

**AN INVESTIGATION OF THE INFORMATION SEEKING BEHAVIOURS OF  
VETERINARY SCIENTISTS IN NAMIBIA**

**A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR  
THE DEGREE OF MASTER OF ARTS IN LIBRARY AND INFORMATION  
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## **ABSTRACT**

This thesis reports findings of an explanatory sequential mixed method research design study that examined information seeking behaviours (ISBs) of veterinarians, laboratory scientists, veterinary hygiene inspectors, animal health and laboratory technicians in Namibia with a view to determine their information needs, information source preferences, familiarity with Directorate of Veterinary Services (DVS) information systems and Ministry of Agriculture, Water and Forestry (MAWF) library services, respondents' adoption of Internet technologies, and barriers to information-seeking. Understanding respondents' information behaviours is vital in designing suitable information systems and aligning library services with user needs. In phase 1, quantitative data was gathered through surveys from 62 conveniently sampled respondents. Completed questionnaires were coded, and a dataset created using SPSSv20. Descriptive statistics were used to analyse quantitative data. Qualitative data was gathered through semi-structured interviews held with 7 purposively sampled key informants in phase 2. Voice-recorded data was transcribed, then coded, and organised into groups of related themes. Thematic analysis was used to derive meaning out of data. Findings show that, respondents had various information needs: emergency problem solving; laboratory tests and experiments; literature review; preparing for meetings and conferences; continuing professional development; and information on drugs. Informal sources, such as personal notes and colleagues were more popular among respondents,

than MAWF libraries, agriculture websites and CD-ROMs. Fewer scientists read scholarly journals and their publications output was low. Time constraints and lack of training in information searching techniques were respondents` major obstacles. Results confirmed previous findings by African scholars: Nweke (1992), Chikonzo and Aina (2001), Sife and Chilimo (2006), and Nel and Fourie (2010). A modified version of Wilson`s (1996) General Information Behaviour model guided the study, and was also used to develop an ISB model exhibiting information seeking patterns of veterinary scientists in Namibia. Study recommends training in information literacy, improving respondents` information skills, optimising usage of agriculture libraries, information repositories, and Internet.

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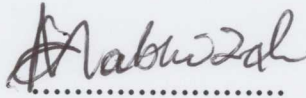
**DECLARATION STATEMENT**

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**March 2016**

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## **LIST OF ABBREVIATIONS AND ACRONYMS**

- AFREA: Africa Evaluation Association
- AGORA: Access to Global Online Research in Agriculture
- AHIF: Abattoir High Incidence Form
- AHT: Animal Health Technician
- AHW: Animal Health Worker
- ARDI: Access to Research and Development and Innovation
- ARIS: Animal Resource Information System
- ASK: Anomalous State of Knowledge
- ASLIB: The Association for Information Management
- AU/IBAR: African Union Inter-Africa Bureau of Animal Health Resources
- BVM: Bachelor of Veterinary Medicine
- CAC: Codex Alimentarius Commission
- CBPP: Contagious Bovine Pleuropneumonia
- CD-ROM: Computer Disc Read Only Memory
- CPD: Continuing Professional Development
- CTA: Technical Centre for Agriculture and Rural Cooperation
- CVL: Central Veterinary Laboratory
- DOAJ: Directory of Open Access Journals
- DRF: Disease Report Form
- DVS: Directorate of Veterinary Services
- EBM: Evidence Based Medicine



EU: European Union

FANR: Food, Agriculture and Natural Resources Directorate, SADC

FANR: Faculty of Agriculture and Natural Resources, UNAM

FAO: Food and Agriculture Organization

FDI: Foreign Direct Investment

FMD: Foot and Mouth Disease

FTP: File Transfer Protocol

FVF: Farm Visit Form

GDP: Gross Domestic Product

GNP: Gross National Product

GRN: Government of the Republic of Namibia

HACCP: Hazard Analysis and Critical Control Point system

HHF: Herd Health Form

HINARI: Health Inter-Network Access to Research Initiative

HVMS: Human and Veterinary Medical Scientists

ICT: Information Communication Technology

IICA: Inter-American Institute for Cooperation on Agriculture

ILL/DD: Inter-Library Lending and Document Delivery

ILRI: International Livestock Research Institute

IMR: Institute for Medical Research

IRB: Institutional Review Board

ISB: Information Seeking Behaviour

ISO: International Standards Organisation

IVIS: International Veterinary Information Service

LIMS: Livestock Information Management System

MAWF: Ministry of Agriculture, Water and Forestry

MEATBOARD: Meat Board of Namibia

MEATCO: Meat Corporation of Namibia

MET: Ministry of Environment and Tourism

MMR: Mixed Methods Research

MMWR: Monthly Morbidity Weekly Report

MTC: Mobile Telecommunications Company

NAWIC: Namibian Agriculture and Water Information Centre

NBRI: National Botanical Research Institute, Namibia

NCA: Northern Communal Area

NEAHIS: Namibian Epidemiology Animal Health Information System

NIH: National Institute of Health

NVC: Namibia Veterinary Council

OARE: Online Access to Research in the Environment

OIE: World Organisation for Animal Health

PCR: Polymerase Chain Reaction

POEMS: Patient Oriented Evidence that Matters

PSC: Public Service Commission

RSA: Republic of South Africa

SADC: Southern Africa Development Community

SA E-Publications: South Africa Electronic Publications

SAVC: South Africa Veterinary Council, RSA

SHIV: Slaughter High Incidence Forms

SNAL: Sokoine National Agriculture Library, Tanzania

SPS Agreement: Sanitary and Phytosanitary Measures

SUA: Sokoine University of Agriculture, Tanzania

TAD Info: Transboundary Animal Disease Database Information System

TADs: Transboundary Animal Diseases

TELECOM: Telecommunications of Namibia

UNAM: University of Namibia

USA: United States of America

UZ: University of Zimbabwe

VAN: Veterinary Association of Namibia

VCF: Veterinary Cordon Fence

VCN: Veterinary Council of Namibia

VHI: Veterinary Hygiene Inspector

VIN: Veterinary Information Network

VMIC: Veterinary Medical Information Centre

VS: Veterinary Services

VSPN: Veterinary Support Personnel Network

WAHIS: World Animal Health Information System

WHO: World Health Organisation

WTO: World Trade Organization

# **CHAPTER ONE: INTRODUCTION**

## **1.1 Orientation of the Study**

Information-seeking behaviour (ISB) remains an important research area to librarians and information professionals today due to advances in technology and the changing information environment of scientists. The study of ISB in information science fits into the broader group of user studies. User Studies is the study of how different individuals or groups of people satisfy their information needs (Wilson, 1994; Case, 2006).

Advances in science and technology have made the publishing landscape and consequently, information environment of scientists unpredictable. There are genuine concerns about information overload which could lead to anxiety among information seekers and information management among both scientists and information professionals. According to Wilson (1999), research in information behaviour dates back to the Royal Society Scientific Conference of 1948 when a number of papers on the information behaviour of scientists and technologists were presented (p. 250).

Wilson (2000) claims that, apart from information retrieval, there is no other branch of information science that has occasioned more research effort than user studies (pp. 49-55). The user's life world can be defined as the totality of the experiences

centered upon the individual as an information user (Wilson, 1981, pp. 3-15, In: Wilson, 2006, p. 661). Previous studies have discussed at length the information needs of specific groups of professionals or scientists; the information sources they used or preferred; and their information environment; among other areas of user studies.

The current 'information and knowledge revolution' prompted by advances in science and technology and the unlimited online publishing opportunities through a variety of Internet and Web media have necessitated continuous upgrading of information management skills by information professionals in order to remain competitive and continue to align information services with user needs (Wilson, 2000; Case, 2006a). Information needs, information sources, and information search process are precursors to ISB.

According to Shorley and Jubb (2013), the changing publishing landscape has resulted in a complex ecology of research and communications, comprising a set of systems, processes and groups of players who interact dynamically with each other, making it difficult to reconfigure the research and communications landscape. The challenge for information professionals is to rethink how to reconfigure the working patterns and practices in order to accommodate the varied research behaviours, attitudes and interests of all users, and most importantly, to continue aligning users' research requirements with information, knowledge systems, and library services (Wilson, 2000; Case, 2006b).

Wilson (2000) posits that, library professionals have devoted the last 50 years to studying information seeking behaviours of scientists from various disciplines because their daily working lives are dedicated to acquisition of knowledge, skills, and attitudes that allow them to seek and use information during the course of providing information services to other scientists. Dervin (1983a), Kuhlthau (1988), Wilson (1999), Case (2006), and Jamali and Nicholas (2008) all link the origins of user studies to the Royal Society Conference of 1948.

Literature shows that, in addition to the established and renowned print textbook and journal publishers, the Open Journals Access Movement, organizational websites and knowledge systems, improved scholarly communication channels (such as, institutional repositories, organizational websites and databases), Web 2.0 tools encompassing social media (Facebook, Twitter, YouTube, Blogs, and Discussion Groups) are all communicating new scientific findings through different research communities, that researchers may not be aware of or not be able to cope with in terms of searching, accessing, analysing and incorporating findings to their own field or clinical practice, as in the case of veterinary professionals (Shorley & Jubb, 2013).

Our present understanding of the theoretical perspectives on information seeking behaviours (ISBs) has largely been influenced by reading and seeking meaning from the concepts and activity-based ISB models propounded by eminent scholars, such as, Wilson (1981, 1994, 1996, 1997, 1999a, 2000 & 2006), Dervin (1983b, 1986, 1992 & 1998), Kuhlthau (1988, 1994, 1999, 2004 & 2008) and Ellis (1989, 1991,

1993 & 1997), among others. Case (2002, 2006a) is credited in the library and information science literature for compiling and reviewing most of the significant studies and theoretical perspectives on information seeking behaviour. Case (2006b) reviewed the above scholars` models and concepts, including Krikelas`s (1983) information-seeking behaviour model. According to Talja, Keso and Pietilainen (1999), a large proportion of current theory and information-seeking research is located in the behaviourist framework.

The theoretical concepts, user studies, information needs, and information-seeking behaviour are associated with a broad range of problem areas, from studies that provide a basis for systems development or improvement, through bibliometrics, user education, readability of texts, studies of reading and readership, to information retrieval design and evaluation (Wilson, 1994). Wilson`s definition is quite broad and inclusive. Julien (1995) in, Ikoja-Odongo and Mostert (2006) to a large extent agrees with Wilson (1994), she views ISB to be a field that is concerned with determining a user`s information needs, search behaviour, and subsequent use of information.

Wilson (1994) conceptualises an individual responding to some perceived need to be the most likely to engage in information-seeking behaviour. The current view of information seeking emphasizes communication and the needs, characteristics, and actions of information seekers (Dervin & Nilan, 1986). Historically, information seeking has its roots in the work of scholars in information science, psychology, education, communications, and computer science (Marchionini, 1995). These views

are consistent with those of Gray (2003) who asserted that, research into ISB occupies a niche at the intersection of psychology, management, communications, and information science.

Wilson (1999a) later envisioned a more general field of investigation that comprised of both active and non-active information-seeking activities, as well as receiving information from other persons without seeking it, this he conceptualized to be a broader and inclusive concept 'information behaviour', in which information-seeking was a sub-set of the overall activities. Wilson also noted that these terms were used interchangeably in the literature. On the other hand, Marchionini (1989) perceived information-seeking to be a special problem solving case that enabled us to understand the human information seeking process, including strategies to be employed if we are to design successful search user interfaces.

Progress in health information and sciences had resulted in a staggering body of available information, proliferating electronic sources, and growing concerns about what health professionals and health consumers need to know and how they could find it (Wilson, (2000). Case (2006a) estimated that there were more than 10,000 publications in these and other disciplines related to the basic human quest for knowledge. Despite the fears of information overload implied in Wilson (2000) and Case`s (2006b) analogies, library and information science literature actually shows that, studies investigating the research behaviours and information use situations of veterinary researchers were generally few globally and more acute and far between in



Africa (Nweke, 1992; Chikonzo & Aina, 2001; Sife & Chilimo, 2006; and Nel & Fourie, 2010).

Similarly, the scarcity of literature and knowledge on veterinary researchers' information seeking behaviours (ISBs) have in recent years been reported globally by Weiner, Stephens and Nour (2011), Brent (2011), Wales (2010), and Nel and Fourie (2010), among other scholars. Drake and Woods (1978) earlier claimed that the information needs of veterinarians could not easily be satisfied by conventional sources available at libraries because veterinary medicine was a very dynamic field.

The majority of veterinary researchers in Nel's (2009) study preferred to use the Internet to seek information, keep up to date, read electronic books and articles, and to communicate through e-mail. Respondents did not seem to consult scholarly print journals and textbooks as first choice information sources, a finding inconsistent with most agriculture and health care professional scientists' information behaviours globally (Nel, 2009). While, Sife and Chilimo (2006) found that, despite the availability of a variety of relevant information resources at the Sokoine National Agriculture Library (SNAL), Tanzania; veterinary researchers under-utilized most of the sources available due to lack of awareness, inadequate information searching skills, lack of guidance from librarians, inadequate computers, and unreliable Internet connectivity.

Despite the scarcity of literature, we do know from previous ISB studies of academic researchers, biologists, public health professionals, agriculture researchers,

academicians and other scientists that, veterinary professionals were likely to use a variety of information sources, with scholarly journals, textbooks and experts as the most prominent information sources. “For more than 330 years, the scholarly journal is the essential component in the storage and dissemination of scientific information, and journal articles have been regarded as the fundamental building blocks of the structure of scientific knowledge (Lawrence, 2008, p. 19).”

In recent years, the Internet has become a very popular source of information too, but the cost of access remains high in most developing countries and out of reach of many people. Previous studies showed that ISBs of scientists were largely influenced by the context within which research took place. Literature reviewed established that, most veterinary practitioners were often geographically dispersed and did not have easy access to veterinary medical libraries (Drake & Woods, 1978; Wales, 2000; Murphy, 2003; Bates, 2010; and Brent, 2011).

A review of the literature found that, more ISB studies on veterinary researchers were conducted in the USA, Europe and a few other parts of the world, whose context was quite different from Africa. The researcher noted that, even within Africa, veterinary professionals practiced in different climatic conditions where animal disease situations were different thereby, impacting on veterinary researchers` ISBs. More country-based ISB studies of veterinary researchers from Africa are therefore required, and hence this study.

## **Information Seeking Behaviour Studies conducted in Namibia**

Five studies accessed by the researcher on the information seeking behaviours (ISBs) of specific groups of persons were conducted in Namibia during the last 5 years; and of these, 3 studies were published in peer-reviewed journals, while the other was published as a book chapter. Chiware and Dickson (2008) surveyed the, “Information Needs and Information Seeking Patterns of Small, Medium and Micro Enterprises in Namibia”. The study established that, “business information needs of SMMEs in Namibia were finance, marketing, production, and training, policies on SMME development, sources of raw materials, regulations, technical information and other types of information” (Chiware and Dickson, 2008, pp. 24-36). Furthermore, SMMEs were found to be largely dependent on informal information sources despite the existence of a wide range of business information services in Namibia. The study made recommendations on the improvement of business information delivery services by both government and business support organizations (Chiware & Dickson, 2008).

Meanwhile, Mnubi-Mchombu, Mostert and Ocholla (2009), investigated the Information Needs and Information-seeking Behaviours of Orphans and Vulnerable Children (OVC) and their Caregivers at Okahandja, Namibia.

“Preliminary findings showed that the OVC preferred oral and interpersonal communication, and used relatives, teachers and friends as their main sources of information. The television, books, radio, newspapers and church leaders

were also popular information channels. Caregivers preferred interpersonal communication, and used social workers and relatives as their main sources of information. Other channels used for disseminating information included workshops and seminars, radios and newspapers. Most service providers produced leaflets and posters, and organised meetings in order to disseminate information to their target group” (Mnubi-Mchombu, Mostert & Ocholla, 2009, pp. 39-52).

Matsveru (2013) investigated the information needs and information seeking behaviours of Namibian Pastors as part of his Master degree thesis research. The study made the following findings:

“Pastors in Namibia need information for counselling, community development, administration, evangelism, preaching, directing prayers, leading Bible study, member care, teaching, public relations, leading a service, running a youth programme and for personal growth” (Matsveru, 2013, p. 157). “Pastors used formal sources of information such as Bible concordances, Bible translations, theological works, background information to the Bible, devotional books, books on missions, books on pastoral theology, books on church history, books on worshipping and books that are in line with their denominational theology. Pastors used church documents, the Internet, and personal libraries, as well as visit places of social gathering to get information about their communities” (Matsveru, 2013, p. 158).

Mchombu (2012) carried out, “An investigation into the information needs for poverty eradication at Greenwell Matongo in Katutura, Windhoek”. One of the interesting findings was that,

“...young people seemed to have more awareness of the information needs and channels in comparison to some of the adult groups that lacked awareness of the information flows of the various development concerns under discussion. Illiteracy, powerlessness, and lack of proficiency in English language were cited as some of the barriers to accessing available information (pp. 88-89). The author proposed the provision of information literacy in the adult literacy programme, including English lessons operated from the information centres as one way to overcome barriers to the flow of information (p. 89).”

Mabhiza, Shatona and Hamutumwa`s (2012) used a survey design to investigate the information seeking behaviours of academic researchers from the Faculty of Economic and Management Sciences at the University of Namibia. Additionally, the study sought respondents` views on the relevance and currency of library resources and researchers` participation in collection development. The findings of the study were used to align library collections and services with researchers` information needs for the benefit of students. Results of the study confirmed the findings of previous studies by Patitungkho and Deshpande (2005); Khan and Shafique (2011); and Jamali and Nicholas (2008) who all found that, most faculty members sought

information when preparing for lectures, to update their knowledge, and when writing and presenting papers.

Meanwhile, the researcher observed that, none of the information seeking behaviour (ISB) studies carried out in Namibian investigated veterinary professionals and veterinary para-professionals, and hence the above comprised the target population of this study. The present study therefore, examined the information-seeking behaviours of veterinary scientists in Namibia: their information needs; usage of various sources such as, textbooks, scientific journals, agricultural databases and organizational websites; and their familiarity with agricultural libraries and DVS information systems. The study also explored veterinary services sector` adoption of ICTs for professional practice, and usage of the Internet for the purposes of research, and continuing education.

## **1.2 Statement of the Problem**

Weiner, Stephens and Nour (2011) observed that, although emphasis in veterinary medical education was increasingly being placed on the ability to find, use, and communicate information; studies on the information behaviours of veterinary students and veterinary professionals were few. The authors` assertion is consistent with the views of Brent (2011) who also reported that, despite the few studies conducted to date, little had been done to actually ascertain their information needs. The paucity of literature on the information seeking behaviours (ISBs) of veterinary

researchers in Africa is well-documented by Nweke (1992), Chikonzo and Aina (2001), Sife and Chilimo (2006), Nel (2009), and Nel and Fourie (2010).

Furthermore, the researcher had also noted with concern that the voices of laboratory scientists, veterinary hygiene inspectors, and most veterinary para-professional groups employed in the animal health sector were silent in the literature. The present study was therefore a response to a gap in the literature on veterinary researchers' information seeking behaviours in Namibia and was purposely designed to cover broader population groups: veterinarians, laboratory scientists, veterinary hygiene inspectors, animal health technicians, and laboratory technicians.

The present study examined the information seeking behaviours of veterinary scientists in Namibia in order to have a better understanding of their information needs, information source preferences, adoption of Internet technologies, and the obstacles that affected scientists' ability to access and use information. Wilson's (1996 & 1999) General Information Behaviour model with some modifications was used to develop a model exhibiting the information seeking patterns of veterinary scientists in Namibia.

### **1.3 Research Questions**

Research questions used in this study originated from personal experiences as a practicing academic and research librarian and review of previous ISB studies. Gap-

spotting was the dominant way of developing research questions from the existing information seeking behaviour literature of veterinary researchers. It was by looking for gaps, such as, the deficiencies in previous ISB studies and the lack of the delivery of conclusive results in the existing literature that research questions were constructed (Alvesson & Sandberg, 2013). The present study was guided by the following specific research questions:

1. What are the information needs of veterinary scientists in Namibia?
2. Which information sources are used most by veterinary scientists?
3. What is the uptake of Internet technologies by veterinary scientists?
4. How familiar and satisfied are veterinary scientists with the Directorate of Veterinary Services (DVS) information systems and the Ministry of Agriculture, Water and Forestry (MAWF) library services?
5. How do veterinary scientists practicing in Namibia update their knowledge and skills?
6. What are the barriers encountered by veterinary scientists during information-seeking?
7. To what extent is Wilson`s (1996) General Information Behaviour model applicable to the information seeking patterns of veterinary scientists in Namibia?



#### **1.4 Significance of the Study**

Livestock production is a major source of income to both large and small-scale livestock farmers in Namibia; the same applies to wildlife and game meat; while the livestock sector is reported to be the most important contributor to value addition in the agricultural sector (DVS, 2011; Sherbourne, 2014). Overall, the agricultural sector contributed 5% to 6% of Namibia's Gross Domestic Product (GDP) and 10.7% of the Gross National Product (GNP) (Sherbourne, 2009). The research behaviours of veterinary professionals and veterinary para-professionals have a direct impact on the DVS's capacity to perform animal disease surveillance, efficient and effective response to animal disease outbreaks; and maintenance of a responsive animal health information system.

The study of veterinary scientists in Namibia is therefore, economically significant to livestock farmers, conservancies, domestic and international markets, and the consumers. This in turn determines the performance of the livestock sector in Namibia. In addition to the above, veterinary professionals regularly collected, collated, transferred, stored and analysed livestock data, disseminated and shared data with other scientists and stakeholders, and their role was therefore significant to the economic development of Namibia's agricultural sector (DVS, 2007).

The study has identified the lack of a strong support system for veterinary scientists based outside Windhoek by agriculture librarians. Results of the study will help agriculture librarians and information professionals to have a better understanding of

the information behaviours of veterinary scientists and align library information resources and services with user needs.

### **1.5 Limitations of the Study**

Veterinary scientists are located in all the 13 geopolitical regions of Namibia. The geographical distance between regions housing state veterinary offices constituted a barrier that methodically and logistically limited the use of observations and focus group discussions as alternative methods of data collection for this study. Two survey questionnaires and an interview guide emerged as the suitable data collection instruments. An official register of private veterinary practitioners was not readily available at the commencement of the questionnaire survey, this affected sampling. Low response from veterinary hygiene inspector respondents made it impossible to generalize findings across this population group. Future studies could employ qualitative data collection techniques in order to gather in-depth perceptions of all target population groups and provide a detailed description of the information behaviours of the respondents.

## **1.6 Operational Definitions of ISB Concepts used in this Study**

Information; Information Needs; Context in information seeking; Information Seeking Perspectives; Information-seeking behaviour; Information Literacy; and Information Behaviour.

### **1.6.1 Information**

The term information may not easily be defined in user studies. Information is used by researchers in multiple ways thereby, leaving readers confused sometimes about the meaning and sense implied (Wilson, 2000). According to Wilson (2000), the term information in user studies denotes a physical entity or phenomenon, the channel of communication through which messages are transferred, or factual data, empirically determined and presented in a document or transmitted orally. Mchombu (2004) treats the terms information and knowledge as social constructs shaped by a people's history, culture and perceptions.

### **1.6.2 Information Needs**

Wilson (2000) asserts that, information needs has been a subject of debate within the field of user studies for many decades with no little confusion. Belkin, Oddy, and Brooks (1982) perceive information to be a method used to solve problems. An information need evolves from an awareness of something missing, which

necessitates the seeking of information that might contribute to understanding and meaning (Kuhlthau, 1993). A problem is regarded as an inadequate state of knowledge, better conceptualised by (Belkin, 1982) as an Anomalous State of Knowledge (ASK). Taylor (1968, p. 181) as referred to in Case (2007) describes an individual with an information need as having a certain incompleteness in his picture of the world, an inadequacy in his state of readiness to interact purposefully with the world around him.

### **1.6.3 Information Sources**

Any person, object, publication, or related work that provides information can be regarded as a source (Behrens, Allen, & Machet, 1999, p. 312). As veterinary scientists conduct research, they may need to consult different types of information sources; they may need to combine primary, secondary, and tertiary sources. Overall, information relevant to veterinary scientists may be found in journals, books, articles, research reports, handbooks, encyclopaedias, maps, pre-appraised sources, government documents, dissertations, organisational websites, unpublished in the "grey" literature, and many more (<http://custompapers.com/>).

### **1.6.4 Context in Information Seeking**

It is generally accepted by scholars that, the information seeking behaviours (ISBs) of scientists is influenced by the context within which research takes place. It is

therefore not a coincidence that, context is one of the theoretical concepts examined by scholars of information behaviour in recent times because there is no consensus on its exact definition and demarcation of its boundaries. This assertion was expressed by Cool (2001) who observed that context remained ill-defined and inconsistently applied, and corroborated by Courtright (2007) and Agarwal, Yunjie, Xu and Poo (2010) who reiterated that there had been no success in defining context and delineating its boundaries and hence, different researchers had arrived at different models of context.

ISB literature shows that the terms person in context, professional roles and task relationships, the demographic groupings, social responsibilities, setting and the factors that led to information seeking tended to feature prominently in the conceptualization of context by various scholars, including Case (2007). The Information Ecologies model conceptualized by Nardi and O'Day (1999) highlights that the diverse array of human activity that took place within a closed setting was the bounding element for context.

## **1.6.5 Information Literacy, Information Skills and Scientific Literacy**

### **1.6.5.1 Information Literacy (IL)**

It is now generally accepted among researchers and information professionals that we need to be information literate and possess some information literacy competencies

in order to survive in the modern information environment. The present study uses the ACRL (2014) definition of IL that incorporates threshold concepts. The first draft of the Association of College and Research Libraries (ACRL) Framework for Information Literacy conceptualizes IL to be a combination of "... a repertoire of abilities, practices, and dispositions focused on expanding one`s understanding of the information ecosystem, with the proficiencies of finding, using and analyzing information, scholarship, and data to answer questions, develop new ones, and create new knowledge, through ethical participation in communities of learning and scholarship" (Gibson & Jacobson, 2014, p. 4).

#### **1.6.5.2 Information Skills**

A set of abilities which enable you to use information effectively; these abilities include finding information, analysing and evaluating it, and applying it to solve a problem (Behrens, Allen, & Machet, 1999, p. 312).

#### **1.6.5.3 Scientific Literacy**

Scientific literacy refers to one`s capacity to understand and apply scientific knowledge, concepts, principles, and theories to solve problems and make decisions based on scientific reasoning and to interact in a way that reflects the core values of

the scientific community (Neuman, 2011, p. 11). Scientific literacy is closely related to research literacy.

### **1.6.6 Information Environment**

According to Chikonzo and Aina (2001), information environment is an all-encompassing term that involves information needs, information sources and information seeking behaviours. It is particularly important that information professionals should be conversant with the information environment of their users as this will enable them to provide optimum information to their users (Chikonzo & Aina, 2001).

### **1.6.7 Information Seeking Models**

Wilson (1999a) describes a model as a framework for thinking about a problem and may evolve into a statement of the relationships among theoretical propositions; information seeking models describe and explain circumstances that predict actions by people seeking to find information. According to Wilson (1999b), most models in the field of information behaviour are statements, often in the form of diagrams that attempt to describe an information-seeking activity, the causes and consequences of that activity, or the relationships among stages in information seeking behaviour (p. 250). Flow-charts and diagrams suggest sequences of specific events, often defined in relation to theories. Rarely do such models advance to the stage of specifying

relationships among theoretical propositions: rather, they are at a pre-theoretical stage, but may suggest relationships that might be fruitful to explore or test (Wilson, 1999a, p. 250). Models of information behaviour appear to be fewer than those devoted to information seeking behaviour or information searching (p. 251).

### **1.6.8 Information Seeking Behaviour**

Information-seeking behaviour (ISB) studies stem from concerns surrounding how people use information in their work environments. Feather and Sturges (2003) define ISB as complex patterns of actions and interactions which people engage in when seeking information of whatever kind and for whatever purpose. Wilson (1999b) broadly conceptualizes ISB as activities a person may engage in when identifying his or her own needs for information, searching for such information in any way, and using or transferring the information. ISB arises as a consequence of a need perceived by the information user, who in order to satisfy it, makes demands upon formal or informal information sources or services, resulting in either success or failure (Wilson, 1999c, p. 251).



### **1.6.9 Information Behaviour**

Information behaviour is the currently preferred term used to describe the many ways in which human beings interact with information, in particular, the ways in which people seek and utilize information (Bates & Maack, 2010a). The present study uses Wilson`s (1994, 2000a) definition of information behaviour (IB) “... is the totality of human behaviour in relation to sources and channels of information, including both active and passive information seeking, and information use. Thus, it includes face to face communication with others, as well as the passive reception of information as in, for example, watching TV advertisements, without any intention to act on the information given” (Wilson, 2000b, p. 49). Bates and Maack (2010b) added that, information behaviour also refers to a sub-discipline of library science that engages in a wide range of types of research conducted in order to understand the human relationship to information.

Information behaviour means those activities a person may engage in when identifying their own needs for information, searching for such information in any way, and using or transferring that information.

## **1.7 Definitions of Key Veterinary Science Terms used in the Study**

This section presents definitions of terms used in animal health and their conceptualization in the veterinary services sector, here-in also referred to as the animal health sector. Namibia as a member of the World Organization for Animal Health (OIE) has ratified and makes use of the international guidelines on animal health as espoused in the Terrestrial Animal Health Code of the OIE, and the Codex Alimentarius established by the Food and Agriculture Organization (FAO) and World Health Organization (WHO) (OIE PVS Pathway, 2009). Below are explanations of some of the veterinary terms used in this study.

### **1.7.1 Veterinary Authority**

Veterinary authority means governmental authority of the country or region that comprises of veterinarians, other professionals and paraprofessionals that have responsibility and competence to supervise the implementation of animal health and welfare measures, international veterinary certification and other standards and recommendations in the Terrestrial Code and the OIE Aquatic Animal Health Code in the country (OIE PVS Pathway, 2012).

### **1.7.2 State Veterinary Office**

State Veterinary Offices are regional offices within the veterinary services (VS) of Namibia, these offices are headed by a state veterinarian and staffed by other veterinarians (not always) and veterinary para-professionals (Namibia Veterinary Council, 2014).

### **1.7.3 Veterinary Statutory Body**

Veterinary Statutory Body means an autonomous authority regulating veterinarians and veterinary paraprofessionals (OIE PVS Pathway, 2012).

### **1.7.4 Chief Veterinary Officer**

- (1) Subject to the laws governing the Public Service, the Minister must designate a staff employed in the Ministry who is a veterinarian to be Chief Veterinary Officer or to act as such;
  
- (2) The Chief Veterinary Officer is responsible for the administration of this Act and exercises the powers and performs the duties conferred or imposed on him or her by or under this Act subject to the control and directions of the

Minister (Government Gazette of the Republic of Namibia, Veterinary Professionals and Veterinary Para-professionals Act 1, 2013).

### **1.7.5 Veterinarian**

Veterinarian means a person registered or licensed by the Veterinary Statutory Body of a country to practice veterinary medicine/science in that country (OIE PVS Pathway, 2012).

### **1.7.6 Day 1 Veterinary Graduate**

Day 1 veterinary graduate means a veterinarian who has just graduated from a veterinary education establishment (OIE PVS Pathway, 2012)

### **1.7.7 Laboratory Scientist**

At the time of the DVS assessment by the OIE in 2008, a laboratory scientist was a professional equivalent to veterinarians working at the laboratory, but holding a masters level degree in microbiology and immunology, among other disciplines (Thiermann & Hutter, 2008). The new Veterinary and Veterinary Para-professionals Act 1, 2013 has changed the status of lab scientists to veterinary para-professionals.

### **1.7.8 Veterinary Hygiene Inspector**

A veterinary hygiene inspector (VHI) is a para-professional holding a four year degree in environmental health, meat hygiene, an equivalent degree to bachelors in food technology (OIE PVS Pathway, 2012a).

### **1.7.9 Animal Health Technician**

Animal health technicians (AHTs) are veterinary para-professionals that have completed an established 3 to 4-year curriculum at a college (OIE PVS Pathway, 2012b).

### **1.7.10 Veterinary Competencies**

There are 3 types of veterinary competencies, basic, general and advanced competencies. Basic competencies means the minimum knowledge, skills, attitudes and aptitudes required for a veterinarian to be licensed by a veterinary statutory body; this comprises general competencies, as well as specific competencies that relate directly to the World Organization for Animal Health (OIE) mandate (OIE Website, 2015).

Basic general competencies means basic veterinary sciences, which are taught normally early in the curriculum and are prerequisite to clinical studies; clinical veterinary sciences, which provide the necessary competence to diagnose, treat and prevent animal diseases; and animal production, which includes health management and economics of animal production. While, advanced competencies means the minimum knowledge, skills, attitudes and aptitudes required for a veterinarian to work within the veterinary authority (OIE Website, 2015).

## **1.8 Methodology**

The study employed a mixed method approach, situated in a pragmatic research paradigm and postpositivist philosophical worldview. An explanatory sequential mixed methods research design employing both quantitative and qualitative techniques in data collection and data analysis was used to carry out the study. The design took place in two phases. Phase 1 was quantitative and employed the survey method to gather data, while phase 2 was qualitative and data was gathered through interviews. In phase 1, two survey questionnaires were developed to elicit responses from five veterinary scientist population target groups. Questionnaire 1 was used to gather data from veterinarians and laboratory scientists, while Questionnaire 2 was used to collect data from veterinary hygiene inspectors, animal health and laboratory technicians. In phase 2, a semi-structured interview guide was used to gather in-depth perceptions of 7 purposively sampled key informants to help explain some of the

quantitative responses obtained in phase 1. Integration of the two sets of research findings took place at the end of phase 2.

## **1.9 Organization of the Thesis**

This thesis comprises of 7 chapters in total. Chapter 1 introduces the study and explores information seeking behaviours through an orientation of the study. It presents a statement of the problem, the research questions, the significance of the study, its limitations, definitions of key concepts, research ethics and the working framework and a summary of research methodology used to conduct the study. Although, different ideas from eminent ISB scholars such as Kuhlthau (1988, 1994, 2004), Dervin (1983) and Dervin and Nilan (1986, 1991), Case (2002, 2007), Wilson`s 1996 General Information Behaviour model with slight modifications provided the major theoretical perspectives that guided the study.

Chapter 2 discusses the context (environmental setting, information environment and personal characteristics of veterinary scientists practicing in Namibia) of the study, while Chapter 3 presents the literature review and the theoretical framework that guided the study. Chapter 4 discusses the methodology used to carry out the study, while Chapter 5 presents the data analysis and findings of the study. Chapter 6 discusses the findings according to the research questions. The researcher attempts to locate the findings of this study in the literature. Chapter 7 presents a summary of the

findings, conclusions and recommendations. A model depicting the information seeking patterns of veterinary scientists in Namibia was developed using a modified version of Wilson`s 1996 General Information Behaviour model as a basis.

### **1.10 Summary of Chapter One**

This chapter has provided the overall framework of the study through the discussion on orientation of the study. The orientation provides a brief historical background of the origin of user studies and also provides the operational definitions of the key concepts used in this study: information, information needs, context in information seeking, information environment, information seeking perspectives, information seeking behaviour, information literacy and information behaviour. The chapter presents the problem statement and the research questions that guided the inquiry; followed by the significance and limitations of the study. A discussion of the ISB models and operational definitions used in this study is followed by the summary of the chapter and finally, details pertaining to the organisation of the thesis. Chapter 2 discusses the context of the study.



## **CHAPTER TWO: CONTEXT OF THE STUDY**

### **2. 1 Introduction**

Chapter two discusses the context of veterinary services in Namibia and how it impacts the information environment of veterinary scientists and consequently, their information seeking behaviours. The chapter examines the responsibilities of veterinary professionals and veterinary para-professionals, their usage of agriculture libraries and DVS information systems, Internet services and research tools.

#### **2.1.1 Livestock Industry of Namibia**

There are three categories of land tenure in Namibia. Approximately 44 % of the country is commercial farmland with freehold tenure, 41 % is communal farmland and 15% is state owned which includes conservation areas (DVS, 2011). Communal farmlands are mainly situated in the northern parts of the country have unclear boundaries with common grazing areas with a subsistence base. This farming sector comprises 41% of agricultural arable land and about 70% of the population is directly or indirectly dependent on small-scale agriculture either as communal farmers or farm labourers. Agriculture contributes significantly to rural livelihoods (DVS, 2011).

Various DVS reports show that, production systems in the communal areas are pastoralist and agro-pastoralist and those in the commercial areas are mostly cattle ranching. The commercial farming areas which occupy most of the central and southern parts of the country have clear boundaries, are well-developed, have exclusive rights for individual properties, are capital intensive and are export oriented. The commercial farming sector contributes about 65% of agricultural output in Namibia (DVS, 2011).

Cattle production systems are concentrated in the central and northern parts of Namibia. Various production systems are practiced in the central parts of the country. The main agricultural activity is extensive beef ranching with beef production systems such as weaner production, slaughter oxen production, rearing of cattle or purchasing of young cattle and raising to marketing age (DVS, 2011). Male calves are exported to feedlots in Republic of South Africa (RSA) as soon as they are weaned. The major cattle breeds are Brahman, Afrikaner, Santa Gertrudis and Simmentaler in the commercial areas and the Sanga predominantly found in the northern communal areas. Small stock and ostriches are concentrated in the drier southern parts; the main sheep breeds are Karakul, bred mainly for its pelt and the Dorper for meat production (DVS, 2011). Supervision and co-ordination of marketing in Namibia is a major function of the Meat Board, it advises the authorities and all stakeholders of the meat industry in matters related to meat trade, the export of livestock and welfare of the meat industry in Namibia (DVS, 2011). Livestock marketing is done through formal auctions to other farmers, local butcheries, local &

export abattoirs, direct sales to other farmers, to informal markets or direct exports to Republic of South Africa (RSA) (DVS, 2011).

The Directorate of Veterinary Services (DVS) is the competent authority for animal health in Namibia and is responsible for the certification of animals and animal products for export. All export approved establishments are under the direct supervision of the DVS with a permanent staff complement. The five EU approved export abattoirs are Hazard Analysis and Critical Control Point system (HACCP) and International Standards Organisation (ISO) certified and comply with all EU legislations with respect to residue testing, animal welfare standards and beef labelling with regards to traceability of animal and animal products (DVS, 2011).

## **2.2 Veterinary Services**

The term Veterinary Services refers to the World Organisation for Animal Health (OIE) Terrestrial Animal Health Code (Terrestrial Code) which refers to both public and private components of the veterinary profession responsible for promoting animal and public health, including animal welfare (OIE PVS Pathway, 2012; DVS, 2011). All veterinarians in every nation are responsible for providing National Veterinary Services under the legislative framework and auspices of a governmental authority of a country to implement animal health to assure the health and wellbeing of animals, people and ecosystems. National Veterinary Services should meet the national standards set for the country and international standards, especially those set in the OIE Terrestrial Code (OIE PVS Pathway, 2012; DVS, 2011).

In order for veterinary professionals to develop expertise required in veterinary services and maintain standards after graduation and throughout their professional practice, they need to develop and nurture good information seeking behaviours and lifelong learning skills (OIE PVS Pathway, 2012). A close relationship between veterinary scientists and agriculture information professionals will enable the scientists to have easy access to required research information to support their work.

### **2.2.1 The Veterinary Services sector in Namibia**

Veterinary services in Namibia are coordinated by the Directorate of Veterinary Services (DVS), Ministry of Agriculture, Water and Forestry (MAWF). The DVS is the custodian of animal health and production and is responsible for establishing local, bilateral, and multilateral agreements with local, regional and international organizations (DVS, 2011).

All veterinarians registered to practice in Namibia should be well-informed and appreciate the delivery of National Veterinary Services as a public good; understand the organization of veterinary services in Namibia; and be knowledgeable about the roles of the Namibia Veterinary Council, MEATBOARD and MEATCO and where to find up-to-date and reliable animal health information should deeper knowledge be needed or desired (Thiermann & Hutter, 2009).

### **2.2.2 Veterinary Scientists in Namibia**

Research on Namibia's veterinary scientists' ISBs was warranted in order to determine if they had distinctive information needs and information use situations. The Directorate of Veterinary Services (2007, 2011) reported that, veterinarians regularly collected, collated, transferred, stored and analysed livestock data, disseminated and shared data with other scientists and stakeholders. It was therefore

logical for librarians and information professionals to assume that the responsibilities of veterinary professionals and para-professionals triggered ISBs.

Like other scientists practicing in today`s information society, veterinary scientists are today inundated with too much information that may not fit the category of evidence based veterinary medical practice, while trying to make intelligent decisions on diagnostics, therapeutic (animal patient care), trade in livestock and meat products, animal disease policies and legislation, among others.

The present research studied veterinary scientists (veterinarians, lab scientists, lab technicians, veterinary hygiene inspectors and animal health technicians) whose occupational responsibilities were regulated by the Directorate of Veterinary Services (DVS) and registered by the Namibia Veterinary Council (NVC). While the DVS, MAWF was the biggest employer of veterinary scientists in Namibia, other employers were the Ministry of Environment and Tourism (MET), Meat Board, MEATCO, private veterinary clinics and animal health hospitals, among others. Veterinarians and veterinary para-professionals were expected to understand and apply high standards of veterinary medical ethics in carrying out day-to-day operations; and provide leadership to society on ethical considerations involved in the use and care for animals by humans

The educational background, expertise and context (settings, professional roles, social responsibilities, personal circumstances) and research interests could be varied,

but their professional roles complemented each other. The settings of lab scientists and lab technicians were veterinary laboratories, veterinary clinics and surgeries. Veterinary hygiene inspectors` occupational responsibilities involved farm surveys, inspecting meat at abattoirs and livestock environments. Veterinarians and animal health technicians operated from all types of veterinary settings, that is, from offices, clinics, livestock farms, abattoirs, airports and border entry posts, among other settings.

The following responsibilities of veterinary professionals are defined and legislated in the Veterinary Services Namibian legislative framework.

### **2.3 Directorate of Veterinary Services Mandate, Functions and Operational Structure**

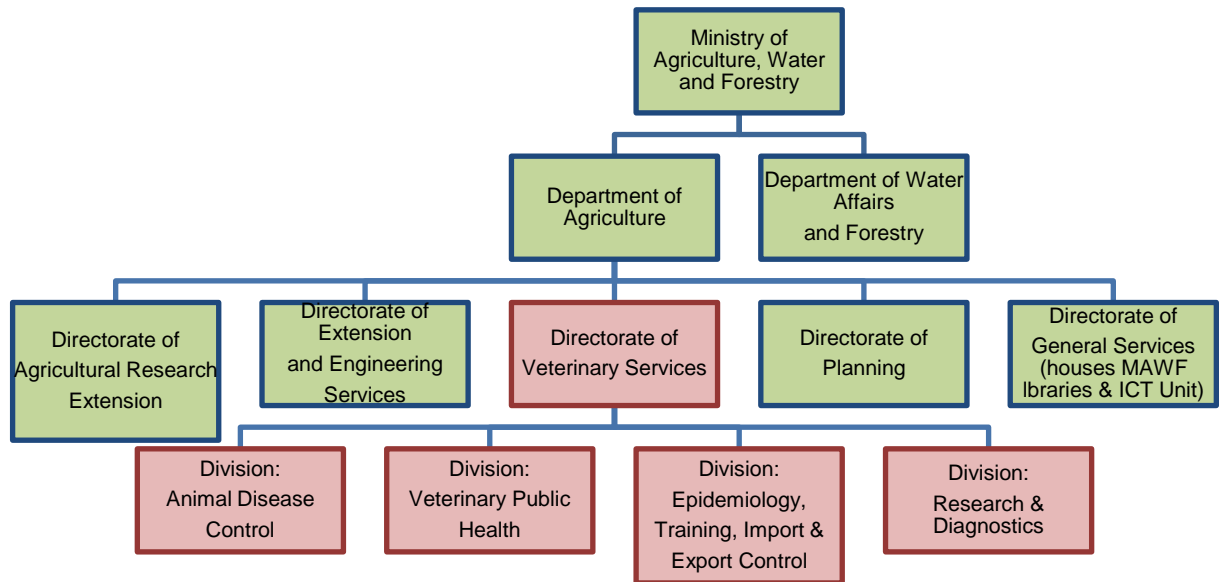
The Directorate of Veterinary Services (DVS) is the custodian of animal health and production and reproduction in the country and is responsible for establishing local, bilateral and multilateral agreements with local, regional and international organisations (DVS, 2011). The DVS falls under the Ministry of Agriculture, Water and Forestry, and falls into the structure shown on the diagram below. Namibia has a single unified official Veterinary Services with a direct chain of command from the Chief Veterinary Officer to each field veterinarian (DVS, 2011).

Of significance to the present study is that, all veterinarians should be knowledgeable about the fundamentals of the national veterinary legislation and specific rules governing the practice of veterinary services in Namibia and the SADC region, alternatively, veterinarians should know where to find up-to-date and reliable information regarding veterinary legislation and the rules and regulations governing veterinary services in Namibia.

Figure 1 below presents the organogram of the Ministry of Agriculture Water and Forestry (MAWF), including the DVS and its divisions (DVS, 2011). MAWF libraries and the ICT unit are under the Directorate of General Services. They both provide services to all researchers from the different directorates. The Namibian Agriculture and Water Information Centre (NAWIC) is the biggest MAWF library. Ministerial libraries provide services to independent researchers as well as students from tertiary institutions.



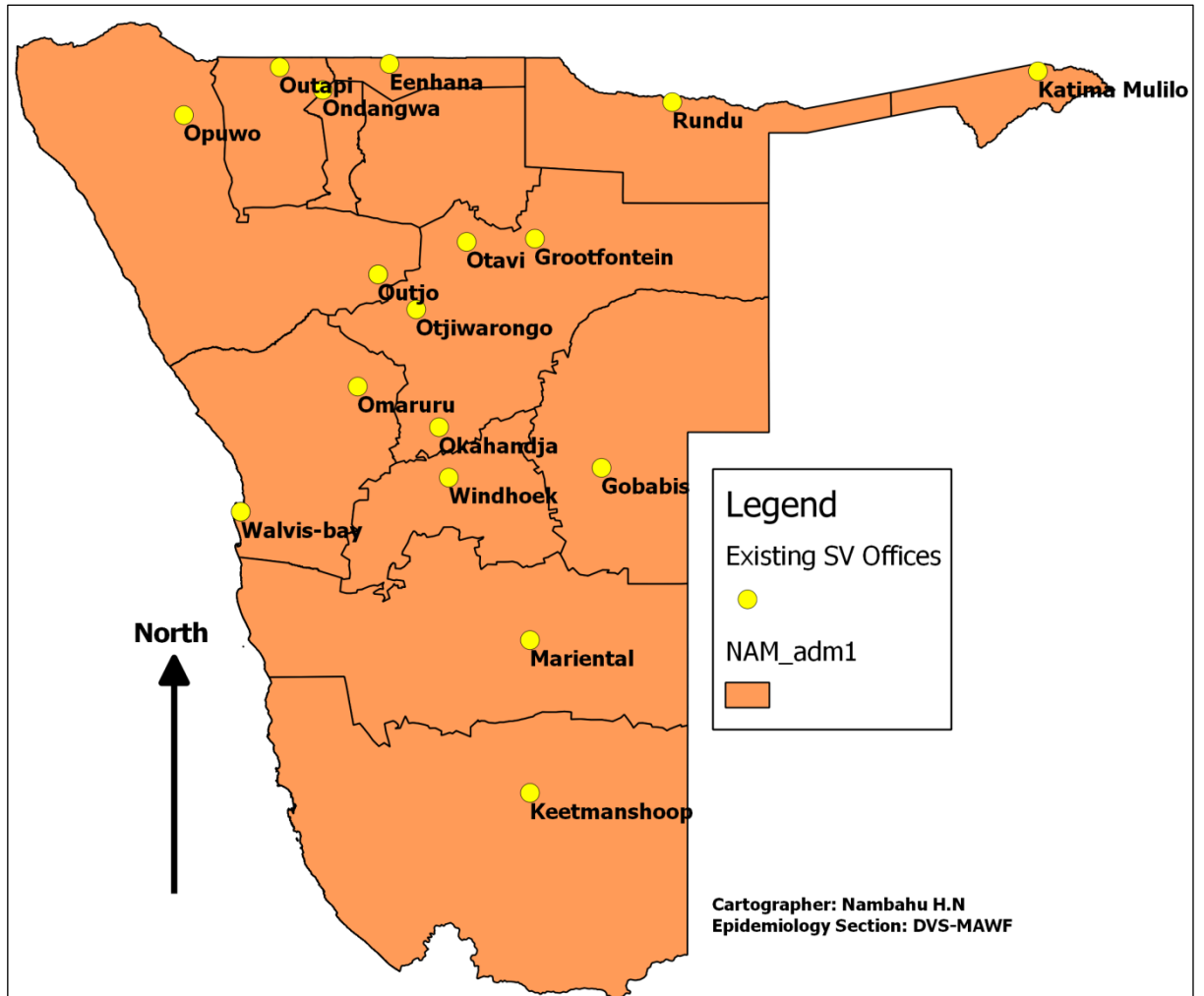
**Figure 1: Organogram of the MAWF, Including Directorate of Veterinary Services and MAWF Libraries**



**Source: DVS Annual Report, 2012, 3**

### 2.3.1 Cartographic Maps

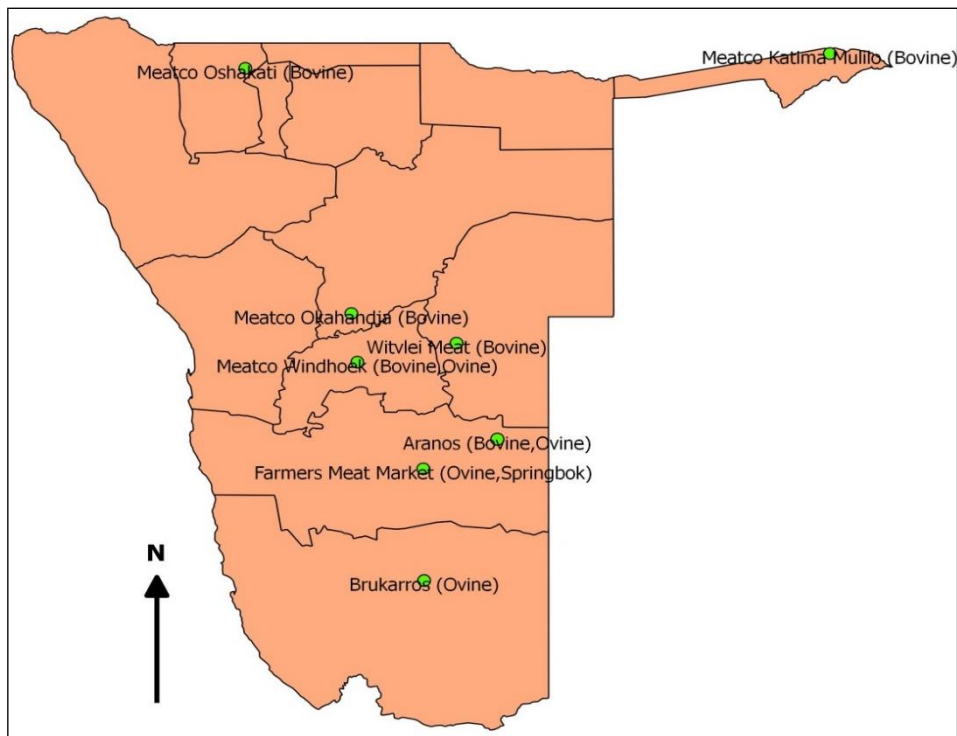
Figure 2: Cartographic Map: State Veterinary Offices in Namibia



Source: DVS Annual Report 2011, 12; 2012, 7

Figure 2 above shows the distribution of regional State Veterinary Offices throughout Namibia.

**Figure 3: Location of Export Abattoirs & Animal Disease Situation in Namibia**



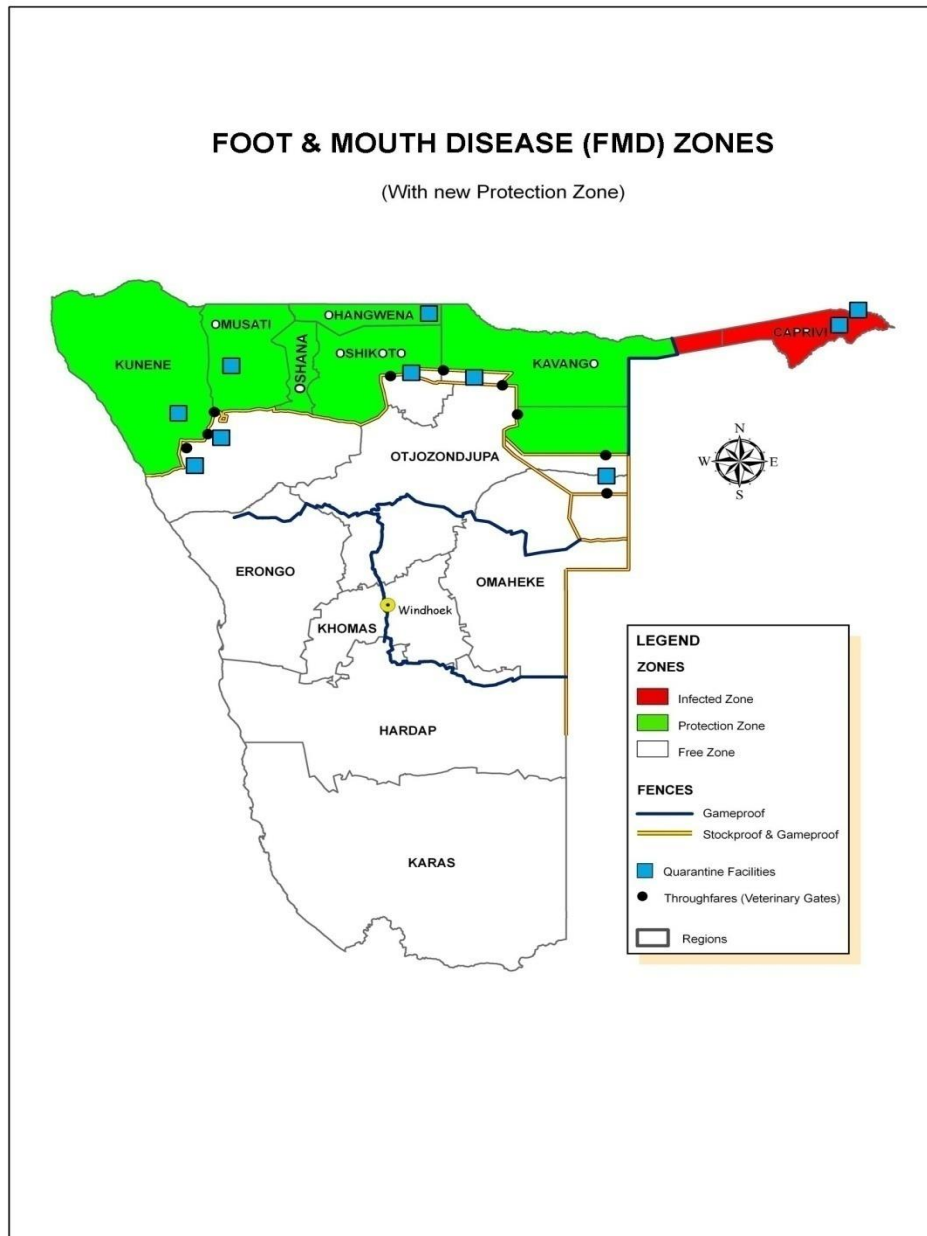
**Source: DVS Annual Reports 2011, 16; 2012, 11**

The figure above shows the location of export abattoirs and the animal disease situation in Namibia. The Veterinary Public Health division, DVS maintains a permanent presence at all export abattoirs. Livestock is slaughtered at 7 export abattoirs under veterinary supervision. The cold storage facility at Walvis Bay Harbour has capacity to handle imports and exports (DVS, 2011, 15; 2012, 10).

Figure 4 below shows the Foot and Mouth Disease (FMD) infection and protection zones. Disease control and strategy is based on a zoning system primarily regarding FMD status. Livestock movement in all zones is controlled through individual producer identification and a permit system (DVS, 2011; 2012). On 1 February 2006

the Namibia Livestock Identification and Traceability System (NAMLITS) was launched to cover all areas south of the Veterinary Cordon Fence (VCF) (DVS, 2011).

**Figure 4: Cartographic Map: FMD Infection and Control Zones of Namibia**



Source: DVS Annual Report, 2011, 31; 2012, 25

The different FMD infected and protection zones are described below:

**The Infected Zone** is a region referred to as infected because of the high risk of FMD outbreaks due to the presence of free-roaming buffalo; vaccinations are carried out bi-annually using the trivalent (SAT 1, 2 & 3) vaccine (DVS, 2011). While the **Protection Zone** is free of free-roaming buffalo and borders the infected zone and areas bordering neighbouring countries considered as high risk (DVS, 2011). The southern boundary of this zone is formed by a game and stock-proof double fenced corridor VCF. The **Free Zone** is an area south of the surveillance zone where no FMD vaccinations are permitted and is free of wild African buffalo (DVS, 2011).

### 2.3.1.1 The Veterinary Cordon Fence and Meat Exports

**Figure 5: The Veterinary Cordon Fence**



**Source: DVS Annual Reports, 2011, 32; 2012, 26**

Figure 5 above shows the veterinary cordon fence. Livestock farmers and abattoirs from the southern regions benefit from the lucrative meat export markets.

### **2.3.2 Directorate of Veterinary Services (DVS) divisions and their Operations**

Operationally, the DVS is divided into the following 4 main divisions: Animal Disease Control, Veterinary Public Health, Epidemiology, Training, Import and Export Control, and Diagnostics and Research. All DVS divisions are headed by deputy chief veterinary officers and their functions are summarized below.

The **Animal Disease Control (ADC) division** is field based. Some of the major functions of the division are: Inspecting, evaluating and recommending export establishments for trade in animals and animal products; Plan and implement control of Bovine Pleuropneumonia, Foot and Mouth Disease, Anthrax and Rabies; Prevent the introduction and/ or spread of animal diseases and pests through movement control; monitoring and surveillance of animal disease and pests in order to react early to outbreaks; drafting, reviewing and enforcing animal health legislation; and to provide clinical, surgical and extension services to smallholder farmers (DVS, 2005, 2011).

All practicing veterinarians and lab scientists registered to practice in Namibia are expected to have a general awareness and appreciation of how transnational and interdisciplinary research is essential to advance veterinary knowledge in the areas relevant to delivery of national veterinary services and know where to get up-to-date and reliable information regarding specific diseases, prevention and control measures, including rapid response mechanisms (DVS, 2011). Additionally, new veterinary graduates should know where to find up-to-date and relevant information

on emerging and re-emerging diseases; they also need relevant and up-to-date animal health legal instruments for reference purposes (Thiermann & Hutter, 2008).

The **Veterinary Public Health (VPH) division** has responsibility to ensure that meat export establishments meet standards and requirements of trading partners. In this regard the division is tasked with the responsibility of interpreting, advising and ensuring compliance with international legislation, conventions, protocols and agreements on trade related to veterinary matters; inspection, evaluating and recommending export establishments for trade in animal products; monitoring and guiding export establishments for minimum standards; and export certification for animal products (DVS, 2005, 2007, & 2011).

The DVS and the Namibia Veterinary Council (NVC) expect veterinarians to know and stay current about animal health standards set by the World Trade Organization (WTO), the OIE and the Codex Alimentarius Commission (CAC) (DVS, 2011). Of significance to this study is that, VPH officials need up-to-date information on the current performance of international stock markets so that they can advise Namibia livestock producers, MEATCO and MEATBOARD accordingly (DVS, 2011). VPH officials require skills in appropriate record keeping and know how to find up-to-date and reliable information regarding specific withdrawal times, a grace period given to an animal that has undergone treatment to recover from the drugs consumed before milking or slaughtering of the same animal for meat consumption is permitted. They also need to know where to find and how to interpret up-to-date and reliable



information regarding the link between use of antimicrobials in food animals and development of antimicrobial resistance in pathogens of human importance (DVS, 2011). VPH professionals require information skills that will enable them to know where to find up-to-date and reliable information regarding local, national, and international animal welfare regulations/ standards in order to describe humane methods for: animal production, transport, and slaughter for human consumption and killing for disease control purposes (DVS, 2011).

The **Epidemiology, Training, Import and Export Control division** is sub-divided into 3 sections: Epidemiology and Surveillance, Import/Export Control, and Training. The Epidemiology and Surveillance section collates, processes, and analyzes animal health data and reports on animal diseases and other data from other divisions for the purposes of decision-making; to run a computer based data management and reporting system; assist in the development of epidemiologically based surveillance and control strategies for animal diseases, at local, regional and international levels; and to offer technical support and training in epidemiology to field staff (DVS, 2011). The Import/Export Control section safeguards the national animal health status through import control and risk analysis; ensures that animals and animal products imported into the country meet import permit requirements; ensures that certification for export meets requirements of trading partners (DVS, 2011). While the Training section is responsible for providing continuous education to DVS staff and development of extension material and also training in animal health at various levels. The section administers the Namibia Livestock Identification and Traceability system (NAMLITs) (DVS, 2011).

With regard to information behaviour, veterinary epidemiologists are expected to know where to find up-to-date and reliable information should deeper knowledge be needed or desired, for example, from the OIE Handbook on Import Risk Analysis, the following risk analysis concepts must be properly conceptualized: hazard identification; risk assessment; risk management; and risk communication; know and understand the general principles of descriptive epidemiology, its application to disease control and the ability to access and use appropriate information sources; and understand and participate appropriately in an epidemiological enquiry in case of occurrence of a reportable disease, including collection, handling, and transport of appropriate specimens or samples; and communicate technical information in a way that the general public can understand; and communicate effectively with fellow health professionals to exchange scientific and technical information and practical experience (DVS, 2011).

The **Diagnostics and Research** division has a diagnostic support function for both animal health and veterinary public health, these include microbiology, pathology, parasitology, and toxicology (DVS, 2011). The division has its Central Veterinary Laboratory in Windhoek, while two regional laboratories are at Ondangwa and Grootfontein. The molecular diagnostic laboratory is equipped with real-time Polymerase Chain Reaction (PCR) facilities for microbiological diagnosis as well as for the detection of ruminant protein in animal feeds (DVS, 2011).

In information behaviour, Lab Scientists and Technicians require basic knowledge of how to conduct research in veterinary science; this means testing a hypothesis by appropriately designing and implementing a protocol analyzing the data, drawing conclusions and publishing the results (OIE PVS Pathway, 2009). Veterinary scientists require awareness and appreciation of how transnational and interdisciplinary research is essential to advance veterinary knowledge in the areas relevant to the delivery of National Veterinary services to assure the health of animals, the public and ecosystems (DVS, 2011).

### **2.3.3 Directorate of Veterinary Services Information Systems**

The role of an information system is to inform future animal disease diagnosis, surveillance and notification, control of national and international trade of meat, meat products and live animals, food safety management, investigation of diseases, predictive microbiology and quantitative risk assessment. An up-to-date information system helps guarantee the provision of quality veterinary services (DVS, 2011). The (DVS) has office presence and a computerized network throughout the country that enables veterinarians, lab scientists, veterinary hygiene inspectors (VHIs), and animal health technicians (AHTs) to capture animal disease surveillance, farm inspection, and abattoir data; it is computerised and managed through 3 animal health information systems whose details are outlined below (DVS, 2011).

The **Namibian Epidemiology and Animal Health Information System (NEAHIS)** is coordinated by the Epidemiology Unit which collects detailed disease and herd health data from veterinarians, disease and related data from VHIs, laboratory results, and abattoir data from all regions; it collates, manages, analyzes and reports on data collected to support trade in livestock and livestock products and to meet international reporting obligations (DVS, 2011). The information system assists in decision making at national level and international trade in livestock and livestock products (DVS, 2011). NEAHIS consists of a number of sub-systems handling:

The **Professional Sub-system** is based on data collected by veterinarians using the disease report form (DRF), herd health form (HHF), and abattoir high incidence form (SHIV/AHIF), all of which capture the state veterinary district, farm name, number of animals affected and at risk, as well as the tentative diagnosis. Data is now being captured using the Transboundary Animal Disease Information (TADInfo) System developed by FAO (DVS, 2005). Coverage is 2% of animals, but accuracy is very high; the sub-system is a vital alternative source of information during disease outbreaks, especially of re-emerging diseases; it is also a knowledge source that enables veterinarians to control the spread of the disease very quickly (DVS, 2011).

The **Animal Health Technician (AHT) Sub-system** involves the use of two questionnaires which are completed by AHTs after visiting a farm or community. The farm visit form (FVF) is used to report diseases and other issues on commercial farms south of the Veterinary Cordon Fence. Community visit forms are used in the Northern communal areas to collect data similar to that collected using FVFs (DVS,

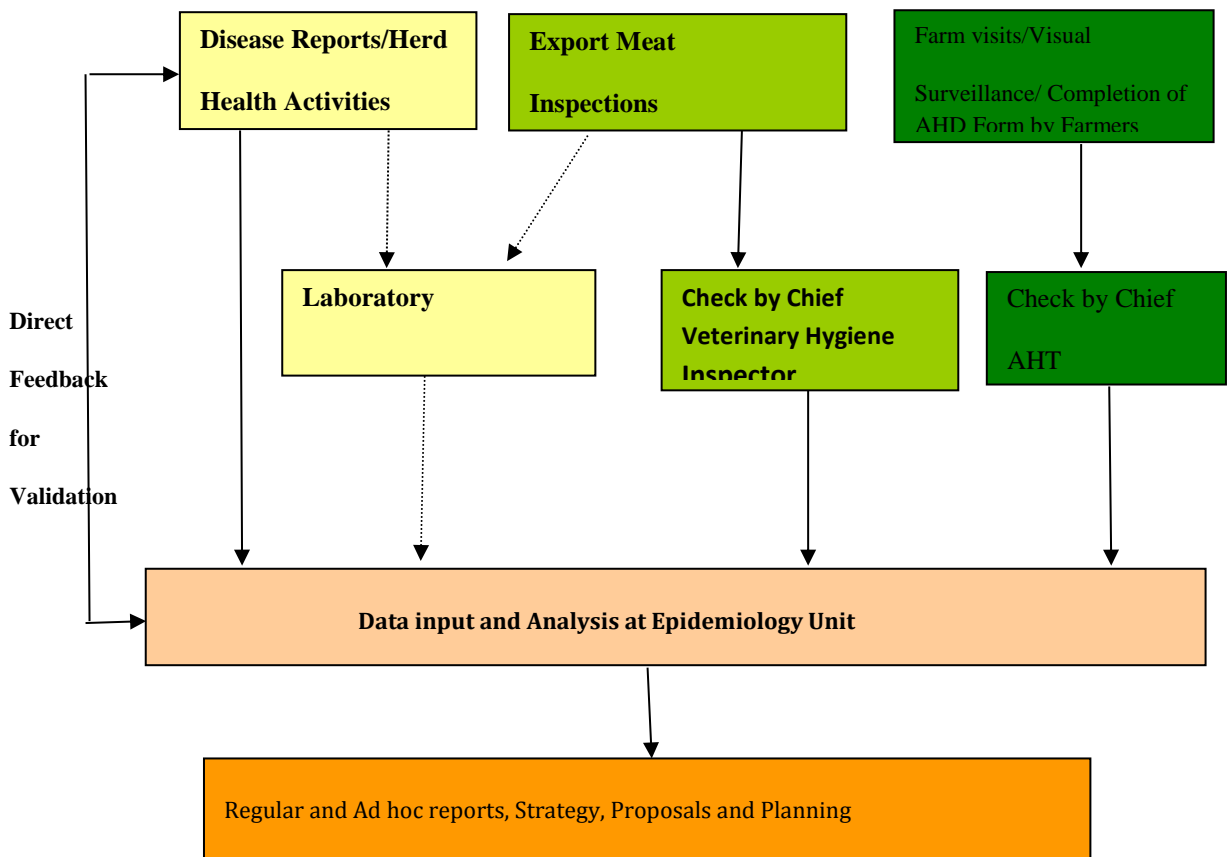
2011). Coverage is 80% of animals, but accuracy is not very high because data is based on reports from farmers (DVS, 2005). The Sub-system is a vital source of information to new AHTs who need orientation and on the job training (DVS, 2011). Available information enables fast compilation of farm visit survey reports (DVS, 2007).

The **Abattoir Sub-system** operates at all export abattoirs manned by official veterinary staff. Data on diseases and other conditions showing high incidence in a specific consignment is collected using slaughter high incidence forms (SHIV). Together with the permit system this system allows for tracing back to be done for conditions of interest (DVS, 2011).

### 2.3.3.5 Data Processing and Report Generation

**Figure 6: NEAHIS Epidemiology Information Flow**

Professional subsystem      Abattoir subsystem      Animal Health Inspector Subsystem



**Source: DVS Annual Report, 2011, 25**

Figure 6 above shows the epidemiology information flow.

All the data collected are sent to a central epidemiology unit for processing and report generation. There are several examples of reports and feedback to stakeholder produced by the epidemiology section which include the National Summary Report, Disease Listing, Animal Health Inspection Update, Epidemiology Update and the

Annual Report. The unit also reports to the OIE on biannual basis monthly to the Southern African Development Community and to the African Union Inter Africa Bureau for Animal Resources (AU-IBAR) (DVS, 2011).

## **2.4 MAWF Libraries**

### **2.4.1 The Role of MAWF Libraries in Animal Health Research**

The Namibian Agriculture and Water Information Centre (NAWIC) Annual reports show that, it is the biggest MAWF library and is part of the MAWF Head Office facilities in Windhoek; the same building also houses the DVS Head Office. The library provides services to all GRN agricultural researchers, members of the public and individual researchers, but borrowing privileges are limited to MAWF staff. NAWIC has Inter-Library Lending agreements with other libraries in Namibia (NAWIC Annual Reports, 2007 & 2010).

NAWIC subscribes to a number of print journals in the fields of Veterinary Science, Biology and Micro-Biology and agriculture. Some of the veterinary science journals are housed by the Central Veterinary Laboratory (CVL) for use by veterinarians, lab technologists and lab technicians based at CVL. NAWIC subscribes to e-journals accessible through the South Africa (SA) E-Publications and Access to Global Online Research in Agriculture (AGORA) databases. In addition to the 2 databases stated above, MAWF researchers through NAWIC now qualify to use the Access to

Research in Health Programme (HINARI), Access to Research in the Environment (OARE) and Access to Research for Development and Innovation (ARDI) databases free of charge, courtesy of the Research4Life scheme. Veterinary researchers can also access e-journal literature through the following open access platforms: Directory of Open Access Journals (DOAJ), Google Scholar and BioMed Central among others (NAWIC Annual Reports, 2007 & 2010).

NAWIC also has a sizeable collection of veterinary medicine and agriculture related textbooks, CD-ROM databases and DVDs, Files and Records. NAWIC provides free Internet access service to agriculture researchers. Another MAWF branch library is housed by the National Botanic Research Institute (NBRI) for use by researchers based at the Herbarium. Two University of Namibia (UNAM) agriculture libraries at Neudamm and Ogongo focus on the information and research needs of the Faculty of Agriculture and Natural Resources (FANR). Reading privileges are however extended to other agriculture researchers. The Polytechnic of Namibia Library also houses some agriculture and natural resources collections that could be of interest to MAWF researchers (NAWIC Annual Reports, 2007 & 2010).

#### **2.4.2 The Role of Agriculture Libraries in Economic Development**

The role of agricultural libraries in the development of the Namibian economy and the research capacity of agricultural officials cannot be over emphasized. It is estimated that 75% of the Namibian population is directly and indirectly employed



by the agriculture, forestry and water sectors (Sherbourne, 2014). The export of beef and livestock generates a significant amount of the country's Gross Domestic Product (GDP). The researcher perceives that, the new breed of information professionals managing agricultural libraries must be very experienced, dedicated and have the capacity to acquire skills in the application of Information Communication Technologies (ICT) in the agricultural sector.

Agricultural librarians need to evolve together with their parent organizations because modern technologies are now being utilized to satisfy the information needs of the users (Majid, Anwar & Eisenschitz, 2001). Staff working in agricultural libraries needs training and exposure to new techniques available at an international level (Jain & Gorla, 2001, pp. 31-38). This will help library professionals to provide relevant and customer focused agricultural information services.

#### **2.4.3 Namibia Agriculture and Water Information Centre (NAWIC) Budget**

NAWIC, NBRI and CVL had a reasonable annual library budget for subscription to journals, acquisition of books, stationery and office equipment. NAWIC Invoice Files, 2007 & 2008 showed that, approximately a million dollars (N\$1,000,000.00) was required for the 3 libraries` operations, development of library collections, and journal subscriptions (NAWIC Invoice Files, 2007 & 2008). The NAWIC budget

was quite substantial at the time in relation to other publicly funded libraries in Namibia.

#### 2.4.3.1 Online Journal Databases

**Table 1: NAWIC Online Journal Subscriptions and Open Access Databases**

Name of Database	Subject Coverage	Mode of Access by MAWF and Namibian Researchers
AGORA (Access to Global Online Research in Agriculture).	Food, Agriculture, Environmental science, water, Forestry, Ecology Physiology, Nutrition, Biochemistry, Microbiology, Ornithology, Veterinary Science.	Subscription Based between 2006 – 2010; Research4Life Programme – for developing countries, 2011 and 2015
SA e-Publications	Agriculture, Science & Technology Collection.	Subscription based
HINARI (includes PubMed)	Biological Sciences, Life Sciences, Medicine, Veterinary Medicine, Social Sciences	Research4Life Programme – for Developing countries
BioMed Central	Biological Sciences, Life Sciences, Healthcare research	Open Access
DOAJ- Directory of Open Access Journals	Multi-disciplinary	Open Access
Google Scholar	Multi-disciplinary	Open Access
JSTOR	Multi-disciplinary	Developing Country offer
Open J-Gate	Multi-disciplinary	Open Access
Waicent Portal, FAO	Agriculture, Food, land, Fisheries, Aquaculture, Genetics, Biodiversity.	Open Access
Ananzi Database, CTA	Agriculture	Open Access

**Source: NAWIC Invoice Files, 2007 & 2008**

In addition to print journal subscriptions, the Namibian Agriculture and Water Information Centre (NAWIC) subscribed to the South Africa (SA) E-Publications and Access to Global Online Research in Agriculture (AGORA). Researchers used common User Identity and Passwords; Internet connectivity was the only pre-requisite. DVS scientists also had access to online research information through

organizational websites, open access databases such as, BioMed Central, Google Scholar, Directory of Open Access Journals and Open J-Gate. From 2011 to date, DVS scientists also have access to online research information through JSTOR and Research4Life products: HINARI and OARE.

#### **2.4.3.2 NAWIC Veterinary Science Print Journal Subscriptions (NAWIC Invoice Files, 2007 & 2008)**

1. American Journal of Veterinary Research (CVL).
2. Animal Reproduction Science.
3. Australian Veterinary Journal.
4. The Canadian Veterinary Journal.
5. Compendium on Continuing Education for the practicing Veterinarian.
6. Index Veterinarius (CVL).
7. Journal of AOAC International (CVL).
8. Journal of the American Veterinary Medical Association (JAVMA).
9. Journal of Veterinary Postgraduate Clinical Study & In Practice.
10. Journal of Wildlife Diseases.
11. New Zealand Veterinary Journal.
12. Onderstepoort Journal of Veterinary Research (CVL).
13. Research in Veterinary Science (CVL).
14. Trends in Immunology, formerly Immunology Today (CVL).
15. Trends in Parasitology, formerly Parasitology Today (CVL).
16. Tropical Animal Health and Production.
17. Veterinary Bulletin (CVL).
18. Veterinary Clinics of North America.
19. The Veterinary Journal, formerly British Veterinary Journal.
20. Veterinary Medicine.
21. Veterinary Microbiology (CVL).
22. Veterinary Pathology (CVL).
23. Veterinary Record & In Practice (CVL)

The list above shows that NAWIC subscribed to print journals relevant to veterinarians, laboratory scientists and other veterinary para-professional groups that took part in this study.

## **2.5 Summary of Chapter Two**

Chapter 2 provided operational definitions of veterinary services terminology within the framework of the Terrestrial Code of the World Animal Health Organization (OIE) and as used by the Directorate of Veterinary Services (DVS) in Namibia. The chapter also presented a summary of the evaluation of the DVS organizational structure, operations and the occupational responsibilities of the veterinary professionals and para-professionals on the establishment of the DVS by the OIE using the PVS Pathway Tool during 2008/ 2009.

The chapter also discussed the DVS Animal Health Information Systems and the MAWF libraries in relation to information-seeking behaviours of respondents in this study. In addition to competencies required by registered veterinary professionals and para-professionals, the chapter also presented an overview on the understanding of Veterinary Services globally.

Chapter 3 presents the Literature Review.

## **CHAPTER 3: LITERATURE REVIEW**

### **3.1 Introduction to Literature Review**

This chapter is a systematic and critical discussion of the literature reviewed for this study. The chapter also provides insights on theoretical perspectives and concepts pertaining to information seeking behaviour (ISB) propounded by scholars, such as, Benson and Maloney (1975); Belkin (1980); Belkin, Oddy and Brook (1982); Wilson (1981, 1994, 1996, 1999 & 2000); Dervin (1977, 1983, 1992, 2003 & 2005); Dervin and Nillan (1986); Kuhlthau (1988, 1991, 1993, 2000 & 2004); Taylor (1991); Marchionini (1995); O`Day (1999) and Case (2002a & 2007a), among renowned ISB scholars.

According to Case (2007b), scholars of information behaviour acknowledge that there is no single theory of information seeking per se. Information behaviour approaches are typically regarded as models and concepts because they focus on specific problems (Case, 2002b, 2007c). The following ISB concepts are discussed in this study: information, information needs, information sources, information seeking perspectives, information environment, and information seeking behaviour (ISB) models, information literacy and research in animal health, incorporating continuing professional development and information behaviour. The chapter also reviews some definitions of concepts used in the veterinary services sector.

Literature on the ISBs of academic researchers, basic science and agriculture researchers, bio-medical and human medical and healthcare professionals, veterinary hygiene and environmental scientists, and veterinary researchers was reviewed. Some of the knowledge acquired during a review of the literature was used to select the research design of the study, procedures and methods of data collection and to design the questionnaire used to gather data during phase one of the study.

### **3.2 Working Framework: Information Seeking Behaviour Models**

Ocholla and Le Roux (2011) posit that, library and information science does not have a theoretical framework of its own as a discipline, instead, it generally makes use of research frameworks and models derived from other disciplines. Marchionini (1995a) perceived that, "... the aim of information seeking was to get relevant information into one's head ... to take some action or integrate it into the knowledge base" (p.56). This was accomplished by coordinating information-seeking factors in systematic and heuristic ways (Kuhlthau, 1991; Marchionini, 1995b).

Information needs, information sources and information search strategies were precursors to information seeking behaviour. Benson and Maloney (1975) asserted that, a generalized model of an information search process involved two givens: an information system and a search query. A system in this context meant, any organized presentation of information, such as, traditional or digital libraries; single

tools, such as bibliographies or dictionaries; and state of the art systems (Benson & Maloney, 1975a). A search was regarded as successful when congruity was achieved between the characteristics of the query and those of the information system being searched (Benson & Maloney, 1975b).

Dervin (1977) was particularly influential in focusing attention on people's information needs in making sense of the world. Belkin (1980) and Belkin, Oddy and Brooks (1982) constructed a model of information seeking that focused on information seekers' anomalous state of knowledge (ASK). In a much more specific context, Kuhlthau (1988) devised a model of how students sought information as part of their school work writing process. A general theoretical model of information seeking behaviour was first presented by Wilson in 1981 and later revised and re-coined a general information behaviour model in 1996, meaning that it could be applied in different contexts.

Case (2007) and other ISB scholars observed that, Wilson's (1981) and other models of information seeking behaviour shared perspectives on information seeking as a problem-solving activity that depended on communication acts. This perception was accepted by researchers and information science professionals, it only begun to influence designers and engineers who implemented electronic retrieval systems by the 90s (Marchionini, 1995). The present study investigated the information seeking behaviours of veterinary scientists in Namibia as a basis for the design of a suitable animal health and agriculture information service for the veterinary services sector of

Namibia. In order to achieve the above, Wilson`s (1996) General Information Behaviour Model with some modifications was chosen to guide the inquiry.

### **3.2.1 Theoretical Framework**

Theoretical framework refers to the agenda, outline, and theoretical construct of a research approach (Ocholla & Le Roux, 2011a). The theoretical framework discusses the problem under investigation and a possible solution to the problem; and also attempts to justify how realistic the approach assumed by the researcher is (Ziedler, 2007), in: Ocholla and Le Roux (2011b). According to Ikoja-Odongo (2002a, p. 86) concepts refer to major phenomena studied, eventually forming the foundation of the conceptual framework of the subject under investigation.

Generally, information seeking involves a number of personal, cognitive, emotional and environmental factors and processes. Singh and Satija (2007) made an interesting claim that, there was a universal assumption that man was born innocent or ignorant and should actively seek knowledge as a natural and necessary mechanism of human existence. Quite a number of ISB scholars perceive information seeking to be primarily an intellectual rather than a physical activity, most of the time we are not quite sure what we need, we are not quite sure what the information problem is, and it is the seeking itself that illuminates, informs, and assists us in defining, growing, learning, and succeeding (Dervin, 1991; Wilson, 1994; and Case, 2006).



Case (2002 & 2007a) posits that, the growing emphasis on users manifests itself in many recent studies of occupations, roles, and demographic groups. Like other ISB scholars before him, Case (2007b) acknowledges that, conceptually, ISB research has a fragmented, weak and borrowed theory, and sometimes uses incompatible methods and results that may be less cumulative (p. 287). The present study examined the information-seeking behaviours (ISBs) of veterinary scientists in relation to the context of veterinary services in Namibia and the following ISB concepts: information, information needs, information seeking perspectives, information search behaviours and information use, information literacy (IL) and continuing professional development (CPD) and barriers (obstacles) to information and Internet access and use. A modified version of Wilson`s (1996) General Information Behaviour model guided the inquiry.

### **3.2.2 Human-Centered Information Seeking Behaviour Models**

#### **3.2.2.1 Introduction**

Models are often said to precede the development of formal theory (Case, 2006: 120). Wilson (1999a) describes a model as a framework for thinking about a problem and may evolve into a statement of the relationships among theoretical propositions (p. 250). According to Wilson (1999b), most models in the general field of information behaviour are statements, often in the form of diagrams that attempt to describe an information-seeking activity, the causes and consequences of that activity, or the relationships among stages in ISB, they are at a pre-theoretical stage,

but may suggest relationships that might be fruitful to explore or test (Wilson, 1999a, p. 250, in: Case, 2006a, p. 121).

Dervin (1977) was particularly influential in focusing attention on people's needs in making sense of the world (Dervin, 1992, p. 68; Wilson, 1994; Case, 2006b). People find a gap between what they understand and what they need in order to make sense of the current situation (Dervin, 1983b, p. 156, In: Case, 2006c, p. 75). On the other hand, a model of information seeking that focuses on information seekers' anomalous state of knowledge (ASK) was constructed by Belkin (1980), in: Belkin, Oddy, and Brooks (1982). In this model, information seekers are concerned with a problem, but the problem itself and the information needed to solve the problem are not clearly understood. In a much more specific context, Kuhlthau (1988, 1991a) devised the information search process, a model of how students sought information as part of the writing process. Her model extends to both cognitive and affective perspectives and was developed through observations and interviews with students over long periods of time (Kuhlthau, 1991b).

Ingwersen's (1984) model is among cognitive models which show the relations among information and cognitive processes, presenting dependence of behaviour upon the type of intellect. Researchers who apply the social perspective see information users first of all as the members of a particular community, social category or group (Niedzwiedzka, 2003). While, an information-seeking behaviour (ISB) model that discusses researchers' everyday information search behaviours was propounded by Krikelas (1983). It is one of the activity based ISB models.

### 3.2.2.2 Wilson`s 1981 Information Seeking Behaviour (ISB) Model

According to Wilson (1994 & 1999a), the concepts founding Wilson's original model were presented in 1981, and a revision of that model was presented in 1996. Wilson`s 1981 model was presented as a model of information seeking behaviour; it suggested how information needs arose and what could prevent the actual search for information (Case, 2006). The model embodied a set of hypothesis about information behaviour that was testable: for example, the proposition that information needs in different work roles would be different, or that personal traits could inhibit or assist information seeking (1999b). The model could be regarded as a source of hypothesis, which is a general function of models of this kind (Wilson, 1999c, p. 252):

1. **Context of Information Need:** (a) Environmental; (b) Social Role; (c) Person: Psychological, Effective, and Cognitive States;
2. **Barriers:** Personal; Role-related; and Environmental; and
3. **Information Seeking Behaviour:** Starting, Chaining, Browsing, Differentiating, Monitoring, Extracting, Verifying, and Ending (Wilson, 1999).

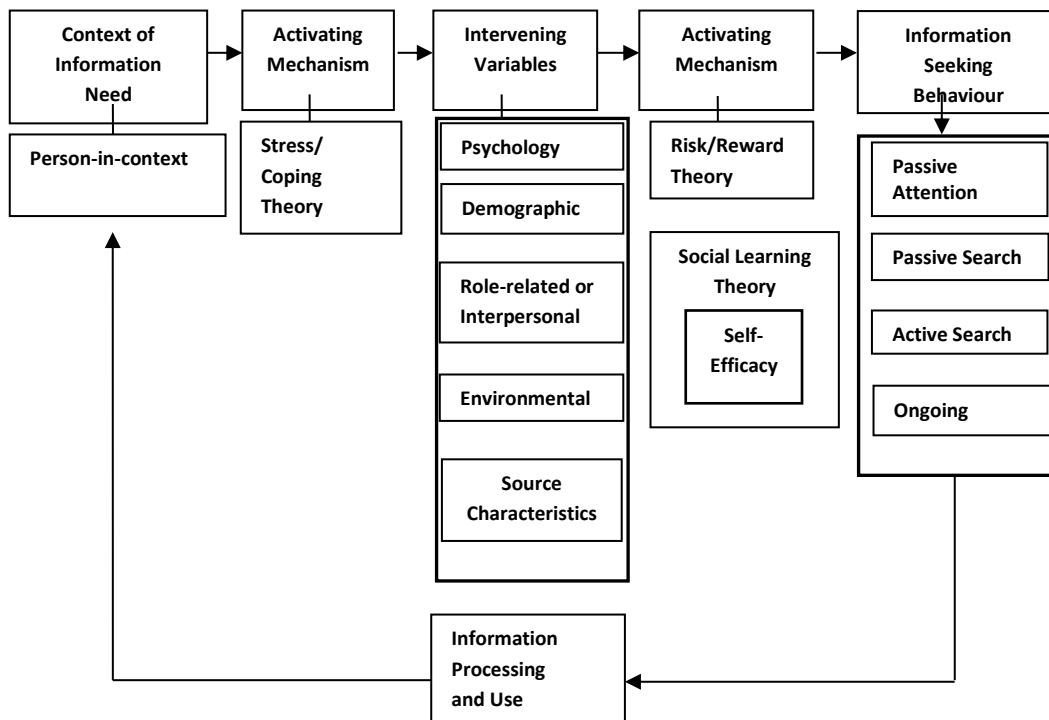
Wilson`s (1981) model included: an information need that was defined as a subjective experience that occurred in the mind of the person in need (Wilson, 1999a). Information need was connected to the physiologic, affective, and cognitive states of a person; the social role, which affects information need and information seeking context; the environment, which also affects information need and information seeking context; personal role-related, and environmental barriers of

information seeking behaviour; and the information seeking process (Wilson, 1999b, p. 254).

The weakness of Wilson's 1981 model is that all of the hypotheses are only implicit and are not made explicit (Ingwersen, 2003, in: Wilson, 1999c). Nor is there any indication of the processes whereby context has its effect upon the person, nor of the factors that result in the perception of barriers, nor of whether the various assumed barriers have similar or different effects upon the motivation of individuals to seek information (Wilson, 1999d).

### 3.2.2.3 Wilson's 1996 revised General Information Behaviour Model

**Figure 7: Wilson's General Information Behaviour Model, 1996**



Source: Journal of Documentation, 55(3), 249-270 ASLIB, 1999

Wilson`s 1996 model was a major revision of the 1981 model, and drew upon research from a variety of fields other than information science, including decision-making, psychology, innovation, health communication and consumer research (Wilson, 1999a, p. 256). The basic framework of the 1981 model persists, in that the person in context remains the focus of information needs, barriers are represented by intervening variables and information seeking behaviour is identified (Wilson, 1999). Information seeking behaviour was specified to be passive attention, passive search, active search, or ongoing search (Wilson, 1999b; Sonnenwald & Iivonen, 1999). According to Wilson (1999c), usage of the concept, ‘intervening variables’ instead of barriers served to suggest that their impact may be supportive of information use as well as preventive; intervening variables could be physiologic, demographic, role related, interpersonal factors, environment, or information source characteristics (Wilson, 1999, p. 256; Sonnenwald & Iivonen, 1999a; Case, 2007a).

Wilson (1996) also added information processing and use, two stages which the author considered to be beyond information seeking, but provided the link back to the need-arousing situation of the person-in-context (Wilson, 1999; Sonnenwald & Iivonen, 1999b; Case, 2007b). Wilson (1999b) however conceded that the model remained one of macro-behaviour, but its expansion and the inclusion of other theoretical models of behaviour made it a richer source of hypotheses and further research than the 1981 model (p. 257). Wilson`s revised 1996 model presents a cycle of information need and seeking, and how various intervening variables can aid or impede successful information searching.

Information seeking behaviour was shown to consist of more types than previously, where the active search was the focus of attention (Wilson, 1999c, p. 257). Wilson (1999d) perceived information processing and use to be necessary components of the feedback loop, if information needs were to be satisfied (p. 257). The revised model presented three relevant theoretical ideas: stress/ coping theory which offered possibilities of explaining why some needs did not invoke ISB; while risk/ reward theory which may help to explain which information sources may be used more than others by a given individual; and social learning theory, which embodied the concept of self-efficacy, the idea of the conviction that one could successfully execute the behaviour required to produce the desired outcomes.

Wilson (1999a) concluded that, Ellis`s (1989a) search features (model) and Kuhlthau`s 1988a Information Search Process can be related easily to Wilson`s active search mode of information seeking behaviour. Wilson (1999b) regarded Ellis`s (1989b), Kuhlthau (1988b) and his own models (1981 & 1996), information behaviour models because they were concerned with generalised behaviours surrounding the actual initiation of information-seeking and, with a broader perspective of the information search than simply the use of computer based information retrieval systems. Information retrieval systems were more concerned with overall design principles of search systems but the specification of rules for the design of interactive systems on the basis of information behaviour research may not be possible (Wilson, 1999c, p. 258).

### **3.3 Review of Literature on Information Seeking Behaviours of Scientists**

#### **3.3.1 Information Seeking Behaviours of Scientists**

Many studies have been conducted to date globally about the information needs, information sources and information seeking behaviours (ISBs) of various groups of scientists from different sectors including, agriculture, biomedical, chemistry, education, environmental and healthcare sciences. Adequate knowledge of scientists' information needs is vital in order to improve the currency, relevance, accessibility, effectiveness and efficiency of information systems and library services.

Hurd, Blečić, and Vishwanatham (1999) studied the information seeking behaviours of molecular biologists and established that molecular biology drew on a multidisciplinary knowledge base, such as, biology, medicine, pharmacy, physics, public health, natural science and other unclassified ones. Molecular biologists' information needs reflected the diversity in disciplines and were further influenced by individual research specializations and funding sources. The above study results are consistent with the findings of Basimalla's (2000a) study of health science researchers which established that they were in need of health information applied in medical treatment; information and knowledge that contributed to medical research; and international health research information. Basimalla's (2000b) study also found that 50% of scientists were satisfied with the available library collections.

A literature review study of the information seeking behaviours (ISBs) of medical doctors carried out by Davies (2007a) established that, medical practitioners sought clinical information and evidence based medicine (EBM), such as, diagnosis; treatment; prognosis; research into clinical information needs of doctors; prescription drug information; selecting a diagnostic test; and developing a treatment plan. Related studies showed that doctors had a need for information in a clinical setting; electronic resources remained an underutilized information source; and that the use of EBM needed to be championed by librarians (Davies, 2007b). Davies`s (2007c) study also outlined the following implications for medical practice: doctors could develop skills to undertake literature searches; and librarians needed to highlight pre-appraised sources such as the Cochrane Library.

A related information needs and seeking behaviour study of biomedical scientists at the Institute for Medical Research (IMR) in Malaysia carried out by Zawawi and Majid (2001) established that, the respondents required up-to-date information because health sciences was a continuously evolving discipline in search of medical break-through in control of various diseases and improvement in human health. Similarly, Singh and Satija (2007a) found that agricultural scientists in India used agriculture related information for research purposes. Scientists approached libraries, information centres and the department of Agriculture to obtain research information sources. Agricultural information available in the state was not sufficient (Singh & Satija, 2007b).



Similarly, a literature study conducted by Revere, Turner, Madhavan, Rambo, Bugni, Kimball, & Fuller (2007a) on understanding the information needs of public health practitioners found that, the need for rapid access to information to support critical decisions in public health could not be disputed. The study established that, public health practitioners used the following information sources: bibliographic databases, table of contents (TOCs), bibliographies, grey literature, government reports, Internet based publications, and meeting abstracts (Revere et al., 2007b). Revere et al.'s (2007c) findings were corroborated by Haines, L. L., Light, J., O'Malley, D., & Delwiche, F. A. (2010a) after investigating basic science researchers and found that, respondents used a wide range of sources, from, popular Internet search engines to highly technical databases; the library website's electronic journal title list; TOCs alerts; publishers' websites; and other miscellaneous resources. The respondents preferred to search for information from PubMed or Google over the library website. Other electronic sources of information consulted were the Web of Science, SciFinder Scholar, Up-To-Date, PsycINFO, and Ovid MEDLINE (Haines et al., 2010b). Haines et al. (2010c) also found that, the respondents were highly collegial as they interacted with co-workers in their laboratories and colleagues at other institutions.

A related study by Fourie (2009a) investigated healthcare professionals in South Africa and found that, they consulted inspirational information sources; they made retrospective searches; and were also interested in current information and opinion papers. Other sources consulted included, treatment protocols, textbooks and research reports (Fourie, 2009b). In addition to the above, a related exploratory study

of the information behaviours of veterinary practitioners in South Africa conducted by Nel and Fourie (2010a) linked the existing library products and services to recommendations for reducing information gaps and satisfying the requirements identified as a means of extending the services of veterinary libraries and furthering theoretical studies. The authors claimed that the library assisted veterinary practitioners in earning continuing professional development (CPD) points (Nel & Fourie, 2010b).

According to Dzandu and Dadzie (2012), the generation and application of innovative technologies and services by the six institutes that comprised the CSIR had positively affected the work performance of research officers and enhanced their research output by efficiently and effectively exploiting Science and Technology for socio-economic development in the critical areas of agriculture, industry, health and environment. Respondents from six institutes took part in the study.

### **3.3.2 Information Needs of Veterinary Scientists**

An investigation of the information seeking and use by human and veterinary medical scientists (HVMS) in Borno State, Nigeria was conducted by Nweke (1992a), who found that medical and veterinary scientists required quality health information that improved their clinical acumen. According to Nweke (1992b), HVMS were interested in journals and textbooks devoted to patient care because they taught them clinical judgment and problem solving skills. HVMS required up-to-date

medical and veterinary science journal titles in order to keep abreast with developments in their fields, such as, Epidemiological Reviews in Cancer, Community Medicine and all other subjects (Nweke, 1992a).

According to Nweke (1992b), correspondence with experts was considered reliable, authoritative, current and of high quality, while usage of current newsletters and bulletins was preferred because they provided information on library acquisitions. Human and veterinary medical scientists (HVMS) preferred to use personal records because they were handy, reliable, and organized in the most convenient way for easy retrieval, while browsing was also preferred because it was light reading and led to perusal of a wide range of sources, including announcements and news items (Nweke, 1992c).

Corresponding findings were reported by Chikonzo and Aina (2001a) after carrying out a study on the information environment of veterinary researchers (53/70 staff comprising of professors, lecturers, teaching assistants and veterinary technicians) at the University of Zimbabwe (UZ). The study singled out the following reasons for seeking information: researching on a new topic; preparing lecture notes; preparing a conference paper; and career development, among others (developing proposals, writing manuscripts, writing papers for publication, reviewing a paper, following up on seminars, identifying new parasites, information on new laboratory techniques and sourcing for research funding) (Chikonzo & Aina, 2001b).

Chikonzo and Aina (2001a) perceived that the results of their study compared well with the findings of Ikpaahindi (1985) who investigated the information gathering methods of veterinary scientists in Nigeria as part of his doctoral dissertation through the University of Wales and established that they needed information for research; keeping up to date; preparing for conferences/seminars; and teaching were the major reasons. Similarly, the results of Chikonzo and Aina`s (2001b) study of veterinary researchers showed that the Veterinary Science branch library at the UZ was the main provider of veterinary information to researchers, thereby justifying the need to strengthen the library resources. Journal articles were the most preferred content, while textbooks were second.

Similarly, Sife and Chilimo (2006a) investigated and found that veterinary science researchers at Sokoine University of Agriculture (SUA), Tanzania required information from more than one field of study that resembled their disciplines, such as, veterinary anatomy, immunology, anaesthesiology, molecular biology, animal diseases and welfare, microbiology, veterinary surgery, veterinary practice, wildlife biology, parasitology, pathology, pharmacology, animal nutrition, physiology, environmental health and biochemistry. Lack of awareness affected the respondents` usage of resources available at the National Agriculture Library, SUA (Sife & Chilimo, 2006b).

Like Nweke (1992) and Chikonzo and Aina (2001), Nel (2009) conducted an exploratory study of veterinary practitioners in South Africa and found that the respondents' desire for information were triggered by: the desire to keep up -to-date and Continued Professional Development (CPD); for emergency problem solving (for example, diagnosis); to improve work performance; when preparing a paper or presentation to be delivered at conferences; when buying new products, equipment or technology; for work related projects (for example, committees); for personal studies; professional groups and associations; and other interest groups.

Angello and Wema (2010) examined the information literacy skills of livestock researchers at 3 institutions in Tanzania; the study investigated the respondents' awareness of the availability of electronic information resources and the role played by librarians in facilitating access. The study established that, the lack of information literacy skills among most of the 50 respondents limited their access to and use of e-resources. The findings of the above study were consistent with those of Sife and Chilimo's (2006) study conducted at the Sokoine University of Agriculture (SUA).

Drake and Woods (1978) conducted an Information Service survey for practicing veterinarians and established that they required information covering all facets of animal medicine and management. Information requests were made through telephone and mail inquiries. The Veterinary Medical Information Center (VMIC) had a single inquiry station operated by a paramedical information specialist with a

scientific and medical research background responsible for the provision of appropriate responses to questions (Drake & Woods, 1978a). The VMIC was also involved in an outreach program aimed at increasing veterinarians' awareness of information and the necessity to consult information sources for new data. The outreach program was conducted through state and regional meetings, publications of the School of Veterinary Medicine, news media and the Veterinary Extension Service (Drake & Woods, 1978b).

In a related study, Pelzer and Leysen (1991) investigated the ISBs of veterinary practitioners and found that, little use was made of veterinary medical libraries, computer databases or extension services. The researchers observed that the information behaviours of respondents could have negative implications for veterinarians' awareness of current issues in preventative medicine and zoonoses. Similarly, Murphy (2003a) investigated information access by remote veterinarians and established that problem-based veterinary curricula emphasized the use of printed and electronic resources to gather information regarding particular cases for clinical care.

Murphy (2003b) reported that Ohio college actively participated in the university's cooperative extension service, providing workshops and services for veterinarians, farmers, livestock breeders, and others throughout the State of Ohio, this renewed emphasis on outreach and community engagement. Veterinarians were also involved with industry, public health and research, while some of the Library services offered

to veterinarians included document delivery, chat reference, websites and online training, among others (Murphy, 2003). Similar results were also reported by Chikonzo and Aina (2001), Slawson and Shaughnessy (2005) and Lawson (2010). Murphy's (2003) study urged hybrid librarians to re-examine the roles of libraries as a physical space, principles of outreach and engagement and contribute to lifelong learning and sustained relationships with veterinary practitioners. Hybrid librarians and libraries provide mixed information services through digital and paper environments. There is a collaboration of librarians and technologists serving on cross-functional technology teams that provide more integrated, personalized services at the point-of-need (Allen, 2005, p. 291).

A corresponding study was conducted by Cockcroft and Holmes (2004) who found that, veterinary practitioners in rural Ohio's information and knowledge requirements were triggered by the need for epidemiological information; clinical reasoning; diagnostic tests; treatment; prognosis; and control and prevention in the information requirements of the practitioners. Results of the study were consistent with Slawson and Shaughnessy's (2005) findings that, veterinary researchers required clinical information, resulting in high quality patient care guided by best evidence; skills to critically evaluate medical literature; clinical practice and applied science of information management; and techniques and skills focusing on finding, evaluating and using information at the point of care.

Veterinary researchers were also expected to have the ability to select foraging-keeping up tools that filter information for relevance and validity; skill to select and use hunting just in time information tool that presents pre-filtered information easily and in a quickly accessible form at point of care and ability to make decisions by combining best patient oriented evidence with patient centered care and placing evidence in perspective with the needs and desires of the patient (Slawson & Shaughnessy, 2005). Results of the study corroborated the findings of Slawson and Shaughnessy (2005) and Wessel, Tannery, and Epstein (2006).

In 2006, Wessel, Tannery, and Epstein investigated clinical research coordinators at the University of Pittsburgh in Pennsylvania and identified gaps in the following information requirements: grant, budget and program development; preparation and submission of Institutional Review Board (IRB) applications and reports; audits of IRB protocols; data collection, analysis, and monitoring; case management of patients; recruitment and enrolment of human subjects; auditing and reporting of adverse events; and maintenance of drug records and education of patients, family, and other health care professionals (Wessel, Tannery, & Epstein, 2006). The study also established the need for evidence based health care resources.

A corresponding study of clinical specialists and biomedical researchers conducted at the US National Institute of Health (NIH), Gefsheim and Rankin (2007) found that, the respondents sought research information for various reasons, such as, when conducting translational clinical research; during manuscript preparation; when



conducting comprehensive searches; for managing bibliographic information; in order to manage gene sequence data; when preparing papers for presentation; when tracking grantee publications; technology; when interpreting validity of articles read; when verifying citations; and during cited reference searching.

Lawson (2010) investigated access to scientific literature by rural veterinary practitioners in Kansas State and established that, they required clinical information on veterinary science, human medicine, infectious and emerging infectious diseases, nursing science, agriculture and animal science information. PubMed provided online tutorials and help links to assist veterinary practitioners gain familiarity with and expertise to search databases that addressed specific clinical questions that arose in daily practice (Larson, 2010).

A round table panel discussion of six veterinary practitioners facilitated by Hess (2010) interrogated the implications of the Internet on the provision of veterinary services. The discussants claimed that, veterinary practitioners used the Internet to access current veterinary science information; hold online consultations; share radiologic images with colleagues; interact with clients; hold online continuing education meetings; order hospital supplies and equipment; access online medical records and client education information; make quick reference to veterinary websites; access animal husbandry and animal health information; and send and receive email messages (Hess, 2010). Hess (2010) also reported that, despite

advances in Internet technologies, some veterinary practitioners continued to use snail mail.

Other Internet services included accessing online research material; reading online to stay current with recent advances and provide higher level patient care; post videos and photos on Facebook; exchange ideas with veterinary colleagues, text messages; review cases; communicate and gather different opinions quicker and in a more collective manner; and to market veterinary services through the AAV site and personal websites (Hess, 2010). In a related study, Brent (2011) investigated the ISBs of veterinary practitioners and established that they were required to read veterinary information sources for the following reasons: to keep up to date on new procedures; diagnosis; and patient care and treatment. Veterinarians exchanged knowledge with veterinary experts at the Cross Roads Animal Hospital (Brent, 2011).

Vandeweerd, J. M., Kirschvink, N., Clegg, P., Vandenput, S., Gustin, P., & Saegerman, C. (2012a) conceptualized evidence based medicine (EBM) to be a conscientious, explicit and judicious use of current best evidence from research for the care of an individual patient. The study established that, veterinary practitioners required clinical information for treatment, risk, frequency, diagnosis and prognosis (Vanderweerd et al. (2012b). The study recommended investigation of EBM at a larger scale in order to build most useful and adequate tools for veterinary practitioners (Vanderweerd et al., 2012c).

A study by Thomas, Bowers, Cadatal, and Kim (2013) established that the clinical care of individual patients was the primary reason that prompted primary care physicians to seek information because information resources related to clinical care assisted them in making clinical decisions. Other information requirements were triggered by the need to keep up-to-date with new and updated clinical information relevant to their practice; the need to obtain information for patients to explain really important risk factors, especially for well-informed patients; to acquire pharmacological information to guide and back-up prescribing decisions; to fill specific gaps in knowledge on "new" diagnoses and therapies; the need to satisfy curiosity, personal interest, and inclination; and the need to resolve issues around uncertainty and acquire evidence (Thomas, Bowers, Cadatal, & Kim, 2013).

According to Talbot (1991), Sundlof (1993) and Westhuisen (1995), the nature, usage, rate of change and acquisition of the information required by veterinarians present formidable difficulties at all career stages. An investigation of veterinary practitioners in the United Kingdom (UK) conducted by Wales (2000) found that, they required drug, diagnostic and therapeutic information. Veterinary practitioners preferred to use clinical information sourced from conventional journal articles, textbooks and conferences; they also used other types of information sources, such as, encyclopaedias and compendia, current awareness publications, practice records, other books, lab, databases (16), Internet, citations and references, abstracting and indexing services and annual reviews, among other sources (Wales, 2000).

Similar findings were reported by Cuk and Fuznic (2002), whose study found that veterinary practitioners required information for clinical decision-making in EBVM; and research information to use during fieldwork. Results of the previous studies were consistent with the findings of Hider, P. N., Griffin, G., Walker, M., and Coughlan, E. (2009a), whose study of clinical staff found that, respondents needed clinical information to respond to clinical questions. Some variability existed in the use of Internet based sources by different groups of health professionals. Examples of initiatives undertaken to improve veterinarians' access to veterinary sources online included the Veterinary Information Network (VIN) community of the Postgraduate Foundation for Veterinary Education at the University of Sydney, Australia which provides access to CAB Abstracts to its members for a small fee (Hider et al., 2009b). While the Internet was used more, it ranked below journal articles, textbooks, and conferences as a source for drug, diagnostic and therapeutic information (Hider et al., 2009c).

O'Leary (2012a) opined that social media tools provided an opportunity for self-directed learning to biomedical scientists and veterinary professionals which could enhance their continuing professional development. The author observed that social media provided a shift in the way practitioners thought, learnt, and connected with their clients, staff and the community (O'Leary, 2012b). O'Leary (2012c) perceived that, social media was about sharing information and bringing clients and their pets into community with veterinary clinics; clinic websites could become more interactive with tools like podcasts, web radio, and video sharing devices. Online

sites like Zoomerang and Survey Monkey helped clinics to design and collect data from clients through surveys on their websites. These forums were changing veterinarians as their staff and clients learnt, interacted and communicated with each other (O`Leary, 2012).

### **3.3.3 Information Sources used by Veterinary Scientists**

Nweke (1992a)`s doctoral study on information seeking and use by human veterinary medical scientists (HVMS) from Borno State, Nigeria established that: HVMS visited libraries in order to read Newspapers; journals; reference books, browse; copy documents; borrow books; find specific information; make literature searches; make reference enquiries; write papers; and own books. Nweke (1992b) also noted that using books, monographs, journals, conference proceedings and other publications to get information had become problematic because of their scarcity in Nigeria.

A related study on the information environment of veterinary researchers at the University of Zimbabwe established that, academic researchers used a wide range of information sources for research and teaching purposes, they included journals, textbooks, CD-ROMs, annual reports, video-tapes, veterinary bulletins, conference proceedings, the Internet, the faculty/branch Librarian, colleagues and newspapers (Chikonzo & Aina, 2001a). Chikonzo & Aina (2001b) also reported that, CD-ROMs were used more, while journals and books were indispensable information sources.

Various informal sources of information were also used including, professional colleagues, allied health specialists, seminars, conferences and workshops and the bibliographic database of human medicine, Medline (Chikonzo & Aina, 2001a).

The majority of veterinary researchers at the Sokoine University of Agriculture (SUA), Tanzania did not utilize most of the e-journals; e-books; print journals; textbooks; CD-ROMs: VETCD, AHPC, BSAS, CIRAD and ILRI; e-resources: AGORA, AJOL, EBSCO, HINARI and E-Granary (digital library); Print Indexes and OPACs at the Sokoine National Agriculture Library (SNAL) due to lack of awareness (Sife & Chilimo, 2006a). The information search behaviours and library use patterns of the respondents in the above study were contradictory to those who took part in Nweke (1992) and Chikonzo and Aina`s (2001b) studies, even though their environmental setting was also academic and research. The study does not reveal if the respondents had attended any library user education programs.

Nel`s (2009a) exploratory study of the information behaviours of veterinary practitioners in South Africa established that respondents used the Internet to access electronic books, journal articles, and other animal health information; and for communication purposes. Print journals and books were less preferred by respondents. The 3 most used research tools were the PubMed, International Veterinary Information Service (IVIS), FAO and the World Organization for Animal Health (OIE) databases (Nel, 2009b). Meanwhile, Fourie (2010) studied the information literacy skills of healthcare professionals (including veterinarians) in

South Africa and found that, they used research reports, treatment protocols and textbooks as information sources. Results of the study found that, the respondents in Fourie`s (2010) study behaved like other scientists elsewhere, they used print journals and textbooks.

Angello and Wema (2010) investigated the extent to which livestock research institutions facilitated access to and use of electronic information by livestock researchers in Tanzania and found that the TEEAL was the most used source. Other sources of information consulted were computers, the Internet and CD-ROM databases: CAB Abstracts, FAOSTAT, AGROS, AGRICOLA and SilverPlatter (Angello & Wema, 2010). Respondents used the following online information sources: AGORA, HINARI, Medline, Tanzania Development Gateway, OARE, Tanzania Online and Cochrane Library (Angello & Wema, 2010). Livestock researchers requested improvement in Internet connectivity to enable them to efficiently search for information online (Angello & Wema, 2010).

Drake and Woods (1978) carried out an Information Service survey of practicing veterinarians and found that veterinarians used a wide range of information sources, but the following were singled out as critical and urgent information sources: textbooks, other practitioners, Purdue University Clinicians, Journal Articles and Purdue University Diagnostic Laboratory. Other sources of new information consulted were: Journals, Books, National Professional meetings, Extension services, other practitioners, University faculty, Sales representative, Adverts received in mail,

Adverts in journals and the State veterinarian (Drake & Woods, 1978). The following sources were used very often: Consultation with Purdue faculty, Info updates, References or abstracts on timely topics, Computer produced literature searches and Extension service (Drake & Woods, 1978).

Larson`s (2010) study on rural veterinary practitioners at Kansas State University established that, they used peer-reviewed journal articles, citations and abstracts. Other sources of information preferred included PubMed, CABI and AGRICOLA, FDA Veterinarian Newsletter, MMWR: Morbidity and Mortality Weekly Report, Google Scholar and Email Discussion lists. Brent`s (2011) study of the information needs of veterinary practitioners also found that they sought information from multiple sources, such as, veterinary colleagues, experts, print journals, Internet databases and conferences.

According to Hurd, Blecic, and Vishwanatham (1999) molecular biologists at the University of Yugoslavia used the following sources of information: journals, monographs, reference materials, theses, unpublished documents and conference proceedings. The respondents relied on refereed journals, handbooks and lab manuals; they also used basic science and medical information sources covered by both Medline and BIOSIS (Hurd, Blecic, & Vishwanatham, 1999).

Davies`s (2007) review of literature on the information seeking behaviours (ISBs) of medical doctors established that, they preferred to use pocket reference sources and



colleagues; medical journals and bulletins; Cochrane Library; colleagues; patient oriented evidence that matters (POEMS); and drug information sources. Books were used more followed by colleagues, Internet, biomedical databases, PubMed, National Library for Health; search engines: Jubilee & Justeis; and the Telephone (Davies, 2007).

### **3.3.4 Adoption of Internet Technologies by Veterinary Scientists**

Chikonzo and Aina`s (2001) study showed that veterinary researchers at the UZ used a variety of information sources in both print and electronic format (computers, CD-ROMs, the Internet, and email, among others). Similarly, Nel (2009)`s investigation of the information seeking behaviours (IBSs) of veterinary researchers in South Africa established that, they used the Internet to seek information, to keep up to date, read e-books and articles, and to communicate via e-mail.

Meanwhile, the study of ICT adoption among research scientists in Ghana conducted by Dzandu and Dadzie (2012) also established that the respondents used a wide range of electronic information sources, such as, computers, Internet sources and databases. The high level of awareness and usage of Internet technologies and databases corresponds with the findings of Nel`s (2009) study above. Librarians in Ghana behaved like the Faculty Librarian at the University of Zimbabwe (UZ) who provided an enabling environment to researchers through timely delivery of literature or information to researchers; they provided selective dissemination of information

(SDI) to research officers and ensured that databases were current and relevant; and they also kept profiles of researchers and their interests. Similarly, the library was also acknowledged in Nel's (2009) study for aiding veterinary practitioners to earn continuing professional development (CPD) points.

Pelzer and Leysen (1991) investigated the information seeking behaviours of veterinary practitioners and found that although 50% of respondents had access to a computer, but hardly any of the researchers used it for database searching, implying that ICT uptake among practitioners was low. In a repeat study, Pelzer, Wiese & Leysen (1998) found that 60% of veterinary medical students used the Internet to locate information. Overall use of e-resources was reported to be high among students receiving problem based learning method of instruction.

An investigation of rural veterinary practitioners at Kansas State University by Larson (2010) established that they used a variety of electronic resources, among them, peer-reviewed journal articles, Citations and Abstracts, PubMed, CABI Abstracts, AGRICOLA, the FDA Veterinarian Newsletter, Morbidity and Mortality Weekly Report (MMWR), Google Scholar and Email Discussion lists. Usage of e-resources was high among respondents. The findings of a multidisciplinary study of the information-seeking behaviours (ISBs) of academic researchers in the digital age conducted by Xuemei (2010) also found ICT uptake to be high among respondents, thereby, corroborating the results of Larson's (2010) study above. The respondents used Email, Listservs, Websites, FTP, Online Catalogs, E-journals, Databases and Web Portals (Xuemei, 2010).

Similar to Larson (2010) and Xuemei (2010), Hess`s (2010a) study of veterinary practitioners established that, the Internet was a source of blood work and radiographs; it provided access to websites on sugar glider medicine, as well as wildlife rehabilitation and poison control. The Internet had made it possible for veterinary practitioners to investigate the availability and quality of products; to hold conferences and continuing education meetings online; and it also made it possible for veterinarians to make online telephone exchanges. The results indicate that respondents in Hess`s (2010b) study used the Internet and ICTs to perform a wider variety of tasks; the level of ICT uptake was therefore very high.

The studies of veterinary practitioners and scientists referred to above from Nigeria, Zimbabwe, South Africa, Tanzania Ghana, the USA and Europe have all revealed high usage of a variety of information sources in both print and electronic media by scientists irrespective of their setting. Studies conducted between 2009 and 2012 show an increase in the variety of usage of Internet technologies and e-mail for the purposes of research, teaching, exchange of radiology images and communication in general by the scientists and clinicians. Social media (Blogs, Facebook, and Twitter, among others.), smart phones, tablets, and ipads have also increased options for access to information and communication channels by scientists.

### **3.3.5 Usage of Veterinary Medical libraries**

Wales`s (2000) investigation of veterinary practitioners in the United Kingdom (UK) found that, the majority of respondents used the Internet to access veterinary information than used a veterinary library. In a similar study, Grefsheim & Rankin`s (2007) investigation of information needs and information seeking in a biomedical research setting established that, NIH scientists overwhelmingly used the NIH library (85%), they began their searches at the library website rather than Google; and were likely to seek information themselves (95%); and valued desktop resources and services (Grefsheim & Rankin, 2007). The above findings contradicted the results of Wales`s (2000) study where the majority of users and non-users would prefer enhanced library access via the Internet, especially access to full-text journals.

### **3.3.6 Continuing Veterinary Medical Education, Problem Based Learning and Information Literacy**

Murphy`s (2003) findings that, veterinary medicine students who studied problem based learning in veterinary science education also acquired good information skills correspond with the new recommendations by the World Organisation for Animal Health (OIE) (2013) which set basic minimum standards expected of practitioners now known as “Day 1 Veterinary Graduates”. The latter include acquisition of information skills that enable new veterinarians to effectively seek and communicate information to fellow veterinary practitioners and stakeholders. The basic

competencies also entail ability to carry out basic research (OIE Website, 2014 & 2015).

Nweke`s (1992a) investigation of information seeking and use by Human Veterinary Medical Scientists (HVMS) in Africa established that, practitioners benefitted from library user instruction conducted by library staff, and selective dissemination of information (SDI) and current awareness (CA) services. HVMS also accessed the latest information from current abstracts, specialized bibliographic searches and up-to-date reference materials, among others (Nweke, 1992b). Pelzer, Wiese, & Leysen (1998) noted that, the overall use of e-resources was high among students receiving problem based learning method of instruction.

Hurd, Blečić, and Vishwanatham`s (1999) investigation of the ISBs of molecular biologists established that, knowledgeable librarians had become change agents within organizations facilitating access to information and knowledge embedded in information systems, online and CD-ROMs, among other sources; and training scientists in information skills and effective library use. While, an investigation of the information environment of veterinary researchers at the University of Zimbabwe (UZ) by Chikonzo and Aina (2001a) also identified the need to provide constant training to the library staff, so that they could continue to improve library services provided. Veterinary researchers also obtained information through attending conferences, seminars, reading journals, reading books, and consulting colleagues (Chikonzo & Aina, 2001b).

According to Moore (2003a), continuing veterinary medical education (CVME) is used to update skills, to learn about what new services to offer, to rejuvenate enthusiasm for practice or to validate clinical impressions. Although CVME meets a variety of practitioner needs, the ultimate goal should be to assist practitioners to solve clinical problems to improve practice and patient care (Moore, 2003b). According to Murphy (2003c), continuing education courses, conference attendance, and participation in veterinary associations presented some opportunities to maintain and update veterinary scientists` clinical practice skills.

In an effort to understand how the geographical divide influenced access to information by remote veterinarians in rural Ohio, Murphy (2003d) investigated their participation in outreach and engagement programs. The study implores professional veterinarians to commit to a program of lifelong learning to maintain and upgrade their information search behaviour skills and use the best available evidence in clinical and animal patient care (Murphy, 2003e).

Murphy`s (2003f) recommendations were informed by her awareness that, problem based veterinary medicine required use of print and electronic resources to gather information regarding particular cases: CAB Abstracts, PubMed and e-journals, among others. The study also implored hybrid librarians to re-examine the roles of libraries as physical spaces, principles of outreach and engagement and contribute to lifelong learning and sustained relationships with veterinarians; some of the library services offered to veterinarians included document delivery, chat reference, websites and online training, among others (Murphy, 2003g, p. 1).

In a related study conducted in Tanzania, Sife and Chilimo (2006a) found that the low ICT uptake among veterinary researchers at the Sokoine University of Agriculture (SUA) contributed to their lack awareness of the existing information resources. Veterinary researchers were also affected by inadequate information searching skills; lack of guidance from librarians; and limited knowledge on the structure of databases. Results of Sife and Chilimo`s (2006b) study are consistent with the findings of Davies (2007), who reviewed literature on the ISBs of medical doctors. Most studies reviewed by Davies (2007) highlighted the complexity of literature searches; and hence recommended that, librarians needed to provide information literacy training to health researchers.

Colby, Turner and Vasbinder`s (2007a) investigation of the training strategies for laboratory animal veterinarians found that, the field was experiencing a serious shortage of appropriately trained veterinarians for both clinically related and research oriented positions within academia, industry and government. The field required formal and informal training programs; publicly accessible training resources and educational opportunities and newly emerging training resources such as Internet based learning aids (Colby, Turner, & Vasbinder, 2007b). The study suggested that new training strategies should be considered by institutions and professional lab animal medicine organizations to attract experienced veterinarians to this field, address their needs as adult learners and the advantage of new developments in electronic educational tools (Colby, Turner, & Vasbinder, 2007c).

Similarly, Larson`s (2010) investigation of rural veterinary practitioners at Kansas State University established that respondents required training on how to use the Loansome document feature on PubMed, Veterinary Medical Library Section, Medical Library Association (MLA) and My NCBI which helps veterinarians to set up automatic searches for articles. Brent`s (2011) study established that veterinarians upgraded their skills and knowledge, and also accessed the latest information through conference attendance once per year.

The situation was however different in South Africa, where Nel (2009) acknowledges the significance of the compulsory Continued Professional Development (CPD) programme that was initiated by the South Africa Veterinary Council (SAVC) to assist veterinarians in keeping up to date with contemporary veterinary developments. Respondents used the following tools/ sources to keep up to date: IVIS – International Veterinary Information Service, Google, Web 2.0, Google and Blogs; Results of the study showed that there was high ICT uptake among the respondents (Nel, 2009).

The above findings are consistent with the contributions of six veterinary practitioners who participated in a roundtable panel discussion facilitated by Hess (2010) and reported high Internet use by practitioners and veterinary interns. Veterinary practitioners used the Internet to verify clinical information supplied by other veterinarians and to seek advice; and was also used by veterinary interns to obtain research information; send radiographs; and access the veterinary information



network (VIN) (Hess, 2010). Slawson and Shaughnessy's (2005) study of the ISBs of veterinary practitioners questioned the wisdom of veterinary schools' continued emphasis on teaching evidence-based medicine instead of teaching information management, so that future veterinary practitioners could access, use and manage information with less difficulty.

O'Leary's (2012a) assessment of continuing veterinary medical education recommends that veterinary professionals should continue their professional development after graduation through free self-directed learning opportunities provided by Social Media tools. He implored veterinary practitioners to acquire more knowledge on Web 2.0 applications because they facilitated participatory information sharing, interoperability, user centered design and collaboration through the world-wide-web (O'Leary, 2012b). Web 2.0 allowed users to interact and collaborate with each other in a social media dialogue as creators of user generated content in a virtual community; Examples of Web 2.0 tools were: social networking sites, blogs, wikis, video sharing sites, hosted services, web applications, mashups and folksonomies (O'Leary, 2012c).

### **3.3.7 Barriers (Obstacles) to Access and Use of Information**

Drake and Woods`s (1978a) information service survey established that: many Indiana veterinarians were relatively isolated from colleagues and information sources, and comprehensive medical libraries and trained information specialists. Veterinary medicine was a rapidly changing field in which information needs of veterinarians could not easily be met by conventional sources, public or medical libraries; and practitioners often found that the medical library was not sufficiently equipped to deal effectively with problems in animal medicine (Drake & Woods, 1978b).

Results on the geographical scatter and isolation of veterinary practitioners were corroborated by many subsequent studies across the globe, including, Pelzer and Leysen (1991a), Talbot (1991), Sundlof (1993), Westhuisen (1995a), Wales (2000) and Murphy (2003). Pelzer and Leysen (1991b) and Westhuisen (1995b)`s studies reiterated that, veterinary practitioners were often isolated from easy access to information in medical or hospital libraries, making the use of a variety of information resources necessary.

Westhuisen (1995c) also emphasized that, the nature, usage, rate of change and acquisition of the information required by veterinarians presented formidable difficulties at all career stages: the real-time nature of most veterinary work; and the

very small unit size of veterinary practices. Pelzer and Leysen (1991) added that, although 50% of respondents had access to the use of a computer, hardly any researcher used it for database searching. Similar findings were reported in Wales's (2000a) study of veterinary researchers in the UK; respondents did not use Veterinary library catalogues, this had implications on the location of required veterinary information. Wales (2000b) also identified some variations in information source use by practice size and type, as well as information type.

Murphy's (2003a) study of veterinary practitioners in rural Ohio State, USA identified the following obstacles to accessing information: lack of time; cost; poor organization of information sources; lack of an appropriate source to satisfy an information need; the questionable reliability of certain information sources; and the geographical distance from a veterinary medicine library. More than 75% of veterinary practitioners lived beyond a one hour driving distance from the Ohio State; distance alone was a significant barrier to obtaining veterinary information, while the ability to obtain accurate clinical information in real time was another (Murphy, 2003b). Similar barriers were also reported in Wales's (2000c) survey of veterinary practitioners in the UK.

Murphy's (2003c) study also reported the following obstacles: inability to locate information readily or reach an individual to consult with, and a lack of resources or out of date resources; lack of knowledge of where to look for the information on the web; and lack of awareness of the services offered by the Ohio State University

Veterinary Medicine library. Other barriers were: a significant number of animals to be attended to by one veterinarian per geographical location; public access to the new library building was restricted to students, faculty and staff; there were also difficulties in getting a university specialist or clinician to satisfy immediate information needs (Murphy, 2003). According to Cockcroft and Homes (2004), best patient care required: additional clinical information and an assessment of how good the evidence that supports that information is; the question could be for example, be about the optimal diagnostic approach, therapeutic strategy or prognosis.

Davies`s (2007a) literature review of the ISBs of doctors established the following barriers: lack of time; ineffective search strategies; some clinicians were too busy to seek information; limited search skills; lack of basic IT skills; irrelevant material; inappropriate search terms; inappropriate databases; incorrectly spelt terms (did not use MeSH); answers did not exist or would not affect care; and limited EBM sources (Davies, 2007b).

Nweke`s (1992) investigation of HVMS established the following obstacles for Veterinary Medical libraries: lack of finance to subscribe to current international periodicals; low quality health information content available in local magazines and newspapers; low TV and radio broadcasts of new developments in orthodox human and veterinary medicine; low level of assistance from Library staff; absence of librarians familiar with medical science literature and not just library retrieval systems; absence of more cordial and efficient staff members; lack of improved

information environments; outdated medical literature, no-longer sufficient to deal with the rapidly changing medical field; and shortage of up-to-date medical & veterinary journal titles (Nweke, 1992a). HVMS also requested more library opening hours, including weekends; other information resources required urgently included up-to-date reference materials, and regular provision of newsletters and bulletins; and recent Advances series and Epidemiological Reviews in all subjects (Nweke, 1992b).

Basimalla`s (2000) investigation of the ISBs of Health Science researchers in India identified the following barriers: proliferation of health literature; exponential growth of knowledge; deplorable library staff; incomprehensive collection of books and monographs; varied organization of information sources; limited library services, such as, lending and basic reference service; lack of cooperation among libraries; inefficient libraries, for example, lack of norms to guide library functions and operations; and libraries performed below agreed national standards.

In Angello and Werner`s (2010a) study of the ISBs of livestock researchers established that, they experienced the following obstacles: Time constraints; resource reliability; trustworthiness/ credibility of information; and information overload. Although few formal studies of the information needs and ISBs of public health professionals have been reported, the literature consistently indicated a critical need for comprehensive, coordinated, and accessible information to meet the needs of the public health workforce (Angello & Werner, 2010b). Results show that, Institutes had few e-resources for their researchers; and most researchers were not aware of the

available e-resources, hence they could not access and use them effectively in their research work; and they also had little usage of VETCD, AHPC, Tropical Forages, and Integrated Principles of Zoology, among other sources (Angello & Werner, 2010).

Hurd, Blecic, and Vishwanatham`s (1999) study of the ISBs of molecular biologists established that, molecular biology had a variety of disciplinary backgrounds and now saw applications in many fields, including science, medicine, agriculture, and industry in developments as designer drugs engineered to treat specific diseases. Similarly, Kim and Dietrich`s (2008) investigation of the categorization of services for seeking information in biomedical literature established the following barriers: no single service for information retrieval could meet all information demands of biologists for their research; first cluster existing services for seeking information from biomed literature based on their input and output formats; compare unique features of services with different behavioural type of information seeking activities; and describe usability and reliability of tools.

In a related study, Cuk and Fuznic (2002) investigated veterinary practitioners in Slovenia and identified the following barriers: busy work schedule; lack of time; inadequate information skills; lack of access to veterinary portals; and librarians could perform literature searches for busy clinicians. On the other hand, Grefsheim and Rankin`s (2007) study of information needs and information seeking in a biomedical research setting established the following obstacles: inadequate time to

search and gather information; lack of knowledge of what was available; information was too hard to find; there were challenges in managing gene sequence data; and difficulties in manuscript preparation. The findings underscored the need to continue assessing specialized needs and seeking innovative solutions (Grefsheim & Rankin, 2007).

Turoff and Hiltz's (2008) study of the emergency preparedness of the NLM practitioners and academic researchers identified that lack of access to current authentic information at the point of need was an obstacle to information access and use. In a similar study, Hider (2009) identified inadequate information skills; negative attitudes and search behaviours as the main challenges to accessing required information.

Meanwhile, Sife and Chilimo's (2006) study of veterinary researchers found that, despite availability of a variety of relevant information sources at Sokoine National Agriculture Library, most of them were under-utilized due to lack of awareness, inadequate information search skills, lack of guidance from librarians, inadequate computers, and unreliable Internet connectivity, frequent power cuts, inadequate research information in relevant fields. While the following constraints were reported by Nel (2009) after investigating veterinary researchers in RSA: lack of time; long distance from centres where CPD activities were held; and problems associated with administration, registration and cost implications. Most respondents saved retrieved

information in personal files on their computers; participants were required to write a report, guideline, notes, papers and articles; and 50% of respondents shared or communicated retrieved information with other people or colleagues (Nel, 2009).

In a related study, Fourie`s (2009) information literacy (IL) study of healthcare practitioners identified the following barriers: inadequate access to ICT; inadequate computer and information skills; lack of time; lack of motivation; long working days; emotionally intense jobs; age and gender dynamics; lack of opportunity; lack of energy; inadequate access to information sources; inadequate support from employers for promoting evidence based practice; and inadequate Internet skills and lack of professional curiosity.

An ISB study of basic science researchers by Haines et al. (2010) identified the following barriers to accessing research information: they relied on basic keyword searching, using the simplest interface of a database or search engine. While, Raza, Fatima and Uphaday`s (2010) investigation of the ISBs of researchers at the Central Drug Research Institute (CDRI), Nebraska University, in India established although most researchers were satisfied with the library facilities available/ provided and helpful library staff, they also identified the following obstacles to information access: slow Internet downloads; lack of or poor technical guidance; and unsatisfactory opening hours.



In 2011 Brent investigated the information needs of veterinarians found the following barriers: geographical distance from the closest veterinary libraries; busy work schedule made it difficult for the veterinarian to seek for information at different places; and university veterinary libraries nearby required special authorization for a veterinarian to access or check out articles. On the other hand, an investigation of evidence based medicine (EBM) in veterinary research and practice by Vanderweerd et al. (2012) established the following obstacles: lack of high quality patient centered research; the need for basic understanding of clinical epidemiology by veterinarians` absence of adequate searching techniques and accessibility to scientific databases and inadequacy of EBM tools that could be applied to the busy daily practice of veterinarians.

Dzandu and Dadzie`s (2012) study found that: researchers encountered difficulties in using ICTs due to inadequate training in usage of ICTs and services and low frequency; inadequate cooperation among libraries reduced the chances of sharing of library resources through Inter-library Lending and document and delivery; lack of effective publicity of ICT facilities and services available; and only a few researchers had received training in Inter-Library Lending & Document Delivery (ILL/DD) and Online Public Access Catalogue (OPAC) searches.

### **3.4 Summary of Chapter 3**

The following two paragraphs summarise the discussions of the ISB models considered in this study because of their relevance to the information seeking patterns of veterinary scientists (researchers). Ellis's search features model (1989, 1993) and Kuhlthau's (1988, 1991, 1994) Information Search Process can be related easily to Wilson's active search model of information seeking behaviour (Wilson, 1999a). Wilson (1999b) labels Ellis and Kuhlthau, and his own information behaviour models because they were concerned with generalised behaviours surrounding the actual initiation of information-seeking and, with a broader perspective of the information search than simply the use of computer based information retrieval systems (Wilson, 1999c, p. 258). Wilson (1996a, 1999d) asserts that, the expanded model could be taken to apply to information behaviour more generally, rather than solely to ISB.

Wilson's (1996b, 1999d) revised model is one of several employed in research concerned with information use and users (Case, 2002 & 2007). These models present in a simplified way the relationships among theoretical propositions and processes connected with identification and satisfying one's information needs (Wilson, 1999e; Case, 2007). According to Wilson (1999f), the existing models could be grouped according to the level of described processes (for example, level of cognition, level of social behaviour) or according to how complete a picture of behaviour they represent (that is, whether they refer to a particular stage of

information acquisition or present a full sequence of related mental and physical activities). The various models of information behaviour, ISB, and information searching represent different aspects of the overall problem; and are complementary, rather than competing (Wilson, 1999).

Most ISB scholars concur that, information behaviour research has grown immensely from its scattered beginnings earlier in the twentieth century. Wilson (1994) attributes the beginnings of user studies to the Royal Society Scientific Conference of 1948. We now have a much deeper and less simplistic understanding of how people interact with information (Kuhlthau, 2004; Case, 2007). We understand information behaviour better within social contexts and as integrated with cultural practices and values (Wilson, 1999; Case, 2007). The further complexity of information seeking through the use of various technologies and genres is coming to be better understood, though there is much more to be studied (Bates, 2010).

The above assertion resonates with the views of Marchionini (1995) who perceived that, the influence of technology on information seeking had been felt since the early 80s & 90s. The extraordinary changes in information technology (IT) over the last 50-60 years have meant that a great deal of information behaviour research has also been concerned with impacts of and reactions to the kinds of interactions people experience when using new technologies for finding and communicating information (Bates & Maarch, 2010).

Chapter four presents and discusses in detail the methodology (mixed methods research approach and its philosophical worldviews, the explanatory sequential mixed methods research design, methods of data collection, study population and samples, data analysis and ethical considerations) used to carry out the study.

## **CHAPTER FOUR: METHODOLOGY**

### **4.1 Introduction**

This chapter discusses the methodology used to carry out and guide the study. The chapter is organized as follows: section 4.2 covers research approaches, philosophical worldviews, designs, and methods. Section 4.3 justifies the choice of mixed methods research as an approach to guide the study. Section 4.4 discusses the variables considered in this study, and section 4.5 explains the design of the study. Section 4.6 presents the study population, while section 4.7 outlines the data collection procedures. Section 4.8 discusses the ethics observed in this study. Section 4.9 presents the summary of chapter 4.

## **4.2 Research Approaches, Philosophical Worldviews, Designs, and Methods**

Research approaches are plans and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis. According to Creswell (2014a), a research approach is the intersection of philosophical assumptions, designs, and specific methods (p. 247). While, research designs are types of inquiry within qualitative, quantitative and mixed methods approaches that provide specific direction for procedures in a research study (Creswell, 2014b, p. 247). Creswell (2014) asserts that, research methods involve the forms of data collection, analysis, and interpretation that researchers propose for their studies (p. 247). The worldviews, designs, and methods all contribute to a research approach that tends to be quantitative, qualitative or mixed (p. 17). The researcher agrees with the pragmatists' philosophical worldviews that, knowledge is conjectural, absolute truth can never be found; thus knowledge found in research is always imperfect and fallible (Creswell, 2014c). The present study did not seek absolute truths, but a better understanding of the research phenomena.

According to Bryman (2006) and Tashakkori and Teddlie (2010), as referred to In: Creswell (2014, p. 217), many different terms are used to describe the mixed methods research approach, such as, integrating, synthesis, qualitative and quantitative methods, multi-method, and mixed methodology, but recent writings tend to use the term mixed methods. The mixed methods label suggests that it is the methodologies and not the methods that are mixed. Giddings and Grant (2007)

however do not agree with Creswell (2014) and other scholars with similar views; their conception of the process is that, in many instances, what was actually mixed were methods rather than methodologies, with the qualitative component too often in a subservient role.

#### **4.2.1 Explanation of Mixed Methods Research (MMR)**

Creswell (2014) conceptualizes mixed methods research to be an approach to inquiry that combines the use of both quantitative and qualitative forms of research; it involves philosophical assumptions, and the mixing or integration of both approaches in a study (p. 244). Johnson et al. (2007) are credited in the literature for providing a synthesis of 19 definitions of mixed methods research (MMR). The authors define MMR as a type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches for the broad purposes of breadth and depth of understanding and corroboration (Johnson et al., 2007, p. 123).

The researcher chose the explanatory sequential mixed methods research (MMR) design to guide the present study because MMR procedurally provided a better strategy that enabled the researcher to have a more complete understanding of the research phenomena being investigated, while at the same time exploring research questions through explanations of quantitative results with qualitative follow-up data

collection and analysis processes (Johnson et al., 2007). The selected design incorporated both quantitative and qualitative data collection procedures; it enabled inclusivity, as well as complementarity of research methods.

**Table 2: Tendencies (Practices) of Mixed Methods Approach**

Tendencies (Practices)	Mixed Methods Approaches
<ul style="list-style-type: none"> <li>❖ Use these Philosophical Assumptions</li> <li>❖ Employ these Strategies of Inquiry</li> </ul>	<ul style="list-style-type: none"> <li>❖ Pragmatic Knowledge Claims</li> <li>❖ Sequential, Concurrent, and Transformative</li> </ul>
<ul style="list-style-type: none"> <li>❖ Employ these Methods</li> </ul>	<ul style="list-style-type: none"> <li>❖ Both open ended and closed ended questions, both emerging and predetermined approaches, and both quantitative and qualitative data and analysis</li> </ul>
<ul style="list-style-type: none"> <li>❖ Use these practices of research as the researcher</li> </ul>	<ul style="list-style-type: none"> <li>❖ Collects both quantitative and qualitative data</li> <li>❖ Develops a rationale for mixing</li> <li>❖ Integrates the data at different stages of inquiry</li> <li>❖ Presents visual pictures of the procedures in the study</li> <li>❖ Employs the practices of both qualitative and quantitative research</li> </ul>

**Source: Content adapted from Creswell, 2014, p. 18**

#### **4.2.2 The Pragmatic Worldview of Mixed Methods Research**

Mixed methods research (MMR) approach is a pragmatic worldview that is used to gather both quantitative and qualitative data sequentially in the design. According to Creswell (2014), the researcher bases the inquiry on the assumption that collecting diverse types of data, best provides a more complete understanding of a research problem than either quantitative or qualitative data alone (p. 19). The study begins



with a quantitative survey of the five population target groups with a view to generalize the findings to the population (findings are reported in section 5.2), while the second phase is qualitative, it uses interviews to collect detailed views from purposively sampled key informants (findings are reported in section 5.3) to help explain the initial quantitative survey results (Creswell, 2014a, p. 19). Creswell (2014b) contends that, pragmatism derives from the work of Peirce, James, Mead, Dewey, Murphy, and Paton, among other scholars (p. 11). As a philosophical underpinning for mixed methods studies, Morgan (2007a), Patton (1990), and Tashakkori and Teddlie (2010) attribute its importance to focusing attention on the research problem in social science research and then using pluralistic approaches to derive knowledge about the problem.

Creswell (2014c, p. 11) acknowledges the works of Cherryholmes (1992) and Morgan (2007b) and his own ideas in arriving at the conclusion that pragmatism provides a philosophical basis for research: Pragmatism is not committed to any one system of philosophy and reality; Individual researchers have freedom of choice; Pragmatists do not see the world as an absolute unity; Truth is what works at the time. It is not based in a duality between reality independent of the mind or within the mind; Thus, in mixed methods research, investigators use both quantitative and qualitative data because they work to provide the best understanding of a research problem; The pragmatist researchers look to the what and how to research based on the intended consequences; Pragmatists agree that research always occurs in social, historical, political, and other contexts; Pragmatists have believed in an external

world independent of the mind as well as that lodged in the mind; and thus for the mixed methods researcher, pragmatism opens the door to multiple methods, different worldviews, and different assumptions, as well as different forms of data collection and analysis (Cresswell, 2014a).

#### **4.2.3 Research Paradigms, Mixed Methods Research and Postpositivism**

Neuman (2011) defines a paradigm as a general organising framework for theory and research that includes basic assumptions, key issues, models of quality research, and methods for seeking answers (p. 94). On the other hand, mixed methods research (MMR) is a form of ‘postpositivistic’ research that uses a pragmatic approach to exploring research questions (Pickard, 2013a, p. 10). These views are corroborated by Creswell (2014b, p. 245) who asserts that, pragmatism as a worldview or philosophy arises out of actions, situations, and consequences rather than antecedent conditions (as in postpositivism). Pickard (2013b) contends that, current postpositivism is rooted in the premise that any perception of reality cannot be an objective picture but it is drawn from empirical observation and existing theory. There has been a shift within this paradigm but the basic concepts of quantification and generalization from original positivism remain predominant (Pickard, 2013c; Creswell, 2014c).

Pickard (2013a) asserts that, the approach taken by postpositivists remains one of experimentation and hypothesis testing although the procedures have been modified. Other scholars share a different perspective. According to Creswell (2014), MMR is constructed following the same process of a priori design but that design can take a number of different forms giving equal weighting to qualitative and quantitative aspects of the inquiry or allowing for dominance of one over the other. Usage of the qualitative dimension for interpretation allows for the possibility of prior knowledge having an impact on the perceptions of the results (Pickard, 2013b, p. 11).

Mixed methods research (MMR) has not been exempted from criticism either; some researchers contend that, it is a pragmatic approach to exploring research questions and should therefore not be regarded as a different and new research approach. In the present study, quantitative and qualitative research procedures were implemented sequentially over two (2) phases. In Phase one, two (2) standard self-administered questionnaires were used to gather quantitative data from all target population groups. Questionnaire 1 was used to gather data from veterinarians and laboratory scientists, while questionnaire 2 was used to gather data from technicians and veterinary hygiene inspectors. Phase two (2) was qualitative and semi-structured interviews were used to gather data from seven (7) purposively selected key informants.

### **4.3 Justification for Choosing MMR and Purpose Statement**

The choice of an approach and research design in a study are determined by the researcher's intentions and objective of the study. The choice of the explanatory sequential mixed methods research design to guide the present study was motivated by the researcher's desire to first, seek explanations and predictions that will generalise to other persons and places. The intention was to establish, confirm, or validate relationships and to have both representative views of the survey respondents, as well as a better understanding of complex situations through in-depth interviews with key informants in phase 2 to compliment quantitative data obtained from phase 1, as well as explain some of the unclear answers. The researcher perceived that the sequential data collection procedures would maximize the strengths of both quantitative and qualitative phases through complementarity. The sequencing of data collection procedures is also recommended by Johnson and Onwuegbuzie (2004) who asserted that, combining quantitative and qualitative methods means bringing together the strengths of both methods to compensate for the weaknesses found in one method. The selection of the mixed methods research approach to guide the study was informed by a review of the literature.

Pickard (2013) conceptualises the purpose of research within postpositivism to be very similar to that of positivism. Generalisations about the phenomena under investigation remain an output of the postpositivist approach to remain an empirical investigation (p. 11). The choice of the explanatory sequential mixed methods

research design to guide the present study was made with the full knowledge that the principle of generalizing the results to the study population would be done after analyzing the quantitative results of phase 1. Methodological dualism in the use of qualitative and quantitative data collection techniques is accepted practice in postpositivist research (Pickard, 2013, p. 11).

#### **4.4 Variables Considered in this Study**

Creswell (2014a) defines the term variable as a characteristic or attribute of an individual or an organization that can be measured or observed and that varies among the people or organization being studied (p. 52). This variance means that scores in a given situation fall into at least two mentally exclusive categories (Thompson, 2006). The variables of interest in this study included independent, dependent and intervening variables:

**4.4.1 Independent Variables:** are those that cause, influence, or affect outcomes; they are also called treatment, manipulated, antecedent, or predictor variables (Creswell, 2014b, p. 52). The following independent variables were considered to be relevant to this study:

- (i) Information needs of respondents;
- (ii) Educational qualifications;
- (iii) Reading culture;

- (iv) Information Searching Skills;
- (v) Library use habits; and
- (vi) Information Communication Technology (ICT) skills.

**4.4.2 Dependent Variables:** According to Creswell (2014a) dependent variables are those that depend on the independent variables, they are outcomes or results of independent variables; they are also called criterion, outcome, effect and response variables (p. 52). The following four (4) dependent variables were considered in the present study:

- (i) Veterinary scientists' publications output (depended on the scientific writing skills and library use habits of the researchers);
- (ii) Information Sources (depended on the information needs of the researchers);
- (iii) Library use habits and Search strategies; and
- (iv) Information seeking behaviours (ISB) of researchers (depended on information needs of researchers, information sources preferred, and information skills, among others (Creswell, 2014b, p. 52).

**4.4.3 Intervening (mediating) Variables:** stand between independent and dependent variables; they mediate effects of independent variables on dependent variables (Creswell, 2014c, p. 52):

- (i) Adoption of ICTs and Internet use in Veterinary Services sector (positive impact and improvement in information environment of veterinary scientists);

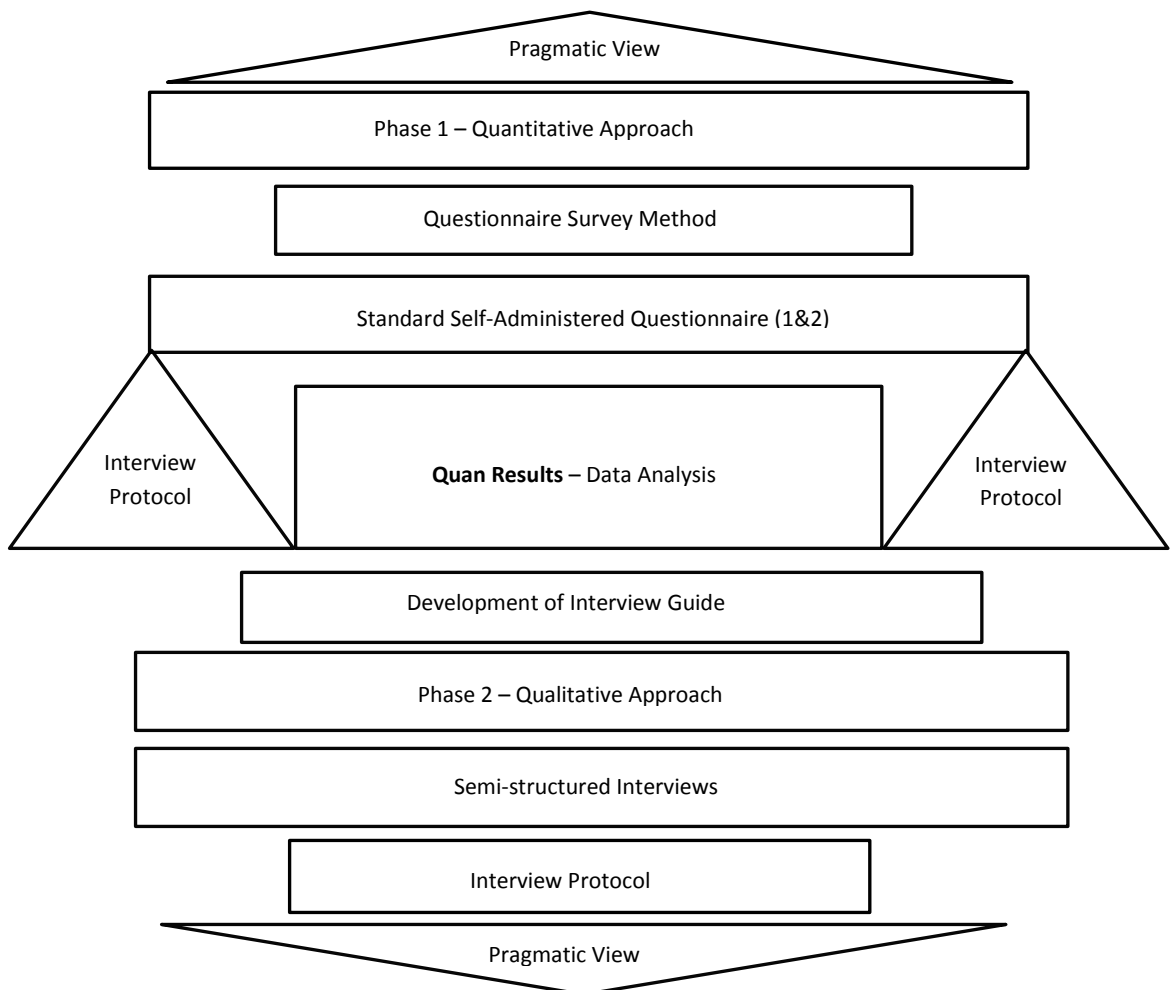
- (ii) Information literacy (determination of information needs; locating and accessing required information; critical thinking; analysis and evaluation of information; synthesis; and application of information);
- (iii) Continuous professional development (continuous upgrading of skills and knowledge of veterinary scientists); and
- (iv) Information environment of veterinary scientists (access to agriculture libraries and Livestock information systems; and Internet research tools, social media, smart phones, and tablets, among others)

#### **4.5 Design of the Study**

Creswell (2014) conceptualizes research designs as types of inquiry within qualitative, quantitative, and mixed methods approaches that provide specific directions for procedures in research studies (p. 12). They address different aspects of the research procedure, from philosophical assumptions to data analysis (De Lisle, 2011). Others call designs, strategies of inquiry (Denzin & Lincoln, 2011). The present study employed the explanatory sequential mixed methods research design; it involves a two-phase project in which the researcher collects quantitative data in the first phase, analyses results, and the types of questions that will be asked of participants in the qualitative phase (De Lisle, 2011; Creswell & Clack, 2011; Creswell, 2014, p. 15). The major reason for selecting the above design was to have the qualitative data help explain in more detail some of the discrepancies deduced from the quantitative findings. Procedurally, statistical data was gathered using

survey questionnaires 1 and 2 from the quantitative study during Phase 1; while in Phase 2, qualitative data was collected using face to face semi-structured interviews with 7 purposively sampled key informants (Creswell, 2014a, p. 224; Tashakkori & Teddlie, 2010). The pragmatic philosophical worldview of the research design adopted in this study is represented graphically by figure 8 below:

**Figure 8: Visual Model of the Pragmatic Philosophical Worldview of the Explanatory Sequential Mixed Methods Research Design**



**Source: Original Ideas about the Explanatory Sequential MMR Design were adapted from Creswell (2014b)**



## **4.6 Study Population**

The target population comprised of 5 definite strata (5 target groups) collectively referred to in this study as veterinary scientists (target population is described in sections 1.7.6 – 1.7.10).

Standard self-administered questionnaires 1 and 2 were used to gather data from the five population target groups, while in-depth perceptions were gathered through in-depth interviews held with seven (7) purposively selected key informants. Some of the purposively sampled key informants were DVS senior managers responsible for decision making; advising the Minister of Agriculture, Water and Forestry (MAWF) and the livestock industry on international trade in live animals and animal products; drafting policies and legislation related to livestock, animal health and welfare; and the continuing professional development of veterinary scientists, among other responsibilities.

### **4.6.1 Description of Quantitative Phase 1 Population Sample**

While the statistics of the state veterinarians, lab scientists, animal health technicians (AHTs), and veterinary hygiene inspectors were recorded in DVS Annual reports (2005, 2007 and 2011, the exact statistics of private veterinarians, and veterinary para-professionals were not readily available from the Namibia Veterinary Council

(NVC) and the Veterinary Association of Namibia (VAN) during 2011. Furthermore, the legislation governing the registration of veterinary professionals and veterinary para-professionals only came into effect on 27<sup>th</sup> February 2014 (Government Gazette, Ministry of Justice, and GRN). During the design of the study, sampling initially made provision for 100 veterinarians from both the state and the private sector. Lab scientists and veterinary hygiene inspectors were known to be very few. From the figures given by the DVS, the first 100 Veterinarians, the first available 50 AHTs, 10 lab scientists and all (19) VHIs were conveniently sampled for investigation.

At the conclusion of phase 2 however, during 2014, the population figures supplied by the NVC and the DVS showed that there were 56 State (DVS, MAWF and MET) Veterinarians and about 59 private Veterinarians registered to practice in Namibia by the Namibia Veterinary Council (NVC) beginning of 2014 (NVC Register, February 2014), 75 Animal Health Technicians, 19 Veterinary Hygiene Inspectors, 7 Laboratory Scientists (DVS, 2011; NVC Register, 14 February 2014).

#### **4.6.1.1 Quantitative Sampling Design: Phase 1**

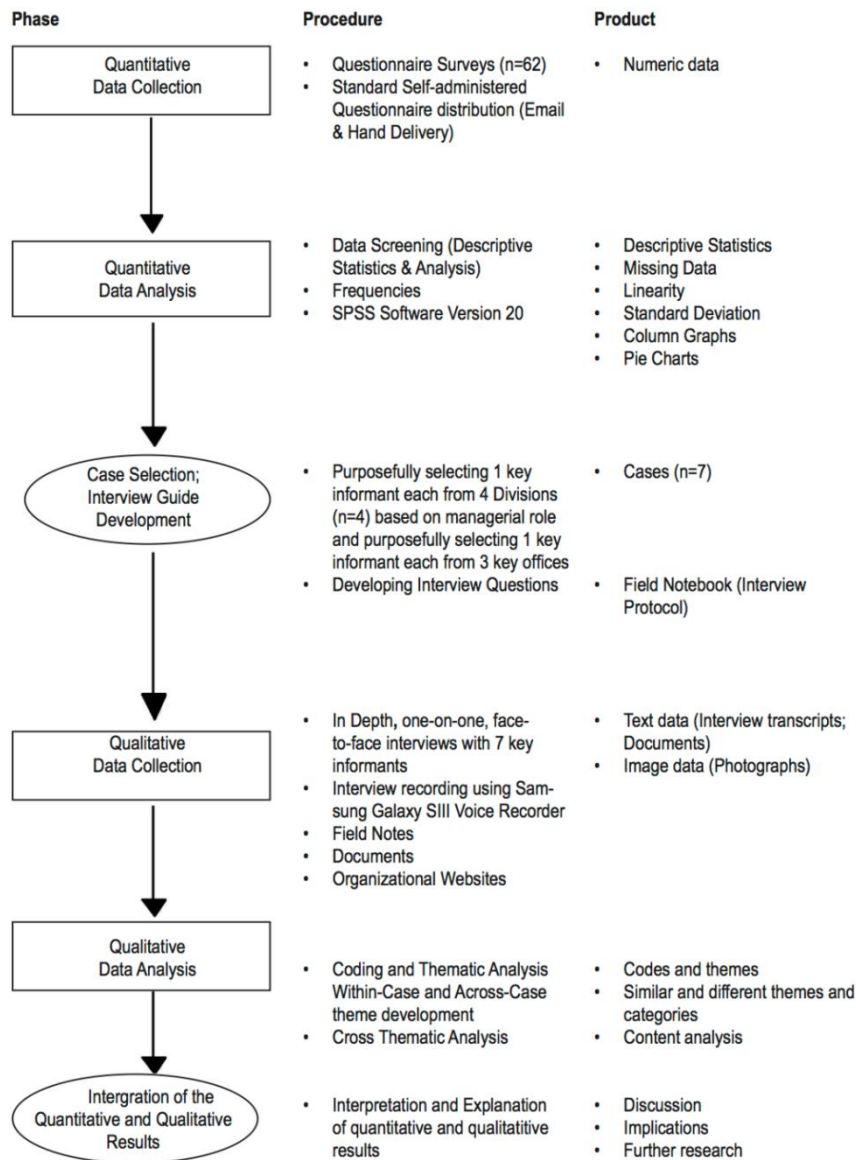
Convenience sampling used for this study is discussed in section 4.6.1 above.

#### **4.6.1.2 Qualitative Sampling Design: Phase 2**

In the qualitative phase, purposive sampling was used to identify 7 key informants. The first 4 key informants were sampled from experienced and senior veterinary professionals based in the 4 divisions of the Directorate of Veterinary Services (DVS), depending on their availability and willingness to participate in the interviews. The other 3 respondents were sampled to be key informants because of their roles in coordinating the training and development of state veterinary professionals and veterinary para-professionals; and data processing and management of the DVS Information systems because it impacted on the overall services provided by the DVS (Onwuegbuzie & Collins, 2007, p. 291).

## 4.7 Data Collection Procedures

**Figure 9: Visual Model of the Mixed Methods Explanatory Sequential Design Procedures and the Research Process**



Source: Ideas of the Visual Model adapted from Creswell and Clack (2011, p. 305)

Official permission to conduct this study was obtained from the Office of the Permanent Secretary, Ministry of Agriculture, Water and Forestry (MAWF) (Appendix 4). Information seeking behaviour (ISB) literature, including Case (2006) recommends the use of surveys in conducting ISB studies. Data collection was carried out in two (2) distinct phases with rigorous quantitative sampling in the first phase and purposive sampling in the second, qualitative phase.

#### **4.7.1 Quantitative Data Collection Procedures: Phase 1**

In Phase 1, the study employed the survey method and procedures to collect quantitative data using 2 standard self-administered questionnaires. Questionnaire 1 was used to collect data from veterinarians, laboratory scientists, while Questionnaire 2 was used to gather data from veterinary hygiene inspectors (VHIs), animal health technicians (AHTs) and laboratory technicians. The surveys ran concurrently because Questionnaire 1 and Questionnaire 2 were targeted at different groups of respondents and therefore did not interfere with each other.

During the descriptive and inferential analysis of statistical results, some inconsistencies (discrepancies) and inadequacies or gaps among the responses provided by the participants were identified, and hence phase 2 was used to gather qualitative data in order to build onto results from phase 1.

#### **4.7.1.1 Quantitative Data Collection Instruments: Questionnaires 1 and 2**

The purpose of the study was to examine information seeking behaviours of veterinary scientists in Namibia as they carried out their responsibilities, such as, scheduled farm visit and inspection surveys; abattoir inspections; livestock disease research; processed data used to develop DVS information systems; and attended livestock disease conferences as part of continuing professional development (CPD), among others.

In the quantitative approach, 2 standard self-administered questionnaires 1 and 2 were used to gather data from all the 5 population target groups. In the absence of a register, it was very difficult to locate the duty stations of most of the private veterinary scientists. Once the research instrument was validated, data collection commenced immediately and was planned to be completed within a period of 1 year.

Questionnaires were hand delivered to all respondents in the target population groups based in Windhoek, including scientists based at private veterinary clinics and animal hospitals. Second, other questionnaires were emailed to all regional State Veterinary Offices outside Windhoek and the target respondents were also informed about it by the DVS Head Office; prior arrangements had been agreed upon with the researcher for that purpose. Where necessary, the questionnaires were sent to individual respondents through e-mail upon request.

However, due to either slow or lack of response, other copies of questionnaires were also hand delivered to all respondents who attended a DVS organized workshop at Otjiwarongo during October 2011. In all instances, respondents were requested to record their answers against individual questions on each questionnaire. It was unfortunate that the researcher was initially referred to the President of the Association of Private Veterinarians and the Registrar of the NVC, who both could not divulge the contact details of the private practitioners because they needed their consent, therefore, some target members of the study population may not have received the questionnaire at all.

Section 1 of the questionnaire covered Demographic characteristics of the information user. Section 2 asked questions pertaining to the information needs/requirements of the respondents. Section 3 covered the information seeking behaviours of respondents with respect to information sources, use of Internet technologies and information search strategies. Section 4 asked respondents questions about their information literacy skills and the DVS initiatives on continuing professional development. Section 6 asked respondents about the barriers (obstacles) that hindered their progress in accessing and using research information.

#### **4.7.1.2 Validity**

Validity in research is determined by the type of research approach, whether it's quantitative, qualitative or mixed methods, although the discussion is centered

around the issues of trustworthiness, authenticity and credibility of the overall research results, quantitative scores, data sources, and research participants (Creswell, 2014a). In the present mixed methods study, the researcher needed to establish the validity of the scores from the quantitative measures (drawing meaningful and useful inferences from scores on particular instruments) and to discuss the validity of the qualitative findings (determining whether the findings are accurate from the standpoint of the researcher, participants or the readers of an account; employing strategies such as, member checking and triangulating data sources) (Creswell & Miller, 2000; Creswell, 2014b, p. 201).

Since the present study employed the explanatory sequential mixed methods research design, additional validity concerns, such as, sample sizes for both the quantitative and qualitative phases, accuracy of the overall findings, consideration of selecting the same respondents for both quantitative and qualitative phases, and follow-up on all possible options, among others were considered (Creswell, 2014c, p. 225). The 7 purposively sampled key informants who took part in qualitative phase 2 of the study were part of the 62 respondents that took part in quantitative phase 1 of the study. The quantitative data collection instruments (questionnaires 1 and 2) were pretested on volunteer biology scientists at the University of Namibia before the commencement of the study.



#### **4.7.1.3 Quantitative Data Analysis: Phase 1**

Data collected using Questionnaires 1 and 2 was first coded, organised, and computerised (creating databases) using the software package SPSS Version 20 because it enabled cross tabulation and generation of frequency distributions. Basic level Descriptive Statistics were then used to organize and analyse statistical data from the survey into categories of objects for every variable that was measured by the different questions in the data collection instrument using the principles discussed in du Plooy (2009); and Powell and Connaway (2004). The processed data generated frequency tables, column graphs, and charts. Drawing inferences and further interpretation of the data from graphs, charts, and tables commenced thereafter.

#### **4.7.2 Qualitative Data Collection Procedures: Phase 2**

Qualitative data collection built directly onto the quantitative results. The quantitative results that were built on were extreme and outlier cases and significant results relating variables. Thus, phase 2 purposively sampled 7 key informants from the Directorate of Veterinary Services (DVS) among respondents who earlier participated in the quantitative phase 1. The intention of the design was to follow up the quantitative results and explore the results in more depth.

The purpose of holding interviews with purposively sampled key informants was two-fold. First, it was to obtain data on specific questions that would supplement some of the answers that were provided by 62 respondents who participated in the Quantitative Phase 1 of the study during 2011. Second, was to seek clarification and further understanding of the research phenomena using semi-structured interviews. Interviews were considered more appropriate than other qualitative data collection methods, such as, observations or focus group discussions because they allowed the researcher to have control over the line of questioning. The limitations were that interviews provided indirect information filtered through the views of interviewees. They provided information in designated office space rather than the natural field setting, but the researcher's presence may have biased the responses.

#### **4.7.2.1 Qualitative Data Collection Method: Semi-structured Interviews**

The interviews with seven (7) purposively sampled key informants sought clarity on matters pertaining to: information source preferences of respondents, continuing professional development, usage of libraries and the Internet, access to ICT facilities and internet connection by veterinary para-professionals and publications output of veterinary professionals and laboratory scientists. The researcher conducted face to face, one-on-one, in-person interviews; they involved semi-structured and generally few open-ended questions. Before entering the field, the researcher planned and developed an Interview Guide for asking questions and a protocol for recording answers.

#### **4.7.2.2 Data Collection Instrument: Interview Guide**

A semi-structured interview guide comprising of open-ended questions was used to collect data from 7 purposively sampled key informants on the establishment of the Directorate of Veterinary Services (DVS). The Interview guide was first approved by the research supervisor and then pretested on a few voluntary biologists at UNAM. The researcher conducted face to face, in-person interviews. With the consent of the informants, the interviews were recorded using a SAMSUNG Galaxy SIII mobile phone voice recorder in order to capture responses verbatim. The researcher also hand-recorded field notes during interviews, capturing the most important facts to supplement the interview transcripts.

Procedurally, questions were read out to the respondents. The first interview was held in December 2013 and completed in January 2014; DVS management considered this to be a less busy period. Qualitative data was gathered over a period of two months.

#### **4.7.2.3 Population**

Phase 2 of the study was qualitative. The study population in this phase comprised of very experienced, highly qualified and senior State veterinary professionals on the staff establishment of the Directorate of Veterinary Services (DVS). Although both state (public) and private veterinary professionals and veterinary para-professionals

took part in the questionnaire survey(s), no key informants were sampled from the private sector for interviews because private veterinary professionals mostly specialized in animal patient care of pets and small stock animals only, whereas the DVS had enough capacity in terms of human and financial resources, as well as infrastructure country wide to satisfactorily deal with animal disease diagnosis and animal patient care and monitor livestock disease surveillance, among other responsibilities.

Furthermore, the DVS was the only veterinary services authority in Namibia recognized by the World Organization for Animal Health (OIE), Food and Agriculture Organization (FAO), World Health Organization (WHO), the European Union (EU) and other international trading partners, as well as the Government of the Republic of Namibia (GRN).

#### **4.7.2.3.1 Purposive Sampling**

Four (4) out of seven (7) of the purposively sampled key informants were managers of the four (4) divisions that constituted the DVS and had a lot of influence and decision making authority with regard to the type of training required by veterinary professionals and veterinary para-professionals under their supervision, in pursuance of further studies in veterinary science (animal health), molecular biology, diagnostic services and research and disciplines that impacted on veterinary and environmental

hygiene and to some extent in-house training for the purposes of acquiring new knowledge and skills, in order to continuously improve job performance and to keep up-to-date on contemporary issues related to animal health.

Meanwhile, the other three (3) key informants were purposively sampled because of their key roles in training and continuing professional development of all DVS scientists; management of the DVS information systems; and supervision of field veterinary professionals and veterinary para-professionals south of the VCF.

#### **4.7.2.4 DVS and Namibia Veterinary Council (NVC) Documents**

In addition to data collected through interviews held with key informants, the researcher also collected available public and private documents that comprised of DVS Annual Reports between 2005 and 2011; DVS Circulars; Official Correspondence; Namibia Veterinary Council (NVC) Congress Agenda items and NVC Proceedings reports. The selected DVS and NVC documents supported the qualitative phase of the study. The researcher used a field notebook during the study; the researcher collected and analysed public documents (such as, DVS circulars, DVS annual reports and official correspondence.

#### **4.7.2.5 Qualitative Data Analysis**

Gibbs (2002) asserts that, qualitative data analysis is grounded in the interpretative philosophy in which people interpret their experience, mainly using language, and the researcher is entitled to discover the embedded meanings to conceptually gain a holistic understanding or generate a theory. Qualitative data analysis is an extensive examination of the data, fracturing it into various components and defining the characters and dimensions in order to make an inference about the whole object (Corbin & Strauss, 2008).

According to Creswell (2014), the intention of qualitative data analysis is to make sense out of the text and image data; it involves segmenting and taking apart the data as well as putting it back together (p. 224). Coding is a central activity in qualitative data analysis, meaning naming the pieces of data, and varies in type and level through the progress of analysis (Punch, 2009).

##### **4.7.2.5.1 Coding and Thematic Analysis**

**In the present study, the overall analysis process involved the following:**

- (i) Data analysis in qualitative phase 2 proceeded hand-in-hand with other parts of developing the qualitative study, namely, the data collection and the write-up of findings. Interviews were held sequentially one after the other, from the first (1<sup>st</sup>) until the last of the seventh (7<sup>th</sup>) interviewee.

After collecting data from the first interviewee, interviews with other key informants continued, analysis of data collected from earlier interviews proceeded hand in hand with data collection, write-up of the findings and organizing the structure of the final report;

- (ii) Coding began as soon as the first responses were received. Responses were initially coded using free text tags to describe the content. A group of tags was generated for each entry. As coding proceeded, memos (notes) were written about the potential overarching themes and any problematic content or codes. After the initial round of coding, similar tags were merged and then the codes were clustered into the following themes, representing the strongest ideas that emerged from the data: Information Seeking Behaviour, Information Needs, Information Sources, Accessing Information, Information Process and Use, Animal Health, Context of Information Seeking, Agriculture Researchers, Livestock researchers, Veterinary Researchers (Scientists), Veterinary Professionals, Veterinary Para-Professionals, Continuing Professional Development, Lifelong Learning, ICT adoption, Barriers to Internet Access and Use. The themes were then merged into 10 general categories, which helped the researcher to map them into generally known and existing ISB Concepts. Some themes were then clustered together and reduced to 6 ISB categories or meta-themes that emerged from the data as a whole, providing a backdrop for the themes and categories that emerged (Hofer, Townsend & Brunetti, 2012, pp. 391-392); and

- (iii) Data analysis proceeded on two levels, the general analysis (coding and thematic analysis) and the specific steps embedded in Content Analysis. General analysis involved detailed description of the informants, their responsibilities and their understanding of information seeking behaviour, their perceptions on continuing professional development, access to ICT and the Internet by veterinary para-professionals (technicians), among others.

#### **4.7.2.6 Discussion**

A discussion of the findings organized according to research questions is presented in Chapter 6 under the heading, Discussion. Procedurally, Section 5.1 presents and discusses factual and numeric data obtained from Quantitative Phase 1 of the study. Qualitative results are presented and discussed in Phase 2, Section 5.2 of the study. The discussion presented in Chapter 6 integrates the quantitative and qualitative results, as well as Phases 1 and 2. The third form of interpretation done in this study is the use of qualitative data from Phase 2 to help explain in detail the quantitative survey results obtained in Phase 1 (Creswell, 2014, p. 225). The intention of the design was to have the qualitative data help to provide more insight into the quantitative results.



#### **4.8 Research Ethics**

The introductory paragraphs of the 2 standard self-administered questionnaires and the interview guide contained ethical statements that informed respondents about their voluntary participation in the study and respect for their privacy. Respondents were informed about their right to withdraw from the study if they felt uncomfortable with data collection procedures and processes (Bak, 2008; du Plooy, 2009). All the research participants (private and state employees), as well as the Directorate of Veterinary Services (DVS) and the Namibia Veterinary Council (NVC) were given assurance by the researcher that information or data obtained from their employees or documents would be kept confidential, and would be used for study purposes only.

The researcher undertook to uphold and respect the intellectual property rights and the privacy of respondents. The researcher would seek permission from the copyright holders if dissemination of the results publicly was anticipated. Ethics were observed throughout the different processes of the study, starting from research design, collecting data, analysis and reporting results as presented in Table 3 below.

**Table 3: Research Ethics Considered in this Study**

<b>General Practice of Ethical and Professional Issues</b>	<b>Questionnaire Survey</b>	<b>Qualitative Interviews</b>
Respecting Intellectual Property Rights	The researcher acquired permission from the Permanent Secretary, MAWF, GRN and the Chief Veterinary Officer, DVS to carry out the study and to distribute the questionnaires among respondents	Explain the research's purpose to participant(s)
		A Prior written consent to proceed with the study was first obtained from Dean, FHSS, UNAM and another from the Permanent Secretary, MAWF
In Phase 1, each Questionnaire had 2 paragraphs explaining to the respondents the purpose of the study and the research procedures and approach	In Phase 2, the researcher explained the research's purpose to participants first before the interviews. The Interview Guide also contained an explanation about the study's purpose	Both the Questionnaires and the Interview Guide had a paragraph each guaranteeing/ Ensuring participants' privacy, anonymity and confidentiality
Gaining prior permission from supervisor when meetings were recorded	Ensuring participants' privacy, anonymity and confidentiality	Gaining a prior permission before recording the interviews
Committing to the UNAM Research Policy Ethics guideline(s)	Storing data securely	Transcribing interviews records accurately
	Reporting results accurately	Storing interviews' records and transcripts securely
		Reporting interviews data accurately

**Source: Original Ideas were adapted from Creswell (2014)**

#### **4.9 Summary of Chapter 4**

Chapter 4 discussed Mixed Methods Research (MMR). In the introductory section, the study defines and explains MMR and the Philosophical Worldviews, research paradigms and pragmatic view associated with MMR. The remaining sections of the study discuss in detail the explanatory sequential MMR design, data collection procedures, processing, data analysis and ethical considerations employed in this study.

Chapter 5 presents Data Analysis and the Findings of the study. The quantitative findings from Phase 1 of the study are reported in Chapter 5.2, while the qualitative findings from Phase 2 of the study are reported in Chapter 5.3.

## **CHAPTER FIVE: DATA ANALYSIS AND PRESENTATION OF THE FINDINGS**

### **5.1 Introduction**

This chapter presents data analysis and the findings of Phase 1 (quantitative) and Phase 2 (qualitative) of the study. The findings of phase 1 were obtained from data gathered from the 5 study population groups (veterinarians, lab scientists, veterinary hygiene inspectors, animal health technicians and lab technicians) using Survey Questionnaire 1 and 2. The findings of phase 2 were obtained through interviews held with seven (7) purposively selected key informants on the establishment of the Directorate of Veterinary Services (DVS). Questionnaire 1 (Appendix 1) was targeted at Veterinarians and Laboratory Scientists, while Questionnaire 2 (Appendix 2) was targeted at Veterinary Hygiene Inspectors (VHIs), Animal Health Technicians (AHTs) and Laboratory Technicians. Responsibilities of the study population and the veterinary services sector in Namibia are discussed in detail in Chapter 2: Context of the Study.

## **5.2 Data Analysis and Presentation of the Findings of Phase One: Quantitative Study**

Section 5.2 presents the quantitative findings under Parts 1, 2, 3, 4, 5 and 6. Part 1 covers the demographic characteristics of the respondents, while Part 2 presents their Information Needs. Parts 3 and 4 deal with Information seeking: information sources used by the respondents, their adoption of ICTs and usage of Internet Technologies, plus the user search behaviours online. Part 5 covers Continuing Professional Development (CPD), while Part 6 presents the Barriers to Information and Internet access and use.

The following section presents demographic data about the study population.

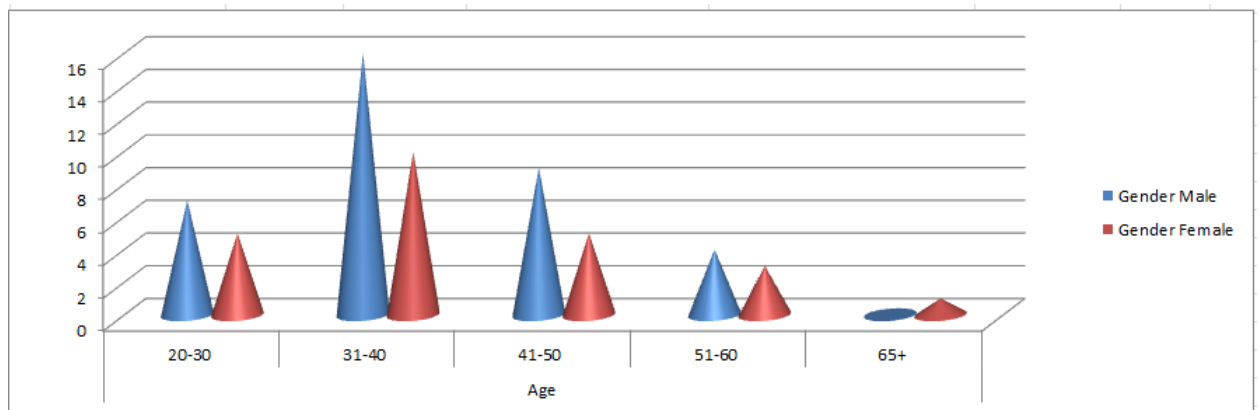
### **5.2.1 Demographic Characteristics of the Respondents**

Employment figures of state (Public Service) veterinary professionals and veterinary para-professionals are presented in most Directorate of Veterinary Services (DVS) Annual reports (2005 – 2011), while the employment figures of private veterinary professionals and veterinary para-professionals were not readily available at the Namibia Veterinary Council during 2011; guided estimates were however provided by the DVS at the time. Overall, sixty two (62) respondents out of a target population of an estimated two hundred (200) veterinary professionals and veterinary para-

professionals participated in the questionnaire surveys (1 and 2), that is, approximately 31% response rate.

### 5.2.1.1: Gender and Age of Respondents

**Figure 10: Column Graph 1: Frequency Distribution of Respondents by Gender and Age (n = 62)**



**Statistics:** There were 2 missing values, meaning that 2 respondents did not indicate their gender.

Results presented in Column Graph 1 above show that, 58% (36) of the respondents were male, while 42% (26) were female. The numerical distribution of the respondents by job category was as follows: Twenty four (24) veterinarians, seven (7) lab scientists, twenty five (25) animal health technicians, five (5) lab technicians and one (1) veterinary hygiene inspector. Of these, about 84% (52) of the respondents were between the ages of 20 and 50 years, while 11% (7) were aged between 51 and 60 years and below 1% (1) was beyond the age of 65 years. A

couple (2 – missing values) of female respondents did not answer the question, and therefore their age categories could not be determined.

### 5.2.1.2: Work Experience and Primary Field of Study

The overall results in Column Graph 1 above also show that some of the respondents were young scientists with less work experience, while others were middle-aged, with several years of work experience. Several years of veterinary practice did not necessarily imply research experience; the research expertise of most respondents that had not published journal articles or book chapters could not be determined.

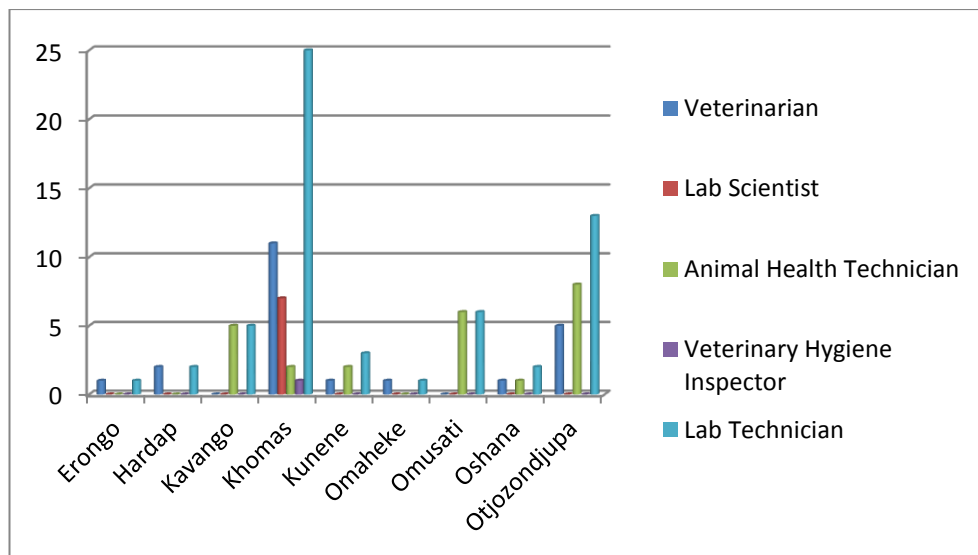
**Table 4: Frequency Distribution of Respondents according to Primary Field of Study (n = 62)**

Age Category	Primary Field of Study								
	BVMS	Veterinary Science	Veterinary Medicine	Microbiology	Food Science	Agriculture	Animal Health	Public Health	Subtotal
	Count	Count	Count	Count	Count	Count	Count	Count	Count
20-30 yrs	1	5	0	1	0	2	0	0	9
31-40 yrs	0	7	1	1	1	5	4	1	20
41-50 yrs	2	6	0	1	1	1	0	0	11
51-60 yrs	0	2	0	1	0	2	0	0	5
61-65 yrs	0	0	0	0	0	0	0	0	0
65+ yrs	0	0	0	1	0	0	0	0	1

Results displayed in Table 4 above show that, the main disciplines studied by veterinary scientists were as follows: Veterinary Science/Medicine, Microbiology, Food Science, Public Health, Animal Health, Agriculture, and Agriculture and Commercial Production.

### 5.2.1.3: Regional Distribution of Respondents

**Figure 11: Column Graph 2: Frequency Distribution of Respondents` Location per Region by Job Title (n = 62)**



**Statistics: 4 Missing Values**

Results in Column Graph 2 above show that, most respondents were from the Khomas, Otjozondjupa, Omusati, and Kavango regions. It was interesting to note that there was a 100% (7 out of 7) response rate from laboratory scientists from the Central Veterinary Laboratory (CVL), Windhoek, Khomas region. It was also very surprising that only 1 (5%) Veterinary Hygiene Inspector (VHI) from the Khomas



region participated in the study. The reasons for very low participation by this study group are not known, but the DVS Annual Report, 2011 shows that there were 19 State VHIs on the DVS, MAWF establishment. The geographical location of four (4) respondents was not known because they did not indicate their duty station or region.

#### 5.2.1.4: Academic Qualifications

**Table 5: Frequency Distribution of Respondents and Highest Academic Qualifications (n = 62)**

Highest Academic Qualification of Respondents	Job Title			
	Veterinarian	Lab Scientist	Animal Health Technician	Veterinary Hygiene Inspector
	Count	Count	Count	Count
Diploma	1	4	21	0
Degree	17	3	2	0
Postgraduate Diploma	0	0	0	1
Master's Degree	3	4	0	0
PhD	4	0	0	0
Total	25	11	23	1

**2 Missing Values (No Response)**

Results in Table 5 above show that, in addition to their minimum job entry qualifications (first degree, BVMS), 19% of the veterinarians were in possession of postgraduate qualifications. In fact, 4 veterinarians held doctoral degree (Phd) qualifications. Similarly, 4 laboratory scientists were holders of a Master degree in

addition to the first degree, while 2 technicians were in possession of a first degree in addition to the diploma minimum entry qualification.

### 5.2.1.5: Distance of Respondents from Nearest Library

**Table 6: Distance of Respondents from Nearest Library Visited Most Often (n = 62)**

Proximity to Library Facility		Frequency	Percent (%)
Valid	Within Same Premises	13	21.0
	Within 2 km Radius	10	16.1
	Very Far Away	11	17.7
	Don't Use Library Services	26	41.9
	Total	60	96.8
No Response	9	2	3.2
Total	62	100.0	

Table 6 above shows that, 21% of the respondents were located within the same premises of a library facility, while a total of 37% of respondents were within the 2km radius of a library facility. 18% of respondents were located far away from library facilities. Another 42% of respondents did not use library services, making a total of 60% of respondents, whose access and use of library and information services were not known. The question did not ask respondents to state the reasons why they did not use library services. A follow-up study may be required to establish if geographical location and distance from nearest library facilities affected the information seeking behaviours of veterinary scientists in Namibia.

## 5.2.2 Information Needs of the Respondents

This section responded to **Research Question 1: What are the information needs of veterinary scientists in Namibia?**

**Table 7: Frequency of Respondents` Information Needs by Job Title (Multiple Responses were allowed, where n = 62)**

Information Gathering Activities * Job Title							
Count		Job Title					Total
		Veterinarian	Lab Scientist	Animal Health Technician	Veterinary Hygiene Inspector	Lab Technician	
Emergency Problem Solving	Yes	18	2	2	0	1	23 (37.1%)
	No	6	4	0	0	4	14
<b>Total</b>		<b>24</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>5</b>	<b>37</b>
CPD	Yes	16	3	8	1	0	28 (45.16%)
	No	8	4	17	0	5	34
<b>Total</b>		<b>24</b>	<b>7</b>	<b>25</b>	<b>1</b>	<b>5</b>	<b>62</b>
Lab Test/ Experiments	Yes	4	4	0	0	4	12 (19.35%)
	No	20	2	2	0	1	25
<b>Total</b>		<b>24</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>5</b>	<b>37</b>
Literature Review	Yes	10	4	0	0	0	14 (22.58%)
	No	14	2	2	0	5	23
<b>Total</b>		<b>24</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>5</b>	<b>37</b>
Meetings	Yes	11	2	8	0	0	21 (33.87%)
	No	13	5	17	1	5	41
<b>Total</b>		<b>24</b>	<b>7</b>	<b>25</b>	<b>1</b>	<b>5</b>	<b>62</b>
Conference Presentations	Yes	13	4	6	0	0	23 (37.1%)
	No	11	3	19	1	5	39
<b>Total</b>		<b>24</b>	<b>7</b>	<b>25</b>	<b>1</b>	<b>5</b>	<b>62</b>
Info on Drugs	Yes	14	2	10	0	0	26 (41.94%)
	No	10	5	15	1	5	36
<b>Total</b>		<b>24</b>	<b>7</b>	<b>25</b>	<b>1</b>	<b>5</b>	<b>62</b>
Survey Inspection	Yes			2	0		2 (3.23%)
	No			21	1		22
<b>Total</b>				<b>23</b>	<b>1</b>		<b>24</b>
Abattoirs Inspection	Yes			1	1		2 (3.23%)
	No			22	0		22
<b>Total</b>				<b>23</b>	<b>1</b>		<b>24</b>

**Key: CPD = Continuing Professional Development**

Results in Table 7 above show that, the information needs of veterinary scientists varied. Respondents engaged in information gathering activities for various purposes. Results show that, continuing professional development (CPD) (45.1%); seeking information on drugs (41.94%); emergency problem solving (37.1%); preparing for conference presentations (37.1%); and preparing for meetings (33.87%) were the most notable or significant reasons for respondents to engage in information gathering activities. Literature review and lab experiments were also some of the noticeable motivations for respondents to engage in information gathering. Results obtained from Veterinary Hygiene Inspectors were not considered due to a very low response rate from this group.

### 5.2.2.1: Time Spent Seeking Information

**Table 8: Time Spent by Respondents Gathering Information (n = 62)**

Hours Spent by Respondents Per Week		Frequency	Percent (%)
	<1 hour	1	1.6
	1-5 hours	36	58.1
Valid	6-10 hours	15	24.2
	11-15 hours	1	1.6
	16+ hours	4	6.5
	Total	57	91.9
No Response	9	5	8.1
Total		62	100.0

Results in Table 8 above show that the majority of respondents spent part of their official time per week on information gathering activities: 58% of the respondents

spent 1-5 hours per week, while 24% of the respondents spent 6-10 hours. 2% of the respondents spent between 11 and 15 hours per week, while 7% of the respondents spent more than 16 hours seeking information. 2% of the respondents spent a maximum of 1 hour per week seeking information.

### 5.2.2.2: Publications Output of Veterinarians and Laboratory Scientists

**Table 9: Frequency Distribution of Articles Published by Respondents (n = 31)**

Number of Published Articles	Job Title			
	Veterinarian	Lab Scientist	Animal Health Technician	Veterinary Hygiene Inspector
	Count	Count	Count	Count
1-5	7	1	0	0
6-10	0	0	0	0
11+	0	0	0	0
None	17	8	2	0

Results in Table 9 above show that, 26% of veterinarians and 14% (1) of lab scientists had published between 1 and 5 articles in peer-reviewed journals within the previous 5 years before the commencement of the study. The results above were consistent with the findings from previous information seeking behaviour (ISB) studies. ISB literature shows that, most scientists based at state institutions outside universities and research institutions lacked support from parent institutions to carry out research, they instead produced grey literature that circulated in-house and also among key stakeholders.

### 5.2.2.3: Information Access Tools Used to Locate Information

**Table 10: Frequency of Usage of Online Access Tools, Selected Websites and Information Systems (n = 62)**

Online Access Tools, Websites, DVS Circulars & Memos and Information Systems		Job Title				
		Veterinarian	Lab Scientist	Animal Health Technician	Veterinary Hygiene Inspector	Sub-Total
		Count	Count	Count	Count	Count
Library Catalogues	Yes	3	3	3	0	9 = 14.52%
	No	22	7	22	1	52 = 83.87%
Publishers' Websites	Yes	6	4	0	0	10 = 16.13%
	No	19	6	2	0	27 = 43.55%
Indexing Journals	Yes	3	1	2	0	6 = 9.68%
	No	22	10	23	1	56 = 90.32%
DVS Reports	Yes	9	5	17	0	31 = 50%
	No	16	6	8	1	31 = 50%
OIE and EU Websites	Yes	13	6	2	1	22 = 35.48%
	No	12	5	23	0	40 = 64.52%
Internet	Yes	22	8	10	0	40 = 64.52%
	No	3	3	15	1	22 = 35.48%
Pharmaceutical Websites	Yes	3	0	2	0	5 = 8.06%
	No	22	11	23	1	57 = 91.94%
FAO Website	Yes	5	5	3	0	13 = 20.97%
	No	20	6	22	1	49 = 79.03%
World Animal Health Information System	Yes	5	2	7	0	14 = 22.58%
	No	20	9	17	1	47 = 75.81%
	3	0	0	1	0	1 = 1.61%

Results in Table 10 above show that respondents used a wide variety of websites and online access tools to locate information. About 65% of the respondents used the Internet as an information access tool, while 50% of respondents used DVS reports to locate information. On the other hand, about 36% of respondents used the OIE and EU websites to locate information. Only 23% of the respondents used the World

Animal Health Information System (WAHIS) to locate information, while 21% of the respondents used the FAO website to locate information. Only 8% of the respondents used pharmaceutical websites to locate information on drugs. Meanwhile, very few (15%) respondents used the library catalogue to locate information sources, while about 16% of the respondents browsed publishers' websites in search of information. Only about 10% of the respondents used indexing journals to locate information.

Overall, results above show that, only the Internet and DVS reports were used by at least 50% of the respondents as access tools to locate information. It was surprising that, the majority of information access tools were not popular among the respondents. The results may also imply that, the majority of information access tools in this category were not well-known by the respondents; or were poorly marketed by MAWF librarians. Furthermore, it was also revealing that, only 14.52% of the respondents used library catalogues to locate information, and yet they remained standard access tools used globally to locate information in libraries and remotely via online library catalogues.

#### 5.2.2.4: Information Overload, Satisfaction with Information Searches, and Awareness of Contemporary Developments

**Table 11: Respondents` Experiences of Information Overload (n = 62)**

Ranking/ Perceptions		Frequency	Percent (%)
Valid	Strongly Agree	2	3.2
	Agree	12	19.4
	Disagree	30	48.4
	Strongly Disagree	11	17.7
	Total	55	88.7
No Response	9	7	11.3
Total		62	100.0

Table 11 above shows that, only 23% of the respondents had experienced information overload before participating in the present study. In other results, the study established that: 87% of the respondents agreed that they required information in order to discharge their responsibilities. At least 69% of the respondents said that they were aware of the contemporary developments in veterinary medicine, agriculture and related fields of expertise, while 31% of the respondents were not. About 60% of the respondents were willing to pay for correct information; this signified the value scientists attached to information. Finally, 56% of the respondents were satisfied with the results retrieved after performing literature searches.



## 5.2.3 Information Seeking

### 5.2.3.1 Sub-Section A: Information Sources

This section responded to **Research Question 2: Which information sources are used most by veterinary scientists?**

#### 5.2.3.1.1 Usage of Specified Information Sources

**Table 12: Frequency Distribution of Information Sources used most by Respondents (n = 62)**

Information Source Types	Very Often Used	Often Used	Used Sometimes	Rarely Used
Journals	6	17	18	18
Textbooks	16	18	15	8
Conference Papers & Reports	6	10	32	11
Research Reports	3	13	26	16
FAO Publications	3	12	20	23
OIE & EU Publications	10	13	11	23
Work Colleagues	23	21	11	5
Subject Experts	9	17	18	13
Personal Notes & Files	23	29	4	2
DVS Guidelines (Circulars & Memos)	17	22	13	8
Scientific Databases	6	19	13	20
Internet	30	8	6	15
Library	1	5	11	40 (64.5%)

Results presented in Table 12 above show that, respondents in this study used a variety of information sources. Results also show that personal notes, work colleagues, DVS Guidelines, Textbooks and Conference Papers and Reports were the top 5 most popular sources of information used by at least 75% of the respondents. The rate of use was as follows: Personal Notes (90%), Work Colleagues (89%), DVS

Guidelines (84%), Textbooks (79%), Conference Papers and Reports (77%), Internet (71%), Subject Experts (71%), Research Reports (68%), Journals (66%), Scientific Databases (61%), FAO Publications (56%), OIE and EU Publications (55%), and the Library (27%). Results also show that, the library was the least popular source of information and was used by less than 50% of the respondents.

#### **5.2.3.1.2: MAWF Library Subscription to Journals**

At least 27% of the respondents said that, MAWF through NAWIC subscribed to journals in their fields of expertise. Results of the study however showed that, only 21% of veterinary professionals and laboratory scientists read scholarly journals housed at MAWF libraries (NAWIC and CVL). The actual journal titles read by respondents are presented in Table 13 below.

## NAWIC Print Journal Titles Read by Respondents

**Table 13: NAWIC Print Journal Titles Read by Respondents (n = 32)**

Journal Titles	Veterinarian	Lab Scientist	AHT	Total
Veterinary Microbiology		2		2
Immunology Today		1		1
Onderstepoort Journal of Veterinary Research	2	1		3
Trends in Immunology		2		2
American Journal of Vet Research	1	2		3
Veterinary Bulletin	1	1		2
Research in Veterinary science	1	2		3
Journal of AOC International		1		1
Veterinary Record	2	1		3
Journal of Parasitology	1			1
In-Practice	1			1
Journal of the SAVA	1			1
Veterinary Pathology	2			2
Animal Production	1			1
Small Animal Manual	1			1
UK Vet	1			1
LPG Health Review	1			1
VET MED	1			1
Australian Veterinary Record	1			1
Preventive Veterinary Record	1			1
Management Calendar			1	1
Animal Health Disease Books			1	1
Animal Health Declaration Forms			1	1

**Source: NAWIC, MAWF Journal Title List, 2011**

**Key: AHT = Animal Health Technician, while VHI = Veterinary Hygiene Inspector**

Table 13 above presents a list of the 22 MAWF print journal subscription titles read by respondents per job category (9 veterinarians, 3 Laboratory Scientists and 1 Animal Health Technician). Results in Table 13 show that two (2) Laboratory Scientists read 5 journal titles each, while 1 Laboratory Scientist read 3 journal titles. Some respondents did not read journal titles on the MAWF Library print list, while other respondents chose not to answer the question, and one (1) Animal Health Technician may have misunderstood the question and erroneously listed animal disease textbooks and DVS forms instead of journals. Two (2) Veterinarians read four (4) journal titles each, while one (1) Veterinarian read three (3) journal titles. Another two (2) Veterinarians read two (2) journal titles each, while four (4) veterinarians read one (1) journal title each. The following eight (8) journal titles were found to be the most popular among the respondents: Veterinary Microbiology; Onderstepoort Journal of Veterinary Research; Trends in Immunology; American Journal of Veterinary Research; Veterinary Bulletin; Research in Veterinary Science; Veterinary Record; and Veterinary Pathology.

#### **5.2.3.1.3: Information Sources Preferred by Respondents in Emergency**

##### **Situations**

The following information sources proved to be more popular among respondents in emergency situations: Knowledgeable persons (76%) in first place; followed by the Internet (73%) in second place; while textbooks (68%) were in third place; and work colleagues (66%) in fourth place. Surprisingly, authentic sources, such as, DVS

guidelines were selected by only 65% of respondents in 5<sup>th</sup> place. While OIE publications used by veterinary researchers globally were only selected by 45% of respondents. It is actually not known how many respondents were actually aware of OIE publications` free accessibility online.

### 5.2.3.2 Sub-Section B: Adoption and Usage of Internet Technologies

This section sought to answer **Research Question 3: What is the uptake of Internet technologies by veterinary scientists?**

#### 5.2.3.2.1 Access to Office Personal Computers (PCs) and Internet Connectivity

**Table 14: Frequency Distribution of Respondents with Internet Access at work (n = 62)**

<b>Yes / No / No Response</b>	<b>Frequency</b>	<b>Percent (%)</b>
Valid Yes	44	71.0
Valid No	17	27.4
Valid Total	61	98.4
No Response	1	1.6
Total	62	100.0

Results in Table 14 above show that, 71% of all respondents had access to Internet connected computing facilities at work, while only 27% of respondents did not. Out of these, 97% of veterinarians and 100% of laboratory scientists had an Internet connected office personal computer (PC) at work, in comparison to only 45% of veterinary para-professionals.

#### 5.2.3.2.2: Additional Internet Access Options

About 32% of veterinary professionals and 26% of the veterinary para-professionals additionally accessed the Internet through their own 3G, while 32% of veterinary professionals and 6% of veterinary para-professionals accessed the Internet through a

home connection. About 32% of veterinary professionals and 3% of veterinary para-professionals accessed the Internet through an Internet Café, while 32% of veterinary professionals and 16% of veterinary para-professionals accessed the Internet through a friend.

### 5.2.3.2.3: Usage of Internet Search Engines

**Table 15: Frequency of Respondents` Usage of Selected Search Engines (n = 62)**

Usage Rate		Number of Respondents	Percent (%)
Valid	Quite Often	26	41.9
	Often	7	11.3
	Sometimes	4	6.5
	Rarely	3	4.8
	Total	40	64.5
No Response	9	22	35.5
Total		62	100.0

Results displayed in Table 15 above show that, about 60% of the respondents used search engines to seek information. The usage rate of search engines was quite high if compared to other information sources, such as the OIE and WHO websites that were considered to be more relevant to veterinary scientists.

**Table 16: Respondents` Usage of Online Discussion Groups (n = 62)**

Usage Rate		Number of Respondents	Percent (%)
Valid	Often	1	1.6
	Sometimes	8	12.9
	Rarely	25	40.3
	Total	34	54.8
No Response	9	28	45.2
Total		62	100.0

Results in Table 16 above show that, few (15%) respondents used online discussion groups as a source of information, while very few (10%) respondents used Listservs and Newsgroups.

#### **5.2.3.2.4: Benefits derived from using Internet Services and Research Tools**

**Table 17: Respondents` Ranking of the Importance of Current Awareness Services (n = 62)**

Ranking		Number of Respondents	Percent (%)
Valid	No Ranking	5	8.1
	Very Important	6	9.7
	Important	11	17.7
	Somewhat Important	6	9.7
	Less Important	4	6.5
	Total	32	51.6
No Response	9	30	48.4
Total		62	100.0

Results in Table 17 above show that, about 37% of the respondents ranked Current Awareness Services, such as, Journal Table of Contents Alerts and RSS Feeds as important benefits derived from using the Internet.



**Table 18: Respondents` Ranking of the Importance of Providing Office Administration Services online through the Internet (n = 62)**

Ranking		Number of Respondents	Percent (%)
Valid	No Ranking	6	9.7
	Very Important	7	11.3
	Important	4	6.5
	Somewhat Important	6	9.7
	Less Important	6	9.7
	Total	29	46.8
No Response	9	33	53.2
Total		62	100.0

Results in Table 18 above show that, about 28% of the respondents ranked providing Office Administration services online as an important benefit derived by the organization from using the Internet.

**Table 19: Respondents` Ranking of the Importance of Online Research Services (e-journals & e-books) (n = 62)**

Ranking		Number of Respondents	Percent (%)
Valid	No Ranking	3	4.8
	Very Important	13	21.0
	Important	12	19.4
	Somewhat Important	4	6.5
	Less Important	5	8.1
	Total	37	59.7
No Response	9	25	40.3
Total		62	100.0

Results displayed in Table 19 above show that, about 47% of the respondents ranked access to online research tools, such as, e-books and e-journals as important benefits derived from using the Internet by a veterinary service organization.

**Table 20: Respondents` Ranking of the Importance of Using the Internet to Communicate with Clients and Suppliers Online (n = 62)**

Ranking		Number of Respondents	Percent (%)
Valid	No Ranking	3	4.8
	Very Important	5	8.1
	Important	9	14.5
	Somewhat Important	8	12.9
	Less Important	4	6.5
	Total	29	46.8
No Response	9	33	53.2
Total		62	100.0

Results presented in Table 20 above show that about 36% of the respondents ranked using the Internet to communicate with clients and suppliers online to be an important benefit to the organisation. While about 36% of veterinary professionals and 19% of veterinary para-professionals ranked communicating with colleagues through Web 2.0 tools to be an important benefit to the organisation.

#### **5.2.3.2.4.1 Respondents` Raking of Using the Internet to Communicate, Market, Provide Services, and Use Cellular Technologies to be Important Benefits to the Organisation**

About 55% of veterinary professionals and 16% of veterinary para-professionals ranked communicating, while 35% of veterinary professionals and 13% of veterinary para-professionals ranked marketing the organization`s services online to be an important organisational benefit of using the Internet. About 32% of veterinary professionals and 7% of veterinary para-professionals ranked providing services online to be a benefit to the organization, while 23% of veterinary professionals and 10% of veterinary para-professionals ranked using cellular technologies (SMS, MMI) to be important benefit to the organisation. Overall, a significant percentage of respondents ranked communicating, marketing, providing services online, and using cellular technologies to be important benefits of using the Internet.

#### **5.2.3.2.5: Usage of Selected Agriculture CD-ROM Databases**

About 10% of veterinary professionals sought information from the AGRICOLA database, while another 10% of veterinary professionals and 13% of veterinary para-professionals sought information from the VET CD. 13% of veterinary professionals sought information from the CAB CD or CAB Abstracts, while 10% of veterinary para-professionals and only 3% of veterinary professionals used the Current Contents

Annual database. Overall, results show that there was a generally low usage of all CD-ROM databases listed when compared to other information sources discussed above. The majority of agriculture CD-ROM databases were not used by most of the respondents. CD-ROMs were only available at the MAWF Head Office library (NAWIC), geographical location and distance of most veterinary scientists outside the Khomas region may have affected usage. Lack of awareness about the existence of the CD-ROMs, including by veterinary scientists based at the MAWF Head Office could be another hindrance. Time constraints to visit the library is also reported elsewhere in this study as one of the reasons for none-use of the library/ information sources.

#### 5.2.3.2.6: Usage of Selected Internet Subject Information Tools

**Table 21: Frequency Distribution of Respondents' usage of Electronic Zoo (NetVet) (n = 62)**

Usage Rate	Number of Respondents	Percent (%)
Sometimes	5	8.1
Valid Rarely	27	43.5
Total	32	51.6
No Response 9	30	48.4
Total	62	100.0

Results in Table 21 above show that, 8% of the respondents sometimes used the Electronic Zoo (NetVet) as a source of information. Meanwhile, about 23% of the respondents used the International Veterinary Information Service (IVIS) to seek information. Only a minority of the respondents used veterinary alert services to keep up-to-date.

**Table 22: Respondents' usage of the World Organisation for Animal Health Website (n = 62)**

Usage Rate		Number of Respondents	Percent
Valid	Quite Often	4	6.5
	Often	6	9.7
	Sometimes	15	24.2
	Rarely	12	19.4
	Total	37	59.7
No Response	9	25	40.3
Total		62	100.0

Results in Table 22 above show that, at least 40% of the respondents used the OIE website as a source of information.

**Table 23: Respondents' usage of the WHO Website (n = 62)**

Usage Rate		Number of Respondents	Percent
Valid	Quite Often	3	4.8
	Often	4	6.5
	Sometimes	11	17.7
	Rarely	17	27.4
	Total	35	56.5
No Response	9	27	43.5
Total		62	100.0

Results in Table 23 above show that about 29% of the respondents often used the WHO website as a source of information.

#### **5.2.3.2.7: Respondents` Perceptions about Internet Technologies**

About 60% of respondents recognized that the Internet enhanced their ability to access the latest science, research and information, while 18% of respondents believed that the information available on the Internet confused their clients. About 44% of respondents perceived that the Internet was good for communication, while 38% of acknowledged that the Internet made them enjoy their job. About 16% of both veterinary professionals and para-professionals felt overloaded by the amount of information available. Finally, 57% of respondents felt comfortable with the searches that they made on the Internet.

## **5.2.4: Sub-Section C: Information Search Strategies**

### **5.2.4.1: Information Search Options**

About 34% of respondents preferred to search electronic versions of journals and databases, while 26% of respondents preferred printed editions. Only 20% of respondents preferred to read the printed edition of a publication, while only 5% of respondents preferred to read electronic editions/versions.

### **5.2.4.2: Reading Format Preferences**

About 65% of respondents perceived that making a choice of the preferred document format was dependent on circumstances. Other While the other results choices

### **5.2.4.3: Search Interface Preferences**

Results show that more respondents preferred to make information searches from the Google search engine interface over the library home page. The researcher attributed lack of user education to be the major reason behind the selection of Google over the library website. Literature shows that most users preferred the Google interface because they could readily access full-text publications while the library catalogue retrieved bibliographic data only.

#### **5.2.4.4: Remote Interaction with the Library**

About 23% of the respondents made telephone information enquiries to the library, while 21% of the respondents often used fax to make an information enquiry to the library, and 24% of the respondents often used e-mail to make an information enquiry from the library. Results suggest that E-mail, Telephone and Fax were still viable options used by respondents to remotely communicate with the library. The results also suggest that there was usage of MAWF libraries by veterinary scientists based in remote locations using services such as, a telephone, fax and e-mail. Although the above devices are considered to be old technology, they are still preferred and reliable in remote locations where there is no Internet access or the download speed is too slow for busy veterinary professionals.

#### **5.2.4.5: Frequency of Sharing Information with Colleagues**

About 87% of veterinary professionals and 71% of veterinary para-professionals often shared information acquired at conferences with colleagues in the profession.



#### **5.2.4.6: Social Networking**

About 39% of respondents agreed that Social Networks were important to the veterinary services profession, while 47% of respondents also agreed that the Internet enabled them to establish business relationships. About 76% of respondents agreed that the Internet could be used as a tool to facilitate continuous professional development (CPD) training programmes.

The results above show that the majority of veterinary scientists appreciated the Internet's role in promoting social networking; establishing business relationships; and facilitating continuing professional development (CPD) training online.

#### **5.2.4.7 Rate of Use of Selected Information Sources/Systems**

Results in Table 24 below show that, respondents in this study consulted a wide variety of information sources from the given list. The rate of use was distributed as follows: At least 11% of the respondents sought information from AGORA; while about 21% of the respondents used the SA E-Publications database; and about 2% of the respondents used the LAN TEEAL information system. Only 6% of the respondents sometimes sought information from the DOAJ, while at least 35% of the respondents used Google Scholar and only 3% of the respondents sometimes consulted the Open J-Gate database.

**Table 24: Respondents` Rate of Use of Selected Information Sources/Systems (n = 62)**

Information Source Types	Quite Often Used	Often Used	Used Sometimes	Rarely Used	No Response
AGORA	0	1	6	32	23
SA E-Publications	1	3	9	26	23
LAN TEEAL	0	1	0	22	39
DOAJ	0	1	3	0	58
Google Scholar	6	10	6	19	21
WAICENT Portal, FAO website	0	3	5	30	24
ANANZI database, CTA website	0	1	1	22	38
World Animal Health Information System (WAHIS)	2	3	4	29	24
Open J-Gate	0	1	1	22	38
Pharmaceutical Websites	0	3	8	28	23
MAWF/ Other Libraries	1	3	18	24	16

Results in table 24 also show that, few (13%) respondents often used the WAICENT portal, while only 3% of the respondents consulted the ANANZI database often and about 15% of the respondents often searched for information from the WAHIS. At least 35% of the respondents often used MAWF/ Other agriculture libraries, while about 3% of the respondents sought information from the Open J-Gate databases, and about 18% of the respondents sometimes made information searches from pharmaceutical websites. Significantly, notable percentages of respondents did not select any of the listed information sources in the above section. This could be attributed to lack of user education, culminating into lack of awareness of the

existence of important online agriculture information sources, such as AGORA, LAN TEEAL, and SA E-Publications, among others.

The results above also show that MAWF/ Other libraries, Google Scholar and the SA E-Publications databases were the top 3 most used information sources in this category. There was also notable usage of pharmaceutical websites, the ANANZI and WAICENT portals. It was however surprising that the AGORA platform, a specialist aggregator created by FAO and partners for the purposes of making it easier for agricultural scientists and scholars in developing countries to access the latest agricultural science at a cheaper cost and in some countries for free was not popular among the respondents.

### 5.2.5: Information Literacy, Lifelong Learning and Continuing Professional Development

This section responded to **Research Questions 4 and 5.**

**Research Question 4: How familiar and satisfied are veterinary scientists with the DVS information systems and MAWF library services?**

#### 5.2.5.1: Respondents` Level of Satisfaction with DVS Information Systems

**Table 25: Respondents` Ranking of the Importance of the Currency of DVS Information Sources (n = 62)**

Ranking		Frequency	Percent (%)
Valid	No Ranking	6	9.7
	Very Important	9	14.5
	Important	10	16.1
	Somewhat Important	7	11.3
	Less Important	5	8.1
	Total	37	59.7
No Response	9	25	40.3
Total		62	100.0

Results in Table 25 above show that about 42% of the respondents perceived that it was important for the DVS to have current information sources. The study established that, 39% of veterinary professionals and 26% of veterinary para-professionals were satisfied with the DVS information system. If not satisfied, 19% of veterinary professionals and 23% of veterinary para-professionals consulted experts to cover up for the gaps in the DVS Information System; 32% of veterinary

professionals and 52% veterinary para-professionals consulted work colleagues; while 39% of veterinary professionals and 26% of veterinary para-professionals searched the Internet to fill gaps in the DVS Information System.

**Table 26: Respondents` Ranking of the Importance of Library Catalogue Searching Skills (n = 62)**

Ranking		Frequency	Percent (%)
Valid	No Ranking	4	6.5
	Very Important	4	6.5
	Important	3	4.8
	Somewhat Important	4	6.5
	Less Important	6	9.7
	Total	21	33.9
No Response	9	41	66.1
Total		62	100.0

Table 26 above shows that, about 18% of the respondents ranked and considered it important to be in possession of library catalogue searching skills. Scientists used the skills to locate required information sources.

The following section responded to research question 5: **How do veterinary scientists practicing in Namibia upgrade their knowledge and skills?**

### **5.2.5.2: Upgrading Knowledge and Skills**

About 16% of veterinary professionals and 7% of veterinary para-professionals attended monthly meetings once in 3 months (used by veterinary professionals to review progress and to train veterinary para-professionals), while 13% of veterinary professionals and only 3% of veterinary para-professionals attended DVS monthly meetings. About 52% of veterinary professionals and 7% of veterinary para-professionals attended training as part of continuous professional development (CPD). Overall, results show that a significant percentage of veterinary professionals attended CPD training, while veterinary para-professionals did not. Meanwhile, 48% of veterinary professionals did not attend CPD meetings. Veterinary para-professionals were not members of the Veterinary Association of Namibia (VAN) that organized CPD training. Meanwhile, only 7% of veterinarians used veterinary alert systems; and one veterinarian used the following 2 Alert Systems: IVIS and VAN to keep current.

### **5.2.5.3: Attending Training in User Education and Internet Searching Skills**

About 10% of veterinary professionals and 7% of veterinary para-professionals attended training in library user education, while 52% of veterinary professionals and 7% of veterinary para-professionals attended training as part of continuous professional development (CPD), and 26% of veterinary para-professionals attended training on Internet searching skills.

#### **5.2.5.4: Animal Health Conferences and Seminars**

The majority (87% of veterinary professionals and 97% of veterinary para-professionals) agreed that it was important to attend animal health conferences and seminars, while 36% of veterinary professionals had actually presented papers at conferences and seminars before. While 90% of veterinary professionals and 94% of veterinary para-professionals agreed that it was important to share information and knowledge acquired at conferences and seminars with colleagues.

#### **5.2.5.5: Veterinarians and Laboratory Scientists` Publications Output and Animal Health Information Systems**

**5.2.5.5.1: Publications Output:** Only 23% of veterinarians and 1 (14%) laboratory scientist had published articles in both peer-reviewed journals and industry magazines within the previous 5 years before the study. On the other hand, 10% of veterinarians had contributed a chapter towards publishing a book in their field, while the majority had not.

**5.2.5.5.2: Animal Health Information Systems:** Few (39%) of veterinary professionals and the majority (74%) of veterinary para-professionals contributed towards the development of the DVS Information System; while 52% of veterinary

professionals and 77% of veterinary para-professionals felt that they should have been consulted prior to the design of an information system targeted at their use.

### **5.2.6 Barriers to Information and Internet Access and Use**

This section responded to **Research Question 6: What are the barriers encountered by veterinary scientists during information-seeking?** Respondents selected 4 barriers each.

Barriers in this context refers to obstacles related to the characteristics of information (format, currency, overload) that could affect access and use of information, while the second set of barriers are related to Internet access (connectivity, infrastructure, cost):

#### **5.2.6.1: Barriers to accessing and using Information**

The following barriers or obstacles were perceived to be important by the respondents: Slightly more than half (52%) of the respondents selected non-availability of required information sources, while less than half (42%) of the respondents selected outdated information sources at the DV S. Few (36%) of the respondents selected lack of adequate time to seek information, while only 29% of the respondents selected information is far apart from each other, within the same information system/ source. Few (27%) of the respondents either selected



information is scattered in too many sources or incomplete information materials at the DVS, while only 24% of respondents either selected information overload or information on my subject is too vast. Very few (18%) of the respondents selected lack of skills to search the library catalogue, while only 6% of the respondents selected reluctance of library staff to assist users. Only 5% of respondents selected inadequate knowledge of libraries,

Overall results show that, non-availability of information sources, outdated information sources, lack of time for information seeking, information overload and scattering of information sources were the most significant barriers that had an impact on the information seeking activities of veterinary scientists.

#### **5.2.6.2 Barriers to Internet Access and Use**

Few (26%) respondents selected slow speed of downloading information, while only 23% of the respondents selected inadequate time to keep up with everything scientists required. Very few (11%) respondents selected limited Internet searching skills, while only 10% of the respondents either selected cost of accessing the Internet or lack of access to the Internet. Other results were negligible. Overall results show that, slow download speed and inadequate time to keep up with everything scientists required were perceived to be significant barriers in this section.

### **5.2.7 Summary of Section 5.2: Quantitative Phase 1 of the Study**

Results presented above show that 5 groups of veterinary scientists, namely, veterinarians, lab scientists, veterinary hygiene inspectors, animal health technicians, and lab technicians took part in the study. Demographic data, such as age, gender, geographical location, primary discipline, and distance from nearest agriculture library was presented in section 1 of the report. About 58% of the respondents spent 1-5 hours per week, while 24% of the respondents spent 6-10 hours gathering information. Continuing professional development (CPD) (45.1%); seeking information on drugs (41.94%); emergency problem solving (37.1%); preparing for conference presentations (37.1%); and preparing for meetings (33.87%) were the most notable motivations for respondents to engage in information seeking.

Like other veterinary researchers elsewhere, respondents in this study used various information sources to perform different functions. Personal notes (90%), work colleagues (89%), DVS Guidelines (84%), Textbooks (79%), and Conference Papers & Reports (77%) were the top 5 most popular sources of information used by at least 75% of the respondents. Contrary to findings from previous studies, the present study established that informal sources of information were more popular among respondents. One of the startling findings was that, journals and scientific databases were used by 66% and 61% of the respondents respectively, while only 27% of respondents used the library. The difference in choice of information source preferences could be because respondents in this study were not academicians and

therefore, journals, scientific databases, and the library may not be the automatic choices when seeking information to perform a specific task, such as, vaccination, clinical practice, and lab tests or experiments. It is therefore not surprising that, in emergency situations, respondents consulted knowledgeable persons (76%) first; followed by the Internet (73%) in second place; while textbooks (68%) were in third place; and work colleagues (66%) in fourth place. Meanwhile, only a few respondents sought research information in order to review related studies for the purposes of writing and publishing in scientific journals. In fact, only 26% of veterinarians and 14% of lab scientists had published between 1 and 5 articles in peer-reviewed journals. It could also be argued that, respondents had no motivation to publish in peer reviewed journals instead of in-house organisational reports as per standard practice in most government entities that are not directly to the university or tertiary institutions.

Overall, the findings show that there was a general low usage of most information access tools by the respondents. The Internet and DVS Guidelines were the only access tools used by at least 50% of the respondents; and only 14.52% of respondents used library catalogues. On the other hand, 87% of the respondents agreed that they required information in order to discharge their responsibilities; and 60% of respondents were even willing to pay for correct information. The way researchers seek information may be changing today due to the influence of the Internet. Library catalogues may continue to lose ground against other access tools in the future because they are static databases that do provide ready access to full-text content

which the researcher may be looking for. Findings also showed that more respondents preferred to make information searches from the Google search engine interface over the library home page. The choices of the majority of respondents could be attributed to lack of user education and hence they found Google easier to use than the library website. Results may also imply that, the majority of information access tools in this category were either not well-known by the respondents or were not their preferred information search options.

Significantly, notable percentages of respondents did not select any of the listed online agriculture information sources. The researcher attributes this to lack of user education, culminating into lack of awareness of the existence of important agriculture information sources, such as AGORA, LAN TEEAL, and SA E-Publications, among other databases. Interestingly, a significant proportion (at least 40%) of the respondents used the World Organization for Animal Health (OIE) website. Findings also showed that, the majority of agriculture CD-ROM databases were not used by most of the respondents. CD-ROMs were only available at the MAWF Head Office library (NAWIC), geographical location and distance of most veterinary scientists from the library/ information centre may have affected usage. Lack of awareness about the existence of CD-ROM databases, including by veterinary scientists based at the MAWF Head Office could be another hindrance to usage. Time constraints to visit the library is also reported elsewhere in this study as one of the reasons for none-use of the library/ information sources.

Although devices, such as telephone, fax and e-mail are considered to be old technology, they are still used by some veterinary scientists in remote locations because they are more reliable and convenient in areas where there is no Internet access or the download speed is too slow for busy veterinary professionals. Meanwhile, results presented in Tables 17 – 19 above show that, about 37% of the respondents selected access to Current Awareness Services, such as, Journal Table of Contents Alerts and RSS Feeds as a benefit derived from using the Internet. While, about 47% of the respondents selected online research tools, such as, e-books and e-journals as beneficial to the organization. About 55% of veterinary professionals and 16% of veterinary para-professionals selected communication online. Only a minority of the respondents used veterinary alert services to keep up-to-date.

The following barriers or obstacles were considered to be significant to information and Internet access and use: non-availability of required information sources (52%), outdated information sources at the DVS (42%); lack of adequate time to seek information (36%); selected information is far apart from each other (29%), selected information is scattered in too many sources (27%); incomplete information materials at the DVS (27%); and information overload or information on my subject is too vast (24%).

## **Section 5.3: Data Analysis and Presentation of the Findings of Phase Two: Qualitative Study**

### **5.3.1 Introduction**

The purpose of holding interviews with the 7 purposively selected key informants was two-fold. First, it was to use the qualitative responses from more knowledgeable respondents in phase 2 to explain in detail the quantitative results obtained in phase 1, in compliance with the procedures of the explanatory sequential mixed methods research design used to carry out the study (Cresswell, 2014). Second, the researcher intended to gather more data to supplement the findings from phase 1, quantitative study.

The key informants helped to clarify some ambiguous responses provided by some of the respondents that took part in phase 1, especially with regard to preference for informal sources of information, such as, personal notes, ahead of authoritative DVS guidelines & memos, OIE and FAO publications (information sources), and MAWF libraries. Other quantitative results that required explanation were related to: limited or lack of access to ICT facilities and Internet connection by veterinary para-professionals; and the participation of DVS veterinary professionals and veterinary para-professionals in CPD training programs.

Although both state and private veterinary professionals and veterinary para-professionals took part in the questionnaire survey(s), no key informants were sampled from the private sector. This is because private veterinary professionals specialized mainly in animal patient care of pets and small stock animals only. On the other hand, state veterinary professionals performed all veterinary services functions because the DVS had enough capacity in terms of human and financial resources, as well as infrastructure set-up country wide to satisfactorily deal with animal disease diagnosis and patient care and monitor livestock disease surveillance, among other responsibilities.

Four (4) out of seven (7) of the purposively sampled key informants occupied senior managerial positions on the DVS staff establishment. They were based in four different divisions that comprised the DVS structure (Epidemiology, Training, Import and Export; Animal Disease Control; Veterinary Public Health; and Lab Diagnostics and Research). While the other 3 key informants performed special functions that were central to the operations of the DVS establishment. They were responsible for staff training and CPD of all DVS personnel; compilation of DVS annual reports, information management and dissemination, risk analysis and predictions; and administration and supervision of field veterinary services and operations south of the VCF.

The first 4 key informants occupied senior managerial positions in the 4 divisions and were considered to be experienced and knowledgeable with regard to the type of training required by veterinary professionals and veterinary para-professionals, who pursued further studies in veterinary science, molecular biology, diagnostic services and research and disciplines that impacted on animal health, meat safety, veterinary and environmental hygiene. Additionally, in-house training also helped veterinary scientists acquire new knowledge and skills that enabled them to continuously improve job performance and keep up-to-date on contemporary issues related to animal health.

All the 7 key informants were aware of the obstacles related to access to information and Internet connectivity cited by the majority of veterinary para-professionals who participated in the questionnaire survey in phase 1 of the study. Some of the veterinary para-professionals either had limited or lacked access to MAWF/agriculture libraries and Internet research tools.

Meanwhile, private veterinary practitioners submitted their animal health data to the DVS's Epidemiology, Training, Import and Export Control division for integration into the DVS information systems and the Diagnostics and Research division for laboratory tests and further research in case diagnosis of an animal disease was not conclusive and archiving in the Namibian Epidemiology Animal Health Information System, for future reference.



### **5.3.2 Perceptions about the Biographical Data of Veterinary Scientists**

Biographical data of the respondents collected in phase 1 showed that, veterinary professionals and veterinary para-professionals employed in Namibia had different academic backgrounds, and were trained at different universities and tertiary institutions throughout the world; the results were confirmed by phase 2 key informants. The key informants interviewed in phase 2 explained in detail the disciplines studied by the veterinary scientists (veterinarians, lab scientists, veterinary hygiene inspectors, animal health technicians and lab technicians) that participated in the quantitative study, especially at postgraduate level and the implications on veterinary services practice.

The 7 key informants agreed that, veterinary professionals and veterinary para-professionals practicing in Namibia had studied a variety of Veterinary Medicine and Agriculture related disciplines, ranging from Veterinary Science, Animal Health, Animal Physiology, Microbiology, Biology, Molecular Biology, Bio-Chemistry, Agriculture and Commercial Production, Food Science, Public Health, Biomedical and Life Sciences, Environmental Science and general Agriculture, among others. Furthermore, diagnosticians (veterinarians based at the CVL, Diagnostics and Research division) were expected to have qualifications and expertise in Virology, Toxicology, Serology and Biotechnology.

Although the key informants were purposively sampled, the actual order in which the interviews were held depended on the availability of the key informants and their business schedule at the time. In order to make the study anonymous and to protect the privacy of the key informants, the terms and numerical order, Informant 1, Informant 2, Informant 3, up to Informant 7, are used here to report the findings of phase 2. The numerical numbers represent the chronological sequence in which the qualitative interviews were held, that is, Informant 1 was first, while informant 2 was second, until the last interview with key informant 7.

Three key informants (informants 1, 2, and 4) were based in the Epidemiology, Training, Import and Export division, while informant 3 was from the Diagnostic Services and Research, and informant 5 was from the Veterinary Public Health. Informants 6 and 7 were based in the Animal Disease Control division. All the seven key informants had several years of work experience and coincidentally held a Master`s degree or higher academic qualification(s) in Veterinary Science. 5 out of the 7 key informants had specialized in Veterinary Epidemiology and Immunology in their postgraduate training, while the other two key informants had specialized in Veterinary Public Health and Field Veterinary Science.

### **5.3.2.1 Perceptions about Knowledge Levels of Veterinary Scientists**

Informants 1, 2, and 7 were satisfied with the knowledge levels of DVS staff; they were sufficient to deal with export requirements of the International Organization for Animal Health (OIE), Food and Agriculture Organization (FAO) and the European Union (EU). Informant 1 reported that the DVS had competent veterinary professionals with postgraduate qualifications, while a number of veterinary para-professionals were holders of a first degree, and some were even pursuing postgraduate studies.

Key informants 3 and 4 were satisfied to some extent with the knowledge levels of most veterinary professionals and para-professionals but acknowledged that there was room for improvement. According to interviewee 3,

“... the DVS professionals are capable and competent to perform normal duties but cannot not be employed anywhere else; they lack knowledge on lab diagnostic procedures (testing of samples), epidemiology and modelling of diseases due to the nature of training at veterinary schools globally and virology is considered extra training”.

Informant 4 said that,

“... Namibia is reasonably well-equipped to deal with animal disease surveillance, livestock information management and database maintenance.

The DVS has successfully maintained the foot and mouth disease (FMD) free zone since 1998”.

Meanwhile, informant 6 was not satisfied with the knowledge levels of most of the questionnaire survey respondents.

“The majority of veterinary professionals and veterinary para-professionals are in possession of job entry mandatory qualifications. They have been practicing for a long time without furthering their education, as well as acquiring new knowledge and skills”.

The key informants suggested that, all veterinary professionals and veterinary para-professionals should be encouraged to pursue postgraduate studies in order to acquire more knowledge and skills and be able to carry out research. Postgraduate studies enabled veterinarians to specialize in specific areas of knowledge. On the other hand, informant 5 reasoned that,

“... performance among employees is not always the same. New veterinary graduates need time to learn and master their responsibilities. Employees need to be dedicated and committed to their jobs” (Informant 5).

On the other hand, Informant 7 remarked that,

“... the examination and registration of veterinary professionals with the Namibia Veterinary Council is a tough process. The DVS is audited by the

EU every 2 years and the latest report of 2012 has positive feedback on the DVS`'s maintenance of the animal disease free zone, south of the Veterinary Cordon Fence and the livestock traceability system. A DVS report with recommendations on the establishment of disease free zones north of the veterinary cordon fence has already been submitted to the Cabinet for discussion and consideration. The report contains alternative suggestions as recommended by the World Organisation for Animal Health. The Cabinet decision will depend on the GRN`s capacity to avail funding to the DVS for the recruitment of the required veterinary professionals and veterinary para-professionals, infrastructure and other material resources”.

### **5.3.2.2 Perceptions on Access to ICT Facilities and Internet Connectivity**

Informants 1, 2, 4, 6, and 7 endorsed the results of the questionnaire survey with regard to the lack of access to ICT facilities and limited Internet connection by veterinary para-professionals especially field Animal Health Technicians. Additionally, most of the veterinary para-professionals were not entitled to official mobile phones allocated to all veterinary professionals. Lack of access to ICT facilities affected their ability to access Internet research tools and data entry on the NAMLITS database.

Informant 1 added that,

“... time constraints is an obstacle, but access is relative because only a few offices are located in remote places. There is a problem at the Okahandja DVS office because the TELECOM has not installed Internet connectivity”. The majority of DVS offices throughout country had ICT facilities and Internet connection. “Some places in northern Namibia, like Ondangwa experience frequent power interruptions, thereby limiting livestock farmers from accessing DVS import and export application forms. DVS officials also sometimes fail to access the Internet and the NAMLITS database” (Informant 1).

Access to ICT facilities may have improved significantly during 2012 when the DVS acquired laptops and 3G cellular routers and distributed them among some of the AHTs (informants 2, 4, and 7). Informant 7 estimated that,

“... about 20% of the AHTs may still be experiencing lack of access to ICT facilities and Internet connection. Some DVS offices also have Internet connection through wifi”.

Informant 4 also reported that,

“... there are likely to be new developments during 2014 as a tender for the supply of computers and laptops to the MAWF Head Office has already been sent out to the public media for advertisement”.

In spite of the ICT challenges reported above, all veterinary para-professionals who performed data entry tasks on the NAMLITS database and the Namibia

Epidemiology Animal Health Information System, as well as process veterinary Import and Export permits were accorded access to ICT facilities and the Internet.

Informant 7 asserted that,

“... there are a variety of reasons for lack of access to ICT facilities and Internet connection by some of the veterinary para-professionals; they include absence of electricity infrastructure in some of the areas. Smart phones and 3Gs cannot be used in some of the rural livestock communal farming areas due to common infrastructural challenges in some places”.

Meanwhile, Informant 3 said that,

“... the CVL Lab technicians share PCs but all have access to ICT facilities and Internet connection”.

Informant 5 pointed out that,

“... the Veterinary Public Health (VPH) division did not have field AHTs on its establishment” (Informant 5).

### **5.3.2.3 Perceptions on Adoption of ICTs and Internet use by the Veterinary Services sector**

All the 7 key informants acknowledged that the Internet had made a positive impact on the practice of veterinary services in Namibia. Informants 1, 2, and 7, agreed that,

veterinary professionals used the Internet quite a lot to access quick reference materials and research publications. Informant 1 added that, "... I expect most veterinary professionals to use the Internet". While Informant 7 felt that, "... usage of the Internet is dependent upon individuals".

Informants 1-4, and 6 reasoned that,

"... the Internet provides easy access to Internet research tools; information through the OIE website; up-to-date reports; access to new information without additional cost; new information on imports and new products; and animal disease situation in different countries. Internet use saved time when processing documents and searching for information, it was usually accurate and up-to-date".

Informant 6 said that,

"... the Internet enables veterinary professionals to access Veterinary Alert Bulletins; and participate in online discussions and disseminate information".

Informant 4 posited that,

"... the Internet improves job performance of veterinary professionals and veterinary para-professionals; it makes it easy to communicate; it provides a channel for quick dissemination of information and quick feedback; and hence mobile phones with internet access were issued to all DVS veterinary



professionals and all Chief AHTs for official use by the MAWF. Chief AHTs communicate (sms, email) with Border entry personnel 24/7”.

According to Informant 6,

“... the Internet enables exchange of DVS reports and circulars online; it improves communication through email; and the OIE reported on animal disease outbreaks in various countries throughout the world through its website”.

Informants 4 and 5 pointed out that,

“... the Internet has made it possible for livestock farmers and pet owners to apply for animal movement and veterinary import permits online via email”.

“The NAMLITS database is also linked to the Internet. Having said that, Chief Veterinarians and Veterinary Control officers that occupy the grades of Veterinary hygiene inspectors are also entitled to free Internet access, courtesy of the DVS/ MAWF. The Internet is used by Veterinary Public Health officials to access and process data on the NAMLITS database; continuously update regulations; and to compile monthly reports” (Informant 5).

Finally, informants 3 and 6 pointed out that the Internet provided opportunities to veterinary professionals and veterinary para-professionals to study or further their studies (Master degree) online.

#### **5.3.2.4 Perceptions on Access to Agriculture Libraries outside Khomas Region**

Informants 1-4, 6, and 7 acknowledged that, most veterinary professionals and veterinary para-professionals outside the Khomas region had limited access to MAWF or agriculture libraries. Informants 1, 2, and 6 said that,

“... the Namibian Agriculture and Water Information Centre (NAWIC) at the MAWF Head Office, Windhoek has stopped the current awareness service of sending out contents pages of current scholarly journals to veterinarians, which previously enabled us to select topics of interest”.

Informants 1-3, 6, and 7 conceded that,

“... most of us are not aware of NAWIC’s subscription to online databases. We do not have the passwords for AGORA and the SA e-Publications databases. We also do not know about the existence of the Directory of Open Access Journals, Biomed Central and other databases that were listed on the questionnaire”.

Informant 5 claimed that, “... the Internet can replace physical agriculture libraries”.

“The DVS Head Office is aware of veterinarians’ struggles to access agriculture libraries. DVS Management allocates an annual budget to all State Veterinary Offices for the acquisition of research resources that include

textbooks, journals, and CD-ROM databases with a view to keep field veterinary professionals and veterinary para-professionals up-to-date about contemporary developments in animal health” (Informant 7).

According to informant 1,

“... the DVS is in the process of finalizing the review of the Integrated Disease Surveillance and DVS animal disease response guidelines which will be hosted on the MAWF website and accessible to all DVS employees. They will be updated automatically online. Hard copies of the publication will still be distributed to all employees”.

Informant 1 added that, “... at present state veterinarians and technicians rely on official DVS circulars and memos”.

Informants 2, 3, and 4 made the following recommendations:

“... the Ministry of Education through NLAS should make provision for access to agriculture libraries throughout the country at various institutions, including schools, research institutions and universities, to enable access by all researchers” (Informant 2).

“The MAWF must provide access to electronic (e)-libraries; subscription to journals; acquisition of books to set up small libraries at all DVS offices; Networking of libraries; and Inter-library Lending (ILL) services to DVS staff outside the Khomas region” (Informant 3). “... MAWF libraries should

communicate with agriculture researchers throughout the country through the MAWF network” (Informant 4).

#### **5.3.2.5 Perceptions on Reading, Research, and Library use Behaviours**

The findings of the study show that, informants 1, 3, 4, and 6 were not satisfied with the reading and research behaviours of veterinary professionals and veterinary para-professionals. Informant 1 said that,

“... the reading and research behaviours of veterinary professionals are discouraging. Besides conforming to the requirements of the Namibia Veterinary Council in relation to CPD, nothing compels veterinary professionals and veterinary para-professionals to read and carry out research”.

Informants 1 and 6 reiterated that, staff shortages created heavy workloads resulting in veterinary professionals neglecting information seeking and research tasks. Informant 1 opined that,

“...attitude change is required among veterinary professionals and veterinary para-professionals. There is lack of realization of the need to read continuously to update their knowledge and skills”.

Informant 1 posits that,

“...the reading and research behaviours of veterinary professionals and veterinary para-professionals in Namibia are affected by the absence of a national veterinary journal locally”.

While Informant 4 opined that,

“... library use is a very good initiative and habit for veterinary interns. Most veterinarians prefer to use the Internet to search for information”.

Five out of the seven key informants conceded that, most veterinary professionals and veterinary para-professionals across the country were not aware of AGORA and the SA E-Publications subscription databases.

“Low computer skills also affect usage of libraries and Internet research tools. MAWF libraries have never provided training to researchers on computers and Internet use” (Informant 4).

According to informant 3, very few veterinary scientists sought new information they instead relied on their old knowledge. “...there is no push factor to acquire new knowledge and skills. There is no motivation to do research; and compulsory CPD only enables veterinary professionals to recollect what they learnt or studied already”.

Informant 3 recommended the introduction of a performance management system,

“... that way veterinary professionals will be compelled to carry out research and publish. They can also diversify into other areas and specialise, for example, in Virology, Microbiology, Toxicology, Biotechnology, and Serology”.

Introduction of a performance management was also recommended by Informant 7.

According to informant 3,

“... most veterinary professionals practicing in Namibia cannot be requested to carry out professional responsibilities beyond the general veterinarian`s knowledge or mandate”.

Informant 4 stated that,

“... most veterinary professionals can access information easily, but most AHTs are affected by the unavailability of Internet connection and agriculture libraries in remote communal farming areas; lack of literature analysis and synthesis skills; and low English language proficiency as this affected veterinary para-professionals even during training. Most veterinary para-professionals preferred to communicate in local languages, instead of English, the official national language”.

Similarly, informant 5 opined that,

“... some of the veterinarians and veterinary hygiene inspectors are good, while others are encountering challenges on how to use computers. Training in information communication technology (ICT) skills is however required”.

Informant 7 felt that,

“... some veterinary professionals and veterinary para-professionals successfully search for information, while some cannot. Veterinary professionals search for information only when it matters most”.

To the contrary however, informant 2 shared a different perspective,

“I am satisfied with the reading and research behaviours of veterinary professionals and veterinary para-professionals. Veterinary professionals and veterinary para-professionals have good information retrieval skills”.

### **5.3.3 Perceptions on Survey Respondents` Information Source Preferences**

Informants 1, 2, 5, and 7 did not envisage any problems with usage of personal notes, as long as the notes conformed to prescribed DVS guidelines and circulars or were summaries of the DVS Circulars and there was consistency in their usage. Veterinary professionals and veterinary para-professionals also had access to the library through the Internet and institutional registration. Informant 7 added that,

“... most of the knowledge used by veterinary professionals and veterinary para-professionals in discharging their daily responsibilities was acquired

during veterinary training at universities and not necessarily from reading the content on the DVS circulars and memos”.

To the contrary however, informants 3, 4, and 6 contend that,

“... usage of personal notes ahead of authoritative sources of information by some veterinary professionals and veterinary para-professionals is a deficient that needs to be corrected”.

They assert that,

“... all veterinary professionals and veterinary para-professionals should be compelled to use prescribed DVS Circulars and Memos because they are linked to animal health legislation and international standards developed by the OIE, the WTO, FAO, and the WHO. DVS Circulars and memos should be given preference because they are customized to suit the Namibia animal disease operating environment” (Informants 3, 4, and 6).

Informant 4 added that,

“... personal notes are inadequate to address animal disease control and may have been used by veterinary professionals with lack of access to agriculture libraries and the Internet”.

Informants 4 and 6 strongly recommended that,



“... all veterinary professionals and veterinary para-professionals should use prescribed DVS Circulars, Standard Operating Procedures, and Contingency Plans for dealing with FMD, CBPP, Avian Influenza and PPR”.

In addition to the above, most key informants encouraged veterinary professionals to consult research publications hosted on the OIE, WTO, and the FAO organizational websites.

“... most veterinary professionals are aware that the OIE, WTO, and FAO host research publications on animal disease diagnosis, methodologies, new medicines, disease outbreaks, regular disease surveillance on specific diseases, emerging diseases, and new diseases on their websites” (Informants 3, 4, and 6).

#### **5.3.4 Informants` Perceptions on Continuing Professional Development (CPD)**

Results of Questionnaire 1 and Questionnaire 2 surveys showed that, a significant proportion of veterinary professionals and the majority of veterinary para-professionals did not attend CPD training. The results were however disputed by informants 1, 2, 4, 6, and 7 on the basis of the following reasons. First, there was no formal CPD training for veterinary para-professionals. Second, CPD training was compulsory to all veterinary professionals on the DVS establishment.

“I joined the DVS establishment in 1998, and my orientation since then is that, CPD training has always been compulsory” (Informant 4).

“... it is compulsory to all DVS staff. I have not noticed any discrepancies in attendance of both CPD and in-service training” (Informant 7).

“...all DVS veterinary para-professionals attended compulsory training between 2011 and 2013. The training provided during 2013 focused on veterinary epidemiology” (Informant 4).

Furthermore,

“... the DVS pays fees annually to enable all state veterinary professionals to attend the annual congress organized by the Veterinary Association of Namibia (VAN)” (Informants 1, 2, 4, 6, and 7).

According to informant 5,

“... CPD training has always been compulsory and continuous in the VPH division because it enables the DVS to keep export vendors and trading partners. The DVS Head Office inspects abattoirs regularly; it is a regulatory requirement”.

Meanwhile,

“...the VAN congress is used to conduct CPD training and present papers on various animal health themes. The trainers and paper presenters at all VAN congresses comprises of academicians and specialists from veterinary schools (universities), the SADC PRINT Project, FANR Directorate, the OIE, FAO and clinicians from public and private practice in Namibia and other countries” (Informants 1, 2, 4, and 6).

In addition to the above,

“... a mini examination constituted part of CPD training which veterinary professionals were required to pass in order to retain their registration status with the Namibia Veterinary Council” (Informant 7).

“A proceedings report of the VAN Congress is published annually and distributed to all veterinary professionals in the country” (Informants 1, 2, 4, and 6).

On the other hand,

“...all veterinary para-professionals on the DVS staff establishment attend a number of in-house organized training sessions. Training is needs driven, but the training is however unstructured and there is no accumulation of CPD points” (Informant 4).

Informants 3 and 5 added that,

“...the CVL and VPH divisions held in-house organized training on various subject matters and also made arrangements for DVS staff to attend pre-identified international training programs”.

“...training is organized after internal work audits or departmental reviews, while other training is continuous to enable staff to acquire skills and knowledge on application or usage of new technologies. Most of the training programs, including external or international are competency based”  
(Informant 3).

While,

“... other international training is organized by the OIE and the SADC FANR/ PRINT Project for focal points on disease reporting, animal welfare, communication, laboratory, aquatic diseases, wildlife diseases, animal production food safety. The OIE provides training on OIE standards for educating veterinarians. 7 AHTs from the Animal Disease Control Division attended training in China during 2012/2013. The African Union Inter-Africa Bureau for Animal Resources (AU-IBAR) provided training on Animal Resource Information System (ARIS) and Databases attended by some DVS staff responsible for the DVS information systems and information management; and the SADC PRINT project provided training on the Livestock Information Management System (LIMS) a few years ago”  
(Informant 4).

According to informant 7,

“DVS veterinary professionals and veterinary para-professionals regularly attend conferences at the Onderstepoort Veterinary School, University of Pretoria in South Africa”.

Informant 5 remarked that,

“... the EU, USA, China and Malaysia offer training relevant to veterinary public health (VPH) officials. There are also ongoing international training projects managed through the Ministry of Foreign Affairs. The Veterinary Public Health (VPH) division identifies relevant programmes from those available”.

In spite of the above training initiatives, Informants 1, 2, and 3 expressed some reservations about the structure and training modalities

“... there are no mechanisms to monitor and evaluate ad-hoc training offered to veterinary para-professionals. The training is reactive, instead of being proactive and is based on the needs of the present”.

“... Ad-hoc training tends to ignore other areas of knowledge that may be required by veterinary para-professionals later” (Informant 1).

6 key informants (1-4, 6, and 7) supported compulsory CPD for both veterinary professionals and veterinary para-professionals. Informant 1 said that,

“... the Training Section should establish a structured compulsory CPD training for veterinary para-professionals”.

“... all veterinary professionals should be compelled to train veterinary para-professionals under their supervision” (Informant 1).

Meanwhile, informants 1 and 6 reasoned that,

“... training also enables veterinary professionals to update their knowledge. CPD and postgraduate training keep practitioners up-to-date”.

Informant 7 added that,

“... Veterinary Science is a dynamic field where new techniques emerge every time. ... if the professionals are not compelled to study, they tend to deteriorate in job performance” (Informant 7).

Finally, informants 4 and 5 asserted that,

“... attendance of CPD training is now a legislative requirement for all veterinary professionals and veterinary para-professionals; it is therefore, simply a matter of compliance”.

“Enactment of the new Veterinary Professionals and Veterinary Para-professionals Act 1, No. 1, 2013, legally compels all veterinary professionals practicing in Namibia to attend CPD training and accumulate a stipulated number of CPD points per year” (Informant 4).

Despite the existence of the legislation cited above, there are still challenges pertaining to the training of veterinary para-professionals,

“... continuous professional growth and development training of veterinary para-professionals (VHIs, field AHTs, and CVL technicians) is however different, as there are no agreed standards at present to regulate the training and professional responsibilities of the different groups of veterinary para-professionals, and hence no technical staff has been professionally registered in compliance with the Veterinary Professionals and Veterinary Para-professionals Act 1, No. 1, 2013” (Registrar of the NVC, January 2014).

The Namibia Veterinary Council was working on the standards for para-professionals at the time of winding up this study.

### **5.3.5 Informants` Perceptions on Veterinary Scientists` Publications Output**

Informants 4, 5, and 6 conceded that few veterinary professionals were capable of conducting research.

“Low research and publications output within the DVS was affected by lack of interest in further studies, sometimes due to family commitments and lack of time to pursue further studies. Lack of postgraduate training results in inadequate research skills” (Informant 6).

Similarly, informants 3 and 7 also made an interesting observation that,

“... most veterinary professionals carried out research while pursuing postgraduate qualifications (Msc degree and Phd) and thereafter, stopped their research activities because there is no recognition of research or publications in civil service”.

On the other hand,

“...most veterinary professionals find it difficult to carry out research side by side with full-time office responsibilities because scientific research cannot be done piecemeal. Professionals require dedicated time to carry out meaningful research” (Informants 2 and 7).

The 7 informants acknowledged that, state veterinary professionals` conditions of service were like those of most civil servants and were therefore, not entitled to research leave. The above were typical characteristics of a developing country because in developed countries like the UK, Russia and the USA, among others, there was pride and recognition of scientists and generation of new knowledge. Most scientists who published within the DVS/ MAWF were reported to be experienced veterinary professionals interested in improving their biographical profile.

Key informant 3 asserted that,

“... the research and publications output is affected by the absence of a performance management system (PMS). There is no clear driving force to



compel DVS veterinary professionals to do research or to improve their academic profiles because it is not an incentive for civil servants. The PSC must introduce research leave and grants which can incentivize veterinary professionals to carry out research and publish”.

Other informants wished that research findings could be used for promotion as in the case of university teaching staff and researchers. The informants further suggested that, the PSC should improve the working conditions of state veterinary professionals by allowing them to access consultancy fees from international organizations and the government (GRN) in order to enable them to carry out research and publish their findings.

Meanwhile, key informants 2, 4, and 6 narrated that, the shortage of veterinary professionals and veterinary para-professionals resulted in work overload to the few available, a constraint that further prevented veterinary professionals from engaging in scholarly writing and communication of their scientific findings. Informant 4 said that,

“... the Epidemiology, Training, Import and Export division has taken note of the low publications output by veterinary professionals, and hence the division now focuses on encouraging young veterinary professionals to pursue further studies and develop capacity to conduct research”.

In addition to the above, Informant 7 reasoned that,

“... the absence of a veterinary school in Namibia before its introduction by UNAM in January 2014 previously hampered the DVS veterinary professionals` desire to carry out collaborative research with academicians, and relate theory to practice”.

Informant 1 recommended the launch of a Namibian national veterinary journal,

“...in order to provide a local platform for veterinary professionals to disseminate their research findings, before they can contemplate of publishing in scholarly peer-reviewed journals and textbooks. At present, some veterinary professionals are struggling to find mechanisms to apply their scientific skills and veterinary knowledge. Most veterinary professionals who have attempted to carry out research have found themselves to be in competition with their core functions”.

### **5.3.6 Perceptions on Barriers encountered during Information Seeking**

According to Informant 1,

“... field veterinary professionals and veterinary para-professionals operate in remote locations and the majority has limited access to information and Internet research tools. The consequences are minimal when the staff is at the DVS Head Office”.

Meanwhile, informants 2 and 7 singled out time constraints as one of the biggest challenges,

“... most veterinary professionals are overloaded with work to the extent that they do not have spare time to seek information for research purposes”.

Informants 3, 4, 6, and 7 reported that the following obstacles were experienced by veterinary professionals and veterinary para-professionals during information seeking: (a) lack of access to libraries and information resource centers; literature review suffered because most field veterinary professionals and veterinary para-professionals did not have ready access to subscription journals, unlike their colleagues based in Windhoek; (b) NAWIC librarians did not distribute the log-in details (user ID and Password) of AGORA and the SA E-Publications databases and hence most veterinary professionals and veterinary para-professionals lacked access to important research resources; (c) electricity black outs were frequent in rural areas and some urban areas like Ondangwa, this affected productivity at some of the DVS offices and also limited veterinary professionals` access to Internet research tools.

TELECOM took long to set up Internet access even in places like Okahandja, work continued to be processed manually, thereby affecting the speed of production. TELECOM, the service provider of ICT infrastructure and Internet connection was also very slow to respond to reported network problems, this affected business and DVS office operations (receiving lab samples; issuing permits; and lack of

communication with colleagues and supervisors; (d) shortage of veterinary professionals and veterinary para-professionals resulted in work overload to the existing staff; and lack of awareness of the existence of free Internet research tools and the NAWIC subscriptions to the SA E-Publications and AGORA databases.

According to Informant 7,

“... failure to obtain the source of information that a veterinarian requires at the point of need constitutes an obstacle or barrier to accessing information and Internet use. Sometimes we have to order required animal disease textbooks at the point of need. Sometimes it is difficult to get access to the required textbooks; and yet it is also difficult to acquire textbooks online due to lack of trust in revealing my personal banking account details online to unknown persons. I am afraid of fraudulent activities on the Internet”.

### **5.3.7 Summary of Section 5.3: Qualitative Study, Phase 2**

The findings presented in Section 5.3 (qualitative data) above helped to clarify some of the results in Section 5.2 (quantitative data), especially pertaining to the choice of information source preferences, that is, informal sources versus authoritative sources, educational background of the different veterinary scientist groups and the situation with regard to the attendance of continuing professional development meetings. The key informants also shed more light on the limited access to Internet facilities by veterinary para-professionals, the absence of a formal continuing professional development program for para-professionals, and the lack of user education and Internet training across all groups of veterinary scientists. The informants also explained how difficult it was for field veterinary scientists to access physical agriculture libraries, and lack of ICT infrastructure in some of the remote locations. While the Interview Guide used to get responses from key informants, the findings in Section 5.3 helped to clarify some of the issues as well as, compliment the results presented in Section 5.2 and fill the missing gaps.

Chapter 6 presents the Discussions of the findings; they are organized according to the research questions of the study.

## **CHAPTER SIX: DISCUSSION OF RESEARCH FINDINGS**

### **6.1 Introduction**

The primary objective of the study was to examine information seeking in different information environments of veterinary scientists in Namibia and determine how information services delivered through various media, information systems, and channels (print, electronic, CD-ROM databases, Telephone, and Fax, among others.) influenced scientists' information seeking, access, processing and use behaviours, and the information decisions they made. Section 6.2.1 presents the demographic profiles of the respondents, while Sections 6.2.2 up to 6.2.6 discuss the findings in respect of the research questions of the study stated below:

1. What are the information needs of veterinary scientists in Namibia?
2. Which information sources are used most by veterinary scientists?
3. What is the uptake of Internet technologies by veterinary scientists?
4. How familiar and satisfied are veterinary scientists with the Directorate of Veterinary Services (DVS) information systems and MAWF libraries?
5. How do veterinary scientists practicing in Namibia update their knowledge and skills?
6. What are the barriers encountered by veterinary scientists during information seeking?

7. To what extent is Wilson's 1996 General Information Behaviour Model applicable to the information seeking patterns of Namibia veterinary scientists?

The research questions were addressed by analysing empirical (quantitative survey and qualitative interview) data and reviewing related literature. Research questions 1, 4, and 5 were addressed by analysing empirical data, while research questions 2, 3, 6, and 7 were addressed through a combination of literature review and analysis of empirical data.

## **6.2 Profiles of the Respondents**

This section presents data about the demographic characteristics of the respondents. The details below pertain to the respondents: gender and age categories, job titles and primary field of study, highest academic qualifications, work experience, geographical location per region, and distance from nearest library facility visited most often. Results presented in Chapter 5, Table 4 show respondents' qualifications in various disciplines: Veterinarians specialized in Veterinary Science/Medicine, Animal Physiology, Surgery, Virology, Toxicology, Serology, and Biotechnology, among others. While, Lab Scientists specialised in Food Science, Biological Sciences, Microbiology and Molecular Biology. Veterinary Hygiene Inspectors read Environmental Science or Veterinary Public Health. Animal Health Technicians read Animal Health or Biomedical Sciences, while Lab Technicians studied Agriculture,

or Agriculture & Commercial Production. Furthermore, key informants interviewed in phase 2 added that, some of the veterinarians and lab scientists specialised in: Veterinary Epidemiology and Immunology, and Field Veterinary Science. Some of the respondents were expected to have additional qualifications to their job entry qualifications.

### **6.2.1 Respondents` Academic Qualifications**

This question sought information about the frequency distribution of respondents in relation to their highest academic qualifications. Results in Chapter 5, Table 5 show that, a significant percentage of veterinarians and lab scientists held postgraduate qualifications in addition to their minimum job requirements. Respondents in the present study held academic qualifications similar to those of veterinary and biomedical researchers at the Sokoine University of Agriculture, Tanzania and veterinary researchers at the University of Zimbabwe (UZ) studied by Chikonzo and Aina (2001).

### **6.2.2 Distance from Nearest Library**

This question sought data about the distance of the respondents from the nearest library they visited most often: results presented in Table 6 show that, only 21% of the respondents were located within the same premises of a library facility, while a total of 37% of respondents were within the 2km radius of library premises. 18% of



the respondents were located far away from any library facility. Significantly, 42% of the respondents did not use libraries at all. The above results imply that about 60% of the respondents` access to and use of library and information services was not known. The geographical location of veterinary professionals and para-professionals in Namibia was determined by the distribution of livestock farms, communal areas and abattoirs across the 13 geopolitical regions of the country which could have pushed respondents further away from well-stocked information centers and MAWF/ agriculture libraries in the Khomas region.

Field veterinary scientists based in remote locations could have depended on virtual libraries and agriculture information systems if all geographical locations in Namibia had reliable Internet connectivity with good download speed. The reality is that some of the places do not have electricity and Internet connectivity at all. The DVS Office at Okahandja did not have Internet connection during the time of the study; DVS Officials could not undertake data entry on NAMLITS, while livestock farmers could not download applications forms online. Some of the results presented in Chapter 5 above already shows that, some of the respondents used old technology such as, telephone, fax, and email to interact with MAWF libraries due to either lack of access or limited access to the Internet and by implication virtual libraries.

Results of the present study to some extent corroborate the findings of Drake and Woods (1978), veterinarians were isolated from colleagues and information sources

and hence their information needs could not be met easily by veterinary medical libraries (p. 437). The scarcity of literature was also reported by Nweke (1992) who investigated human and veterinary medical scientists (HVMS) in Borno State, Nigeria and found that most medical libraries had inadequate information sources, especially journal literature.

### **6.3 Discussions of the Findings According to Research Questions**

#### **6.3.1 Information Needs of the Respondents:** This section responded to **Research Question 1: What are the information needs of veterinary scientists in Namibia?**

Results presented in Chapter 5, Table 7 show that, the information needs of veterinary scientists varied; the following were the most notable: continuing professional development (CPD); information on prescription drugs; information for emergency problem solving, such as, vaccination or animal patient care; preparing for conference presentations; preparing for meetings; literature review; and laboratory experiments. Information needs of respondents resembled the nature of the work in the veterinary services sector. These results are consistent with the findings of Chikonzo and Aina (2001) and Sife and Chilimo (2006) after conducting studies of veterinary researchers in Zimbabwe and Tanzania respectively.

Similar findings were also reported by Raju (2000) who found that health science researchers were in need of information applied in medical treatment; information and knowledge that contributed to medical research; and international health research information. Corresponding findings were also reported by Zawawi and Majid (2001), whose ISB study of biomedical scientists at the Institute for Medical Research (IMR) in Malaysia established that, they required up-to-date information

because health sciences was a continuously evolving discipline in search of medical break-through in control of various diseases and improvement in human health.

### **6.3.1.1 Time Spent on Information Gathering**

Results presented in Chapter 5, Table 8 show that the majority of respondents spent a considerable part of their official time on information gathering activities per week: 58% of respondents spent 1-5 hours, while 24% of the respondents spent 6-10 hours per week. Other results were considered insignificant. In a related study, time constraints forced many environmental scientists to perform some of their information-gathering activities during their off-time or delegate certain research responsibilities to others (Murphy, 2003).

### **6.3.1.2 Veterinary Scientists' Publications Output**

This section sought data about the publications output of veterinarians and laboratory scientists. Results presented in Chapter 5, Table 9 show that, there was a low publications output by veterinary scientists. Only 26% of veterinarians and 14% of lab scientists had published between 1 and 5 articles in peer-reviewed journals, while the majority had not. Key informants interviewed in phase 2 of data collection explained that the veterinarians and lab scientists on the DVS (State/ Public Service) establishment were not entitled to research funding and research leave. Research was

not rewarded by the Public Services Commission (PSC), hence there was no incentive to publish in scientific publications.

### **6.3.1.3 Online Access Tools, Websites and Information Systems**

Results in table 10 show that respondents used a wide variety of websites and online access tools to locate information. About 65% of the respondents used the Internet, while 35% did not. About 50% of respondents read DVS guidelines (circulars & memos); and another half of respondents did not. Other information access tools in the category, including library catalogues, and organisational websites were used by less than 40% of the respondents; while the majority of respondents did not.

### **6.3.1.4 Information Searches, Overload, and Contemporary Developments**

The study established that: the majority of respondents (87%) acknowledged the importance of information to their work responsibilities. While 60% of the respondents were willing to pay for correct information and 40% were not. About 69% of respondents claimed to be aware of contemporary developments in their fields of expertise, while 31% were not aware. About 56% of respondents were satisfied with the results of their information searches, while 44% were not. Finally, results presented in table 11 show that, only 23% of the respondents had experienced information overload before; the majority of respondents did not answer this question.

Three previous ISB studies conducted in Africa conducted by Nweke (1992) in Nigeria, Chikonzo and Aina (2001), and Sife and Chilimo (2006) demonstrated veterinary researchers` desire to use various information sources, from journals, textbooks, conference and research reports, among other sources.

### **6.3.2 Section 3: Information Seeking: Subsections A, B and C**

This section responded to **Research Question 2: Which information sources are used most by veterinary scientists?**

#### **6.3.2.1 Sub-Section A: Information Sources Used**

Results in Table 12 show that, respondents in this study used various information sources to perform different functions: 12 different types of information sources were used by more than 50% of the respondents, while at least 10 different information sources were used by more than 60% of the respondents. Personal notes (90%), work colleagues (89%), DVS Guidelines (84%), Textbooks (79%), and Conference Papers & Reports (77%) were the top 5 most popular sources used by at least 75% of the respondents. Overall, results show that, there is great potential for the animal health sector in Namibia to become an information intensive driven industry in transition to a knowledge economy.

Contrary to findings from previous studies, informal sources of information proved to be more popular among respondents than the formal ones. One of the startling findings was that, journals and scientific databases were used by 66% (9<sup>th</sup> choice) and 61% (10<sup>th</sup> choice) of the respondents respectively, while only 27% of respondents used the library. Results also showed that, respondents were not necessarily dependent on MAWF libraries and DVS information systems as their primary sources of research information as initially assumed by the researcher. The

difference in choice of information source preferences (informal vs formal) could be because respondents in this study were not academicians but veterinary practitioners and therefore, journals, scientific databases, and the library were not their automatic choices when seeking information to perform specific tasks, such as, vaccination, clinical practice, and lab tests or experiments.

Results of the present study differed with the findings of a previous study by Chikonzo and Aina (2001); academic veterinary researchers at the UZ relied more on textbooks, journals, and annual reports for teaching and research purposes. Due to their academic responsibilities, the Veterinary Science branch library, University of Zimbabwe was the main provider of veterinary information (Chikonzo & Aina, 2001). In a related study, Nel and Fourie`s (2010) study in South Africa established that the Onderstepoort library played a pivotal role in assisting veterinary practitioners to earn CPD points.

#### **6.3.2.1.1 Journal Subscriptions**

Question 2A and 2B requested respondents to indicate if their organization subscribed to journals in their field of specialization and list 3-5 titles that they read: Less than 50% of the respondents said that, the MAWF library through NAWIC subscribed to journals in their fields of expertise, while the majority did not. Only a few (21%) respondents listed scientific journals housed at MAWF libraries that they read. Only eight (8) journal titles were found to be more popular among the



respondents. Namibia's veterinary services industry is driven by many groups of veterinary professional and veterinary para-professionals from different educational backgrounds; they are all critical to the success of the industry and its stakeholders in agri-business. The most worrying statistic was the low number of users of scientific journals; information professionals therefore need to work hard to market information sources and services, and to improve library user education.

#### **6.3.2.1.2 Information Sources Preferred during Emergencies**

In emergency situations, knowledgeable persons (76%) were the most popular source of information in first place; followed by the Internet (73%) in second place; while textbooks (68%) were in third place; and work colleagues (66%) in fourth place. The above results correspond with the findings of Nweke's (1992) study of human and veterinary medical scientists in Borno State, Nigeria, Chikonzo and Aina's (2001) study of UZ veterinary researchers, and Sife and Chilimo's (2006) study of Sokoine University veterinary researchers in Tanzania. The most surprising finding on this particular question was that, recommended authentic sources, such as, the DVS guidelines and manuals were selected by only 65% of the respondents in 5<sup>th</sup> place. Equally striking was that, OIE publications that were clearly revered by all key informants interviewed in phase 2 of the study, including DVS senior management and are used globally by most veterinary practitioners and researchers were selected by only 45% of the respondents as the last source of information in this category.

### **6.3.2.2 Sub-Section B: Adoption of ICTs and Internet Use by Veterinary Scientists**

This section responded to **Research Question 3: What is the uptake of Internet technologies by veterinary scientists?**

#### **6.3.2.2.1 Access to Office PC and Internet Connectivity**

Results in Chapter 5.2.4.1, Table 14 show that the majority (at least 70%) of the study population had Internet connected computing facilities at work. In addition to the above, the DVS had provided all veterinarians with a smart phone to enable them to communicate and have access to the Internet while out of office, however, veterinary para-professionals were not accorded the same privileges. In addition to the above, the study also established that respondents had other internet access options out of their duty stations: a significant percentage of the population accessed the Internet through their own 3G, a home connection, an Internet Café, and through a friend.

In view of the above, it can be concluded therefore that, the majority of respondents that took part in this study had various options to access Internet based resources, such as, digital libraries, e-journals and databases (such as AGORA, HINARI, and the SA e-Publications). Contrary to this perception, the above resources were used by

very few respondents (averaging 10%). Results showed that the majority of respondents who took part in the study had not attended any library user education, and therefore, lacked awareness about the existence of the resources. Other respondents may have lacked Internet searching techniques as suggested by some of the key informants.

Lack of and poor Internet connectivity in remote locations proved to be a hindrance to accessing and using virtual libraries and information systems by field veterinary scientists. Field veterinary scientists based in remote locations could have chosen mediated literature search service from MAWF information professionals based in Windhoek, but due to lack of user education, respondents may not have known about this important library service. Some of the key informants accused MAWF information professionals of being invisible to the majority of veterinary researchers and hence, the interaction between the library and researchers was low.

#### **6.3.2.2.2 Frequency of using Internet Search Engines**

Results presented in Table 15 show that, about 60% of the respondents used search engines A: Google.com; B: AltaVista.com; C: Yahoo.com; D: MSN.com; and E: Lycos.com to access information. Google was the most popular search engine among respondents. While Table 16 shows that a notable percentage of the respondents obtained information through online discussion groups, listservs, and newsgroups.

### **6.3.2.2.3 Benefits derived from using the Internet**

Results presented in Tables 17 – 20 show that, less than 50% of respondents selected benefits derived from using Internet services, while the majority did not. The most notable results are presented in Tables 19 and 20 showing that, 47% of respondents selected online research tools (e-books and e-journals) and communication with clients and suppliers. Contrary to results in present study, an investigation of rural veterinary practitioners at Kansas State University by Larson (2010) established that they used a variety of electronic resources, among them, peer-reviewed journal articles, Citations and Abstracts, PubMed, CABI Abstracts, AGRICOLA, the FDA Veterinarian Newsletter, Morbidity and Mortality Weekly Report (MMWR), Google Scholar and Email Discussion lists.

#### **6.3.2.2.4 Agriculture CD-ROM Databases**

Overall, results show that there was a generally low usage of all CD-ROM databases (12% of respondents sought information from VET CD and CAB CD/ CAB Abstracts; 10% used AGRICOLA; while 7% used the Current Contents Annual) when compared to other information sources discussed earlier. The above results are somewhat contradictory to the findings of Chikonzo and Aina (2001). Usage of CD-ROM databases may have been high and easier by veterinary researchers at the University of Zimbabwe (UZ) because they were based at the same geographical location, in comparison to researchers in the present study who are scattered throughout the country. Times have also changed since Chikonzo and Aina`s (2001) study, some of the content previously found on CD-ROMs only is now available online too, making it remotely accessible from any location 24/7.

The researcher`s overall interpretation of the above results and analysis of the literature is that, the growth of the Web has given researchers seamless multiple access to online information sources to the extent that, information available through CD-ROM databases may be falling out of favour with most researchers. The use of CD-ROM technology is limited to a geographical location; this does not suite the Namibia veterinary services industry because veterinarians and veterinary para-professionals are distributed throughout the country where there is presence of livestock and wildlife. The most ideal situation is to enhance Internet access options for veterinary researchers, so that they can use it at the point of need

#### **6.3.2.2.5 Respondents` Perceptions about the Internet**

Respondents` perceptions varied: The majority (65%) of respondents reported that the Internet enhanced their ability to access the latest information and science, while 35% did not. Only 44% of respondents perceived that the Internet was good for communication, while 56% did not. Only 39% of respondents reported that the Internet made them enjoy their job, while the majority did not. Other results were insignificant.

The majority of respondents felt comfortable with the searches that they made on the Internet and was satisfied with the results of their information searches, while a small percentage of respondents experienced information overload. Results correspond with some of the previous studies by Nweke (1992) in Nigeria and Nel and Fourie (2010) in South Africa. Both studies showed that veterinary researchers had at least some difficulty in keeping up with research in their field(s) of study with regard to time.

### **6.3.3 Sub-Section C: Information Search Strategies**

**6.3.3.1 Information Search Strategies and Document Formats:** Few (30%) respondents preferred to search electronic versions of journals and databases, while the majority (60%+) did not. Only 25% of respondents preferred to search printed publications, while the majority did not. Very few (20%) of respondents preferred to read print editions of publications, while the majority did not. The majority (60%) of the respondents opined that making a choice of the preferred document format between print and electronic copies was dependent on circumstances.

#### **6.3.3.2 Web Search Interfaces**

An overwhelming majority of respondents preferred to make information searches from the Google interface over the library home page. Respondents` lack of awareness of the library page could be one of the reasons for their preference for the Google page. While poor marketing of the library website may have contributed to underutilisation of certain information sources by respondents in this study.

### **6.3.4 Familiarity with MAWF libraries and DVS Information Systems**

This section responded to **Research Question 4: How familiar and satisfied are veterinary scientists with the DVS information systems and the MAWF library services?**

**6.3.4.1 Remote Interaction with MAWF libraries:** About 23% of respondents made telephone information inquiries to the library; 21% of respondents often used the fax to make an information inquiry from the library; and 24% of respondents often used e-mail to make an information inquiry from the library. Overall, the results suggest that more than 70% of respondents did not interact with MAWF libraries using telephone, fax and e-mail services.

**6.3.4.2 Sharing Information with Colleagues:** 79% of respondents often shared information acquired at conferences with colleagues in the profession. 79% is quite high considering that veterinary scientists are scattered throughout Namibia. The researcher concluded that some of the knowledge acquired at conferences must have been shared during DVS meetings and also during the VAN organised annual congresses. In some rare occurrences, conference participants were requested to make presentations to other DVS colleagues as reported by a couple of key informants interviewed in phase 2. Previous studies of veterinary researchers at the University of Zimbabwe by Chikonzo and Aina (2001) and Sife and Chilimo (2006) confirmed that they used and shared information acquired at conferences.



**6.3.4.3 Social Networking:** About 39% of respondents agreed that Social Networks were important to the veterinary services profession, while 47% of respondents also agreed that the Internet enabled them to establish business relationships within their profession; and 76% of respondents agreed that the Internet could be used as a tool to facilitate continuous professional development (CPD) of veterinary scientists online. Overall, the results show that the majority of veterinary professionals appreciated the significance of the Internet in promoting social networking; establishing business relationships; and the potential to facilitate CPD training online.

#### **6.3.4.4 Frequency of Searching for Information**

Results presented in Table 24 show that: Less than 50% of respondents in this study consulted a wide variety of information sources: Few (35%) respondents used MAWF libraries and the Google Scholar database, while the majority did not. Only 21% of respondents used the SA E-Publications database, the rest did not. Less than 20% of the respondents sought information from pharmaceutical websites, WAHIS, WAICENT portal, and AGORA. Other results were insignificant. The majority of respondents did not use most of the listed agriculture related portals and websites. The researcher concluded that, time constraints, poor Internet connectivity in remote locations, and lack of awareness among respondents contributed to low usage of AGORA.

Contrary to the above findings, Angello and Wema (2010) investigated the extent to which livestock research institutions facilitated access to and use of electronic information by livestock researchers in Tanzania and found that TEEAL was the best marketed and most used information source. Many respondents also used the following online information sources: AGORA, HINARI, Medline, Tanzania Development Gateway, OARE, Tanzania Online and Cochrane Library (Angello & Wema, 2010).

## **6.4 Information Literacy and Continuing Professional Development**

This section responded to **Research Question 5: How do Namibia veterinary scientists update their knowledge and skills?**

### **6.4.1 Frequency of Training to Upgrade Skills and Knowledge**

Only 16% of veterinary professionals and 7% of veterinary para-professionals attended monthly meetings once in 3 months (meetings were used by veterinary professionals to review progress and to train veterinary para-professionals), while 13% of veterinary professionals and only 3% of veterinary para-professionals attended DVS monthly meetings. 52% of veterinary professionals and 7% of veterinary para-professionals attended training as part of continuous professional development (CPD). Overall, results show that only slightly more than 50% of veterinary professionals attended CPD training, while veterinary para-professionals did not. It was striking that, a significant percentage of veterinary professionals did not attend CPD training. The above findings were however disputed by key informants in phase 2 of the study. Veterinary para-professionals were not members of the Veterinary Association of Namibia (VAN) that organized CPD training.

#### **6.4.2 Attending Animal Health Conferences and Seminars**

The majority (92%) of respondents agreed that it was important to attend animal health conferences and seminars, while only 36% of veterinary professionals had actually presented papers at conferences and seminars. 92% of respondents agreed that it was important to share information and knowledge acquired at conferences and seminars with colleagues.

#### **6.4.3 Training in Library User Education, Information Literacy, and Internet**

##### **Searching Skills**

Very few (9%) of respondents attended training in library user education, while 52% of veterinary professionals and 7% of veterinary para-professionals attended training as part of continuous professional development (CPD), and 34% of respondents attended training on Internet searching skills. The majority of respondents did not attend training targeted at improving their information searching skills.

A corresponding study in Tanzania conducted by Sife and Chilimo (2006a) found that there was low ICT uptake among veterinary researchers at the Sokoine University of Agriculture (SUA) due to inadequate information searching skills; lack of guidance from librarians; and limited knowledge on the structure of databases (Sife & Chilimo, 2006b). A literature review study of medical doctors conducted by Davies (2007) established that, most respondents found literature searches to be

complex. The study recommended that, librarians needed to provide information literacy training to health researchers (Davies, 2007).

In a direct contradiction, Grefsheim and Rankin's (2007a) investigation of information needs and information seeking in a biomedical research setting established that, NIH scientists overwhelmingly used the NIH library (85%), they began their searches at the library website rather than Google; they were likely to seek information themselves (95%); and valued desktop resources and services (Grefsheim & Rankin, 2007b). On the other hand, the results of Wales's (2000) study showed that the majority of users and non-users would prefer enhanced library access via the Internet, especially access to full-text journals. While Internet access is very good and the cost very low in developed countries, it is not the same in Namibia. Some DVS Offices were located in areas without Internet connectivity. Veterinary researchers based outside the Khomas region of Namibia sometimes struggle to get good connectivity and download information fast, while some field veterinary scientists based in remote locations have to drive some distance to get access to the Internet, while others simply gave up.

#### **6.4.4 Satisfaction with information in DVS Information Systems**

Results in Table 25, chapter 5 show that less than half (42%) of respondents perceived that it was important for the DVS to have current information sources, while 58% did not. The study also established that, few respondents (about 33%) of

respondents were satisfied with the DVS information systems, while the majority of respondents were not. Contrary to expectations, the level of satisfaction was low.

Findings reported earlier above showed that: DVS Guidelines were selected by 84% of the respondents and were the third most used type of information source after Personal Notes selected in first place at 90% and Work Colleagues in second place at 89% out of a total of 12 different types of information sources. While in the category of Access Tools, DVS memos and circulars were selected by 50% of the respondents and were second in popularity to the Internet. The latter results were not surprising because memos and circulars were not conventional access tools. Researchers were expected to use library online public access catalogues, indexes and bibliographies, and the Internet. The MAWF library catalogue was a localised in-house database, not publicly accessible and was only accessible to walk-in users (used by 35% of respondents).

#### **6.4.5 Gaps in Information Requirements**

If not satisfied, 19% of veterinary professionals and 23% of veterinary para-professionals consulted experts to cover up for the gaps in the DVS Information System; while 32% of veterinary professionals and 52% veterinary para-professionals consulted work colleagues; and 39% of veterinary professionals and 26% of veterinary para-professionals searched the Internet to fill gaps in the DVS

Information System. Respondents again preferred interpersonal sources of information ahead of formal sources.

#### **6.4.6 Respondents` Publications Output and Contribution towards Developing DVS Animal Health Information Systems**

##### **6.4.6.1 Publications Output**

Few respondents (23% of veterinarians and 14% of lab scientists) had published articles in both peer-reviewed journals and industry magazines. Only 10% of veterinarians had contributed a chapter towards publishing a book in their field, while the majority had not.

##### **6.4.6.2 Respondents` Contribution towards development of DVS Animal Health Information Systems**

Only 39% of veterinary professionals and 74% of veterinary para-professionals contributed towards the development of the DVS Information System. While 52% of veterinary professionals and 77% of veterinary para-professionals felt that they should be consulted prior to the design of an information system targeted at their use. Meanwhile, only 7% of veterinarians used veterinary alert systems; and one veterinarian used the following 2 Alert Systems: International Veterinary Information Service (IVIS) and Veterinary Association of Namibia (VAN) News Bulletin. Key

informant 1 in the qualitative phase 2 did not like alert systems because they flooded his inbox with too many unnecessary notifications. It is possible therefore that, some respondents deliberately avoided using veterinary alert systems.

## **6.5 Barriers to Information, Internet Access and Use**

This section responded to Research **Question 6: What are the barriers encountered by veterinary scientists during information-seeking?** Barriers in this context referred to obstacles while, first, trying to access the information itself in its various formats and second, obstacles related to Internet access and use:

### **6.5.1 Barriers to access and use of information**

About 52% of the respondents selected non-availability of required information sources, while less than half (42%) of the respondents selected outdated information sources at the DVS. Few (36%) respondents selected lack of adequate time to seek information, while 29% of the respondents selected information is far apart from each other (scattered – similar content is found in different sections of the library). Very few (27%) respondents either selected information is scattered in too many sources or incomplete information materials at the DVS. Only 24% of respondents either selected information overload or information on my subject is too vast, while only 18% of the respondents selected lack of skills to search the library catalogue. Other results were considered insignificant.



Overall, results show that the non-availability of information sources, some outdated information sources, lack of time for information seeking, information overload and scattering of information sources were the most significant barriers that had an impact on the professional practice and research initiatives of veterinary scientists. Two previous ISB studies of agriculture researchers conducted by Patitungkho and Deshpande (2005) and Khan and Shafique (2011) also found that, information overload and its availability in various sources, and non-availability of required materials were some of the barriers to information seeking. Similarly, Sife and Chilimo (2006) also found that, poor information skills and lack of awareness affected the respondents` usage of resources available at the National Agriculture Library, Sokoine University of Agriculture (SUA), Tanzania.

### **6.5.2 Barriers to Internet Access and Use**

Few (26%) respondents selected slow speed of downloading information, while only 23% of the respondents selected inadequate time to keep up with everything scientists required. Very few (11%) respondents selected limited Internet searching skills, while only 10% of the respondents chose cost of accessing the Internet and lack of access to the Internet; and other results were insignificant. Overall results show that, slow speed of downloading information and inadequate time to keep up with everything scientists required were the most significant barriers to Internet use in this section.

Previous studies by Patitungkho and Deshpande (2005) and Khan and Shafique (2011) identified: lack of computer hardware and software, lack of time to search for information, non-availability of required materials and lack of good searching skills as some of the barriers to information seeking. Meanwhile, time constraints also forced many veterinary researchers in the UK to perform some of their information-gathering during their off-time or delegate certain research responsibilities to others (Murphy, 2003).

## **6.6 Summary of Chapter Six (6)**

This chapter discussed the findings of the study organised according to the Research Questions 1-6 of the study. Section 6.1 introduced the chapter and outlined how the chapter was organised, while section 6.2.1 summarised the profiles of the respondents of both phases 1 and 2 during data collection.

Data gathered on the demographic profiles of the respondents showed that the 3 groups of veterinary para-professionals (animal health technicians, lab technicians, and veterinary hygiene inspectors held qualifications in the fields of agriculture, biological sciences, and environmental sciences. While veterinarians and lab scientists were required to have a certain level of expertise. They specialised in the following disciplines at different study levels: Animal Physiology, Veterinary Epidemiology and Immunology, Veterinary Public Health, Field Veterinary Science, Biological Sciences, Molecular Biology, Biomedical and Life Sciences, and

Environmental Science. Furthermore, veterinarians and laboratory scientists based at the Diagnostics and Research Division, Central Veterinary Laboratory (CVL) in Windhoek were expected to have expertise in Virology, Toxicology, Serology and Biotechnology, as additional qualifications to their job entry qualification requirements.

Section 6.2.2 answered research question 1 on the information needs of veterinary scientists in Namibia: Findings presented in Chapter 5 show that, while the information needs of the respondents varied, the following were the most notable: continuing professional development (CPD); information on prescription drugs; solving emergency problems, such as, vaccination or animal patient care; preparing for conference presentations; preparing for meetings; Literature review; and laboratory experiments.

Section 6.2.3 responded to research question 2 about the information sources used most by veterinary scientists. Respondents in the present study used various information sources to satisfy different information needs.

Although the results presented in chapter 5.2.4.4G showed that respondents in the present study used a variety of information sources, it is critical to point out that, usage rate was very low among key agriculture databases, such as, AGORA and the SA E-Publications databases that formed part of the MAWF subscriptions at the

time, open access databases, such as DOAJ, Google Scholar, and Open J-Gate, as well as organizational websites (OIE, FAO, and WHO), and agriculture CD-ROM databases (AGRICOLA, CAB Abstracts). Personal notes (90%), work colleagues (89%), DVS Guidelines (84%), Textbooks (79%), and Conference Papers & Reports (77%) were the top 5 most popular sources of information used by at least 75% of the respondents. Results show that informal sources were more popular among respondents.

Findings reported above in Chapter 5, Section 3, Sub-Section A: Question 1 (A-M) show that, DVS Guidelines (memos and circulars) were selected by 84% of the respondents and were the third most used type of information source after Personal Notes selected in first place at 90% and Work Colleagues in second place at 89% out of a total of 12 different types of information sources. Although not used by all respondents, 84% is a very high number and the researcher can conclude the respondents were quite familiar with DVS information sources. While in other results reported earlier in Chapter 5, Section 2, Questions 4 and 5, DVS guidelines (memos & circulars) were selected by 50% of the respondents and were second in popularity to the Internet in the category of access tools. The most surprising finding was that, library catalogues were used by 35% of the respondents. While the low usage of DVS memos and circulars was not surprising because researchers were expected to use library catalogues, indexes & bibliographies, and Internet based tools to access information.

Meanwhile, MAWF libraries were used overall only by 27% of the respondents, while print journals on the MAWF subscription list were read by only 21% of veterinarians and lab scientists. The researcher concluded that MAWF information sources were not well known by the majority of respondents. This is largely attributed to lack of awareness on the part of respondents, and lack of user education and poor marketing of information sources by MAWF information professionals. It could also be a result of respondents' poor reading habits.

Section 6.2.6 responded to research question 5 about the information literacy and lifelong ambitions of the respondents: and found that, few respondents than expected attended different types of training to upgrade their skills and knowledge: 9% of respondents attended training in library user education, while 52% of veterinary professionals and 7% of veterinary para-professionals attended training as part of continuous professional development (CPD), and 34% of respondents attended training on Internet searching skills.

Section 6.2.7 answered research question 6 about the barriers to information and Internet access and use by the respondents:

Findings show that there were four notable barriers to accessing and using information and the Internet: slow speed of downloading information (26%), inadequate time to keep up with everything scientists required (23%); limited Internet searching skills (11%), and cost of accessing the Internet and lack of access to the Internet (10%).

Chapter 7 presents a Summary of the Study, Conclusions and Recommendations. A Model exhibiting the information seeking patterns of veterinary scientists in Namibia is discussed.

Chapter 7 answers **Research Question 7: To what extent is Wilson`s 1996 General Information Behaviour Model applicable to the information seeking patterns of veterinary scientists in Namibia?**

## **CHAPTER SEVEN: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

### **7.1 Introduction**

This chapter summarises the findings of the study, provides conclusions and recommendations that may be used to improve the provision of information services to veterinary professionals and veterinary para-professionals in Namibia. The section also suggests directions for further research. The study set out to examine the information seeking behaviours of veterinary scientists in Namibia. Corresponding research questions that guided the study are provided below, in each case highlighting important findings and various observations. The research questions were:

**Research Question 1:** What are the Information needs of veterinary scientists in Namibia?

**Research Question 2:** Which Information Sources were used most by veterinary scientists?

**Research Question 3:** What is the level of information communication technology (ICT) use and adoption by the veterinary services industry in Namibia and usage of Internet technologies by veterinary scientists?

**Research Question 4:** What is the level of awareness and satisfaction among veterinary scientists with the DVS Information Systems and MAWF library resources and services?

**Research Question 5:** Which strategies were used by veterinary scientists to update their knowledge and skills?

**Research Question 6:** What are the barriers (obstacles) encountered by veterinary scientists during information seeking?

**Research Question 7:** To what extent is Wilson's 1996 revised General Information Behaviour Model to the information seeking patterns of veterinary scientists in Namibia?

What follows is a summary of the findings of the study, conclusions and recommendations.



## **7.2 Summary of the Research Findings Based on the Research Questions**

This section is organised according to the research questions of the study.

### **7.2.1 Information Needs of Veterinary Scientists in Namibia**

The information needs of veterinary scientists varied (see results presented in Chapter 5, Table 7). Veterinary scientists in Namibia sought information primarily to satisfy their needs for: Continuing professional development (CPD: 45.16%); Seeking information on Drugs (41.94%); Conference Presentations (41.94%); Emergency Problem Solving (such as Clinical Decision Making) (37.1%); Preparing for Meetings (33.87%); Lab tests & Experiments (32.43%); and Literature Review (22.58%). A few other needs not listed here were considered insignificant. Meanwhile, results presented in chapter 5, Table 8 showed that the majority of respondents spent part of their official time per week seeking information. Overall, more than 70% of the respondents spent 1-10 hours per week on information gathering activities.

### **7.2.2 Information Sources Preferred by Veterinary Scientists**

Veterinary scientists in Namibia used a wide range of information sources to carry out a variety of information tasks (see chapter 5, Table 12). The study identified personal notes, work colleagues, DVS guidelines and memos, textbooks, and

conference papers and reports as the top 5 most popular sources of information used by at least 75% of the respondents under normal circumstances. The study also established that, knowledgeable persons, the Internet, textbooks and work colleagues were the top four most preferred information sources in urgent information need situations. Results clearly demonstrated that, either under normal circumstances or in emergency situations, they preferred informal sources of information.

According to key informants interviewed in phase 2, all veterinary practitioners were required to use prescribed DVS Circulars, Standard Operating Procedures, and Contingency Plans for dealing with animal diseases such as, Avian Influenza, Contagious Bovine Pleuro Pneumonia (CBPP), Foot and Mouth and Disease (FMD), and Peste des petits ruminants (PPR). Some of the key informants opined that, the respondents who relied on personal notes may have compiled their content from the various DVS circulars and guidelines to make it easier to locate the information source when the need arose, instead of carrying various DVS circulars. The researcher agrees with this analogy because the DVS is assessed regularly for compliance with the OIE Animal Health Terrestrial Code and has to date met the basic minimum OIE, FAO, WHO standards on every occasion the assessment is carried out. In fact, Namibia has maintained its European Union, Norway, and South African beef supply quota for many years now (DVS, 2011). DVS reports (2005, 2007 & 2011) also show that, there has been an increase in demand for Namibian meat and livestock from neighbouring countries; the USA and lately China have also expressed interest in Namibian meat.

### **7.2.3 Level of ICT adoption by the Namibia Veterinary Services sector and Internet Use by Veterinary Scientists**

The majority (71%) of respondents had Internet access at work, while a few (27.4%) respondents did not. The study also found that respondents had additional Internet access options outside the office environment. About 65% of veterinary professionals used the Internet to access information; this represents a leaning towards a preference for web information seeking by veterinary scientists. Most respondents used search engines than they used the International Organisation for Animal Health (OIE) and the World Health Organisation (WHO) websites to seek information on animal health (see Chapter 5, Table 15). About 90% of veterinary professionals agreed that the Internet enhanced their ability to access the latest science, while 84% of veterinary professionals felt comfortable when searching for information on the Internet. Internet use was high among veterinary professionals and low among veterinary para-professionals.

### **7.2.4 Level of Awareness and Satisfaction among Veterinary Scientists with the DVS Information Systems and MAWF libraries**

A smaller percentage (12%) of respondents than expected attended DVS monthly meetings and quarterly meetings once in 3 months (see chapter 5.2.7.1, Section 1). The above results were however disputed by all the key informants interviewed in qualitative phase 2 of the study; they claimed that the meetings were compulsory.

DVS monthly meetings were used by veterinary professionals to review work progress and to train veterinary para-professionals.

More than 40% of the respondents perceived that it was important for the DVS to have current information sources (see Chapter 5, Table 25). 50% of the respondents used DVS reports and memos, while only 27% of the respondents used MAWF libraries and the same percentage of the respondents acknowledged that MAWF libraries subscribed to journals in their fields of expertise. Only 21% of respondents read MAWF journals and were able to list their titles of interest. The study established that, only 30% of respondents were satisfied with the DVS information systems.

### **7.2.5 Strategies used by Veterinary Scientists to update their Knowledge and Skills**

The majority of veterinary professionals (52%) attended continuous professional development (CPD) congresses organized by the Veterinary Association of Namibia (VAN) every year. There was no organized CPD training for veterinary para-professionals; they instead relied on in-house training organized by the DVS. A very low percentage of respondents attended training in library user education and Internet searching skills, while the majority did not. The majority of respondents did not use library catalogues; and did not value the importance of library catalogue searching skills in locating required information (see chapter 5, Table 26).

### **7.2.6 Barriers to Information Seeking and Internet Use**

Results showed that, the following barriers were considered to be significant by the respondents: Non-availability of required information sources (52%); Outdated information materials at the DVS (42%); Lack of adequate time to seek information (36%); Information overload (32%); Required information sources were far apart from each other (29%); Incomplete Information materials at the DVS (27%); Scattering of information sources (materials on the same subject are found in different locations of the library – this is a result of inconsistency in categorisation/ classification of information sources by librarians) (27%); Slow speed of downloading information online (26%); Information on my subject is too vast (24%); and Inadequate time to keep up with everything scientists required (23%); while other barriers were considered to be insignificant.

Overall results showed that, non-availability of information sources, outdated information sources, lack of time to seek information, information overload, and required information sources were far apart from each other, were the top 5 most notable barriers that impacted negatively on the information seeking behaviours of veterinary scientists in Namibia.

### **7.2.7 Recommendations on the Information Seeking Patterns of Veterinary Scientists in Namibia.**

This research question is discussed under recommendations in section 7.4.

### **7.3 Conclusions**

Based on the summary, it can be concluded that, the study successfully achieved its aims and objectives. Three assumptions of the study proved correct: (i) Work/ Job related information needs of veterinary scientists varied; (ii) veterinary scientists used a wide range of information sources; and (iii) veterinary scientists used the Internet as a main research resource, while the veterinary services industry had generally adopted and used information communication technologies (ICTs) for various purposes. On the other hand, two assumptions proved wrong: (i) journals were the most preferred research information sources among veterinary scientists and (ii) DVS manuals & guidelines, the OIE and WHO websites would be automatically selected by veterinary scientists ahead of other information sources. Contrary to the researcher`s expectations, journals were not the most preferred information source because respondents in this study were veterinary practitioners and not academicians. For regular animal disease surveillance & reporting or animal patient care, veterinary scientists were dependent on either their readily available personal notes, work colleagues, prescribed DVS Guidelines, or textbooks. In emergency situations, veterinarians consulted specialists first, or sought solutions from the Internet.

This chapter discussed the findings on veterinary scientists` information seeking behaviours in respect of their information needs; information source preferences; familiarity with DVS information systems and MAWF library services, as well as the level of ICT adoption by the Namibia veterinary services sector and Internet use by

the respondents; how veterinary scientists continued to upgrade their knowledge and skills (CPD); and the barriers they encountered during information seeking.

The researcher concludes that, respondents in the present study exhibited similar traits to other veterinary researchers in Africa with regard to their information needs, information source preferences, and adoption of ICTs by the Namibian veterinary services sector, and usage of Internet research tools. The researcher attributes poor information skills, lack of training in library user education, and Internet searching skills resulted in the majority of respondents not utilising the available MAWF library service and resources, agriculture CD-ROM databases, organisational websites, and Internet research tools, including subscription databases, like AGORA and SA E-Publications. This said, Slawson and Shaughnessy (2005) suggest that, veterinary schools should add information management to their curriculum, so that future veterinary practitioners could access, use and manage information with less difficulty.

It is reported in the ISB literature and the OIE (PVS Pathway, 2008) that, veterinary researchers must possess the ability to navigate, evaluate, and use information to inform decision-making in clinical practice and animal patient care, as well as, research in livestock production, reproduction and animal health (some of the ideas borrowed from Berger, 2008; Cooney & Hiris, 2003; Shanbhag, 2006, in: Rodney G. Birch, 2012, p. 27). Based on the findings presented above, the researcher concludes

that, agriculture information professionals in Namibia need to improve their usage education programmes, and also reach out to veterinary researchers based in remote locations and improve their information search and usage behaviours so that they could become purposeful and self-directed intentional lifelong learners.

Previous studies show that, if used optimally, uninterrupted Internet connectivity and use enabled veterinary scientists to access the latest science at the time of need, thereby enabling them to provide a rapid response to animal patient care and animal disease outbreaks. Furthermore, access to the Internet made it easy for veterinary professionals to communicate new research findings and radiographic images to fellow veterinarians, as well as exchange views much quicker; join online discussion groups; use digital libraries and current awareness service alert systems, among other online services. On the other hand, lack of Internet access may contribute to barriers to the information seeking behaviours of veterinary scientists, such as, limited communication options and channels, lack of access to digital libraries and online research resources (e-journals, research reports/ papers, etc.), lack of awareness to the latest science that is vital to animal patient care (affects practice), and review of related literature in the event a scientist seeks to author a new publication, or is preparing for a conference presentation.

The next section presents the recommendations.



## **7.4 Recommendations**

What follows are general recommendations that should be considered by MAWF information professionals and the DVS Management in order to make information readily available and accessible to veterinary professionals and veterinary para-professionals.

### **7.4.1 General Recommendations**

In view of the low usage of MAWF libraries (27%), information systems/online information sources, such as AGORA, SA E-Publications, HINARI, Google Scholar, and a wide range of agriculture CD-ROM databases housed at MAWF libraries, the study recommends that, agriculture information professionals in Namibia should take the lead in improving the information searching skills, Internet and library use behaviours of veterinary scientists. The study found that, there was low library usage by the respondents (27%); the same percentage of respondents also acknowledge that MAWF library subscribed to journals in their areas of work, while only 21% of the respondents actually read the veterinary science journals on the NAWIC subscription list. Overall, this study justified the need to train veterinary scientists in library user education and Internet searching techniques, and transform veterinary scientists into lifelong learners. Library user education could raise scientists' awareness about the

MAWF libraries` information sources and free Internet research tools and services.

Specific recommendations are as follows:

(i) The study recommends Internet search training for veterinary scientists.

Literature shows that, veterinary practitioners used the Internet regularly to verify clinical information supplied by other veterinarians and to seek advice; the Internet was also used by veterinary interns to obtain research information; sending radiographs; and accessing the veterinary information network (VIN) (Hess, 2010). The researcher encourages Namibia veterinary scientists to use the Internet to hold virtual meetings, join online discussion groups and newsgroups;

(ii) The researcher recommends the development of an outreach programme for training veterinary scientists for the purposes of providing intensive MAWF library user education (information literacy) training. Training could be in the form of traveling workshops; and development of an Interactive Information Literacy (IL) Tutorial to be hosted on the MAWF website;

(iii) The study recommends that Web information seeking courses should form part of all the Veterinary Association of Namibia organized Annual Congresses. Acquisition of effective searching skills by scientists could lead to improvement in library and Internet use. Results presented above showed that various databases, such as, AGORA, SA E-Publications, and organisational websites (OIE, FAO, and WHO) had an average use of only 10%. While MAWF libraries were used by 27% of the respondents;

- (iv) The study recommends that MAWF information professionals should develop a Marketing and Communication Plan, and improve engagement of veterinary scientists and other agriculture researchers. Information professionals should hold marketing information awareness promotions/campaigns; and
- (v) The study recommends that agriculture information professionals to re-examine the roles of MAWF libraries as physical spaces, and develop institutional repositories accessible by scientists 24/7.

The researcher believes that, the above recommendations will culminate in the optimum utilization of agriculture library services and information resources; Internet research tools; and DVS Information Systems. The online and traveling information literacy (IL) training programs may result in veterinary scientists acquiring good information seeking skills and internet searching techniques; information search strategies; good library use habits; critical thinking skills; and analysis and evaluation of online information sources, with a view to become lifelong learners.

#### **7.4.2 Originality of the Study**

This is the first study to address the information seeking behaviours of veterinary scientists in Namibia by an information professional at postgraduate studies degree and higher level in Namibia. The study identified the information needs of veterinary

professionals and veterinary para-professionals in Namibia, as well as, the information sources used and preferred by the respondents to satisfy their information needs. Further to the above, the study also established veterinary scientists` level of awareness about the DVS information systems and MAWF library resources and services; and the extent to which the veterinary services industry had adopted ICTs and used the Internet. The study examined the strategies used by veterinary scientists to upgrade their knowledge and skills; and identified the barriers encountered by veterinary scientists during information seeking and in accessing and using the Internet.

#### **7.4.3 Contributions of this Study**

A major contribution of this study is that it is the first in Namibia to investigate veterinary scientists in Namibia and will serve as a future reference point to information professionals interested in the research area, as well as stakeholders of the veterinary services sector. Unlike most of the previous ISB studies on veterinary researchers conducted elsewhere, the voices of lab scientists, veterinary hygiene inspectors, and animal health technicians have been brought to the fore in this study. Furthermore, DVS Management will know more about the information behaviours of its employees. Agriculture information professionals in Namibia and the DVS Management have their work cut out as they have to work harder to address several deficiencies identified in this study related to Internet searching skills, library use behaviours of veterinary scientists, marketing of both physical and electronic

information sources (online scientific databases, such as, AGORA and SA E-Publications), as well as scientific writing skills of veterinary scientists, with a view to increase their publications output and information dissemination channels.

#### **7.4.4 Components of the Proposed Model of the Information Seeking Patterns of Veterinary Scientists in Namibia**

This section responded to **Research Question 7: To what extent is Wilson's General Information Behaviour model applicable to the information seeking patterns of veterinary scientists in Namibia?** The aim was to use Wilson's 1996 General Information Behaviour model to develop a model exhibiting the information seeking patterns of veterinary scientists in Namibia. The model is based on the empirical findings of this study and ideas from other ISB models that were reviewed on information needs and seeking behaviour (Chapter 3). The original ideas founding the model presented in Figure 10 below were borrowed from Wilson's revised 1996 General Information Behaviour Model. Some of the details of the proposed model are discussed in detail above under the summary of the study, chapter 7, sections 7.2.1-7.2.7; and sections 7.4.3.5.1-7 below. The proposed model is applicable to the behaviours of both private and state (DVS) veterinary scientists in Namibia.

#### **7.4.4.1 Context of Information Needs**

Wilson`s 1996 model was a major revision of the 1981 model. It drew upon research from a variety of fields other than information **science**, including decision-making, psychology, innovation, health communication and consumer research (Wilson, 1999a, p. 256). The basic framework of the 1981 model persists, in that the person in context remains the focus of information needs. Information needs are secondary (2<sup>nd</sup> level) needs and arise from more basic human needs that are physiological, cognitive, or affective in nature (Wilson, 1999b, p. 252).

Veterinary scientists in Namibia sought information to satisfy various information needs, such as, Continuing professional development (CPD); Seeking information on drugs; Emergency problem solving (Clinical Decision Making); Lab tests and Experiments; Literature review; and Field surveys, among others. Further details about the information needs of the respondents in this study are discussed above, see summary of the study, section 7.2.1.

#### **7.4.4.2 Information Environment, Sources and Channels**

Wilson`s 1996 revised Information Behaviour Model presented three relevant theoretical ideas, including the risk/ reward theory which may help to explain which information sources may be used more than others by a given individual. Veterinary

scientists in Namibia used a wide range of information sources to carry out a variety of information tasks; they used both formal and informal sources of information heavily. Information content was available to veterinary scientists through many channels. The study identified personal notes, work colleagues, DVS guidelines & memos, textbooks, and conference papers & reports as the top 5 most popular sources of information used by at least 75% of the respondents under normal circumstances (see chapter 5, Table 12). The study also established that, knowledgeable persons, the Internet, textbooks and work colleagues were the top four most preferred information sources in urgent information need situations.

For further details about information sources used by respondents in this study, see summary of the study, sections 7.2.2 and 7.2.4 above.

#### **7.4.4.3 Information Seeking**

Wilson`s 1996 model also elaborated the concept of information seeking behaviour. Information Seeking Behaviour (ISB) was specified to be passive attention, passive search, active search, or ongoing search; and information processing and use (Wilson, 1999, p. 257; Sonnenwald & Iivonen, 1999). Information seeking refers to how respondents search for and find information, level of education, ICT skills, and information skills.

About 65% of the respondents used the Internet to locate information, while 15% of the respondents used library catalogues. The study also established that, only 27% of the respondents used MAWF libraries, while only 21% of the respondents actually read veterinary science journals on the NAWIC, MAWF subscription list. Results presented in chapter 5, Table 12 showed that, 12 different types of information sources in this category were used by more than 50% of the respondents; in fact at least 10 different information sources were used by more than 60% of the respondents. The above results showed a high usage of various information sources by the respondents, thereby demonstrating that the veterinary services sector in Namibia has potential to become an information intensive driven profession; this is still lacking. Personal notes, work colleagues, DVS guidelines, textbooks and conference papers and reports were the top 5 most popular information sources preferred by the respondents.

Despite the respondents` high level of educational attainment, the study established that some of them had poor information skills, while others lacked awareness of the existing information sources at MAWF libraries, online through Internet research tools, scientific databases, and organizational websites, among others.



#### **7.4.4.4 Information Processing and Use**

Wilson`s 1996 revised General Information Behaviour Model shows that, information processing and use is a necessary part of the feedback loop, if information needs are to be satisfied (Wilson, 1999, p. 257). Three relevant theoretical ideas are presented: stress/ coping theory which offers possibilities of explaining why some needs do not invoke information seeking behaviour; while risk/ reward theory which may help to explain which information sources may be used more than others by a given individual; and social learning theory, which embodies the concept of self-efficacy, the idea of the conviction that one can successfully execute the behaviour required to produce the desired outcomes. Thus the model remains one of macro-behaviour, but its expansion and the inclusion of other theoretical models of behaviour make it a richer source of hypotheses and further research than Wilson`s earlier model (Wilson, 1999, p. 257).

The major tasks are:

- (i) Internet search training and Library user education for veterinary scientists to be provided by agriculture information professionals. During the qualitative study in phase 2, informant 5 opined that, "... some of the veterinarians and veterinary hygiene inspectors (VHIs) are good, while others are encountering challenges on how to use computers. Training in information communication technology (ICT)

skills is however required”. On the other hand, results in chapter 5 showed that MAWF library usage was only 27%, while NAWIC journals were read by 21% of the respondents;

- (ii) Increase veterinary scientists` usage of social media tools for official business;
- (iii) Veterinary professionals must assist veterinary para-professionals in analyzing, evaluating and understanding some of the more challenging veterinary medicine content found in textbooks, journals, scientific databases, and research findings.
- (iv) Communicating research findings through other information channels, such as, journals and textbooks; and
- (v) Continuous training of veterinary scientists in information management; this is consistent with some of the recommendations set by OIE for Day 1 Veterinary Graduate Competencies.

#### **7.4.4.5 Namibia Veterinary Services Sector**

Substantial detail(s) about the veterinary services sector in Namibia are discussed above in chapter 2: Context of the study.

#### **7.4.4.6 Continuous Professional Development (CPD)**

Details pertaining to the CPD of veterinary professionals and veterinary para-professionals in Namibia are discussed above in the Summary of the study, see section 7.2.5.

#### **7.4.4.7 Barriers to Information, Internet Access and Use**

The present study used the concept of barriers to information seeking, see Summary of the study, section 7.2.6 for details. The study however identified some intervening factors as presented by Wilson`s 1996 revised Information Behaviour Model whose details are discussed below.

#### **7.4.4.8 Intervening Factors**

In Wilson`s revised General Information Behaviour Model (1996), barriers are represented by the concept ‘intervening variables’, they included physiologic, demographic, role related, and interpersonal factors as well as environment and information source characteristics. Usage of intervening variables instead of barriers serves to suggest that their impact may be supportive of information use as well as preventive (Wilson, 1999, p. 256).

Although the present study focused on the barriers that affected veterinary scientists related to information seeking and Internet use, the study revealed factors that intervened and either made it easier or more difficult to access information. The following factors are discussed in the following subsequent paragraphs: ICT adoption and Internet use, availability and accessibility of MAWF/ agriculture libraries, Information skills, and Internet search techniques:

- (i) Technology was both an enabler as well as a barrier to information seeking. Internet connectivity enabled veterinary scientists to access the latest science through online journals, scientific databases, Internet research tools, and organizational websites (OIE, WHO & FAO), among others 24/7. Availability of the Internet also enabled instant communication and sharing of information by veterinary scientists. On the other hand poor Internet searching techniques/ skills and lack of awareness about the existence of research information online were both barriers to information seeking among some of the respondents. Furthermore, information overload was a challenge to other respondents who accessed and gathered too much information, but had little time to analyse and evaluate all the available information due to time constraints. Veterinary scientists that did not attend training on Internet searching skills faced challenges during information seeking. Meanwhile, technological advancements have also led to the design of livestock information management systems (LIMS) by international organisations,

such as, the World Animal Health Information System (WAHIS) designed by the World Organisation for Animal Health (OIE), Transboundary Animal Disease Information (TAD Info) designed by FAO, and the Livestock Information Management System (LIMS) designed by SADC Food Agriculture and Natural Resources (FANR) through the PRINT project. The DVS used TAD Info and LIMS to process animal health data and manage its information systems for future reference and decision making. The above developments have impacted positively on the management of animal health information by veterinary professionals and information professionals;

- (ii) Ministerial library service was legislated and regulated by the Namibia Libraries and Archives (NLAS) Act. MAWF housed the Namibian Agriculture and Water Information Centre (NAWIC) at the DVS Head Office, a small resource centre at the National Botanical Research Institute (NBRI) and a small deposit of veterinary science textbooks and journals at the Central Veterinary Laboratory (CVL). In addition to the above, NAWIC paid subscription fees to scientific databases, that enabled veterinary scientists to access the latest science, journal articles, and other research information online 24/7 remotely. Respondents in the present study also had access to open access resources, such as, DOAJ and BioMed Central. Availability of information online made the geographical distance barrier irrelevant. Some of the biggest challenges that made veterinary scientists fail to access information were poor information skills that emanated from lack of Internet training and library

user education, that in turn contributed to lack of awareness of available information sources, systems, and channels; and

- (iii) Training in library user education and Internet search techniques can address poor library and Internet use behaviours of veterinary scientists. While marketing of information and library services through outreach programs can help raise veterinary scientists' awareness of available information. Internet training can also increase usage of social media for official business by veterinary scientists (e.g., usage of Web 2.0 to hold virtual meetings; creation of online discussion groups; and creation of blogs by scientists, among others) and clinicians.

#### 7.4.4.9 Model of the Information Seeking Patterns of Namibia Veterinary

Scientists

Figure 12: Proposed Model of the Information Seeking Patterns of Veterinary Scientists in Namibia

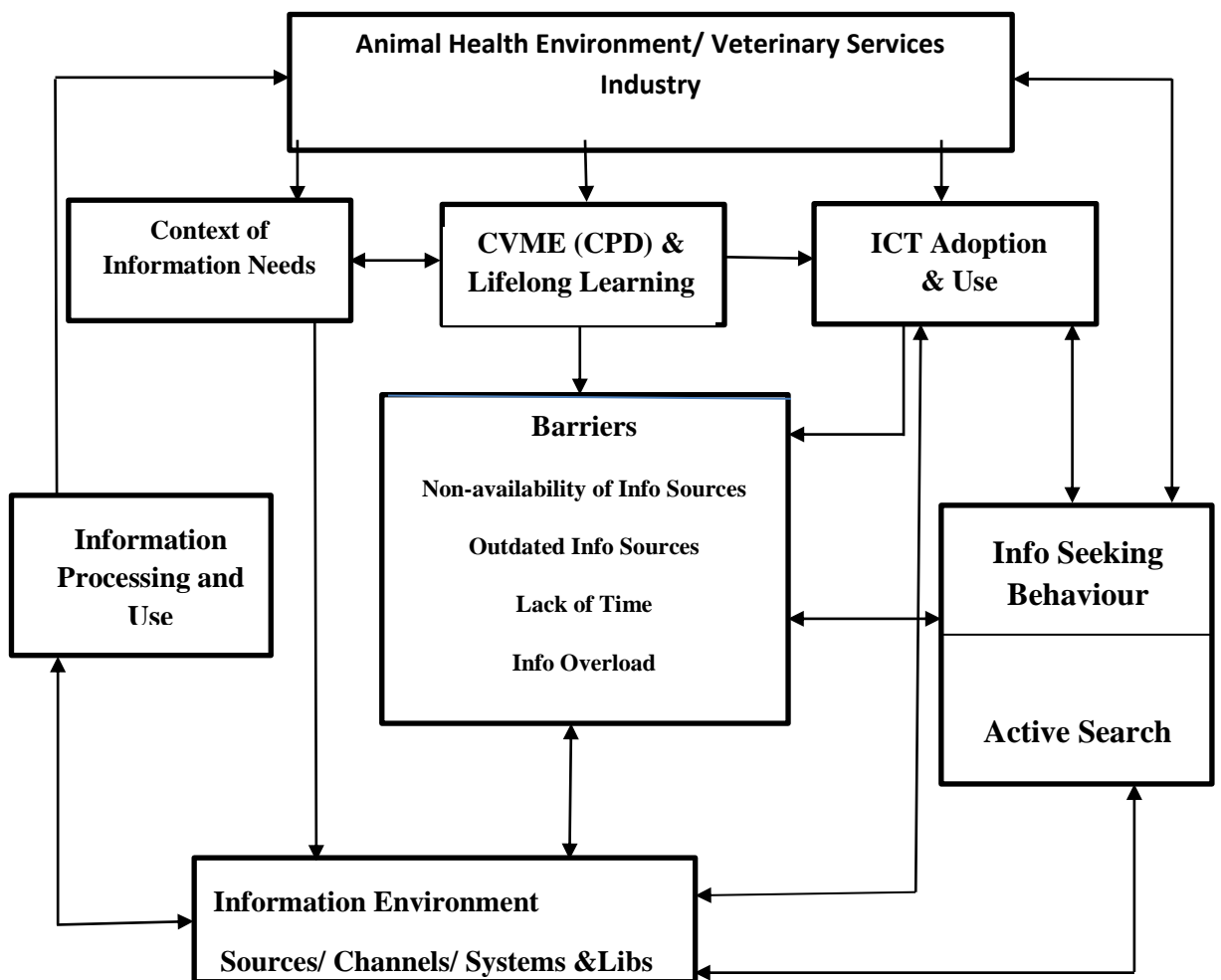


Figure 12 above shows the information seeking patterns of veterinary scientists in Namibia. It was derived out of a modified version of Wilson`s 1996 General Information Behaviour model and hence it shows many similarities. The concept of barriers used in the present study emanate from Wilson`s 1981 model. A critical analysis of figure 12 above however shows that, there are a number of differences in comparison to Wilson`s 1996 model: first, the present study focused on the active search behaviours of the respondents, and did not deal with passive and ongoing search behaviours of veterinary scientists. The present study was also interested in the barriers that affected veterinary scientists from accessing information, whereas Wilson`s 1996 model applied the concept of intervening variables. In addition to the above, the present study could not prove the case for incorporating self-efficacy and the Social Learning Theory. The differences are still in line with Case (2007), Wilson (1999), Sonnenwald and Iivonen (1999), and other ISB scholars` assessment of Wilson`s 1996 model that, it was still at macro-level (pre-theoretical) stage and could be adapted to suit specific circumstances.



## **7.6 Recommendations for Further Research**

Despite the above findings, research by agriculture information professionals on the impact of Internet research tools, social media, and digital library services on the practice of veterinary services is still at its infancy. It is an under-researched area and more so to African librarianship; more studies are therefore, still required in order to add to our understanding of the research phenomena. The present study focused on the information seeking behaviours of veterinary professionals and veterinary para-professionals in Namibia. Further studies could explore how veterinary scientists behaved when searching for information from the Internet, livestock information management systems, and digital libraries. More attention is also required to interrogate the extent to which veterinary and agriculture scientists used social media tools for official business. Due to a low response rate, no meaningful data was gathered on the information seeking behaviours of veterinary hygiene inspectors in the present study; future studies could target this population for detailed investigation.

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## **APPENDICES**

### **APPENDIX 1: QUESTIONNAIRE 1**

#### **Appendix 1: Veterinarians and Lab Scientists Survey Questionnaire 26 August 2011**

Thank you for voluntarily agreeing to participate in this questionnaire survey on the information seeking behaviours of veterinarians and lab scientists in Namibia.

#### **Purpose**

The purpose of this study is to determine the information needs, information seeking behaviours, information use and sharing strategies, information literacy and lifelong learning competencies of veterinary scientists in Namibia as they carry out scheduled farm visit & inspection surveys; abattoir inspections; livestock disease research; gather data and collate it as part of the development process of the Namibian Epidemiology Animal Health Information System (NEAHIS); and attend livestock disease conferences as part of continuing professional development (CPD). For this reason, the researcher has prepared this structured questionnaire to be completed by private veterinarians, Directory of Veterinary Services (DVS) Management, field veterinary scientists, animal health inspectors, diagnosticians, and animal health technicians, including agricultural laboratory scientists stationed at DVS Laboratories. Respondents will be requested to complete a 30-minute survey. If you are willing to participate, the survey will ask questions about your background (age, gender, education, job title) as well as your role in the veterinary services industry, how you look for information, and the types of resources you may use to locate information. The survey aims to establish the information seeking patterns and a better understanding of the professional roles and research practices/regimes of veterinary scientists in Namibia. The study also seeks to establish the level of the respondents' dependency on the DVS/MAWF information systems and library network. This survey is being carried out in order to fulfil the requirements of a Master's degree in Library and Information Studies, Faculty of Humanities and Social Sciences (FHSS) at UNAM. The survey results will be used to develop a model characterizing the information seeking behaviours of veterinary scientists in Namibia.

There are no foreseeable risks associated with this study, nor are there any direct benefits to you. This is an entirely anonymous survey; no responses will be identifiable in any way. Your participation is voluntary, and you may withdraw from completing the survey at any time.

#### **Rights to participate**

Your participation in this survey is strictly voluntary. You may discontinue participation at any time without penalty or skip questions. For questions about research participants' rights, please contact Prof. K.J. Mchombu, the supervisor of this research at (061) 206 3799, Faculty of Humanities and Social Sciences, University of Namibia. All information received through this survey will be kept strictly confidential and will be seen only by authorized UNAM officials. Data gathered from the study will be summarized in the aggregate, excluding all references to any individual responses. The aggregated results of this survey will be used to inform other data sets to help answer the research questions concerning the information seeking behaviours of veterinary scientists. The researcher will keep the information you provide strictly confidential.



No.	SECTION 1: DEMOGRAPHIC CHARACTERISTICS OF THE INFORMATION USER	
1	What is your Gender?	<input type="checkbox"/> Male <input type="checkbox"/> Female
2	Select your Age category:	<input type="checkbox"/> 20-30 yrs <input type="checkbox"/> 31-40 yrs <input type="checkbox"/> 41-50 yrs <input type="checkbox"/> 51-60 yrs <input type="checkbox"/> 61-65 yrs <input type="checkbox"/> 65+ yrs
3	What is the primary discipline of your educational background?	e.g. veterinary science
4	What is your highest qualification (award) in your field of study?	<input type="checkbox"/> Diploma <input type="checkbox"/> Degree <input type="checkbox"/> Postgraduate Diploma <input type="checkbox"/> Master Degree <input type="checkbox"/> PhD
5	What is your Job designation/title?	<input type="checkbox"/> Veterinarian <input type="checkbox"/> Lab Scientists (Technologist)
6	Select your work experience category	<input type="checkbox"/> 1-10 years <input type="checkbox"/> 11-20 yrs <input type="checkbox"/> 21-30 yrs <input type="checkbox"/> 31-40 yrs <input type="checkbox"/> 40+ yrs
7	Indicate your duty station and region	<b>Duty Station:</b> Region:
8	How far from your office is the library that you use most often?	<input type="checkbox"/> Within same premises <input type="checkbox"/> Within 2km radius <input type="checkbox"/> Very far away <input type="checkbox"/> Don't use library services
No.	SECTION 2: INFORMATION NEEDS	
1	What circumstances necessitate you to engage in information gathering activities at work?	<input type="checkbox"/> Emergency problem solving, e.g., patient care, diagnosis, etc. <input type="checkbox"/> Preparing lab tests or experiments <input type="checkbox"/> When conducting literature review <input type="checkbox"/> Continued professional development (CPD) <input type="checkbox"/> Preparing for meetings <input type="checkbox"/> Preparing for conference presentations <input type="checkbox"/> Seeking information on drugs
2	How much time do you spend on information gathering activities per week, e.g., scanning journals, conferring with experts, etc.	<input type="checkbox"/> 1-5 hrs. <input type="checkbox"/> 6-10 hrs <input type="checkbox"/> 11-15 hrs. <input type="checkbox"/> 16 hrs+
3	How many articles have you published in refereed journals in the last 5 years?	<input type="checkbox"/> 1-5 <input type="checkbox"/> 6-10 <input type="checkbox"/> 11+ <input type="checkbox"/> None

4	Which of the following tools do you use to get access to the information sources you need? Select all possible options	<input type="checkbox"/> Library Catalogues <input type="checkbox"/> Publishers websites <input type="checkbox"/> Indexing journals <input type="checkbox"/> DVS Reports <input type="checkbox"/> OIE and EU websites <input type="checkbox"/> The Internet <input type="checkbox"/> Pharmaceutical websites <input type="checkbox"/> FAO website <input type="checkbox"/> World Animal Health Information System			
No. 5	Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
<b>To what extent do you agree with the following statements?</b>					
A	I feel overloaded with information				
B	I am satisfied with the information I can find on my own				
C	I am willing to pay for the correct Information				
D	I am aware of contemporary developments in my profession				
E	I do not need any information				

### SECTION 3: INFORMATION SEEKING

SUB-SECTION A: Information Sources					
No.	Statement	Very Often	Often	Sometimes	Rarely
1	<b>Please indicate how often you use the following sources of information at work</b>				
A	Journals				
B	Textbooks				
C	Conference papers/ reports				
D	Research Reports				
E	FAO Publications				

SUB-SECTION A: Information Sources					
No.	Statement	Very Often	Often	Sometimes	Rarely
F	OIE/ EU Publications				
G	Work colleagues				
H	Subject Experts				
I	Personal notes/ Files				
J	DVS Guidelines/ Manuals/ Reports				
K	Scientific Databases				
L	The Internet				
M	The Library				
<b>2</b>	<b>Journals</b>				
A	Does your organization subscribe to journals in your area of work (specialization)?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
B	If you answered yes above, list below 5 journal titles in organization`s collection that you use most:	e.g., Australian Veterinary Record, Agrekon, etc.			
	(i)				
	(ii)				
	(iii)				
	(iv)				
	(v)				

	Statement	1	2	3	N/A
<b>3</b>	<b>In case of an urgent information need at work, which 3 sources of information would you consult first? Rank your choices 1, 2, 3 where 1 is first choice and 3 is last choice</b>				
A	Knowledgeable person (expert) in my field				
B	Internet				
C	Textbooks				
D	DVS Guidelines/ Manuals/ Reports				

	Statement	1	2	3	N/A
E	OIE and EU Publications				
F	Work Colleagues				

### SUB-SECTION B: Use of Internet Technologies

1	Do you have Internet access at work?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2	If not available at work, where do you access Internet from?	<input type="checkbox"/> Own 3G	<input type="checkbox"/> Home <input type="checkbox"/> Internet Café <input type="checkbox"/> Friend
3	<b>How often do you use the following Internet tools as information sources?</b>		
A	Search Engines (Google.com, Yahoo.com, AltaVista.com)	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
B	Online Discussion Groups	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
C	Electronic Zoo (NetVet)	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
D	International Veterinary Information Service (IVIS)	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
E	OIE website	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
F	WHO website	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
G	Listservs and Newsgroups	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
4	From the list on the right, what 4 benefits does your organization derive from using the Internet? <b>Rank your choices 1-4, where:</b> <b>1 = Very important</b> <b>2 = Important</b> <b>3 = Somewhat important</b> <b>4 = Less important</b>	<input type="checkbox"/> Office administration and management <input type="checkbox"/> Current awareness services, e.g. Vetscite, e-mail alerts, etc <input type="checkbox"/> Research online (e- books, journal articles, etc) <input type="checkbox"/> Communication with colleagues via e-mail <input type="checkbox"/> Access to Web 2.0 tools (Blogs, Google groups, etc.) <input type="checkbox"/> Communication with clients and suppliers <input type="checkbox"/> Marketing organization`s services <input type="checkbox"/> Web services (e.g. Internet banking/ product ordering) <input type="checkbox"/> Cellular phone technologies (SMS, MMS, GPS, etc.)	

5	From the given list, which Compact Disc Read Only (CD-ROM) databases do you use?	<input type="checkbox"/> AGRICOLA <input type="checkbox"/> VET CD (1973-2008) <input type="checkbox"/> CABCD/ CAB Abstracts <input type="checkbox"/> Current Contents Annual				
<b>6</b>	<b>To what extent do you agree with the following statements?</b>					
	Statement	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
A	The Internet enhances my ability to access the latest science, research and information					
B	The available information on the Internet confuses my clients					
C	I mainly use the Internet to communicate					
D	The Internet makes me enjoy my job					
E	I feel overloaded with all the information available					
F	I feel comfortable with the way I conduct information searches on the Internet					

### SUB-SECTION C: Information Search Strategies

1	If given the option, how would you prefer to search for information?	<input type="checkbox"/> Print versions of databases and journals <input type="checkbox"/> Electronic journals and databases				
2	If given the option, how would you prefer to read information retrieved from the Internet?	<input type="checkbox"/> Print copy only <input type="checkbox"/> Electronic copy only <input type="checkbox"/> Both/it depends <input type="checkbox"/> It's not important				
3	Which of the 2 interfaces would you rather use to begin your search process?	<input type="checkbox"/> Google search page <input type="checkbox"/> Your library's home page				
<b>4</b>	<b>How often do you use the following services to remotely interact with your library?</b>					
A	Phone	<input type="checkbox"/> Quite Often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely				
B	Fax	<input type="checkbox"/> Quite Often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely				
C	Email	<input type="checkbox"/> Quite Often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely				
5	How often do you share information with colleagues in your profession?	<input type="checkbox"/> Always <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely				

<b>6</b>	<b>To what extent do you agree with the following statements?</b>				
A	Social networks are important in the veterinary services profession	<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Strongly Disagree
B	The Internet helps me to establish business relationships within the profession	<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Strongly Disagree
C	The Internet can be used as a tool to facilitate continued professional development (CPD)	<input type="checkbox"/> Strongly Agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Disagree	<input type="checkbox"/> Strongly Disagree
<b>7</b>	<b>How often do you search for information from the following electronic resources?</b>				
A	AGORA	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Rarely
B	SA E-Publications	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Rarely
C	WAHIS	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Rarely
D	Open J-Gate	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Rarely
E	Pharmaceutical websites	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Rarely
F	LAN TEEAL (CTA)	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Rarely
G	Directory of Open Access Journals (DOAJ)	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Rarely
H	Google Scholar	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Rarely
I	ANANZI (CTA)	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Rarely
J	WAICENT (FAO)	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Rarely
K	How often do you use MAWF or other agriculture libraries?	<input type="checkbox"/> Quite Often	<input type="checkbox"/> Often	<input type="checkbox"/> Sometimes	<input type="checkbox"/> Rarely

**SECTION 5: INFORMATION LITERACY AND CONTINUING PROFESSIONAL DEVELOPMENT**

1	How often do you get training to upgrade your skills and knowledge?	<input type="checkbox"/> Weekly <input type="checkbox"/> Monthly <input type="checkbox"/> Once in 3 months <input type="checkbox"/> Rarely get training
2	Are you satisfied with the information contained in the DVS information system?	<input type="checkbox"/> Yes <input type="checkbox"/> No
3	If not satisfied, how do you make up for the gap in your information requirements?	<input type="checkbox"/> Consult experts <input type="checkbox"/> Ask colleague <input type="checkbox"/> Send query to Library <input type="checkbox"/> Search the Internet
<b>4</b>	<b>Have you ever received any training in the programmes listed below?</b>	
A	Library user education	<input type="checkbox"/> Yes <input type="checkbox"/> No
B	Continuing Professional Development (CPD)	<input type="checkbox"/> Yes <input type="checkbox"/> No
C	Internet search skills	<input type="checkbox"/> Yes <input type="checkbox"/> No
5	Do you think it is important to attend animal health conferences and seminars?	<input type="checkbox"/> Yes <input type="checkbox"/> No
6	Have you ever presented a paper at an animal health or veterinary services conference?	<input type="checkbox"/> Yes <input type="checkbox"/> No
7	Do you think it is important to share information and knowledge acquired at conferences and seminars with colleagues?	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>8</b>	<b>Have you ever published in any of the following?</b>	
A	An article in a work (industry) magazine	<input type="checkbox"/> Yes <input type="checkbox"/> No
B	Article in a peer reviewed journal	<input type="checkbox"/> Yes <input type="checkbox"/> No
C	Contributed a chapter in a book	<input type="checkbox"/> Yes <input type="checkbox"/> No
9	Do you contribute towards the development of the DVS Animal Health Information System?	<input type="checkbox"/> Yes <input type="checkbox"/> No
10	Do you think that you should be consulted before a veterinary information system is designed?	<input type="checkbox"/> Yes <input type="checkbox"/> No
11	Do you use current awareness services (alerts), e.g., EMPRESS E-mail Alert, to inform you when relevant literature is published? If you do, please list 3 in order of importance, i.e., 1-3, where 1 = very important, 2 = important, and 3 = less important	<input type="checkbox"/> Yes <input type="checkbox"/> No 1. 2. 3.

## SECTION 6: BARRIERS TO INFORMATION ACCESS AND USE

1	<p>Which 4 problems from those on the right have you encountered while seeking information? <b>Rank your choices 1-4, where:</b></p> <p><b>1 = very important</b></p> <p><b>2 = important</b></p> <p><b>3 = somewhat important</b></p> <p><b>4 = less important</b></p>	<input type="checkbox"/> Required information sources are not readily available <input type="checkbox"/> MAWF Library staff is reluctant to assist customers <input type="checkbox"/> Incomplete information materials at DVS <input type="checkbox"/> Information sources are far apart from each other <input type="checkbox"/> I do not have enough time to look for information <input type="checkbox"/> I don't know how to search the library catalogue <input type="checkbox"/> Information is scattered in too many sources <input type="checkbox"/> Information overload <input type="checkbox"/> Some information sources at DVS are outdated
2	<p>If you do not use the Internet at work, what are your 4 major reasons? Pick your choices from those on the right, <b>Rank your choices 1-4, where:</b></p> <p><b>1 = very important</b></p> <p><b>2 = important</b></p> <p><b>3 = somewhat important</b></p> <p><b>4 = less important</b></p>	<input type="checkbox"/> Cost of hardware is prohibitive <input type="checkbox"/> Cost of using the Internet is discouraging <input type="checkbox"/> I do not know the benefits of using the Internet <input type="checkbox"/> I have limited knowledge of Internet products and services <input type="checkbox"/> I do not have access to the Internet <input type="checkbox"/> I do not trust information found on the Internet <input type="checkbox"/> I have limited Internet search skills <input type="checkbox"/> There is not enough time to keep up with everything I would like <input type="checkbox"/> Speed of access or downloads is too slow

Thank you for successfully completing this questionnaire.



## **APPENDIX 2: QUESTIONNAIRE 2**

### **Appendix 2: Animal Health Technicians and Veterinary Health Inspectors Questionnaire 26 August 2011**

Thank you for voluntarily agreeing to participate in this survey on the information seeking behaviours of Animal Health Technicians (AHTs) and Veterinary Health Inspectors (VHIs) in Namibia.

Research on Animal Health Technicians and Veterinary Health Inspectors' information seeking behaviours is warranted in order to determine if they have distinctive information needs and information use situations. It is reported by the Namibia Directorate of Veterinary Services (2005, 2007) that, DVS scientists regularly collect, collate, transfer, store, and analyse livestock data, disseminate and share data with other scientists and stakeholders. It would be logical therefore, for information professionals to assume that the professional roles of veterinary scientists trigger information-seeking behaviours. But according to Fread and Sturges (2003), there is no guarantee however that information carried in burgeoning agriculture networks is objective or correct, and yet what scientists actually need is better, more refined and more readily accessible information rather than just services whose effectiveness is measured in terabytes. Like other scientists practicing in today's information society, veterinary scientists are today inundated with too much information that may not fit the category of evidence based veterinary medical literature, while trying to make intelligent decisions on livestock production and reproduction, livestock disease research, trade in livestock and meat products, animal disease policies and legislation, etc. For this reason, the researcher has compiled this structured questionnaire to be completed in approximately 30 minutes by both private and public veterinary scientists, including Directorate of Veterinary Services (DVS) Management.

If you volunteer to participate, the survey will ask questions about your background (age, gender, education, job title, knowledge and skills) as well as your professional role and access to veterinary services information, how you search, use and disseminate information to your stakeholders. The study also investigates veterinary scientists' aspirations, library use patterns, Internet research and use habits, strategies for continued professional development, and their information literacy and lifelong learning competencies. This survey is being carried out in order to fulfill the requirements of a Master's degree in Library and Information Sciences with the Faculty of Humanities and Social Sciences (FHSS) at UNAM. The survey results will be used to develop a model characterizing the information seeking behaviours of veterinary scientists in Namibia.

#### **Rights to participate**

Your participation is voluntary and you may skip questions or withdraw from completing the survey at any time without penalty. There are no foreseeable risks associated with this study. This is an entirely anonymous survey; no responses will be identifiable in any way. In case of doubt about participants' rights, please contact Prof. K.J. Mchombu, the supervisor of this research at (061) 206 3799, University of Namibia. All information received through this survey will be kept strictly confidential and will not be accessible to any unauthorized UNAM officials. Data gathered from the study will be summarized in the aggregate, excluding all references to any

individual responses. The aggregated results of this survey will be used to respond to research questions set in the proposal of this study.

No.	SECTION 1: DEMOGRAPHIC CHARACTERISTICS OF THE INFORMATION USER	
1	What is your Gender?	<input type="checkbox"/> Male <input type="checkbox"/> Female
2	Select your Age category:	<input type="checkbox"/> 20-30 yrs <input type="checkbox"/> 31-40 yrs <input type="checkbox"/> 61-65 yrs <input type="checkbox"/> 41-50 yrs <input type="checkbox"/> 51-60 yrs <input type="checkbox"/> 66+ yrs
3	What is the primary discipline of your educational background?	e.g., Public Health, Molecular Biology, etc
4	What is your highest qualification (award) in your field of study?	<input type="checkbox"/> Diploma <input type="checkbox"/> Degree <input type="checkbox"/> Postgraduate Diploma <input type="checkbox"/> Master Degree <input type="checkbox"/> PhD
5	What is your Job designation/title?	<input type="checkbox"/> Animal Health Technician <input type="checkbox"/> Veterinary Hygiene Inspector
6	Select your work experience category	<input type="checkbox"/> 1-10 years <input type="checkbox"/> 11-20 yrs <input type="checkbox"/> 21-30 yrs <input type="checkbox"/> 31-40 yrs <input type="checkbox"/> 40+ yrs
7	Indicate your duty station and region	<b>Duty Station:</b>  <b>Region:</b>
8	How far from your office is the library that you use most often?	<input type="checkbox"/> Within same premises <input type="checkbox"/> Within 2km radius <input type="checkbox"/> Very far away <input type="checkbox"/> Don't visit libraries

No.	SECTION 2: INFORMATION NEEDS	
1	What circumstances necessitate you to engage in information gathering activities at work?	<input type="checkbox"/> When carrying out meat inspection surveys <input type="checkbox"/> When inspecting abattoirs <input type="checkbox"/> Continued professional development (CPD) <input type="checkbox"/> Preparing for meetings <input type="checkbox"/> When preparing for conference presentations <input type="checkbox"/> When seeking information on drugs
2	How much time do you spend on information gathering activities per week, e.g., consulting experts.	<input type="checkbox"/> 1-5 hrs <input type="checkbox"/> 6-10 hrs <input type="checkbox"/> 11-15 hrs <input type="checkbox"/> 16 hrs+
3	Which 3 of the following tools do you use to get access to the information sources you need? Rank your selection 1-3, where 1 = very important, 2 = important, and 3 = somewhat important	<input type="checkbox"/> OIE and EU websites <input type="checkbox"/> The Internet <input type="checkbox"/> Pharmaceutical websites <input type="checkbox"/> FAO website <input type="checkbox"/> Library Catalogues <input type="checkbox"/> Indexing Journals <input type="checkbox"/> DVS Reports <input type="checkbox"/> World Animal Health Information System (WAHIS)

No.	Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
<b>4</b>	<b>To what extent do you agree with the following statements?</b>				
A	I feel overloaded with information				
B	I am satisfied with the information I can find on my own				
C	I am willing to pay for the correct Information				
D	I am aware of contemporary developments in the profession				
E	I do not need any information				

### SECTION 3: INFORMATION SEEKING

SUB-SECTION A: Information Sources					
No.	Statement	Very Often	Often	Sometimes	Rarely
<b>1</b>	<b>Please indicate how often you use the following sources of information at work</b>				
A	Journals				
B	Textbooks				
C	Conference papers/reports				
D	Research Reports				
E	FAO Publications				
F	OIE/ EU Publications				
G	Work colleagues				
H	Subject Experts				
I	Personal notes/ Files				
J	DVS Guidelines/ Manuals/ Reports				
K	Scientific Databases				
L	The Internet				
M	The Library				

2	Does your organization subscribe to journals in your field of specialization?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
3	If you said yes above, state 3 journal titles in your organization's collection that you have used:	e.g., Journal of Cell Biology, Agrekon, etc.			
	(i)				
	(ii)				
	(iii)				
	Statement	1	2	3	N/A
<b>4</b>	<b>In case of an urgent information need at work, which 3 sources of information would you consult first? Rank your choices 1, 2, 3 where 1 is first choice and 3 is last choice</b>				
A	Knowledgeable person (expert) in my field				
B	Internet				
C	Textbooks				
D	DVS Guidelines/ Manuals/ Reports				
E	OIE and EU Publications				
F	Work Colleagues				

**SUB-SECTION B: Use of Internet Technologies**

1	Do you have Internet access at work?	<input type="checkbox"/> Yes <input type="checkbox"/> No
2	If not available at work, where do you access Internet from?	<input type="checkbox"/> Own 3G <input type="checkbox"/> Home <input type="checkbox"/> Internet Café <input type="checkbox"/> Friend
3	From the list below, what 3 benefits does your organization derive from using the Internet? <b>Rank your selection 1-3, where 1 = very important, 2 = important, and 3 = somewhat important</b>	<input type="checkbox"/> Office/Practice administration and management <input type="checkbox"/> Access to current awareness services on the Internet (e.g. journal table of contents alerts, RSS feeds) <input type="checkbox"/> Research online (e- books, journal articles, etc.) <input type="checkbox"/> Communication with colleagues via e-mail <input type="checkbox"/> Communicate with colleagues via Web 2.0 tools (e.g. blogs, Facebook, Google groups, etc.) <input type="checkbox"/> Communication with clients and suppliers <input type="checkbox"/> Marketing organization`s services <input type="checkbox"/> Web services (e.g. Internet banking/ product ordering) <input type="checkbox"/> Cellular phone technologies (SMS, MMS, GPS, etc.)
4	Select 2 Compact Disc Read Only (CD-ROM) databases on the right that you have used before	<input type="checkbox"/> AGRICOLA <input type="checkbox"/> VET CD (1973-2008) <input type="checkbox"/> CABCD/ CAB Abstracts <input type="checkbox"/> Current Contents Annual

**SUB-SECTION C: Information Search Strategies**

1	If given the option, how would you prefer to read information retrieved from the Internet?	<input type="checkbox"/> Print copy only <input type="checkbox"/> Electronic copy only <input type="checkbox"/> Both/it depends <input type="checkbox"/> It's not important
2	Which of the 2 interfaces would you rather use to begin your search process?	<input type="checkbox"/> Google search page <input type="checkbox"/> Your library's home page
<b>3</b>	<b>How often do you use the following services to interact with your library?</b>	
A	Phone	<input type="checkbox"/> Quite Often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
B	Fax	<input type="checkbox"/> Quite Often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
C	Email	<input type="checkbox"/> Quite Often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
4	How often do you share information with colleagues in your profession?	<input type="checkbox"/> Quite Often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
5	To what extent do you agree with the following statement?	
	The Internet can be used as a tool to facilitate continued professional development (CPD)	<input type="checkbox"/> Strongly Agree <input type="checkbox"/> Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Strongly Disagree
<b>6</b>	<b>How often do you search for information from the following electronic resources?</b>	
A	AGORA	<input type="checkbox"/> Quite Often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
B	SA E-Publications	<input type="checkbox"/> Quite Often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
C	WAHIS	<input type="checkbox"/> Quite Often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
D	Pharmaceutical websites	<input type="checkbox"/> Quite Often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
E	Google Scholar	<input type="checkbox"/> Quite Often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
F	WAICENT (FAO)	<input type="checkbox"/> Quite Often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely
7	To what extent do you use MAWF libraries?	<input type="checkbox"/> Quite Often <input type="checkbox"/> Often <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely

## SECTION 5: INFORMATION LITERACY AND CONTINUING PROFESSIONAL DEVELOPMENT

1	How often do you get training to upgrade your skills and knowledge?	<input type="checkbox"/> Monthly <input type="checkbox"/> Every 3 months <input type="checkbox"/> Every 6 months <input type="checkbox"/> No training
2	Are you satisfied with the information contained in the DVS information system?	<input type="checkbox"/> Yes <input type="checkbox"/> No
3	If not satisfied, how do you make up for the gap in your information requirements?	<input type="checkbox"/> Consult experts <input type="checkbox"/> Ask colleague <input type="checkbox"/> Send query to Library <input type="checkbox"/> Search the Internet
<b>4</b>	<b>Have you ever received any training in the programmes listed below?</b>	
A	Library user education	<input type="checkbox"/> Yes <input type="checkbox"/> No
B	Continued Professional Development (CPD)	<input type="checkbox"/> Yes <input type="checkbox"/> No
C	Internet searching skills	<input type="checkbox"/> Yes <input type="checkbox"/> No
5	Do you think it is important to attend animal health conferences and seminars?	<input type="checkbox"/> Yes <input type="checkbox"/> No
6	Do you think it is important to share information and knowledge acquired at conferences and seminars with colleagues?	<input type="checkbox"/> Yes <input type="checkbox"/> No
7	Do you contribute towards the development of the DVS Animal Health Information System?	<input type="checkbox"/> Yes <input type="checkbox"/> No
8	Do you think that you should be consulted before a veterinary information system is designed?	<input type="checkbox"/> Yes <input type="checkbox"/> No

**SECTION 6: BARRIERS TO INFORMATION ACCESS AND USE**

1	<p>Which 4 of the following problems have you encountered while seeking information? <b>Rank your choices 1-4, where:</b>  <b>1 = Very important</b>  <b>2 = Important</b>  <b>3 = Somewhat important</b>  <b>4 = Less important</b></p>	<input type="checkbox"/> Required information sources are not available <input type="checkbox"/> Library staff does not treat customers well <input type="checkbox"/> Incomplete information materials <input type="checkbox"/> Information sources are far apart from each other <input type="checkbox"/> I do not have enough time to look for relevant information <input type="checkbox"/> I don't know how to search the library catalogue <input type="checkbox"/> I don't have adequate knowledge on libraries <input type="checkbox"/> Information is scattered in too many sources <input type="checkbox"/> Information on my subject is too vast <input type="checkbox"/> Some information sources are outdated
2	<p>If you do not use the Internet at work, what are your 4 major reasons? <b>Rank your choices 1-4, where:</b>  <b>1 = very important</b>  <b>2 = important</b>  <b>3 = somewhat important</b>  <b>4 = less important</b></p>	<input type="checkbox"/> Cost of hardware is prohibitive <input type="checkbox"/> Cost of using the Internet is discouraging <input type="checkbox"/> I do not know the benefits of using the Internet <input type="checkbox"/> I have limited knowledge of Internet products and services <input type="checkbox"/> I do not have access to the Internet <input type="checkbox"/> I do not trust information found on the Internet <input type="checkbox"/> I have limited Internet search skills <input type="checkbox"/> There is not enough time to keep up with everything I would like <input type="checkbox"/> Speed of access or downloads is too slow

Thank you for successfully completing this questionnaire.



## **APPENDIX 3: INTERVIEW GUIDE**

### **Appendix 3: Interview Guide 5 December 2013**

Thank you for voluntarily agreeing to participate in this interview survey on the information seeking behaviours of veterinary scientists in Namibia.

#### **Rights to participate**

Your participation in this interview is voluntary and you may skip questions or withdraw from completing the interview at any time without penalty. There are no foreseeable risks associated with this study as already explained earlier to participants during Phase 1 (Quantitative Study). This is an entirely anonymous study. In case of doubt about participants` rights, please contact Prof. K.J. Mchombu, the supervisor of this research at (061) 206 3799, University of Namibia. All information received through these interviews will be kept strictly confidential and will not be accessible to any unauthorized UNAM officials. Data gathered from the study will be summarized in the aggregate, excluding all references to any individual responses. The aggregated results of both Phase 1 and Phase 2 of the study will be used to respond to research questions set in the proposal of this study.

#### **Interview Guide**

This Interview Guide was developed in order to fill the gaps on the ISBs of veterinary scientists detected after processing the results of the Questionnaire survey(s) conducted a year ago. This guide is therefore not an entirely separate instrument for data collection, but complements the 2 survey questionnaires that were completed earlier by all target population groups (Veterinarians, Diagnosticians and Lab Technologists, Lab Technicians, Animal Health Technicians and Veterinary Hygiene Inspectors).

## Purpose

Research on veterinary scientists' information seeking behaviours is warranted in order to determine if they have distinctive information needs, professional aspirations, information seeking strategies and information use situations. It is reported by the Namibia Directorate of Veterinary Services (2005, 2007) that, DVS scientists regularly collect, collate, transfer, and store and analyse livestock data, disseminate and share information and knowledge with fellow scientists and stakeholders. It would be logical therefore, for information professionals to assume that the professional roles of veterinary scientists trigger information-seeking behaviours. Like other scientists practicing in today's information society, veterinary scientists may today be inundated with too much information that may not fit the category of evidence based veterinary medical literature, while trying to make intelligent decisions on livestock production and reproduction, livestock disease research, trade in livestock and meat products, animal disease policies and legislation, among others. For this reason, the researcher has compiled this Interview Guide to be used for interviewing purposively selected key informants on the establishment of the Directorate of Veterinary Services (DVS).

There are no foreseeable risks associated with this study. This is an entirely anonymous survey; no responses will be identifiable in any way. The aggregated results of this survey will be used to develop a model of the information seeking behaviours of veterinary scientists in Namibia.

1. Name of your Division (Field of Veterinary Studies Specialization):
2. Professional Responsibility:
3. The majority of field Animal Health Technicians reported that they did not have access to computing equipment and the Internet, and this impacted on their ability to access research information. What is your reaction to that?
4. Survey results established that the majority of veterinary scientists did not attend DVS organized CPD/ CVME training programmes. What could be done to entice the scientists to attend training?

5. Would you support the idea of a compulsory CPD training attendance? Yes  
No . If yes, why?
6. In your view, how has the absence of a compulsory CPDP affected the practice of veterinary services in Namibia?
7. How do veterinary scientists acquire new knowledge and skills?
8. What do you propose that the DVS and MAWF should do to upgrade the knowledge levels of veterinary scientists in Namibia?
9. The majority of veterinary scientists outside the Khomas region did not have easy access to MAWF/ agriculture libraries. What do you think could be done to make libraries more accessible to researchers?
10. Results of the survey showed that, the majority of scientists used personal notes ahead of authoritative sources, such as, the DVS manuals, OIE publications, journals and textbooks. What is your reaction to that? Do you think the behaviours of scientists could have an impact on the practice of veterinary services in Namibia? How can the situation be corrected?
11. In your view, how has usage of the Internet affected the practice of veterinary services in Namibia?
12. What are the major challenges encountered by veterinary scientists when seeking research information?
13. What information related problems are encountered by veterinary scientists during an outbreak of an animal disease?

14. Are you satisfied with the knowledge levels of veterinary scientists in Namibia? If not, why?
15. What is your perception about the information search behaviours of veterinary scientists?
16. Results of the survey showed that, very few veterinary scientists had published articles in peer reviewed journals or chapters in textbooks. What do you think could be the cause of this? Any solution to the problem(s)?
17. Any other comments on the information seeking behaviours of veterinary scientists, usage of libraries and Internet research tools, among other issues?

**Thank you once again for agreeing to participate in this interview.**

## APPENDIX 4: LETTER OF PERMISSION TO CARRY OUT THE STUDY



REPUBLIC OF NAMIBIA

### MINISTRY OF AGRICULTURE, WATER AND FORESTRY

Enquiries: Dr A. Bishi  
Tel: +264 61 2087505  
Fax: +264 61 2087779  
E-mail: [bishia@mawf.gov.na](mailto:bishia@mawf.gov.na)

The Chief Veterinary Officer  
Private Bag 12022  
WINDHOEK

Reference: V13/1/P  
Date: 10 October 2011

### INTERNAL MEMORANDUM

**TO:** All Veterinary Offices

**FROM:** The Acting Chief Veterinary Officer

**RE:** QUESTIONNAIRE ON INFORMATION SEEKING BEHAVIORS OF VETERINARY PERSONNEL IN DVS

- (1) The attached copies of questionnaires (targeted at veterinarians, diagnosticians, animal Health technicians and veterinary hygiene inspectors at all levels including the Acting Chief Veterinary Officer) are part of a study being undertaken by the University of Namibia to assess the information seeking behavior of animal health personnel in Namibia. The study was approved by the Permanent Secretary and the Directorate of Veterinary Services. It is expected to shed light on this very important subject area.
- (2) The survey aims to establish the information seeking patterns and a better understanding of the professional roles and research practices/regimes of above mentioned staff in Namibia. The study also seeks to establish the level of the respondents' dependency on the DVS/MAWF information systems and library network. This survey is being carried out in order to fulfill the requirements of a Master's degree in Library and Information Studies, Faculty of Humanities and Social Sciences (FHSS) at UNAM. The survey results will be used to develop a model characterizing the information seeking behaviors of veterinary scientists in Namibia.

- (3) There are two questionnaires. One is targeted at veterinarians and laboratory scientists (Appendix 1) and the other at animal health technicians and veterinary hygiene inspectors (Appendix 2) regardless of rank.
- (4) All staff in these professional and technical categories are requested to complete the questionnaires and submit them through the epidemiology section to the University of Namibia.
- (5) To take advantage of the State Veterinary meeting which this year will take place in Rundu from 23 to 28 October; staff coming to the meeting are requested to bring copies of their completed questionnaires and from as many of their subordinate staff members as possible. Dr Bishi will be collecting the questionnaires. All completed copies must be handed to the epidemiology section at DVS Headquarters before 30 November 2011.

  
Dr C. Bamhare  
Acting Chief Veterinary Officer

