambo, K;	2	0.27	585	79.81
121	Akhtaev, A	1	0.14	586	79.95
122	Amadi, WE;	1	0.14	587	80.08
123	Aparicio, S;	1	0.14	588	80.22
124	Banda, GC;	1	0.14	589	80.35
125	Banda, T;	1	0.14	590	80.49
126	Banda, Y;	1	0.14	591	80.63
127	Banda, Y; C	1	0.14	592	80.76
128	Beyers, N;	1	0.14	593	80.90
129	Bima, H;	1	0.14	594	81.04
130	Bridges, DJ;	1	0.14	595	81.17
131	Bulaya, C;	1	0.14	596	81.31
132	Chabala, C;	1	0.14	597	81.45
133	Chalwe, V;	1	0.14	598	81.58
134	Chan, AS;	1	0.14	599	81.72
135	Chanda, D;	1	0.14	600	81.86
136	Chandwe, M;	1	0.14	601	81.99
137	Cheeba-Lengwe, M;	1	0.14	602	82.13
138	Chi, BH;	1	0.14	603	82.26
139	Chikwenya, M	1	0.14	604	82.40
140	Chimana, HM;	1	0.14	605	82.54
141	Chimoga, C;	1	0.14	606	82.67
142	Chintu, K;	1	0.14	607	82.81
143	Chitanga, S;	1	0.14	608	82.95
144	Chunda-Liyoka, C;	1	0.14	609	83.08
145	Colborn, J;	1	0.14	610	83.22
146	Dengala, D;	1	0.14	611	83.36
147	Divala, O;	1	0.14	612	83.49
148	Ensor, T;	1	0.14	613	83.63
149	Ezeala, CC;	1	0.14	614	83.77
150	Floyd, S;	1	0.14	615	83.90
151	Fornadel, CM;	1	0.14	616	84.04
152	Fwoloshi, M;	1	0.14	617	84.17
153	Fylkesnes, K	1	0.14	618	84.31
154	Godfrey-Faussett, P;	1	0.14	619	84.45
155	Green, C;	1	0.14	620	84.58
156	Hachaambwa, L;	1	0.14	621	84.72
157	Halwiindi, B;	1	0.14	622	84.86
158	Hamooya, BM;	1	0.14	623	84.99
159	Hazemba, A;	1	0.14	624	85.13
160	Hosp, M;	1	0.14	625	85.27
161	Hughes, S;	1	0.14	626	85.40
162	Jacobs, C;	1	0.14	627	85.54
163	Jewel, J;	1	0.14	628	85.68
164	Johnson, SE	1	0.14	629	85.81
165	Jovic, G;	1	0.14	630	85.95
166	Kachimba, J; ,	1	0.14	631	86.08
167	Kalonda, A;	1	0.14	632	86.22
168	Kaluba, D;	1	0.14	633	86.36
169	Kaluba-Milimo, D;	1	0.14	634	86.49
170	Kalungwana, L;	1	0.14	635	86.63
171	Kamanga, P	1	0.14	636	86.77
172	Kaonga, K;	1	0.14	637	86.90
173	Kapambwe, S;	1	0.14	638	87.04
174	Kapasa, M;	1	0.14	639	87.18
175	Kapatamoyo, B;	1	0.14	640	87.31

176	Kapembwa, KC;	1	0.14	641	87.45
177	Katema, M;	1	0.14	642	87.59
178	Khare, AK	1	0.14	643	87.72
179	Kusanthan, T;	1	0.14	644	87.86
180	Kwalombota, M	1	0.14	645	87.99
181	Lalusha, BD;	1	0.14	646	88.13
182	Lisulo, M;	1	0.14	647	88.27
183	Lukonga, E	1	0.14	648	88.40
184	Lumayi, R;	1	0.14	649	88.54
185	Machiels, L;	1	0.14	650	88.68
186	Maduskar, P;	1	0.14	651	88.81
187	Maimbolwa, M;	1	0.14	652	88.95
188	Makasa, M;	1	0.14	653	89.09
189	Mandanda, B;	1	0.14	654	89.22
190	Marimo, C;	1	0.14	655	89.36
191	Mateyo, K;	1	0.14	656	89.50
192	Matondo, P;	1	0.14	657	89.63
193	Mfula, C;	1	0.14	658	89.77
194	Miti, S;	1	0.14	659	89.90
195	Mlewa, S;	1	0.14	660	90.04
196	Msoni, C;	1	0.14	661	90.18
197	Mubita-Ngoma, C;	1	0.14	662	90.31
198	Muchemwa, L;	1	0.14	663	90.45
199	Mudenda, J;	1	0.14	664	90.59
200	Mudenda, M;	1	0.14	665	90.72
201	Mulenga, GM;	1	0.14	666	90.86
202	Mulla, Y	1	0.14	667	91.00
203	Mumbi, M;	1	0.14	668	91.13
204	Munjita, SM	1	0.14	669	91.27
205	Munkanta, M;	1	0.14	670	91.41
206	Munthali, J	1	0.14	671	91.54
207	Munthali, T;	1	0.14	672	91.68
208	Musukuma, K;	1	0.14	673	91.81
209	Mutale, M;	1	0.14	674	91.95
210	Mutela, K;	1	0.14	675	92.09
211	Mwaanza, N;	1	0.14	676	92.22
212	Mwaba, M;	1	0.14	677	92.36
213	Mwale, A;	1	0.14	678	92.50
214	Mwale, G	1	0.14	679	92.63
215	Mwamungule, S;	1	0.14	680	92.77
216	Mwansa, W;	1	0.14	681	92.91
217	Mwanza, K;	1	0.14	682	93.04
218	Mwanza, WC;	1	0.14	683	93.18
219	Mweemba, C	1	0.14	684	93.32
220	Mweemba, M;	1	0.14	685	93.45
221	Mweemba, O;	1	0.14	686	93.59
222	Mweene, M;	1	0.14	687	93.72
223	Mwikuma, G;	1	0.14	688	93.86
224	Namaambo, K;	1	0.14	689	94.00
225	Nchito, M;	1	0.14	690	94.13
226	Ndhlovu, M;	1	0.14	691	94.27
227	Ngalamika, O;	1	0.14	692	94.41
228	Ng'andu, N;	1	0.14	693	94.54
229	Ngoma, C;	1	0.14	694	94.68
230	Ngoma, M	1	0.14	695	94.82
231	Ngoma, MS;	1	0.14	696	94.95
232	Ngulube, TJ;	1	0.14	697	95.09
233	Njobvu R N, L;	1	0.14	698	95.23
234	Njobvu, CA;	1	0.14	699	95.36

235	Njobvu, L;	1	0.14	700	95.50
236	Nyirenda, S;	1	0.14	701	95.63
237	O'Grady, J;	1	0.14	702	95.77
238	Parham, GP;	1	0.14	703	95.91
239	Payne, L;	1	0.14	704	96.04
240	Quigley, P;	1	0.14	705	96.18
241	Razak Badru, A;	1	0.14	706	96.32
242	Rutagwera, D;	1	0.14	707	96.45
243	Sakala-Kazembe, F;	1	0.14	708	96.59
244	Shibemba, AL;	1	0.14	709	96.73
245	Siame, MN;	1	0.14	710	96.86
246	Sichande, M;	1	0.14	711	97.00
247	Sinsungwe, H;	1	0.14	712	97.14
248	Sinyangwe, S;	1	0.14	713	97.27
249	Sipilanyambe Munyinda, N;	1	0.14	714	97.41
250	Sipilanyambe, N;	1	0.14	715	97.54
251	Siuluta, C;	1	0.14	716	97.68
252	Siyanga, N	1	0.14	717	97.82
253	Soko, R;	1	0.14	718	97.95
254	Spooner, R;	1	0.14	719	98.09
255	Sunkutu, R;	1	0.14	720	98.23
256	Susu, B;	1	0.14	721	98.36
257	Tembo, M;	1	0.14	722	98.50
258	Thuma, P;	1	0.14	723	98.64
259	Tihon, V;	1	0.14	724	98.77
260	Tuba, M;	1	0.14	725	98.91
261	Vinikoor, MJ;	1	0.14	726	99.05
262	Wa-Somwe, S;	1	0.14	727	99.18
263	Winters, AM;	1	0.14	728	99.32
264	Wolff, M;	1	0.14	729	99.45
265	Yavwa, F;	1	0.14	730	99.59
266	Zachary, D;	1	0.14	731	99.73
267	Zulu, J;	1	0.14	732	99.86
268	Zyambo, CM;	1	0.14	**733**	**100.00**
	Total	**733**	**100.00**		

9.8 Appendix G. UNZA School of Medicine Authors as per Payroll Data

S/N	*Author Name*	*Frequency*	*Percentage*	*Cumulative Count*	*Cumulative Percentage*
1	Chintu, C;	67	16.50	67	16.50
2	Michelo, C;	48	11.82	115	28.33
3	Atadzhanov, M;	23	5.67	138	33.99
4	Baboo, KS;	23	5.67	161	39.66
5	Chipeta, J;	20	4.93	181	44.58
6	Mutale, W;	17	4.19	198	48.77
7	Zulu, J;	17	4.19	215	52.96
8	Goma, F;	16	3.94	231	56.90
9	Maimbolwa, M;	13	3.20	244	60.10
10	Nzala, SH;	13	3.20	257	63.30
11	Chitanga, S;	8	1.97	265	65.27
12	Banda, Y;	7	1.72	272	67.00
13	Jovic, G;	7	1.72	279	68.72
14	Mwape, L;	7	1.72	286	70.44
15	Halwindi, H;	6	1.48	292	71.92
16	Kwenda, G;	6	1.48	298	73.40
17	Munsaka, S;	6	1.48	304	74.88
18	Banda, S;	5	1.23	309	76.11
19	Chongwe, G;	5	1.23	314	77.34
20	Kaile, T;	5	1.23	319	78.57
21	Mulla, Y;	5	1.23	324	79.80
22	Odimba Koshe, BF;	5	1.23	329	81.03
23	Sinyangwe, S;	5	1.23	334	82.27
24	Mulundu, G;	4	0.99	338	83.25
25	Mweemba, O;	4	0.99	342	84.24
26	Nkhoma, P;	4	0.99	346	85.22
27	Simuyemba, M;	4	0.99	350	86.21
28	Bwalya, A;	3	0.74	353	86.95
29	Likwa, R;	3	0.74	356	87.68
30	Manankov, AK;	3	0.74	359	88.42
31	Mbewe, N;	3	0.74	362	89.16
32	Munkonge, L;	3	0.74	365	89.90
33	Munthali, J;	3	0.74	368	90.64
34	Mwenya, D;	3	0.74	371	91.38
35	Nkandu, E;	3	0.74	374	92.12
36	Zulu, C;	3	0.74	377	92.86
37	Erzingatsian, K;	2	0.49	379	93.35
38	Hangoma, P;	2	0.49	381	93.84
39	Hazemba, A;	2	0.49	383	94.33
40	Jacobs, C. ;	2	0.49	385	94.83
41	Marimo, C;	2	0.49	387	95.32
42	Ngoma, C;	2	0.49	389	95.81
43	Sijumbila, GMS;	2	0.49	391	96.31
44	Wa Somwe, S;	2	0.49	393	96.80
45	Chanda, D;	1	0.25	394	97.04
46	Chisanga, C;	1	0.25	395	97.29
47	Desai, G;	1	0.25	396	97.54
48	Ezeala, C;	1	0.25	397	97.78
49	Kalonda, A;	1	0.25	398	98.03

50	Kantenga, NMT;	1	0.25	399	98.28
51	Munjita, S;	1	0.25	400	98.52
52	Sipilanyambe Munyinda, N;	1	0.25	401	98.77
53	Musenge, E;	1	0.25	402	99.01
54	Muungo, L;	1	0.25	403	99.26
55	Mweemba, C;	1	0.25	404	99.51
56	Mweshi, M.	1	0.25	405	99.75
57	Zulu, M;	1	0.25	406	100.00
58	Banda, L;	0	0.00	406	100.00
59	Banda, J;	0	0.00	406	100.00
60	Bwembya, A;	0	0.00	406	100.00
61	Chalwe , M;	0	0.00	406	100.00
62	Chapima, F;	0	0.00	406	100.00
63	Chileya, SM;	0	0.00	406	100.00
64	Hamachila, A;	0	0.00	406	100.00
65	Kabinga Makukula, M;	0	0.00	406	100.00
66	Kafumukache, E;	0	0.00	406	100.00
67	Kampamba, M;	0	0.00	406	100.00
68	Kampamba Mutati, R;	0	0.00	406	100.00
69	Kanyimba, S;	0	0.00	406	100.00
70	Kapambwe, K.	0	0.00	406	100.00
71	Korolyova, LB;	0	0.00	406	100.00
72	Kwaleyela, C;	0	0.00	406	100.00
73	Makasa, C;	0	0.00	406	100.00
74	Makoleka, M	0	0.00	406	100.00
75	Shimaponda-Mataa, NM.	0	0.00	406	100.00
76	Mayimbo, S;	0	0.00	406	100.00
77	Mbewe, AR;	0	0.00	406	100.00
78	Meki, D;	0	0.00	406	100.00
79	Moyo, G;	0	0.00	406	100.00
80	Mubita, P;	0	0.00	406	100.00
81	Mufwambi, W;	0	0.00	406	100.00
82	Mukosha, M;	0	0.00	406	100.00
83	Mukwato, P;	0	0.00	406	100.00
84	Muleya, M;	0	0.00	406	100.00
85	Muma Kangwa, M;	0	0.00	406	100.00
86	Mumbula, E;	0	0.00	406	100.00
87	Muneku, E;	0	0.00	406	100.00
88	Munkombwe, D;	0	0.00	406	100.00
89	Mununkila, L;	0	0.00	406	100.00
90	Mutemwa, S;	0	0.00	406	100.00
91	Mwaba, F;	0	0.00	406	100.00
92	Mwango, M;	0	0.00	406	100.00
93	Mwelwa, M;	0	0.00	406	100.00
94	Mwiinga Kalusopa, V;	0	0.00	406	100.00
95	Mwiinga Ndele, P;	0	0.00	406	100.00
96	Mwila, C;	0	0.00	406	100.00
97	Ncheka, M;	0	0.00	406	100.00
98	Ngoma, SMP;	0	0.00	406	100.00
99	Ngwira, Z;	0	0.00	406	100.00
100	Nkhata, L;	0	0.00	406	100.00

101	Phiri, P;	0	0.00	406	100.00
102	Prashar, L;	0	0.00	406	100.00
103	Samutela, M;	0	0.00	406	100.00
104	Shula, H;	0	0.00	406	100.00
105	Sianchapa, B;	0	0.00	406	100.00
106	Sikateyo, B;	0	0.00	406	100.00
107	Simakando, M;	0	0.00	406	100.00
108	Sinkala, M;	0	0.00	406	100.00
109	Sinyani, A;	0	0.00	406	100.00
110	Siulapwa, Y;	0	0.00	406	100.00
111	Tembo-Kamwela, R;	0	0.00	406	100.00
112	Yassa, P;	0	0.00	406	100.00
113	Zgambo, J;	0	0.00	406	100.00
114	Zingani, E;	0	0.00	406	100.00
115	Zulu, E;	0	0.00	406	100.00
116	Gurgis, H;	0	0.00	406	100.00
117	Ravi, P;	0	0.00	406	100.00
	Total	**406**	**100.00**		

9.9 Appendix H. Institutions Collaborating with UNZA School of Medicine

S/N	*Name of Institution*	*Country*	*Freq*	*%*	*Cum Freq*	*Cum %*
1	University of London	United Kingdom	294	22.14	294	0.22
2	University Teaching Hospital	Zambia	147	11.07	441	0.33
3	University of Malawi	Malawi	35	2.64	476	0.36
4	Centre for Infectious Disease Research in Zambia	Zambia	33	2.48	509	0.38
5	Ministry of Health (Zambia)	Zambia	26	1.96	535	0.40
6	University of Alabama at Birmingham	USA	25	1.88	560	0.42
7	University of North Carolina at Chapel Hill	USA	24	1.81	584	0.44
8	Vanderbilt University	USA	24	1.81	608	0.46
9	University of Bergen	Norway	21	1.58	629	0.47
10	Imperial College London	United Kingdom	16	1.20	645	0.49
11	Karolinska Institute	Sweden	16	1.20	661	0.50
12	University of Cape Town	South Africa	15	1.13	676	0.51
13	Emory University	USA	13	0.98	689	0.52
14	Stellenbosch University	South Africa	13	0.98	702	0.53
15	University of Miami	USA	13	0.98	715	0.54
16	University College London Hospitals	United Kingdom	12	0.90	727	0.55
17	Centers of Disease Control and Prevention	USA	11	0.83	738	0.56
18	National Institutes of Health	USA	11	0.83	749	0.56
19	University of Washington	USA	11	0.83	760	0.57
20	World Health Organization	Zambia	11	0.83	771	0.58
21	Johns Hopkins University	USA	10	0.75	781	0.59
22	Loma Linda University	USA	10	0.75	791	0.60
23	Michigan State University	USA	10	0.75	801	0.60
24	Ministry of Community Development, Mother Child Health (MCDMCH)	Zambia	10	0.75	811	0.61
25	University of Rochester	USA	10	0.75	821	0.62
26	National Institute for Medical Research (NIMR)	United Kingdom	9	0.68	830	0.63
27	University of Basel	Switzerland	9	0.68	839	0.63
28	Beth Israel Deaconess Medical Center	USA	8	0.60	847	0.64
29	Chikankata Hospital, Epilepsy Care Team	Zambia	8	0.60	855	0.64
30	Swiss Tropical and Public Health Institute	Switzerland	8	0.60	863	0.65
31	Umeå University	Sweden	8	0.60	871	0.66
32	University of Bern	Switzerland	8	0.60	879	0.66
33	University of Copenhagen	Denmark	8	0.60	887	0.67
34	Columbia University	USA	7	0.53	894	0.67
35	Ministry of Health (Malawi)	Malawi	7	0.53	901	0.68
36	University of California	USA	7	0.53	908	0.68
37	University of Leeds	United Kingdom	7	0.53	915	0.69
38	Boston University	USA	6	0.45	921	0.69
39	Chainama College of the Health Sciences	Zambia	6	0.45	927	0.70
40	Health Partners International	United Kingdom	6	0.45	933	0.70
41	Ipas	USA	6	0.45	939	0.71
42	Massachusetts General Hospital	USA	6	0.45	945	0.71
43	San Diego State University	USA	6	0.45	951	0.72
44	University of Toronto	Canada	6	0.45	957	0.72
45	Chainama Hills College Hospital	Zambia	5	0.38	962	0.72
46	Dignitas International	Malawi	5	0.38	967	0.73
47	Indiana University	USA	5	0.38	972	0.73
48	Mayo Clinic	USA	5	0.38	977	0.74
49	Mbeya Medical Research Centre	Tanzania	5	0.38	982	0.74
50	University of Munich (LMU)	Germany	5	0.38	987	0.74
51	University of Nebraska	USA	5	0.38	992	0.75
52	University of Zimbabwe	Zimbabwe	5	0.38	997	0.75
53	African Centre for Health System Strengthening Innovations (Afri-CHEST)	Uganda	4	0.30	1001	0.75
54	Copperbelt University	Zambia	4	0.30	1005	0.76

55	French National Institute of Health and Medical Research (IINSERM U)	France	4	0.30	1009	0.76
56	Greater Lawrence Family Health Center	USA	4	0.30	1013	0.76
57	Harvard University	USA	4	0.30	1017	0.77
58	Makerere University	Uganda	4	0.30	1021	0.77
59	Tulane University	USA	4	0.30	1025	0.77
60	University of Ottawa	Canada	4	0.30	1029	0.77
61	Aga Khan University	Pakistan	3	0.23	1032	0.78
62	Central Statistical Office	Zambia	3	0.23	1035	0.78
63	Drexel University	USA	3	0.23	1038	0.78
64	Federal Medical Centre	Nigeria	3	0.23	1041	0.78
65	Groote Schuur Hospital	South Africa	3	0.23	1044	0.79
66	Jos University Teaching Hospital	Nigeria	3	0.23	1047	0.79
67	Kent State University	USA	3	0.23	1050	0.79
68	Kenya Medical Research Institute (KEMRI)	Kenya	3	0.23	1053	0.79
69	KLE University's JN Medical College	India	3	0.23	1056	0.80
70	McGill University	Canada	3	0.23	1059	0.80
71	Medical Research Council of United Kingdom	United Kingdom	3	0.23	1062	0.80
72	Ministry of Health (Saudi Arabia)	Saudi Arabia	3	0.23	1065	0.80
73	Moi University	Kenya	3	0.23	1068	0.80
74	Old Dominion University	USA	3	0.23	1071	0.81
75	Ottawa General Hospital Research Institute	Canada	3	0.23	1074	0.81
76	Queen Elizabeth Central Hospital	Malawi	3	0.23	1077	0.81
77	RTI International	USA	3	0.23	1080	0.81
78	Université Montpellier	USA	3	0.23	1083	0.82
79	University of Colorado	USA	3	0.23	1086	0.82
80	University of KwaZulu-Natal	South Africa	3	0.23	1089	0.82
81	University of Limpopo	South Africa	3	0.23	1092	0.82
82	University of Maryland	USA	3	0.23	1095	0.82
83	University of Southern California	USA	3	0.23	1098	0.83
84	University of the Witwatersrand	South Africa	3	0.23	1101	0.83
85	University of Waterloo	Canada	3	0.23	1104	0.83
86	University of Washington	USA	3	0.23	1107	0.83
87	Addis Ababa University	Ethiopia	2	0.15	1109	0.84
88	Akros	Zambia	2	0.15	1111	0.84
89	Brown University	USA	2	0.15	1113	0.84
90	Christiana Health Care	USA	2	0.15	1115	0.84
91	Cincinnati Children's Hospital	USA	2	0.15	1117	0.84
92	Eduardo Mondlane University	Mozambique	2	0.15	1119	0.84
93	George Washington University	USA	2	0.15	1121	0.84
94	Germany National Institute for Medical Research	Germany	2	0.15	1123	0.85
95	Guttmacher Institute	USA	2	0.15	1125	0.85
96	Hokkaido University	Japan	2	0.15	1127	0.85
97	Independent consultant	USA	2	0.15	1129	0.85
98	University of Kinshasa	DRC	2	0.15	1131	0.85
99	Lagos University Teaching Hospital	Nigeria	2	0.15	1133	0.85
100	Liverpool School of Tropical Medicine	United Kingdom	2	0.15	1135	0.85
101	Lusaka Apex Medical School	Zambia	2	0.15	1137	0.86
102	Macha Research Trust	Zambia	2	0.15	1139	0.86
103	Maina Soko Military Hospital	Zambia	2	0.15	1141	0.86
104	McMaster University	Canada	2	0.15	1143	0.86
105	Ministère de la Santé	Mali	2	0.15	1145	0.86
106	Miriam Hospital	USA	2	0.15	1147	0.86
107	Partners in Health	Malawi	2	0.15	1149	0.87
108	Radboud University Medical Center	The Netherlands	2	0.15	1151	0.87
109	Sanofi Pasteur	USA	2	0.15	1153	0.87
110	Skaraborg Institute	Sweden	2	0.15	1155	0.87
111	Society for Family Health	Zambia	2	0.15	1157	0.87
112	Technical University of Denmark	Denmark	2	0.15	1159	0.87

113	Tropical Diseases Research Centre	Zambia	2	0.15	1161	0.87
114	U.S. Agency for International Development	USA	2	0.15	1163	0.88
115	United Nations Population Fund (UNFPA)	Zambia	2	0.15	1165	0.88
116	University College Hospital, Ibadan	Nigeria	2	0.15	1167	0.88
117	University Hospital Bern	Switzerland	2	0.15	1169	0.88
118	University of Chicago	USA	2	0.15	1171	0.88
119	University of Glasgow	United Kingdom	2	0.15	1173	0.88
120	University of Innsbruck	Austria	2	0.15	1175	0.88
121	University of Minnesota	USA	2	0.15	1177	0.89
122	University of Nairobi	Kenya	2	0.15	1179	0.89
123	University of Nottingham	United Kingdom	2	0.15	1181	0.89
124	University of the Western Cape	South Africa	2	0.15	1183	0.89
125	University of York	United Kingdom	2	0.15	1185	0.89
126	Western University - London	Canada	2	0.15	1187	0.89
127	University of Oxford	United Kingdom	2	0.15	1189	0.90
128	Africa University	Zimbabwe	1	0.08	1190	0.90
129	Ahmed Gasim Teaching Hospital	Sudan	1	0.08	1191	0.90
130	Al-Faisal University	Saudi Arabia	1	0.08	1192	0.90
131	All India Institute of Medical Sciences	India	1	0.08	1193	0.90
132	Al-Shaab Teaching Hospital	Sudan	1	0.08	1194	0.90
133	Alzaiem Alazhari University,	Sudan	1	0.08	1195	0.90
134	Aminu Kano Teaching Hospital	Nigeria	1	0.08	1196	0.90
135	AMREF	Kenya	1	0.08	1197	0.90
136	Arthur Davison Children's Hospital	Zambia	1	0.08	1198	0.90
137	Bayero University	Nigeria	1	0.08	1199	0.90
138	Benha University	Egypt	1	0.08	1200	0.90
139	Botswana-Harvard AIDS Institute Partnership	Botswana	1	0.08	1201	0.90
140	Brigham and Women’s Hospital Center	USA	1	0.08	1202	0.91
141	Cairo University Children's Hospital	Egypt	1	0.08	1203	0.91
142	Chelstone Clinic	Zambia	1	0.08	1204	0.91
143	Chinese University of Hong Kong	Hong Kong	1	0.08	1205	0.91
144	Choma General Hospital	Zambia	1	0.08	1206	0.91
145	City University London	United Kingdom	1	0.08	1207	0.91
146	Critical Path Institute	USA	1	0.08	1208	0.91
147	Dr. George Mukhari Hospital	South Africa	1	0.08	1209	0.91
148	East, Central and Southern Africa-Health Community (ECSA)	Tanzania	1	0.08	1210	0.91
149	Ernest Cook Ultrasound Research Education Institute	Uganda	1	0.08	1211	0.91
150	FHI 360	USA	1	0.08	1212	0.91
151	Fundación para la Alimentación y Nutrición de Centro América y Panamá (FANCAP)	Guatemala	1	0.08	1213	0.91
152	German Centre for Infection Research (DZIF)	Germany	1	0.08	1214	0.91
153	Ghent University	Belgium	1	0.08	1215	0.91
154	Grand Challenges, Ottawa, Canada	Canada	1	0.08	1216	0.92
155	Hamilton Health Sciences	Canada	1	0.08	1217	0.92
156	Hiram College	USA	1	0.08	1218	0.92
157	Huazhong University of Science and Technology	China	1	0.08	1219	0.92
158	Ifakara Health Institute,	Tanzania	1	0.08	1220	0.92
159	Institute for Fiscal Studies, London	United Kingdom	1	0.08	1221	0.92
160	Institute for Health Metrics and Evaluation	USA	1	0.08	1222	0.92
161	Institute of Clinical Effectiveness	Argentina	1	0.08	1223	0.92
162	Institute of Infectious Diseases and Molecular Medicine	South Africa	1	0.08	1224	0.92
163	Institute of Tropical Medicine	Belgium	1	0.08	1225	0.92
164	Instituto Nacional de Saúde	Mozambique	1	0.08	1226	0.92
165	International Agency for Research on Cancer	France	1	0.08	1227	0.92
166	International Centre for Diarrhoeal Disease Research	Bangladesh	1	0.08	1228	0.92
167	International HIV/AIDS Alliance	United Kingdom	1	0.08	1229	0.93
168	Jimma University Hospital	Ethiopia	1	0.08	1230	0.93
169	Johns Hopkins Aramco Healthcare	Saudi Arabia	1	0.08	1231	0.93

170	JSS Medical Research (John S. Sampalis)	Canada	1	0.08	1232	0.93
171	Karolinska Hospital	Sweden	1	0.08	1233	0.93
172	Kenyatta National Teaching and Referral Hospital	Kenya	1	0.08	1234	0.93
173	Kilimanjaro Clinical Research Institute	Tanzania	1	0.08	1235	0.93
174	King Faisal Hospital	Rwanda	1	0.08	1236	0.93
175	King's College Hospital	United Kingdom	1	0.08	1237	0.93
176	Lancaster University	United Kingdom	1	0.08	1238	0.93
177	Lata Medical Research Foundation	India	1	0.08	1239	0.93
178	Leeds Metropolitan University	United Kingdom	1	0.08	1240	0.93
179	Livingstone General Hospital	Zambia	1	0.08	1241	0.93
180	llegheny General Hospital	USA	1	0.08	1242	0.94
181	London National Health Service Hospital Trust	United Kingdom	1	0.08	1243	0.94
182	Lusaka District Health Management Team	Zambia	1	0.08	1244	0.94
183	Manchester Academic Health Science Centre	United Kingdom	1	0.08	1245	0.94
184	Marie Bashir Institute for Infectious Diseases and Biosecurity	Australia	1	0.08	1246	0.94
185	Massachusetts Institute of Technology	USA	1	0.08	1247	0.94
186	Maulana Azad Medical College	India	1	0.08	1248	0.94
187	Mbeya Referral Hospital	Tanzania	1	0.08	1249	0.94
188	Medical Research Council of South Africa	South Africa	1	0.08	1250	0.94
189	Medical Research Council of Uganda	Uganda	1	0.08	1251	0.94
190	Medical Research Council of Zimbabwe	Zimbabwe	1	0.08	1252	0.94
191	Ministry of Health (Burkina Faso)	Burkina Faso	1	0.08	1253	0.94
192	Ministry of Health (Uganda)	Uganda	1	0.08	1254	0.94
193	Ministry of Health and Social Welfare	Tanzania	1	0.08	1255	0.95
194	Ministry of Health, Umuahia, Abia State (Nigeria)	Nigeria	1	0.08	1256	0.95
195	Muhimbili University of Health and Allied Sciences	Tanzania	1	0.08	1257	0.95
196	Mulago Hospital	Uganda	1	0.08	1258	0.95
197	National Heart and Lung Institute	United Kingdom	1	0.08	1259	0.95
198	Ndola Central Hospital	Zambia	1	0.08	1260	0.95
199	Nordic School of Public Health	Sweden	1	0.08	1261	0.95
200	Northwick Park Hospital	United Kingdom	1	0.08	1262	0.95
201	Norwegian Institute of Public Health	Norway	1	0.08	1263	0.95
202	Orphanidis GmbH	Germany	1	0.08	1264	0.95
203	PATH	Zambia	1	0.08	1265	0.95
204	Population Ccouncil	Zambia	1	0.08	1266	0.95
205	Prince of Wales Hospital	Hong Kong	1	0.08	1267	0.95
206	Public Health Agency of Canada, Ottawa	Canada	1	0.08	1268	0.95
207	Queen Margaret University	United Kingdom	1	0.08	1269	0.96
208	Red Cross War Memorial Children's Hospital	South Africa	1	0.08	1270	0.96
209	ReSurge International	USA	1	0.08	1271	0.96
210	Royal College of Surgeons in Ireland	Ireland	1	0.08	1272	0.96
211	Sam Houston State University	USA	1	0.08	1273	0.96
212	San Antonio Military Medical Center	USA	1	0.08	1274	0.96
213	Siavonga District Health Management Team	Zambia	1	0.08	1275	0.96
214	South Africa Paediatric Cardiology Service	South Africa	1	0.08	1276	0.96
215	St. Michael's Hospital	Canada	1	0.08	1277	0.96
216	Stanford University	USA	1	0.08	1278	0.96
217	Stobhill NHS Trust Hospital	USA	1	0.08	1279	0.96
218	Stockholm University College of Health Sciences	Sweden	1	0.08	1280	0.96
219	Surgical Society of Zambia	Zambia	1	0.08	1281	0.96
220	Sussex University	United Kingdom	1	0.08	1282	0.97
221	Tanzania Medical Services	Tanzania	1	0.08	1283	0.97
222	TB Alert	United Kingdom	1	0.08	1284	0.97
223	The Children's Hospital at Westmead	Australia	1	0.08	1285	0.97
224	The END FUND	USA	1	0.08	1286	0.97
225	The Global Fund	Switzerland	1	0.08	1287	0.97
226	The Institute for Health Science Research Germans Trias i Pujol (IGTP)	Spain	1	0.08	1288	0.97
227	The Netherlands Development Cooperation	Zimbabwe	1	0.08	1289	0.97

228	Tribhuvan University Institute of Medicin	Nepal	1	0.08	1290	0.97
229	Uganda Heart Institute	Uganda	1	0.08	1291	0.97
230	Uganda Protestant Medical Bureau	Uganda	1	0.08	1292	0.97
231	Uganda Virus Research Institute Research Unit	Uganda	1	0.08	1293	0.97
232	UK Health Protection Agency	United Kingdom	1	0.08	1294	0.97
233	United States Peace Corps	Zambia	1	0.08	1295	0.98
234	Universidad Francisco Marroquin	Guatemala	1	0.08	1296	0.98
235	Universidade Federal de Minas Gerais (UFMG)	Brazil	1	0.08	1297	0.98
236	University Hospital of Montpellier (CHU Montpellier)	France	1	0.08	1298	0.98
237	University Hospital South Manchester	United Kingdom	1	0.08	1299	0.98
238	University of Abuja Teaching Hospital	Nigeria	1	0.08	1300	0.98
239	University of Botswana	Botswana	1	0.08	1301	0.98
240	University of Dakar	Senegal	1	0.08	1302	0.98
241	University of Lusaka	Zambia	1	0.08	1303	0.98
242	University of Manitoba	Canada	1	0.08	1304	0.98
243	University of Melbourne	Australia	1	0.08	1305	0.98
244	University of Milwaukee	USA	1	0.08	1306	0.98
245	University of Missouri	USA	1	0.08	1307	0.98
246	University of Ouagadougou	Burkina Faso	1	0.08	1308	0.98
247	University of Paris V	France	1	0.08	1309	0.99
248	University of Pretoria	South Africa	1	0.08	1310	0.99
249	University of Rhode Island	USA	1	0.08	1311	0.99
250	University of Sana'a	Yemen	1	0.08	1312	0.99
251	University of Sheffield	United Kingdom	1	0.08	1313	0.99
252	University of South Carolina	USA	1	0.08	1314	0.99
253	University of South Manchester	United Kingdom	1	0.08	1315	0.99
254	University of Stellenbosch	South Africa	1	0.08	1316	0.99
255	University of Texas	USA	1	0.08	1317	0.99
256	University of Uppsala	Sweden	1	0.08	1318	0.99
257	University of Virginia	USA	1	0.08	1319	0.99
258	University of Wisconsin	USA	1	0.08	1320	0.99
259	University of Toronto	Canada	1	0.08	1321	0.99
260	Vanderbilt University Medical Center	USA	1	0.08	1322	1.00
261	Windhoek Central Hospital	Namibia	1	0.08	1323	1.00
262	Wusakile Mine Hospital	Zambia	1	0.08	1324	1.00
263	Yale University	USA	1	0.08	1325	1.00
264	Zambia Forum for Health Research	Zambia	1	0.08	1326	1.00
265	Zambia National Blood Transfusion Service	Zambia	1	0.08	1327	1.00
266	Zambia Wildlife Authority (ZAWA)	Zambia	1	0.08	**1328**	**1.00**
		Total	**1328**	**100.00**		

9.10 Appendix I. Countries Collaborating with UNZA School of Medicine

S/N	*Country*	*Frequency*	*Percentage*	*Cumulative Count*	*Cumulative Percentage*
1	Unites States of America	66	28.09	66	28.09
2	United Kingdom	31	13.19	97	41.28
3	Canada	14	5.96	111	47.23
4	South Africa	14	5.96	125	53.19
5	Uganda	9	3.83	134	57.02
6	Nigeria	8	3.40	142	60.43
7	Tanzania	8	3.40	150	63.83
8	Sweden	7	2.98	157	66.81
9	France	5	2.13	162	68.94
10	Kenya	5	2.13	167	71.06
11	Malawi	5	2.13	172	73.19
12	Switzerland	5	2.13	177	75.32
13	Germany	4	1.70	181	77.02
14	India	4	1.70	185	78.72
15	Zimbabwe	4	1.70	189	80.43
16	Australia	3	1.28	192	81.70
17	Saudi Arabia	3	1.28	195	82.98
18	Sudan	3	1.28	198	84.26
19	Belgium	2	0.85	200	85.11
20	Botswana	2	0.85	202	85.96
21	Burkina Faso	2	0.85	204	86.81
22	Denmark	2	0.85	206	87.66
23	Egypt	2	0.85	208	88.51
24	Ethiopia	2	0.85	210	89.36
25	Guatemala	2	0.85	212	90.21
26	Hong Kong	2	0.85	214	91.06
27	Mozambique	2	0.85	216	91.91
28	Norway	2	0.85	218	92.77
29	Argentina	1	0.43	219	93.19
30	Austria	1	0.43	220	93.62
31	Bangladesh	1	0.43	221	94.04
32	Brazil	1	0.43	222	94.47
33	China	1	0.43	223	94.89
34	Democratic Republic of Congo	1	0.43	224	95.32
35	Ireland	1	0.43	225	95.74
36	Japan	1	0.43	226	96.17
37	Mali	1	0.43	227	96.60
38	Namibia	1	0.43	228	97.02
39	Nepal	1	0.43	229	97.45
40	Pakistan	1	0.43	230	97.87
41	Rwanda	1	0.43	231	98.30
42	Senegal	1	0.43	232	98.72
43	Spain	1	0.43	233	99.15
44	The Netherlands	1	0.43	234	99.57
45	Yemen	1	0.43	**235**	**100.00**
	Total	**235**	**100.00**		

9.11 Appendix J. Journals used by UNZA School Academic staff

S/N	*Title of Journal*	*Freq*	*(%)*	*Cum Freq*	*Cum %*
1	PloS one	13	4.5	13	4.5
2	Tropical doctor	10	3.4	23	7.9
3	The American journal of tropical medicine and hygiene	8	2.7	31	10.7
4	BMC health services research	7	2.4	38	13.1
5	BMC infectious diseases	7	2.4	45	15.5
6	BMC public health	7	2.4	52	17.9
7	Lancet (London, England)	7	2.4	59	20.3
8	Clinical infectious diseases	6	2.1	65	22.3
9	Malaria journal	6	2.1	71	24.4
10	The international journal of tuberculosis and lung disease	6	2.1	77	26.5
11	BMC research notes	5	1.7	82	28.2
12	Tropical medicine & international health	5	1.7	87	29.9
13	Epilepsy & behavior: E&B	4	1.4	91	31.3
14	Health research policy and systems / BioMed Central	4	1.4	95	32.6
15	Journal of acquired immune deficiency syndromes (1999)	4	1.4	99	34.0
16	Medical journal of Zambia	4	1.4	103	35.4
17	Transactions of the Royal Society of Tropical Medicine and Hygiene	4	1.4	107	36.8
18	BMC gastroenterology	3	1	110	37.8
19	BMC international health and human rights	3	1	113	38.8
20	Bulletin of the World Health Organization	3	1	116	39.9
21	International journal of gynaecology and obstetrics	3	1	119	40.9
22	Journal of clinical microbiology	3	1	122	41.9
23	Journal of the International AIDS Society	3	1	125	43.0
24	Liver international : official journal of the International Association for the Study of the Liver	3	1	128	44.0
25	Parasites & vectors	3	1	131	45.0
26	The Journal of infectious diseases	3	1	134	46.0
27	Acta tropica	2	0.7	136	46.7
28	African journal of primary health care & family medicine	2	0.7	138	47.4
29	African journal of psychiatry	2	0.7	140	48.1
30	AIDS (London, England)	2	0.7	142	48.8
31	Alimentary pharmacology & therapeutics	2	0.7	144	49.5
32	Annals of African medicine	2	0.7	146	50.2
33	Archives of disease in childhood	2	0.7	148	50.9
34	Archives of public health = Archives belges de santé publique	2	0.7	150	51.5
35	Baillière's clinical rheumatology	2	0.7	152	52.2
36	BMJ open	2	0.7	154	52.9
37	Human resources for health	2	0.7	156	53.6
38	International archives of medicine	2	0.7	158	54.3
39	Journal of alternative and complementary medicine	2	0.7	160	55.0
40	Journal of evaluation in clinical practice	2	0.7	162	55.7
41	Journal of the International Association of Providers of AIDS Care	2	0.7	164	56.4
42	Neurology	2	0.7	166	57.0
43	Neurology international	2	0.7	168	57.7
45	Public health action	2	0.7	170	58.4
46	South African medical journal	2	0.7	172	59.1
47	The American journal of clinical nutrition	2	0.7	174	59.8
48	The Lancet. Global health	2	0.7	176	60.5
49	The Lancet. Infectious diseases	2	0.7	178	61.2
50	The Pan African medical journal	2	0.7	180	61.9
51	The Pediatric infectious disease journal	2	0.7	182	62.5
52	Tobacco control	2	0.7	184	63.2
53	Veterinary parasitology	2	0.7	186	63.9

54	Academic medicine : journal of the Association of American Medical Colleges	1	0.3	187	64.3
55	Acta obstetricia et gynecologica Scandinavica	1	0.3	188	64.6
56	Addiction (Abingdon, England)	1	0.3	189	64.9
57	AIDS care	1	0.3	190	65.3
58	AIDS patient care and STDs	1	0.3	191	65.6
59	AIDS research and therapy	1	0.3	192	66.0
60	Ambulatory pediatrics : the official journal of the Ambulatory Pediatric Association	1	0.3	193	66.3
61	Anatomical sciences education	1	0.3	194	66.7
62	Annals of clinical microbiology and antimicrobials	1	0.3	195	67.0
63	Annals of general psychiatry	1	0.3	196	67.4
64	Annals of medical and health sciences research	1	0.3	197	67.7
65	Annals of the New York Academy of Sciences	1	0.3	198	68.0
66	Annals of the Royal College of Surgeons of England	1	0.3	199	68.4
67	Annals of tropical medicine and parasitology	1	0.3	200	68.7
68	Applied nursing research : ANR	1	0.3	201	69.1
69	BMC medical education	1	0.3	202	69.4
70	Cancer medicine	1	0.3	203	69.8
71	Child and adolescent psychiatry and mental health	1	0.3	204	70.1
72	Clinical and experimental immunology	1	0.3	205	70.4
73	Clinical orthopaedics and related research	1	0.3	206	70.8
74	Clinical practice and epidemiology in mental health	1	0.3	207	71.1
75	Clinical rheumatology	1	0.3	208	71.5
76	Cold Spring Harbor perspectives in medicine	1	0.3	209	71.8
77	Contraception	1	0.3	210	72.2
78	Critical care medicine	1	0.3	211	72.5
79	Curationis	1	0.3	212	72.9
80	Current opinion in pulmonary medicine	1	0.3	213	73.2
81	Early human development	1	0.3	214	73.5
82	East African medical journal	1	0.3	215	73.9
83	Emerging infectious diseases	1	0.3	216	74.2
84	Environmental geochemistry and health	1	0.3	217	74.6
85	European heart journal	1	0.3	218	74.9
86	Frontiers in public health	1	0.3	219	75.3
87	Global health, science and practice	1	0.3	220	75.6
88	Global public health	1	0.3	221	75.9
89	Health information and libraries journal	1	0.3	222	76.3
90	Health policy and planning	1	0.3	223	76.6
91	HIV medicine	1	0.3	224	77.0
92	Indian pediatrics	1	0.3	225	77.3
93	International health	1	0.3	226	77.7
94	International journal of behavioral medicine	1	0.3	227	78.0
95	International journal of cancer	1	0.3	228	78.4
96	International journal of infectious diseases	1	0.3	229	78.7
97	International journal of mental health systems	1	0.3	230	79.0
98	International journal of STD & AIDS	1	0.3	231	79.4
99	International nursing review	1	0.3	232	79.7
100	International orthopaedics	1	0.3	233	80.1
102	International review of psychiatry (Abingdon, England)	1	0.3	234	80.4
103	Issues in brief (Alan Guttmacher Institute)	1	0.3	235	80.8
104	Italian journal of pediatrics	1	0.3	236	81.1
105	JAMA pediatrics	1	0.3	237	81.4
106	Journal of acquired immune deficiency syndromes and human retrovirology	1	0.3	238	81.8
107	Journal of AIDS & clinical research	1	0.3	239	82.1
108	Journal of biosocial science	1	0.3	240	82.5
109	Journal of clinical virology	1	0.3	241	82.8
110	Journal of diabetes research	1	0.3	242	83.2

111	Journal of educational evaluation for health professions	1	0.3	243	83.5
112	Journal of empirical research on human research ethics	1	0.3	244	83.8
113	Journal of environmental and public health	1	0.3	245	84.2
114	Journal of epidemiology and community health	1	0.3	246	84.5
115	Journal of global infectious diseases	1	0.3	247	84.9
116	Journal of injury & violence research	1	0.3	248	85.2
117	Journal of lower genital tract disease	1	0.3	249	85.6
118	Journal of medical virology	1	0.3	250	85.9
119	Journal of occupational medicine and toxicology (London, England)	1	0.3	251	86.3
120	Journal of the neurological sciences	1	0.3	252	86.6
121	Journal of the Royal College of Physicians of London	1	0.3	253	86.9
122	Journal of the South African Veterinary Association	1	0.3	254	87.3
123	Journal of tropical medicine	1	0.3	255	87.6
124	Journal of virology	1	0.3	256	88.0
125	Le Mali médical	1	0.3	257	88.3
126	Malawi medical journal	1	0.3	258	88.7
127	Maternal health, neonatology and perinatology	1	0.3	259	89.0
128	Medical reference services quarterly	1	0.3	260	89.3
129	Online journal of issues in nursing	1	0.3	261	89.7
130	Paediatric respiratory reviews	1	0.3	262	90.0
131	Parasite immunology	1	0.3	263	90.4
132	Parasitology	1	0.3	264	90.7
133	Pediatric rheumatology online journal	1	0.3	265	91.1
134	Philosophical transactions of the Royal Society of London. Series B, Biological sciences	1	0.3	266	91.4
135	PLoS medicine	1	0.3	267	91.8
136	Postgraduate medical journal	1	0.3	268	92.1
137	Progress in cardiovascular nursing	1	0.3	269	92.4
138	QJM : monthly journal of the Association of Physicians	1	0.3	270	92.8
139	Reproductive health matters	1	0.3	271	93.1
140	Rural and remote health	1	0.3	272	93.5
141	Scandinavian journal of infectious diseases	1	0.3	273	93.8
142	Sexually transmitted diseases	1	0.3	274	94.2
143	Statistics in medicine	1	0.3	275	94.5
144	Tanzania health research bulletin	1	0.3	276	94.8
145	Tanzania journal of health research	1	0.3	277	95.2
146	The British journal of surgery	1	0.3	278	95.5
147	The European respiratory journal	1	0.3	279	95.9
148	The Journal of nutrition	1	0.3	280	96.2
149	The Journal of the Association of Nurses in AIDS Care: JANAC	1	0.3	281	96.6
150	The Journal of tropical medicine and hygiene	1	0.3	282	96.9
151	The Lancet. Respiratory medicine	1	0.3	283	97.3
152	The Nursing journal of India	1	0.3	284	97.6
153	Translational behavioral medicine	1	0.3	285	97.9
154	Trials	1	0.3	286	98.3
155	Vaccine	1	0.3	287	98.6
156	Veterinary medicine international	1	0.3	288	99.0
157	Virology journal	1	0.3	289	99.3
158	World hospitals and health services	1	0.3	290	99.7
159	World journal of surgery	1	0.3	**291**	**100.0**
	Total	**291**	**100**		

9.12 Appendix K. Major Subject Areas Covered in the Journal Articles

S/N	*Subject Area*	*Frequency*	*Percentage*	*Cumulative Count*	*Cumulative Percentage*
1	HIV/AIDS	93	31.96	93	31.96
2	Tuberculosis	22	7.56	115	39.52
3	Health Systems	15	5.15	130	44.67
4	Cancer	13	4.47	143	49.14
5	Cigarette Smoking	10	3.44	153	52.58
6	Malaria	8	2.75	161	55.33
7	Diarrhoea	7	2.41	168	57.73
8	Epilepsy	5	1.72	173	59.45
9	Mental Health	5	1.72	178	61.17
10	Respiratory Tract Infections	5	1.72	183	62.89
11	Helminth	4	1.37	187	64.26
12	Medical Abortion	4	1.37	191	65.64
13	Surgery	4	1.37	195	67.01
14	Trypanosomiasis	4	1.37	199	68.38
15	Diabetes	3	1.03	202	69.42
16	Gastrointestinal Pathology	3	1.03	205	70.45
17	Health Workers	3	1.03	208	71.48
18	Informed Consent	3	1.03	211	72.51
19	Measles	3	1.03	214	73.54
20	Mortality	3	1.03	217	74.57
21	Policy	3	1.03	220	75.60
22	Schistosomiasis	3	1.03	223	76.63
23	Anthrax	2	0.69	225	77.32
24	Cytomegalovirus	2	0.69	227	78.01
25	Health Education	2	0.69	229	78.69
26	Health Information	2	0.69	231	79.38
27	Hepatitis	2	0.69	233	80.07
28	Malnutrition	2	0.69	235	80.76
29	Medical Male Circumcision	2	0.69	237	81.44
30	Rheumatology	2	0.69	239	82.13
31	School Bullying	2	0.69	241	82.82
32	School Truancy	2	0.69	243	83.51
33	Sexually Transmitted Diseases	2	0.69	245	84.19
34	Stroke	2	0.69	247	84.88
35	African Traditional Medicine	1	0.34	248	85.22
36	Alcohol	1	0.34	249	85.57
37	Anaemia	1	0.34	250	85.91
38	Anatomy	1	0.34	251	86.25
39	Arthritis	1	0.34	252	86.60
40	Attitude to Health	1	0.34	253	86.94
41	Biostatistics	1	0.34	254	87.29
42	Blood Transfusion	1	0.34	255	87.63
43	Catheters, Indwelling	1	0.34	256	87.97
44	Dental Fluorosis	1	0.34	257	88.32
45	Developmental Disabilities	1	0.34	258	88.66
46	Academic staff Recruitment	1	0.34	259	89.00
47	Family Medicine	1	0.34	260	89.35
48	Family Planning	1	0.34	261	89.69
49	Fever	1	0.34	262	90.03
50	Genetics	1	0.34	263	90.38
51	Genomic Research	1	0.34	264	90.72
52	Health Knowledge	1	0.34	265	91.07
53	Health Reforms	1	0.34	266	91.41
54	Home Based Care	1	0.34	267	91.75
55	Household Water Treatment	1	0.34	268	92.10
56	Hpovolemic Shock	1	0.34	269	92.44

57	Hygiene	1	0.34	270	92.78
58	Hypertension	1	0.34	271	93.13
59	Maternal and Child Health	1	0.34	272	93.47
60	Medical Education	1	0.34	273	93.81
61	Neonatal Sepsis	1	0.34	274	94.16
62	Norovirus	1	0.34	275	94.50
63	Nursing	1	0.34	276	94.85
64	Parkinson's Disease	1	0.34	277	95.19
65	Peste des Petits Ruminants (PPR)	1	0.34	278	95.53
66	Polymorphisms and NCD	1	0.34	279	95.88
67	Prenatal Care	1	0.34	280	96.22
68	Research Capacity	1	0.34	281	96.56
69	Research Output	1	0.34	282	96.91
70	Sexual Abuse	1	0.34	283	97.25
71	Smoking and Pregnancy	1	0.34	284	97.59
72	Students	1	0.34	285	97.94
73	Taenia Solium Cysticercosis	1	0.34	286	98.28
74	Traditional Medicine & Pregnancy	1	0.34	287	98.63
75	Traditional Birth Attendants (TBA)	1	0.34	288	98.97
76	Trauma	1	0.34	289	99.31
77	Typhoid	1	0.34	290	99.66
78	Zoonoses	1	0.34	**291**	**100.00**
	TOTAL	**291**	**100**		