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The Information Behaviour of Kenyan Medical Scientists

By

Francis O. Odhiambo

A Doctoral Thesis submitted in
Partial fulfilment of the requirements for the
Award of the Degree of Doctor of Philosophy
of Loughborough University

May 2000

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ABSTRACT

The subjects of this research are Kenyan medical scientists. The study aims to investigate the Kenyan medical scientists' information behaviour in the context of their research information acquisition. It also aims to show how research can function in conditions of relative information deprivation.

The theoretical framework of the study has been designed to include both quantitative and qualitative methods. Wilson's model of information behaviour is used to develop the conceptual framework of this study. Triangulation is used in data collection and is achieved by the use of interviews, documentary analysis and observation. Both quantitative and qualitative techniques have been used for the analysis of data.

It is found that the medical scientists work under conditions of relative information deprivation. Libraries are inadequate and have deteriorating collections, while informal personal contacts are difficult to establish and maintain. Personal collections are thin and disparate while travel to conferences is also severely constrained. In spite of this, excellent research is continuing using the limited resources available. An attempt is made to show how research functions.
ACKNOWLEDGEMENTS

The preparation and research for this study would not have been possible without the help and guidance of many friends in various walks of life. It is, unfortunately, impossible to list them all here, but I would like to acknowledge particularly my debt of gratitude to a number among them.

The completion of this thesis was made possible through the advice, guidance and encouragement of several people. It is unfortunately impossible to list them all here, but I would particularly like to acknowledge my debt of gratitude to the following for their effort and time given during the course of my research and the preparation of this thesis.

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CHAPTER 1

Introduction

1.1 PREAMBLE

The focus of this study is on the information-seeking behaviour of Kenyan medical scientists. The choice of the topic for this study was influenced by a sense of the role that scientific research plays in national development. This role of research is widely recognised and is factored into most national development policies. The principal aim of defining a national development policy is to map a strategy for positive growth in key socio-economic indicators such as education, health, housing, social welfare and so on.

Positive growth in key indicators, defined as economic development, is characterised by a rise in a people’s standard of living. In developing countries (particularly those of Africa where a deterioration in key indicators has been seen in the 80s and 90s (Singh, 1990)), the goal of economic development is even more challenging and compelling.

One important instrument in attaining the economic development of a nation is its ability to conduct research. Research has been defined as “systematic enquiry with the aim of producing knowledge.” (Ernest, 1994, p.8). The Oxford dictionary defines research as “careful study and investigation, especially to discover new facts” (Thompson, 1995).
Governments the world over acknowledge research and development as a major instrument and mechanism for realising a people’s development goals. This is because research involves, if properly directed, the generation of new knowledge enabling the full exploitation of the opportunities provided by both local environments, and local natural resource bases. The relationship between economic development and the conduct of research has been shown to be positive in both richer and poorer countries (IDRC, 1986).

However, for research to contribute to economic development, certain prerequisites or input factors must be in place. Hitchcock (1989, p. 6) suggests that these are a stock of scientists of the right calibre, laboratories, equipment and libraries. To this list might be added instrumentation, technical staff, support staff and nowadays, an information system as opposed to just libraries.

All these input factors are crucial for the conduct of research. This study however, centres on just one of these factors - information. Information is required in research for a number of reasons. These reasons are:

1. Scientific or technical information is usually required for the planning and conduct of experiments.
2. In the case of the subjects of this study, information will also be required about medical problems that may be solved through research.
3. At another level information from policy makers about research priorities will also be required.
4. Finally, there is need for management information concerning resources, people, research projects, equipment and other relevant factors (Ballantyne, 1991).
In this study the focus is on the scientific information used in the conduct of research itself. There are four uses of information in the conduct of research and each is discussed below:

First, information aids problem solving. In some problem situations, scientists may intuitively know the solution to their problem or draw upon and synthesise past experiences to develop a solution to the problem at hand without need for information. Very often however, a scientist has to rely upon information (be it written, electronic or spoken) to solve a problem. This is an important function of information for research.

Second, information facilitates the generation of new ideas and insights. This is achieved by drawing upon different items of information which by a complex cognitive process, are related to existing knowledge thus forming new ideas.

Third, information reduces instances of duplication of previous research. Apart from duplication being a waste of scientific effort (because the findings of duplicated research are *ipso facto* irrelevant), it is also a waste of money which could be more efficiently used in other ways.

Fourth, information is important in that it allows for the integration of the efforts of scientists separated in space, time and intellectual orientation.

It can be appreciated from the above that scientific information is an essential component of research and development and this has been widely documented (Adair, 1995; Bland & Ruffin, 1992). Further, timely access to scientific information increases productivity and innovation and helps scientists to maintain and improve their professional skills. Given the foregoing, it should be clear that lack of sufficient information could impact negatively on the research process.
This study is about research information in Kenya. The appeal of this topic is that Kenya has a rather well developed scientific capacity for her state of economic development. A survey of the scientific and technical manpower in Kenya in 1982 revealed that there were 62,803 people working professionally in science and technology. The survey further revealed that of these, 16,241 were research scientists and the balance were technicians (UNESCO, 1986). This figure must have grown substantially since 1982 with the establishment of more universities and increased higher education training opportunities. Because of the important role of medical research in development, it was decided to focus on medical research scientists for this study.

1.2 BACKGROUND INFORMATION - KENYA

1.2.1 Geography of Kenya

Kenya (Figure 1), is an independent state on the East African Coast of the Indian Ocean and a member of the Commonwealth of Nations. It sits astride the equator extending from about latitude 4°N to 4°S. It is bounded to the North by Ethiopia and Sudan, to the South by Tanzania, to the West by Uganda and Lake Victoria and to the East by Somalia and the Indian Ocean. It covers an area of 582,640 sq. kms.

Its varied terrain rises from sea-level at the coast to Mount Kenya (5,199 meters) to the east of the Great Rift Valley, and Mt. Elgon (4,321 meters) to the extreme west. The country is bisected by the Rift Valley that runs the whole length of the country from north to south. For a tropical country, Kenya enjoys relatively moderate weather, especially in the highlands to the east and west of the Rift Valley and the lake region. It is only in the arid and semi-arid plains in the south, east and north of the country where hot temperatures (over 28° C.) are found. Apart from these arid lands, the remaining parts of the country including a
Figure 1 Map of Africa Showing Location of Kenya
coastal strip, are arable. Physically, Kenya is one of the most beautiful countries in Africa and is the premier destination for adventure safaris.

1.2.2 History and Political Development of Kenya

In 1505, the Portuguese attacked the east coast of Africa with an armada of 23 ships and 1500 men. This was the start of what was to be two centuries of colonial rule. By 1670, the Portuguese left and control of the coastal strip passed to Arabs until the British and Germans arrived late in the nineteenth century. In 1885, the present day East Africa was divided between the British and the Germans and in 1895, Kenya was declared a British protectorate. By 1930, there were more than 2,000 British farmers settled in Kenya. In 1944, The Kenya African Union (KAU), was formed to demand for greater political and economic freedom for the Kenyan people. Jomo Kenyatta was made President of the KAU. At about the same time, a secret political and religious society called Mau Mau was set up. Because of increased attacks on British property by the Mau Mau, a state of emergency was declared in 1952 and Jomo Kenyatta was imprisoned.

By 1957, the prospect of independence was real with eight Africans being elected to the Legislative Council for the first time. This was followed by the legalisation of KAU as the Kenya African National Union (KANU), in 1960, and the first of two "Lancaster Conferences" was held in London to discuss the handover of Kenya to African rule. Kenya gained her independence from the United Kingdom on 12th December 1963 with Jomo Kenyatta as its President. Since 12th December 1964, Kenya has been a Republic with a unitary system of government having executive powers vested in the President.
Chapter One - Introduction

1.2.3 Social Development and Administrative structures in Kenya

Kenya is renown for being the place where the earliest fossil records of the human race were found at Olorgessaile in the Rift Valley. Because of this discovery, the Rift Valley, which runs through the centre of the country is sometimes also known as "The Cradle of Humanity"

The population of Kenya is approximately 28,000,000. Her people come from a wide range of communities, 42, and there are also two major immigrant groups: Asians and Europeans. Many different languages are spoken in Kenya. Kiswahilli (spoken by everyone apart from the very old) is the national language while English remains the official language. For historical reasons, the system of law, politics and administration are largely modelled upon those of Britain. The economy is largely dependent upon agriculture. Export of agricultural products, (both unprocessed and some processed in agro-industries), is a leading foreign exchange earner. The other leading foreign exchange earners are tourism (which is currently the highest earner) and the re-export of refined petroleum products. Apart from its economic potential, the development of agriculture is also considered vitally important by government for ensuring food security.

1.2.4 The Provision of Medical Services in Kenya

The provision of medical services in Kenya is based upon a hierarchical structure. The hierarchy roughly corresponds to the administrative structure of government. Administratively, Kenya is divided into eight provinces (see Figure 2) including the city of Nairobi. Each of the provinces is further divided into districts, divisions, sub-divisions, locations and sub-locations in that order. There are today 69 districts in Kenya. The physical size of districts varies greatly and is dependent upon factors such as population density and topography.
In terms of medical provision the structure is as follows: there are clinics at sub-locational level, usually staffed by nurses and clinical officers. These clinics provide care for patients with common and easily treated complaints that do not require the attention of a doctor. These clinics are also used for routine post and ante-natal care. One level above these clinics are sub-hospitals at divisional level. These will usually have doctors but do not offer specialist services. Further, they are not found in every division but are concentrated in the more populous divisions.

Figure 2 Administrative Map of Kenya Showing Provinces
A level above the sub-hospitals are the district hospitals. These are found in each district, usually located at the town where district headquarter is situated. These hospitals offer full in-patient facilities and some element of specialised treatment. The availability and types of specialist treatment found varies widely between districts as there is a shortfall in the number of consultants.

Above the district hospitals come the provincial hospitals, all of which offer a wide range of consultant services and have specialised equipment. At the top of the hierarchy come the two national referral hospitals in Nairobi and Eldoret. They also double up as teaching hospitals for the two medical schools in the country. Consequently, these two hospitals benefit from the expertise and services of medical school staff in all the branches of medicine. As their designation suggests, patients at these hospitals are all referred from lower levels, (usually provincial hospitals). There is no provision for patients to be seen in the referral hospitals in the first instance.

Provincial and district hospitals are managed by provincial and district medical officers of health respectively assisted by hospital administrators (Figure 3). The medical officers report to the Director of Medical Services at Ministry of Health headquarters. The director is responsible for all professional matters concerning the running and maintenance of all hospitals and clinics in the country. Also at the ministry headquarters are the Chief Pharmacist, Government Pathologist, National Public Health Laboratories (with satellite laboratories across the country), Drugs and Poisons Board and other relevant agencies. There is also the Central Medical Stores at the ministry responsible for the tendering, procurement and distribution of all drugs and equipment for hospitals in the country. This function however, is now being decentralised and devolved to the district level. The two referral hospitals are headed by Medical Directors under the direction of Hospital Boards and are totally independent of the Director of Medical Services.
Figure 3. Hierarchy of medical personnel in Kenya
Medical research in Kenya is undertaken by practitioners at all levels including the public health laboratories, but the main research centres remain the university medical schools and the two government research institutes. The two medical schools are the University of Nairobi College of Health Sciences and Moi University Faculty of Health Sciences. The two research institutes are the Kenya Trypanosomiasis Institute and the Kenya Medical Research Institute (KEMRI). The latter institution however, is big and consists of many centres, each an 'institute' on its own, but under the direction of a central management and board.

1.3 STATEMENT OF THE STUDY PROBLEM

Lincoln and Guba (1985, p. 226-227), say that a research problem is more than just a question. They say of a research problem that it is a state of affairs "resulting from the interaction of two or more factors... that yields (1) a perplexing or enigmatic state (a conceptual problem) ...." They further add that "the purpose of a research inquiry is to 'resolve' the problem in the sense of accumulating sufficient knowledge to lead to understanding or explanation....."

It has already been suggested in the preamble above, that effective scientific research requires well organised information services. Informal observation and reliable anecdotal evidence suggest that Kenyan medical scientists do not have adequate information resources for their research work. And yet there is evidence that quality research is being conducted in Kenya. This thesis reports the results of an investigation into the extent and quality of the information available and the proposition that research can successfully continue in circumstances that do not appear to meet normal criteria for the adequacy of information provision.

Two recent reports by Africa Online Inc. (1996), and The Times newspaper (Hawkes,1998), provide evidence of medical research work in Kenya. In the first report, news of a new treatment for Leishmaniasis, (a tropical skin infection
similar to leprosy), that has been developed in Kenya is announced. The new treatment is the result of collaborative research between three researchers, one each at the University of Nairobi College of Health Sciences, Ministry of Health Division of Vector Borne Disease and the University of Liverpool School of Tropical Medicine (Africa Online, 1996).

The second report is an article in The Times newspaper announcing that Oxford University scientists in collaboration with medical scientists at the University of Nairobi College of Health Sciences, are to develop an Aids vaccine effective against the strain of HIV(Aids) that is endemic in Africa (Hawkes, 1998). This initiative is the largest privately funded Aids research programme in the world with a research grant worth Stg. £3.6m.

It seemed paradoxical that despite the inadequate development of library and information resources, useful research of the kind described above was being conducted leading to valuable applications. Thus the problem that this study sought to address can be stated in the form of three questions:

1. How do Kenyan medical scientists discover and acquire information resources necessary to conduct research including international standard research?
2. What problems if any, do Kenyan medical scientists encounter in discovering and acquiring information for their research work?
3. Can the Kenyan experience tell us more about how research really builds on information and how it can function in conditions of relative information deprivation?
1.4 STUDY AIMS AND OBJECTIVES

1.4.1 Study Aim

The aim of this study was to analyse and evaluate the information behaviour of Kenyan medical scientists in the context of their research information acquisition and dissemination.

1.4.2 Study Objectives

The objectives of the study were as follows:

1. To describe and evaluate how Kenyan medical scientists use libraries and other information providers for their research work.
2. To evaluate what the role of the under-resourced university and research libraries is in the provision of research information for Kenyan medical scientists.
3. To identify problems Kenyan medical scientists encounter if any, in the process of their research information acquisition.
4. To analyse the implications of Kenyan medical scientists’ information behaviour in the context of their research information acquisition.
5. To assess how the information seeking behaviour of Kenyan medical scientists resembles or differs from what is already known about scientists.

1.5 DEFINITION OF TERMS

It might be useful at this early stage to define certain terms that are used in this study that have a specific meaning attached to them for purposes of this study beyond their normal meanings. They are:
**Academic scientist** – means a member of the teaching staff at any of the university medical schools in Kenya where this study was undertaken.

**Government scientist** – means a medical research scientist (excluding technicians), at any of the government medical research centres where this study was undertaken.

**Medical scientists** – refers collectively to academic medical scientists and government medical scientists as defined above.

### 1.6 JUSTIFICATION OF THE STUDY

This study may be justified on four grounds:

First, little is known about the information seeking behaviour of medical scientists in Kenya. In the absence of previous studies, much of what is ‘known’ about their information behaviour is based on widely held but uninvestigated assumptions derived from studies of scientists in other parts of the world. Many of these studies have been done in developed countries that are information rich thus diminishing the usefulness of their findings to the Kenyan situation. Clearly, there is a need for research into the area to fill the gap in knowledge.

Second, the Kenyan government has had to prioritise its research programmes taking into account the local environment and availability of funds for research. Because it is in the tropics, the incidence of infective diseases in Kenya is high. As a result, medical research is high on the list of research priorities for the Kenyan Government and therefore, it is the most appropriate focus for this study.

Third, in addition to the above, medical research is expensive. International monetary authorities such as the World Bank and the International Monetary Fund are increasingly stressing the need for accountability of public funds in government. A study such as this therefore is both legitimate and interesting, as
the findings will indicate in some measure, how efficiently the scarce resources that are available are being used.

Fourth, though the principal motivation for this study is not its pragmatic value, the findings of the study will no doubt prove useful to those who may wish to engage in similar but policy/action oriented research, particularly that which relates to medical science. In addition, the findings of the study will be potentially valuable to policy-makers and practitioners alike at the sites included in the study.

1.7 LIMITATIONS OF THE STUDY

Normally, one would expect to generalise the findings of a study from the survey population to the wider study population. However, this will not be possible in this study as non-probability sampling methods were used in parts of the study. Non-probability sampling entails selecting participants on the basis of what they can bring to the study. Consequently, the findings of such a study are not statistically representative of the wider population. In the case of this study therefore, the findings will not all be statistically representative of the wider population of medical scientists in Kenya.

However, since a fair proportion of the study population were sampled, the findings that emerged are probably a fair reflection of the information behaviour of other Kenyan medical scientists, and to that extent, cautious inferences can be drawn in regard to the study population.
2.1 HISTORY OF USER STUDIES

The aim of this study was to analyse and evaluate the information seeking behaviour of Kenyan medical scientists in the context of their research information acquisition. For the past few decades, how people find and use information for their work has been an ongoing topic of research in information science. Interest in this topic of research dates from studies into the work of both scientists and the nature of scientific communication in the 1940s – 1960s. Since then, the subject has been researched more and more widely, taking in all kinds of human environment with health a major focus.

The term user studies (also referred to as information needs and uses research) covers a wide range of topics in library and information science (LIS) research. Information needs and uses research is defined by Julien as “that which is concerned with information seeking, determining users’ needs for information, and information use” (1996, p. 53). As a body of research, these studies can be traced back to the Royal Society Scientific Information Conference (Royal Society, 1948), and Berelson’s *The library’s public* (1949). However, the term user studies did not really come into general use until the early 60s (Wilson, 1994; Menzel, 1966).

Regular reviews of this body of literature were inaugurated with Menzel’s chapter (1966) in the Annual Review of Information Science and Technology (ARIST). These reviews have been going on ever since, an indication of the
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significance of this area of research. The establishment of the Centre for Research in User Studies (CRUS) at the University of Sheffield in 1976 further highlighted this area of research, particularly in the UK.

User studies as a branch of LIS research have contributed significantly to the literature in terms of the number of LIS publications. Crawford (1978) estimated that over 1000 user studies had been conducted in the previous 30 years to 1978. Dervin and Nilan (1986) identified over 300 citations to such research in the post 1978 period to 1986, and several hundred citations again were found by Hewins (1990) for the period 1986 – 1989. This huge body of literature cannot be reviewed. However, the various ARIST chapters on information needs and uses provide a framework within which the development of user studies over the years can be discussed.

The major focus of the ARIST chapters has been on the methodological and conceptual problems that have plagued user studies. Consequently, the development and growth of user studies can be discussed in terms of phases roughly corresponding to broad methodological or conceptual changes in the way such studies have been conducted.

The first phase of user studies research (1963 – 1968), was characterised by descriptive studies that had hypothesis testing as the primary objective. There was also a strong emphasis on the use of information in science and technology as was mentioned earlier.

In the second phase of information needs and use research (1968 – 1974), a broadening of the research into areas outside science and technology was seen. Martyn (1974) noted the use of more sophisticated sociological techniques focusing on system oriented studies. He also noted the increasing number of studies on cognition and behaviour. Like others before him though, he regretted
that the methodology being used was inadequate to uncover the true nature and needs of information users.

In the third phase (1974 – 1978), Crawford (1978) found that 80% of studies reviewed were applied in nature and system oriented. She also commented on the continuing trend in the scope of information needs and use studies widening to include people working in many disciplines, as had Martyn (1974) earlier. There was also evidence that the context of information use was becoming important to use studies. Subsequent reviews in the 1980s in the fourth phase were similarly critical of the methodological and conceptual flaws, though noting some modest advances.

Up to 1978, The ARIST reviewers and other commentators had over the years identified a few recurring problems that in their view, had diminished the value of user studies. These problems will be discussed separate from those that were identified in the post 1978 period. The post 1978 problems were associated with the calls for an alternative paradigm and will be discussed together with the review for the period 1978 - 1990.

2.2 PROBLEMS IN USER STUDIES

2.2.1 Study Methodologies

As has already been mentioned, perhaps the most common and recurring criticism of the information needs and use research literature by the ARIST authors and other commentators, (through all the phases of development), centred on the inadequacies of the methodology employed and the conceptual weaknesses of the researches.
Menzel (1966), in an early review of information needs research done between 1963 and 1966, begins his review by describing information needs and use research (on the way scientists use information systems), as necessary for the “planning of science information systems and policy”. However, he argued that the utility of such studies was diminished because of the use of poor methodology. He further argued that even where new methodologies had been established, many researchers ignored these new methodologies in favour of older methodologies that had been shown to be inadequate.

As a result of the above, he suggested that methods developed in communication behaviour research, (and others used in Sociology and Psychology), might be appropriate to information needs and uses research. He was of the opinion that drawing on the methodologies of these disciplines would help improve the methodological base of the information needs and use research.

Herner and Herner (1967), similarly outlined two shortcomings of information needs and use research:

1. They decried the limited number of research methods employed in information needs and use research.
2. They also pointed to the absence of methodological rigour in performing information needs and use research.

Despite their misgivings though, they conceded that the research being done at the time was producing useful findings in spite of the crude techniques employed. For them, this was an indication that a lot of the research being done was action oriented.

Paisley (1968) also referred to the defective methodology encountered in information needs and use research but went a step further than his two
predecessors to say that the main problem of user studies was one of poor conceptualisation. He particularly noted LIS researchers’ failure to:

1. Consider the full range of information sources available.
2. Investigate how information is used.
3. When in a work setting, failing to take into account contextual characteristics of the user such as background, motivation, professional orientation, and so on.
4. Take into account the organisation’s socio-political and economic systems that affect the user and his /her work.
5. Consider the results or impact of using information – [productivity for example].

As a result of the above, he suggested that it would be more profitable if scientists (as research subjects), were conceptualised by LIS researchers as operating within cognitive, emotional and social systems. This he thought would pave the way for better conceptualisation of studies allowing for the conceptual gaps he identified and outlined above, to be incorporated into future studies.

Later, Allen (1969), pointed out that methods had improved but argued that questionnaire design was not being given the attention it deserved. As a result, he claimed, there were several research reports that put out “trivia” because of their use of badly designed questionnaires. He also pointed to the large number of studies in which it was not clear whether scientists or technologists were the subjects of research, and criticised the practice of treating the two groups as though they were similar in their information needs and use. That he should have made this observation is an indication of the large number of studies up to this time, that focused on science and technology.
2.2.2 Theory Building

A second area of concern for critics of LIS research was the lack of a strong theoretical base from which to design systems and services and also the lack of replication and of building on existing research. Menzel (1966), pointed to the neglect of data from different studies that could be used for comparison purposes. He argued that a lot could be learnt for instance, by comparing preference data between studies (that is, data on preference for journals, books, and so on). He further argued that such comparisons would be especially useful, when preference data is taken from studies of users in different environments, disciplines and so forth.

The large number of studies similar in every way except location of the study prompted Herner and Herner (1967), in their ARIST review, to refer to the lack of theory building in the research being done. By this they meant the failure or reluctance on the part of LIS researchers, to build on the good practice of previous studies with a view to theory building. They were of the opinion that LIS researchers were stuck on the treadmill of mediocre studies in spite of there existing an opportunity for integration and advancement.

Paisley too was similarly concerned with the large number of descriptive and localised studies (1968). In his review, he contends that “...purely descriptive study of any set of behaviours has its point of diminishing return”, and argues a case for ‘theories of the middle range’. These he says, are concepts and theorems that fall half way between information use data and systems theory and cybernetics. He argued that the reason for information needs and use research concentrating on the identification of typologies, was because of a lack of middle range concepts that could be used to show how the types in a typology related to each other, thereby enhancing theory building.
Allen (1969), like Menzel and Paisley before him, pointed to the many studies still being done which were concerned with limited and very local problems. He describes these studies as often being of very poor quality and contributing only marginally to theory in the field of communication research. He also noted the concentration of good information needs and uses research in the behavioural sciences and called for behavioural scientists to bring their expertise to bear on studies of physical scientists and technologists.

However all was not gloom, and by 1970, Lipetz (1970) was expressing the view that conceptually and methodologically, user studies were beginning to show consistency. He believed that some unifying beliefs about information seeking were beginning to permeate the field. Nonetheless, he maintained that there had not been sufficient replication of the best of the studies that spawned these beliefs and argued that as a result, the predictive utility of theory in information needs and use research was still weak.

Lin & Garvey (1972), agreed with Lipetz before them and reinforced the call for a conceptual framework within which the results of the studies done in the past decade could be meaningfully integrated.

Crawford (1978), in her ARIST review, noted that the environment in which information was used was increasingly being considered in user studies. She also noted the trend in making a distinction between the cognitive and social aspects of information use. These developments she argued, would through accumulation of valid and empirical data, contribute to a unifying theory of information needs and uses.
In conclusion, the two main concerns of the period were:

1. The use of inadequate research methodologies and the limited number of research methods being used.
2. The failure to build upon prior research with the result that many of these studies remained unconnected by any larger framework or theoretical perspective. Consequently, there was no cumulating of a body of theory on information needs and use research.

2.3 THE SHIFT TO AN ALTERNATIVE PARADIGM

2.3.1 Research Paradigms

The criticism of methods in user studies tapered off in the 1970s but was to re-emerge in the 1980s. By this time, (1980s), there was agreement among critics and commentators that the continued use of the methodological framework underpinning information needs and use research had to be questioned. They argued that the methodologies being used were positivist and based on a deterministic view of the world as discoverable, with the effect that people (users), were reduced to a set of variables which were assumed to be equivalent across situations. They further added that since positivists assume that reality is independent of the knower, and has an objective existence of its own, the notion of information existing independently of the user is conjured. In summary, up to the 1980s, information needs and use research was conceptually dependent on the positivistic approach and its associated methodological prescriptions. It might be useful at this point to examine the concept of a paradigm.

The term paradigm first came into use after the publication of Kuhn's *The structure of scientific revolutions* (1970). Kuhn holds that paradigms are "accepted examples of actual scientific practice - examples which include law,
theory, application, and instrumentation together - provide models from which spring particular coherent traditions of scientific research" (1970, p.10). He further goes on to say (of an adherent of a paradigm), "because he there joins men who learned the bases of their field from the same concrete models, his subsequent practice will seldom evoke overt disagreement over fundamentals" (1970, p.11).

Denzin and Lincoln define a paradigm as a basic belief system or worldview that guides the researcher in choices of method, and also in "ontologically and epistemologically fundamental ways" (Denzin & Lincoln, 1994 p. 3). Hale, defines a paradigm as a lens through which researchers investigate phenomena (1991, p. 343). Lawrence sees a paradigm as “a basic orientation to theory and research” (1991, p. 45). Smith defines a paradigm as the “entire constellation of beliefs, values, techniques, and so on shared by the members of a given community” (1975, p. 24).

Because there are so many definitions, it may be helpful to outline the quintessential attributes of paradigms. Guba and Lincoln (1994), provide a succinct account of the essence of research paradigms. They contend that a paradigm is a set of basic beliefs that defines for its holders the nature of the world and their place in it. They go on to say that there are three philosophical questions that when answered define a paradigm. These are an ontological, epistemological and methodological question. Bilton (1981), defines ontology, epistemology and methodology as follows:

**Ontology** – a branch of metaphysics concerned with the nature of existence, with what kinds of things may be said to exist and in what ways.
**Epistemology** – the philosophy of knowledge. Epistemological issues therefore are concerned with *knowing* and hence on deciding on what sort of statements we accept as a justification for what we believe to exist.

**Methodology** – a rule-governed procedure that aids or guarantees scientific discovery. Methodological issues are concerned with the *logic* of inquiry – how are we to discover what we think exists?

For Guba and Lincoln, each paradigm asks and answers an ontological question about the nature of existence, (the nature of reality). The ontological question therefore is what is there *that can be known* about existence or reality? Following from this, is an epistemological question: what is the relationship between the researcher and what is known? The answer to this question is contingent upon the answer to the first (ontological) question. Lastly, the responses to these first two questions define the answer to the methodological question: what are the legitimate methods by which the researcher can gain knowledge of reality? That is, how can one set out to find what it is believed can be known? Integrating the answers to these three questions defines for a researcher: what the boundaries of research are, defines what the researcher’s stance or attitude towards the research should be, and dictates the methods available to the researcher in performing the research.

In summary, the term paradigm has come to mean what a community of scholars regard as the accepted way of doing legitimate research. So, though there may be many definitions of the term paradigm (including the different meanings given to the term by Kuhn), the main distinguishing feature of paradigms (as has been shown), are their underlying assumptions -- the answers to the three questions -- and that is what is of concern here. The assumptions informing the two main paradigmatic traditions are subsequently discussed.
There are two main paradigmatic approaches to research: the positivist/post-positivist tradition and the critical theory/Constructivist traditions. In general, the former tradition focuses on the verification of a priori hypotheses (the positivist paradigm) or the falsification of such hypotheses (the post-positivist paradigm). Both paradigms assume an objective reality (positivists holding that an objective account of the world can be given, post-positivists that only partially objective accounts of the world can be given). And therefore, researchers must be objective or detached in their attitude, to prevent subjective values creeping into the study as these would make it difficult to apprehend an objective reality. The ultimate aim of research guided by this tradition is explanation enabling the prediction and control of phenomena (Guba & Lincoln, 1994).

The latter tradition is embodied in two paradigms. The first, Critical theory, was developed in Frankfurt by Adorno, Marcuse and others (Ernest, 1994, p.28). Critical theory is pro-Marxist and offers a critique of modern society and in particular, the technical, industrial and bureaucratic interests that drive it. Recent critical theorists Karl Appel and Jurgen Habermas distinguish three types of motives for research which tie in neatly with the discussion above (Ernest, 1994). They are:

1. The desire to predict and control (positivist / post-positivist research).
2. The desire to change society for the better (critical theory research).
3. The desire to understand (constructivist research).

Critical theory focuses on the transformation of a political, social, cultural, gender or economic order that is perceived to undermine human dignity. The aim of research conceived in this tradition, is to offer a critique that engenders debate which should lead to a change in the status quo for the better (Guba & Lincoln, 1994; Ernest, 1994; Morrow, 1994). This paradigm places emphasis on “advocacy and activism” as key ideas (Guba & Lincoln, 1994).
In the Constructivist paradigm, the researcher seeks to understand and evaluate existing knowledge in an area and where necessary, re-interpret and recreate knowledge (referred to as constructions) held by people (including the researcher's own knowledge). This is achieved by a dialectical process the aim of which is to over time, build an increasingly elegant and refined knowledge base in the area of research. Constructivism makes subjectivist assumptions about the nature of lived experience. Reality is assumed to be socially constructed and woven into the meaning and perceptions of those experiencing the reality. Ernest (1994), describes the two principles upon which construction is based as:

"First, that knowledge is not passively received but actively built up by the cognising subject. Second, that the function of cognition is adaptive and serves the organisation of the experiential world, not the discovery of ontological reality."

In terms of this study therefore, the first principle would mean that medical scientists' information behaviour is not objective. Rather, each medical scientist constructs a personal model of behaviour based on his or her experiences from which there is no escape. According to the second principle, medical scientists will use information systems the way they do and not necessarily as they are expected to, for instance, by the creators of the system.

Given the above scenario, researchers in the constructivist paradigm, (that is, investigators), are regarded as legitimate data collecting instruments because it is argued, they can subjectively understand the irrational and emotional dimension of the human condition (in this case information behaviour) and thus, can contribute to a more holistic and elegant theory of human behaviour than might have been achieved in a positivist/post-positivist study. As in critical theory, here too, emphasis is on advocacy and activism, but more significantly on the individual's sense-making experience. What consequence do these paradigms
have for research? Put simply, depending on the aim and questions of a research project, different paradigms will be appropriate if the aim of the project is to be achieved.

Following from this, in library and information science research, there is a growing realisation that positivistic research is not always the best, especially when investigating complex, value laden questions such as some of those that this study aimed to investigate. For these types of questions, the Constructivist paradigm with its emphasis on socially constructed reality and sense-making experience is thought to be better. This is because the findings of such research are likely to be holistic and user-centred, as opposed to the system-centred research of the positivist tradition with its emphasis on measurement and the hypothetico-deductive approach.

2.3.2 User-Centred Research

As is mentioned above, it was mounting dissatisfaction with the methods of the positivist paradigm that led to the call for an “alternative paradigm”, articulated by Dervin and Nilan (1986) in their post 1978 ARIST review. They focused their review on the problem of conceptualisation of use studies. As early as 1968, Paisley (1968) was calling for the need to develop a conceptual framework to guide information needs and use research. Dervin and Nilan (1986) found that several authors were questioning the assumptions guiding information needs and use research and concluded that these authors were essentially calling for an alternative paradigm for this research. Chief among them were: Belkin (1978), Dervin (1977; 1980), Levitan (1980), Jarvelin and Repo (1982) and Wilson (1981; 1984).

For Dervin and Nilan, the root at the problem of research conceptualisation could be traced to the definition of the troublesome concepts ‘information’ and
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‘information needs’. They give as an example of the inadequacies of the traditional paradigm, definitions of information as “1) a property or matter; 2) any message, document or information resources…” These definitions are clearly system oriented. Similarly, in the traditional paradigm, information need is viewed in terms of what the system possesses rather than according to gaps in the user’s knowledge. As a result, systems studies assume that the filling of an information need can be understood in terms of how users have used or might use information systems.

When defined in terms of the proposed alternative paradigm however, new definitions of information need (useful for research that proposes to understand users) emerged. For instance, Dervin (1992, p. 68) suggests that the information seeking activity is triggered when individuals perceive a gap between what they know and what they need to know in a given situation. This notion of a "gap" is what is generally referred to in the literature as an "information need". Consequently, studies of information seeking behaviour have often been linked with a study of information need.

Other authors too defined information need in terms of the alternative paradigm. Belkin (1978), described information need as “when a person recognises something wrong in his or her state of knowledge and wishes to remove the anomaly.” Krikelas (1983) defines information need as “when the current state of possessed knowledge is less than needed.” Wilson (1978), approaches the problem of information need from a different perspective. He asserts that to say that something is needed is to say that it is a sine qua non. That is, necessary to the fulfilment of some goal. A need therefore, is linked to a goal in that without one you cannot have the other. If you have no petrol in your car, you cannot drive. He also makes the important and pertinent observation that there is a simple way of purging a need, and that is to abandon your goal. Whereas this
latter point may seem obvious, it clearly has implications when interpreted from the point of view of information seeking.

Wilson further goes on to say that there is a weaker sense of need defined as that which will facilitate the fulfilment of a goal. This type of need is not necessary for fulfilment of the goal but rather, may reduce the cost, or improve efficiency or allow a better result than might have been possible.

It can be seen from the above that the authors of early models were predisposed to identify information need as the key concept in information seeking. So troublesome is the concept of information need however, that recently, there has been a move away from focusing on information needs, to a view that information seeking stems from problematic situations. Saracevic, et.al. (1988) describe the new trend as “viewing the problem behind the question rather than the information need as central to the information seeking context” (1988, p. 163). Similarly, Wilson and Walsh (1996), suggests that it might be more profitable to focus on the proximate causes of the need rather than on the need itself.

Dervin and Nilan (1986), argued that the alternative definitions of information and information need developed in the new models, confirmed that the need for a paradigm change was essential for improved conceptualisation of information needs and use studies. They argued therefore that the main benefit of the proposed paradigm shift would be to resolve the problem of poor conceptualisation that had hitherto plagued information needs and uses research.

Later, Hewins (1990) in her review of the post 1986 literature noted three new developments:
1. The literature of information needs and uses was increasingly scattered amongst disciplines, a phenomenon all previous ARIST authors had referred to.

2. LIS research was focusing on the cognitive processes of users.

3. New research methods were increasingly being accepted in doing information needs and use research.

She observed that new paradigms and approaches were emerging and pointed to the fact that these new approaches were user-centred as opposed to system centred.

The reviews by Dervin and Nilan (1986), and Hewins (1990), mark a watershed in that the former can be credited for firmly introducing and leading the calls for an alternative paradigm in information needs and use research and the latter for confirming that the paradigm shift was indeed taking place.

In conclusion, the calls for an alternative paradigm have been in essence calls for more user-centred research. Since the early 80s, LIS research has increasingly been user-centred in conceptualisation and this has had implications for the methods selected to perform the researches. A discussion of these methods follows.

2.3.3 Qualitative Methods

The change to a user-centred approach discussed above, has as its corollary a corresponding shift to qualitative methods. But what is qualitative research? As a site of discussion, qualitative research is difficult to define. It has no elegant and universally agreed upon definition. Part of the reason for this lack of a universally agreed definition, is that qualitative research does not have a methodology of its own. Neither does it have a unique paradigm of its own.
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(Denzin & Lincoln, 1994, p. 3; Lindlof, 1995). In spite of these difficulties, qualitative research can be defined as the use of any one of a composite of methods (including life histories, case studies, participant observation, interviews, ethnographies ...), applied within a theoretical framework (a paradigm supporting qualitative assumptions) that is suggested by the subject and focus of the research question.

Various authors have concentrated on describing the features of qualitative research rather than the concept. Mellon, (1990, p. 1) describes qualitative research as “an in-depth study of people, situations and events...” Hannabuss suggests that qualitative research “stresses ‘understanding’, emphasises context, sees the social world from the point of view of the actor, [and] human behaviour from the actor’s own frame of reference” (1995, p. 6). Sutton, (1993, p. 441), has defined qualitative research as “imp[y] interpretive procedures, relativistic assumptions, and verbally rather than numerically based representation of data.”

Most authors however, agree that qualitative methods are the methods of choice when richness of data is required and when the “why” and “how” of human behaviour is being examined (Westbrook, 1994).

Guba & Lincoln (1989), identify four conditions that must be met when doing qualitative research if trustworthiness it to be achieved. These conditions are outlined below:

First, because context is important in qualitative research, the first condition is that the study be carried out in a natural setting so that the study may be contextualised.

Second, Guba & Lincoln say that the researcher should be the primary data-gathering instrument. This is intended to allow the researcher to develop a focus
as the study develops, thereby allowing previously ignored themes to be included in the study.

The third condition relates to the methods used in the study. Guba & Lincoln advocate methods that connect with and link to the human senses. These tend to be qualitative methods of research of the type described above, though they (Guba & Lincoln) do not disallow the use of some quantitative methods.

Finally, the fourth condition is that researchers (study investigators), should bring their tacit knowledge to the study to enrich it.

Thus far, the history of user studies and some of the early problems of user studies have been reviewed. The shift to an alternative paradigm, the subsequent focus on user-centred research and qualitative research methods have also been examined. In the next section, a discussion of contemporary information seeking models will be undertaken. This will be followed by a review of recent information seeking studies.

2.3.4 Information-Seeking Models

User studies as a research front have developed and become more sophisticated over the years to the point that today, not all of these studies investigate the same phenomena. To all intents and purposes, the term ‘user studies’ has been abandoned and replaced by several more specific terms. Wilson (1999), discusses these and makes a distinction between information behaviour, information seeking behaviour and information search behaviour studies. He believes these three terms capture the essence of what used to be called user studies. He suggests that the three are related and nested one into the other with information behaviour defined as the more general field of investigation (Figure 4).
**Figure 4.** A nested model of the information seeking and information searching research areas, Wilson, 1999.

**Figure 5.** Illustrative diagram for the research area of information needs and seeking, Byström, 1997.
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Wilson does not explicitly define what he calls information behaviour studies. However, he implies that information behaviour studies are concerned with a wide range of information activities such as the context of information need, barriers to information seeking, information seeking behaviour, information processing and use and other relevant factors.

On the other hand he says, information-seeking behaviour investigates the methods people use to discover and gain access to information resources. Finally, information search behaviour is concerned with the interplay between an information user (with or without an intermediary), and computer-based information systems, of which textual information retrieval systems are an example.

There have been several attempts to model the information seeking process of different professionals. Some of these models have concentrated on information seeking as it relates to one or two aspects of a professional’s work, whilst others have focused on the organisational context and yet others again, have been developed with the individual as the focus. The different dimensions of information seeking described above have been illustrated by Byström (1997), in the form of a pyramid diagram (Figure 5).

The different dimensions of the pyramid are defined by Byström as:

1. Resources – at the bottom left of the pyramid refers to: information systems, services, channels, sources.
2. Information at the apex of the pyramid refers to: information type, content and usability.
3. Individual at the bottom right of the pyramid refers to: cognitive and information seeking styles, wide/narrow information profile and motivation.
4. Context in the middle of the pyramid refers to: the effects of different work organisations, jobs, projects, tasks and everyday life situations.

**Dervin’s Model**

Dervin’s sense-making model has been built up over a number of years since 1972 (1976, 1977, 1992).

It has been described as more than a model by Wilson (1999) who relies on Dervin’s own writing in which she says of sense-making that it is “… a set of assumptions, a theoretic perspective, a methodological approach, a set of research methods and a practice…” (1983). Morris (1994) however, disagrees and describes Dervin’s sense-making model as an information-seeking model (p. 21)

The sense-making model regards information as subjective, situational, holistic and cognitive (Dervin & Nilan, 1986). It views information not as something objective and external, but as something constructed by the user. It is essentially a cognitive approach to information seeking as it accepts that information is something that involves internal cognitive processes.

The user is the focus in her model and information is regarded as “whatever an individual finds ‘informing’” (Dervin, 1977, p. 22). The model aims to provide a way to understand information in specific contexts and also to understand how information needs come about and how they are resolved.

Dervin illustrates her method using what she calls the ‘sense-making metaphor’ (Figure 6). The metaphor has three elements to it: situation, gap and use. She argues that all information needs arise from a discontinuity or ‘gap’ in one’s knowledge (information need). The gap, develops out of a situation in time and
Figure 6. The Sense-Making Metaphor, Dervin, 1992.
space, which defines the context in which the information need arose. The gap is bridged by employing what she calls uses or helps.

She likens the sense-making metaphor to a journey. People, in their journey through life take steps through experiences and each moment represents a new step. Some steps may be a repetition of past behaviour or experiences but they are theoretically new steps because they occur at a different moment.

The discontinuity occurs when the journey comes to a stop because the individual is in his or her perception, unable to make another step forward without constructing a new sense. The individual has to interpret this moment and attempt to bridge it by defining the situation that was the gap. The uses and helps is the cognitive process which the individual uses to resolve the discontinuity and bridge it.

One strength of the sense-making model is that it can direct a researcher to develop a line of questioning that:

1. Uncovers the nature of a problematic situation (information need).
2. Judges the utility of information in bridging the gap (resolving the information need); and
3. Assesses the nature of the outcomes from the use of information (most probably in terms of productivity) Wilson (1999).

Dervin’s model is also useful in that it is generic and will apply regardless of ‘whom’ the user is: a medical scientist, administrator, and so on.

**Belkin’s Model**

Belkin et al. undertook a design study for an experimental information retrieval (IR) system based on different hypotheses to those underpinning existing systems
(1982). IR systems of the day they argue, are based on the 'best-match' principle where the user's request is matched as closely as possible to the system's textual representation of documents. They point out two problems with this design:

1. This design assumes that the user can specify exactly what it is that they need; and
2. It also assumes that information needs are "functionally equivalent to document texts." (p. 63).

The new approach considered that a crucial element in the IR situation is the growth of an information need out of an inadequate state of knowledge. The information need therefore is best described as an 'anomalous state of knowledge' - ASK. At this point, Belkin is in agreement with Dervin in that the ASK is similar to Dervin's discontinuity or gap.

Belkin's hypothesis is that information needs arise out of a user's anomalous state of knowledge with regard to a topic or situation, and users are unable to articulate what is required to resolve the anomaly. It is therefore more appropriate in IR terms he argues, to have the user describe their ASK rather than attempt to articulate their information need as a request to the system (p. 62).

Because users cannot express what they do not know or what is missing, an interrogation of an information system based on the users' request will not succeed as the request will not adequately represent what is required (Morris, 1994).

To resolve this difficulty, Belkin suggests that the user should formulate a problem statement in which they describe how the information need developed. In doing so, Belkin is recognising context or Dervin's situational elements of
information need. Belkin therefore describes the constructive process of information seeking in terms of the ASK hypothesis.

Their suggested approach to IR is a cognitive one in which it is recognised that human interactions with each other, the physical and self are always given expression by their "state of knowledge about themselves and about that with which or whom they interact".

Thus, for Belkin, an information search is initiated because the user has a problem. The information need is the gap between what the user knows about the problem or topic and what the user requires to know in order to solve the problem. The critical factor in the model is that the user is considered to be dynamic in his state of knowledge as opposed to being static. In practical terms, this means that the user’s knowledge base and resulting constructions change as the search proceeds. And as a result, the user’s ability to articulate requests to the information system change according to his changing understanding of the problem.

**Taylor's Model**

Taylor in his important paper on question negotiation (1968), described four levels of information need and attendant questions.

In the first level, Taylor describes a conscious or unconscious need for information which he describes as not existing in the "remembered experience of the inquirer". He says that often this need may be vague and linguistically inexpressible.

The second level involves a conscious mental articulation of the problem, usually ambiguous. The user may talk to someone else to sharpen the focus of the problem. At the third level, the user describes the area of doubt in concrete terms.
Finally, at the fourth level, the problem is stated or re-cast as a question in terms of the information system. Taylor refers to this level as the 'compromised' need because the question is couched in terms of the system.

He further argues that information systems are essentially content-driven. That is, they derive from the traditional classifications of knowledge. As a result, the information systems are designed only from the point of view of subject matter and ask only "what do you want to know?"

Thus for Taylor, a major input to system design must be an analysis of information use environments. These include elements of anything:

1. That affects the flow and use of information messages into, within and out of any definable entity or group of clients.
2. That determines the criteria by which the value of information messages will be judged in those contexts (1991).

Going by the above definition, three types of information use environments can be defined. They are:

1. Geographical – defined by a physical limit, for example a town, city or state.
2. Organisational – this may be a department within an organisation such as a research division or academic department, a government agency or hospital and so on.
3. Social/Intellectual/Cultural – defined as a group of people who may or may not be known to each other but whose professional or personal interests coincide providing a focus for different kinds of information services and products. Socially, they could be motorbike enthusiasts, wine-club members; intellectually, medical scientists, economists; culturally, classical musicians, theatre company members (MacMullin and Taylor, 1984, p. 24-35).
Further building on the above, MacMullin and Taylor observe that information needs arise from specific problem situations. The situations occur when there is a meeting of "environmental variables such as: subject matter; organisation type and style; function activity; goals; levels of sophistication; connections with other environments; opportunities and constraints" (1984, p. 93).

Taylor believes that it is crucial to "provide some structure on the uses of information: what information does to or for the recipient and for his or her problem or situation" (1986, p. 221). Users make choices about what information is useful to them at given times. "These choices [he says] are based, not only on subject matter, but on other elements of the context within which a user lives and works" (p. 218).

For Taylor, context is important in terms of the type of problem being researched and so he approaches the study of information use by analysing the professional context of the user in recognition of the fact that different professional groups, medical scientists and geographers for instance, might use information differently.

In summary, MacMullin and Taylor argue that a model representing the user's sense-making process of information seeking ought to incorporate three spheres of activity: the physical (actual actions taken); the affective (feelings experienced); and the cognitive (thoughts concerning both process and content). At the start of a search, the user can only express their information need in terms that link with their existing knowledge. It is only after specific gaps in knowledge have been identified, that the user is capable of articulating his or her request as a command for specific information.

They say that a user moves from the state of information need to one of resolution by a series of choices made through a complex interaction within these
three activities (1984). The choices made are influenced as much by environmental factors such as those outlined above as by relevancy of the content of the information retrieved.

**Kulthau's Model**

Kulthau’s stage process model of the information search process ISP is derived from empirical research (Kulthau, 1991). The initial study was a qualitative study of 26 academically capable high school seniors (Kulthau, 1988). The findings of this study led Kulthau to model the ISP in terms of stages she labelled as follows: initiation, selection, exploration, formulation, collection and presentation.

In a second longitudinal study (Kulthau, 1988), the same group of seniors as in the 1983 study were investigated and their perceptions of the ISP were found to have remained the same. Kulthau’s approach is constructivist in its view of information need. Crucial to her approach, is the “uncertainty principle” a cognitive and affective state that characterises the initial stages of the search process. A description of the six stages follows:

*Initiation* is the recognition by a person that they lack knowledge or understanding. It is characterised by a feeling of uncertainty (Kulthau, 1991, p. 366). The important thing at this stage is to recognise a need for information.

*Selection* involves identification of the topic to be investigated. The uncertainty of the initiation stage is replaced by optimism.

*Exploration* is once again characterised by feelings of uncertainty as information encountered is found not to fit with the user’s knowledge and experience. The emphasis here for the user is on “becoming oriented and becoming sufficiently focused about the topic to form a focus or a personal point of view” (p. 366).
Interaction between user and system is awkward at this stage as a result of the user’s inability to adequately express exactly what information is needed.

*Formulation* is the turning point of the ISP where feelings of uncertainty diminish and the user is confident about the nature and focus of the topic. *Collection* is the stage when the user interacts with the system most efficiently in gathering information on the focused topic. *Presentation* is the stage where the ISP is completed and used.

Kulthau’s model of the ISP emphasises the affective in highlighting the feelings experienced in the various stages of the ISP and she links each stage of the process with their accompanying affective states. Like Dervin, it is important in Kulthau’s model to understand the processes users go through in their information seeking activity.

However, whereas Dervin’s model can apply across different user groups, it is unlikely that the stages identified by Kulthau and their corresponding affective states will equally apply to medical scientists, students and the elderly seeking community information for example.

**Wilson’s Model**

Wilson’s system model of information seeking is presented in his paper: *On user studies and information needs* (Wilson, 1981). The model is predicated on two premises (Figure 7). First, information users in work situations have a variety of information systems open to them to satisfy their information needs. These information systems are of two kinds: 1) formal information systems such as libraries, information centres and so on; 2) organisations outside of the information sector but which may provide information within their area of expertise. The second premise is that an information user may choose to seek
Figure 7. Wilson's Information-Seeking Paths, 1981
information from people who are not primarily employed in an information giving role.

Following from these two premises, Wilson introduces the concept of an information user's "life-world" (first proposed by Schutz, 1974), which he defines as the sum of information related experiences the user undergoes. Within this life world is subsumed sub-worlds, of which an important one is the world of work. The world of work is conceptualised in terms of various "systems". One of these systems, is that of "reference groups" which consist of the user's fellow professionals, and peer group within the organisation. Another set of systems is the formal information systems the user interacts with, one of which will be within the user's organisation. These information systems, regardless of whether they are within or without the organisation, are composed of subsystems including:

- A mediator - the staff of the information system;
- The technology - broadly used to include all artefacts for exploiting the system such as catalogues, abstracts and so on; and
- The "embodiments of knowledge", comprising the collection including 'human systems' who may perform an information giving function.

Arising from the above, Wilson suggests four categories of "search paths" (Figure 7) that either an information user (seeking information directly), or the information system and its sub-systems (on his behalf), may use. These categories are described below:

1. Category A paths - defined as search paths that do not involve the use of an information system - talking to people for instance.
2. Category B paths - defined as search paths employing either a system's mediator or technology.
3. Category C paths - defined as a mediator searching on behalf of the user.
4. Category D paths - defined as searches initiated by a "sophisticated technology on behalf of either the user or mediator".

This brings to an end the discussion of information models. The five models were selected because they each focus on different aspects of information seeking. Dervin’s model as has been noted is generic and as a result, is in a sense a methodology. Belkin and his colleagues model cognition in individual users by examining the ‘problem state’ and matching this to retrieval systems. Taylor’s emphasis is on how specific environments affect information seeking in different groups. He identifies context, nature of information sought and the characteristics of the problem as important.

Kulthau’s stage process model is chiefly important in that it provides a framework for identifying where intervention by an information professional can help a user in resolving their information problem. Finally, Wilson’s model lays emphasis on the cognitive and affective. He also stresses the importance of the context in which a person works or lives and so on. He suggests that any barriers to information seeking encountered by the user will almost invariably arise out of the same set of contexts identified in the work place for example.

2.4 WORK-RELATED INFORMATION SEEKING STUDIES

How people access and use information to meet their work-related information needs has become an important area of research in information science. Different occupational and professional groups including researchers have been studied in this way. The range of topics covered in information seeking studies of researchers and scientists has also been wide.

Several general studies of information seeking behaviour of scientists and
researchers have been conducted in the recent past. Some of these studies have been broad in their coverage and were designed to give an overarching picture of information seeking activity amongst various groups. In one such study, a questionnaire survey of Russian scientists working in chemistry, life sciences, earth sciences, mathematics, engineering and social sciences in the *perestroika* period was undertaken (Markusova et al., 1996). The aim of the survey was to discover how scientists find and use scientific and technical information and how scientific knowledge is disseminated.

Other studies have been more specific in terms of the discipline covered such as that by Devi and Lahiri (1997), in which they report on a questionnaire survey they undertook of extension officers and their assistants in the state of Manipur, India. The aim of this study was to evaluate the means and media used by the extension officers in obtaining current information and also to evaluate the sources of information available in agriculture. The survey revealed that the officers relied heavily on the Department of Agriculture for their current information because the library system for agricultural information is very under-equipped and underdeveloped.

Likewise, Izah (1995/96), conducted a questionnaire survey of the information needs and information seeking behaviour of agricultural extension workers in Nigeria. The survey was undertaken at the library of the National Agricultural Extension and Research Liaison Services at Zaria, Nigeria. He found that the most prominent way of obtaining information for the extension workers was through literature searches conducted by staff of the university library.

These latter two studies have been questionnaire surveys of agricultural extension workers in developing countries. Several such studies based on agriculture in developing countries can be identified.
In one such study, Ballantyne (1993), argues that for a long time, research managers have viewed their role as solely to supervise the conduct of experiments. However, an important role of research managers he argues is to ensure that their scientists are adequately served with information. He further argues that systems need to be put in place to ensure that researchers’ information needs are known and that key information sources are identified and made available.

Kaniki (1992), asserts that agricultural research and its information by-products are important for the development of agriculture in Zambia and indeed in any country. He goes on to say that most of the literature on agricultural information services in developing countries is more often based on the authors’ opinions than on empirical research.

Mend and Ballantyne review the state of information services for agricultural research in the Seychelles (1992). They note that there is a shortage of information personnel and as a result, the information services in the country are not as good as they might be. However, because there are very few researchers, personal contact is easy to establish and they regularly exchange information making personal contact the main way in which research information is acquired.

Mavuso and Ballantyne (1992), note the predominance of collaborative agricultural research in Swaziland. Most if not all information needs of local researchers are satisfied by their collaborating institutions. This has meant that local information services have been sidelined and also that there is very little local information available because libraries and documentation centres are not equipped to collect and organise the local information.

There are very few studies that have looked into the information behaviour of medical personnel. Most of the studies that have been done, have been in the US
and the Premsmit study (1990) appears to be the only one so far covering poorer countries. The aim of the Premsmit study was to identify the components of information seeking by Thai medical scientists. Specifically, the study aimed to investigate research-related work situations, information providers used by Thai medical scientists and the use and non-use of libraries as information providers.

Apart from the general studies on information seeking, other studies of scientists and researchers have been comparative in scope. Lalitha (1995), undertook a comparative study of engineers and medical practitioners at five libraries in Thiruvananthapuram, India. The sample included students, teachers, practitioners and researchers. He found that none of the group in the sample seemed to have fully understood the complex nature of their information needs or the information sources available to them and concludes that user education is badly needed for these groups of users.

There has also been interest in professional groups other than scientists and researchers. Reddy and Karisiddappa (1997), conducted a questionnaire survey of the information seeking behaviour of professionals in the field of disabilities in India. The aim was to determine the communication channels they used to access the latest information. They also investigated the sources of information used in research, and the duration of time spent in browsing and reading literature for research purposes. They found that the sources being used included books, periodicals, bibliographies, abstracts and indexes, current literature reviews, databases, meeting and conferences, discussion with colleagues and personal files.

In a departure from the study of professionals such as doctors and lawyers, Ikoro, (1993), studied the information seeking behaviour of academic staff of the College of Administrative and Business Studies of Kaduna Polytechnic, Nigeria. The aim was to develop strategies for the polytechnic librarians to use to satisfy
the information needs of this group of users. The study found that most academic staff still relied upon textbooks for their information. It was also found that most academic staff preferred independent searching to using librarians as intermediaries.

The interest in information seeking has not been restricted to the professions only. Studies of various social groups have also been undertaken. Osiobe (1988), in a study of undergraduate students at Port Harcourt University in Nigeria, found that browsing was the method of choice in accessing information for students in the sample. Their second preferred approach was consulting either faculty or the card catalogue, with subject librarians coming third.

In a more recent study in the United States, Gollop (1997) investigated the ways in which older African American women obtain health information and some of the factors that influence their information seeking. Among the possible determinants thought to influence information seeking were self perceived literacy, access to health information and mobility. The findings showed that the women in the sample received their health information from doctors, the mass media, and members of their social networks. The findings also showed that whereas the number of women in the sample that used the public library was low, the women shared a very high perception of the value of the public library. It is suggested that the public library should exploit this and devise services to offer health information for this group.

Other studies of information seeking behaviour have been concerned with information seeking behaviour only as it relates to specific media or tools. In one such study, Curtis Weller and Hurd investigated the information seeking behaviour of medical faculty at Illinois University at Chicago in relation to their use of bibliographic tools (1993). They found that almost 70% of all faculty used either Index Medicus or Medline. They also found that though new formats to
bibliographic tools were available, the traditional formats were still being used.

The impact of technology on information seeking has also been the subject of research. Shoham in a questionnaire survey of faculty members in two Israeli universities (1998), investigated whether the many technological changes that have taken place in libraries have led to any changes in scholarly communication. The three main areas of investigation were the researchers’ needs and approaches to information problems; the channels they chose to access information; and the information sources that they used. He found that patterns for obtaining information remain conservative and that faculty have resisted technological change. Journals were found to be the most important tool for obtaining information while monographs too were found to be important.

In another study, Williams (1998), investigated journalists’ use of the Internet in the UK. He found that fewer than one in five UK national journalists’ use the Internet. The proportion was even smaller for regional newspapers. The main users of the Internet in the study group tended to be seasoned journalists in their 30s and 40s and he also found that in this group of main users, there was no significant difference in use between the sexes.

It can be seen that research into information seeking in the West is now concentrated on ever more specific issues such as media or technology rather than on capturing the big picture as was the case in the past. Another area of interest in the West, is research into the everyday-life information seeking situations.

One area of interest that has attracted research interest in the past and still does so is that of informal communication among scientists. Chu (1992), in a letter poll of Chinese and non-Chinese scientists, studied 143 researchers that authored 240 highly cited articles in superconductivity. The aim of the study was to
describe the informal aspects of communication between Chinese and non-Chinese researchers. Non-Chinese researchers were found to play both roles equally but Chinese researchers were found more often to be receivers of communications than initiators.

Ehikhamenor also studied the informal communication patterns of Nigerian university scientists (1990), but concentrated on their attendance at conferences. He found that 75% of all scientists in his sample had in the previous twelve months attended a scientific meeting. They gave as their main reasons for attending these meetings the need to exchange information and the desire to present a paper. However, most of the scientists believed that the most important aspect of the meetings was the opportunity to make informal contacts.

In a different type of study, Malmsjo (1997), reviews the factors related to the environment and the situations that influence users' information seeking behaviour. He also reviews the models reported in the literature concentrating on those that model these factors in a quantitative manner. The aim of the study was to examine the degree to which these models of information seeking behaviour can be of use in designing practical information systems.

In summary, a number of conclusions can be reached concerning studies of information seeking. First, information seeking studies have been for a long time, and continue to be, designed as questionnaire surveys.

Second, general studies of the work-related information seeking behaviour of scientists now seem to originate predominantly from developing countries. This might be an indication that the problem of scientific information may no longer be of concern to the West. It probably also confirms that there are still real problems with the provision of information to scientific researchers in developing countries.
Third, the emphasis on what and whom to study has become increasingly diverse ranging from professional groups to studies of everyday-life situations and from the general information behaviour study to studies of single aspects of information behaviour such as conference attendance.

2.5 THE ROLE OF LIBRARIES

Aguolu and Aguolu, (1997), observe that a university or special library cannot be expected to fulfil its role and carry out its responsibilities effectively if its parent institution fails to provide it with adequate funds, physical facilities and personnel. They suggest that the role of the library in research is to serve as an information system that is flexible and which allows researchers to shift and explore the parameters of their research (p. 18). It is important too that the flexibility is available over time so that researchers can follow leads at different stages in the research cycle.

They argue that the progress of scientific research in developing countries is reflected in the high rejection rate of papers sent for publication in foreign international journals. They say that the main reason for this rejection rate is that scientists in the Third World suffer poor levels of current awareness of recent literature. This is blamed on the poor collections of local libraries.

Nonetheless, positive measures are being taken to remedy the situation. This is illustrated in that the African Academy of Sciences and the Third World Academy of Sciences are collaborating to promote local scientific publication with the establishment of Academy Science Publishing in Nairobi, Kenya.
Apart from establishing what the role of libraries is, it is also important to know the reasons for use of the library if an effective service is to be offered. Kwang and Ballantyne (1992) found that agricultural researchers in Mauritius use personal contacts for current information and libraries and book collections for retrospective information. They argue that a documentation centre to be effective needs to be as close as possible to researchers if they are to use it. Given the problems experienced with Grey literature, they suggest that personal contacts rather than the library, would be the best way to keep abreast of research in progress.

Seggern, 1995, makes the same point as Kwang and Ballantyne and observes that for decades, studies of information seeking behaviour of scientists have shown that they rely most on informal communication behaviour and personal collections. She argues that improvements in reference services to the scientific user community must therefore be based on an understanding of scientific communication, information seeking behaviour and the information needs of the user.

Schwartz (1995), investigated how physicians and biomedical scientists in India learnt information seeking skills. He found that they all learnt through mentors. None of the physicians or biomedical scientists reported receiving instruction from a librarian. This he regards as an oversight and suggests that the teaching of information seeking skills is a role for the library. He concludes that training is needed to enable librarians to use computerised systems as there was enormous potential in CD-ROM technology.

Other authors have stressed the value-added role libraries can play to make their services more attractive and relevant to researchers. Vieira and Faraino for instance, observe that few health science libraries maintain databases or produce bibliographies of the publications of faculty in their institutions (1997). They
argue that by offering such services, libraries can provide faculty members with a qualitative analysis of where and how their research is cited and the impact of their research in the fields of biomedicine and related health sciences.

2.6 PROBLEMS IN INFORMATION ACQUISITION

Many studies have been undertaken that address either in whole or in part, the acquisition of research information. Whereas there is a huge amount of literature on this topic focusing on the countries of the West, the focus for this study is on studies of acquisition of research information in poorer countries. Before discussing some of these studies however, an account will be given of the setting of the present study with a view to illustrating some of the problems researchers in Kenya are faced with.

Few academic journals are published in Kenya because demand is too low for commercial publishers to enter the market. Although the Kenya Medical Association is active and strong, most learned societies, where they exist, are weak and have been largely unable to venture into journal publishing. The output of monographs is equally low, for the same reasons as for journals.

University and research libraries are characterised by inadequate and ageing book and serial collections. Unpublished reports are not much used for reasons that will be discussed further on. There is no national inter-lending agency or document delivery system and the international agencies are too expensive to represent a real alternative. Inter-library loans are notoriously difficult to obtain for two reasons: a) Librarians have a protective attitude towards their collections, partly justified by the meagre nature of these collections; and b) Because libraries invariably do not have policies on inter-lending, inter-library loans are usually made on the basis of personal acquaintance or friendship, and so any costs
arising out of loss etc., are borne directly by the librarian who authorised the loan.

As a direct result of the many incidents of loss and mutilation, few librarians are now willing to make such loans. Further, stories of loans that went wrong abound; the effect of this has been to scare off the few librarians who might have contemplated making such loans if requested. For these two reasons, inter-library loans cannot be considered a viable option.

An FAO report (1984, p. 34) of an evaluation study of agricultural research institutes in 12 selected countries (of which Kenya was one), concluded that inadequate library and information resources were a major problem. The report adds that often, monetary allocations for library and information resources could only be justified for large research stations (i.e. sites at which research activity is performed).

Informal communications are equally hampered by mainly institutional shortcomings. Attendance at conferences is severely curtailed because of finance. Neither are there enough scientific meetings held locally to make up for the inability to travel to international conferences. Telephone calls made are charged to the caller, discouraging their use for any but the most necessary calls. Email is not yet widely in use and fax, like telephone, must be paid for by the sender. Further, having a critical amount of specialists in a given discipline is crucial if informal communications are to work well and be of value. Kenya, like many developing countries, has the problem of having too few scientists in any given discipline to adequately ensure the national development of the discipline, and growth via dissemination internationally.

Sturges and Neil (1998), in their book *The quiet struggle: information and libraries for the people of Africa*, offer a comprehensive overview of the
information infrastructure in Africa and the problems relating to information provision in Africa. There is a useful section on Africa's information environment in which the role of libraries in a continent with very low publishing output and high illiteracy rates are discussed. The effects of political censorship and the role of the media are also discussed. There are also two useful sections on services to higher education and to research.

Maguire (1995) describes how the Papua New Guinea University of Technology set about providing better access to information to academic researchers without compromising library provision to undergraduates and with no increase in its budget. Some of the issues that were considered were the use of CD-ROMs, online searching and the Internet.

Access to foreign literature is important in developing countries as the vast majority of the world’s scientific publishing output is in the West. Abdullah (1992) found that research scientists in Malaysia have no problems with obtaining information from overseas sources and described the scientists as having abundant information from abroad. However, the study found that access to local research data was a big problem for Malaysian scientists.

This problem identified by Abdullah is not unique and is really the problem of how to handle grey literature so that it is made available to all those who need it. Lippman (1992), notes that in much of Africa, there is a huge amount of medical information being produced as a result of research and being published as journal articles, reports, theses and conference proceedings. However, he argues that most of this documentation is inaccessible to those who need it because it is not indexed. He describes the proposed African Index Medicus project aimed at collecting this material and having it available electronically.

The twin problem of the lack of foreign literature and inaccessible Grey literature
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is a serious one. Mend (1993) describes how researchers in the Seychelles were up to 1991, relying almost purely on personal contacts for access to scientific information. He notes that since then, small documentation centres have been created in research institutes and adds that these are now beginning to offer traditional documentation services.

Even where collections are not totally inadequate, poor telecommunication facilities, lack of information professionals and uncoordinated information networks remain problems surrounding the provision of information to researchers in Africa (Omwekwu, 1998).

In an effort to resolve the chronic research information poverty, Cornell University’s library announced plans to scan and digitise the entire contents of the past 5 years of 125 selected agriculture journals (Cornell University, 1998). The information will be stored on a set of 16 CD-ROMs. These CDs will be made available to libraries in 111 of the lowest income and food deficit developing countries. The project is to be known as The Essential Electronic Agricultural Library (TEEAL).

Kularatne (1997), also cites information infrastructures as a problem and says that they are often inadequate. Postal and telecommunication systems are also inadequate, and when available do not always work properly. Channels of information provision such as libraries, suffer from lack of funding especially foreign exchange. However, with the advent of liberalisation, the effects of the foreign exchange shortage are not a problem now in many parts of Africa. However, whereas foreign exchange is readily available, lack of adequate budgetary provision remains a problem.

Though not a developing country, Jazdon (1995), cites finance as a major problem of libraries in Poland and illustrates just how important money is. He
cites an example where a library had not been informed of its budget by the middle of May – almost half way through the financial year. He argues that in such an environment, planned collection of books is impossible. He also notes the problems of lack of motivation, and poor prospects, which make staff unwilling to perform as expected. Staff retrenchment schemes are also implemented without proper job audits being undertaken leading to wrong people leaving.

In a study he undertook of Nigerian medical school libraries, Ephraim (1993), found that collection poverty and the absence of union lists are a major handicap facing interlibrary co-operation in Nigeria. Journal collections of Nigerian medical school libraries have seriously deteriorated. He notes that the satisfaction rate amongst users in the study he conducted was less than 25%. Users have developed strategies to cope with poor collections including discussion and consultation with colleagues; attendance at workshops and seminars; attendance at conferences; direct correspondence with authors and membership of learned societies.

In concluding, Abid (1992), argues that scientists in developing countries have a special need for documentation and information services because they are less able to travel to conferences, and also, they benefit less from “invisible colleges” and other alternative means of access to information. He also points out that it is incumbent upon research scientists to make efficient use of their scarce resources by not duplicating research and yet they need access to current literature to do this. He notes that international publications and information services are relatively more costly in developing countries both in absolute terms (because of mailing and handling costs) and also relative to local budgets for scientific research.
2.7 STUDIES UNDERTAKEN IN KENYA

A search of the literature, restricted to user studies and studies on scientific information revealed a remarkable paucity of studies in these two areas for Kenya. Most of the studies found were in the general area of agricultural information. This is in sharp contrast to a country such as Nigeria where several user studies and studies of scientific information have been done.

However, the problems that are faced by libraries in Kenya have been the subject of researches. Barasa (1987), focused on the problems that the Ministry of Agriculture library faces in being a participating member of the AGRIS (The International Information System for the Agricultural Sciences and Technology) project. The issues discussed in Barasa's study are relevant to the present study as problems faced by extension workers and researchers are discussed. She found that there were problems with document delivery at the regional and national level as there exist no inter-library loan arrangements. A second problem that she found was in the management of non-conventional materials, which constitute a major part of the published output of scientific literature in Agriculture in Kenya. The same applies to Medicine.

She also points to the inability to purchase foreign materials in even small amounts, and notes that the same applies to subscription of journal titles. The result has been that periodical collections are very poor, further exacerbating the problem of document delivery.

The agricultural theme has been predominate in studies on Kenya. Kungu (1991), conducted a questionnaire user study of the Ministry of Agriculture library focusing on the use of the library. She found that overall, there was low use of the library and what use there was, was mainly what she referred to as utilitarian. Many of the clients were clerical officers who came in to read newspapers.
The mechanisms for the diffusion of agricultural information to small-holders in Kenya was investigated by Gundu (1985). He investigated among other things, the diffusion of research results through extension workers and identified issues such as the relevance of the research to small-holders; illiteracy; language of communication; communication skills of extension workers; receptivity of smallholders; small-holder attitudes towards research stations and the research performed there as some of the problems inhibiting effective diffusion of information to small-holders.

Iruria (1995), in a doctoral study investigated the generation, communication and utilisation of information about agricultural technology and innovations for small-scale farmers in Kenya. He concluded that technological innovations must be generated through research and also that there must be strong links between researchers, extension workers and farmers if the technological innovations produced by research are to be taken up by the farmers.

Still on dissemination, Gathegi (1994) reviews the dissemination and management of agricultural information in Kenya. He laments that though there is an extensive agricultural research system, little attention has been paid to the information created within the system. He argues that the management of information for research scientists is crucial for the effectiveness of the entire research system and concludes that Kenya is deficient in this respect.

On information services, Ojiambo (1985), reviews the status of agricultural information services in Kenya. He reports that a questionnaire survey of farmers, extension workers and research scientists, was carried out to find out what use these groups made of the various information services available.
Only two studies of information seeking were found. The first by Odini (1995), was a comparative study (leading to a doctorate) of the information seeking and communication behaviour of Kenya Railway and British Rail engineers.

The second was a study by Ocholla (1996), in which he conducted a questionnaire pilot survey of the information-seeking behaviour of academics at Moi University, Kenya. Twenty seven academics were randomly sampled from four faculties. The findings indicated that there was good use of the libraries and that colleagues were considered important for information including intra-university information. He suggests that the library should pay more attention to current awareness services.

In concluding, no references to research into medical scientists in Kenya could be found. This study may well be the first to be done in Kenya in this area.
CHAPTER 3

Methodology

The theoretical and conceptual foundations for this study derive from two main sources. These include:

1. The theoretical perspectives of the Constructivist and Positivist paradigms.
2. Findings of previous research and in particular, concepts drawn from Wilson's system model of information seeking and his later general model on information behaviour (Wilson, 1981; Wilson and Walsh, 1996).

3.1 THEORETICAL FRAMEWORK

The theoretical framework underpinning this study was twofold as there were two main parallel themes for the study. It has already been shown in Chapter Two, that no study of this kind for Kenya could be found. Consequently, this study was in part an exploratory one. Thus the first theme was to investigate as broad a range of topics in information behaviour as was possible. This in turn meant that it would be necessary to collect data that could be analysed in a quantitative way in order to allow a general picture of Kenyan medical scientists’ information behaviour to emerge. As a result, where quantitative data would give a better indication of the medical scientists’ information behaviour, the research strategy was devised quantitatively as appropriate.

For the second theme, the study was intended to lead to an understanding of the situations that lead the medical scientists to behave in the way that they do. This in turn meant that the study should be designed from a user-centred perspective.
This was achieved by using data collection methods that were supportive of user-centred research. These were qualitative data collection methods and included the use of semi-structured interviews, analysis of journal articles and observation.

3.2 CONCEPTUAL FRAMEWORK

In Chapter Two, a number of information seeking models were discussed. Wilson’s system model of information seeking and its later re-statement (Wilson, 1981; Wilson and Walsh, 1996) was chosen as the model to guide the present study for a number of reasons.

First, Wilson’s model is designed with the world of work in mind. This study aimed to investigate Kenyan medical scientists’ work-related research information behaviour. Wilson’s model was therefore deemed appropriate.

Second, Wilson’s model offers a typology of information systems that users in a work situation might use. These typologies were found to be an ideal framework for the conceptual design for this study.

Third, Wilson’s model takes into account the impact of barriers to information seeking and their relationship to the context of users’ work environments. This again was used as a conceptual aid in designing the instruments for the present study.

The remaining four models (Dervin, Belkin, Taylor, and Kulthau) were not applied in the design stage of the study but were used together with Wilson’s in informing the analysis of data collected.
3.2.1 The Model for This Study

As has been mentioned, the model that was developed to guide this study (presented in Figure 8 below), uses some of the concepts taken from Wilson's 1981 model, and a later re-statement of it (Wilson and Walsh 1996). Though the 1996 model maintains the basic structure of the 1981 model, it also introduces new concepts and ideas on information behaviour developed in a number of disciplines outside of information science. Wilson believes that this cross-fertilisation allows a better and more complete model of information behaviour to be constructed (1997).

Also in the 1996 model is a change to the concept of information seeking. In the 1981 model, information seeking was defined as a single activity comprising active search only. However, in the 1996 model, information seeking is viewed as including passive attention, passive search, active search and ongoing search. These terms are further explained below.

This change was incorporated into the model for this study. At the top of the model is the medical scientist in context; that is, in the work situation. The rest of the model is a diagrammatic representation of the two principal areas of investigation. These are information seeking behaviour and intervening variables (barriers to information behaviour).
Figure 8. Model of medical scientists’ information behaviour - adapted from Wilson, 1996.
Information seeking behaviour

This is thus categorised:

1. **Passive search**, refers to those occasions when an information search (or other type of behaviour) unexpectedly brings up information that happens to be relevant to the individual. Browsing (or non-directed searching) is an example of this kind of an activity.

2. **Passive attention**, refers to situations where one may be listening to the radio or television for instance, with no intention of acquiring information, but does so nonetheless. Reading papers, listening in to a conversation between friends/colleagues and so on, are suggested as examples of activities that may lead to this happening.

3. **Ongoing search**, refers to a situation where an individual already has a substantial corpus of knowledge in an area, but periodically engages in a continuing search to update and expand this knowledge. Ongoing search therefore can be described as current awareness activity.

4. **Active search**, refers to the type of activity most commonly thought of as information seeking. Typically, this involves the use of information systems, personal collections, interpersonal communications and attendance at conferences, meetings or other scientific events, to acquire information.

An active search may either end in success or failure. If it ends in failure, the search may either be abandoned, or reformulated. If it ends in success, the information will be processed and may or may not be used. Information behaviour of the *active search* type is central to this study. Figure 8 locates the various concepts that were investigated under this heading.
Intervening variables

Information seeking as an activity is not a natural consequence of an information need. A number of barriers may prevent information seeking behaviour from taking place. Possible barriers to information behaviour have been presented in the model under the heading intervening variables, which is Wilson's preferred term (1996). He says that the use of the term 'intervening variables' is meant to convey the idea that the impact of these variables may be just as supportive of information use as detrimental.

The variables include: the characteristics of the information source as perceived by the individual; personal characteristics; environmental and social or interpersonal factors. The effect of these variables on information behaviour will also be investigated as part of the study.

3.3 STUDY QUESTIONS AND HYPOTHESES

To adequately address the aims and objectives of this study, a number of hypotheses regarding Kenyan medical scientists' information seeking behaviour were developed. Because this study was largely an exploratory one, the hypotheses were developed and stated as theoretical propositions in preference to the usual null and alternative hypothesis format common to experimental research. The hypotheses themselves are the result of a crystallisation of the following influences:

1. The literature in the field of information behaviour – in particular the variety of systems available to information users as described by Wilson in his systems model of information seeking.

2. This researcher's experiences working at an academic library in Kenya.
This researcher's experiences working as an academic member of staff at a Kenyan university.

The study questions and hypotheses were as follows:

**Information Gathering**

Qn. 1 How and to what extent are formal information systems used by the medical scientists?

Hy. 1 Because of the inadequate development of university and research libraries, Kenyan medical scientists do not rely on these libraries for information for their research work.

**Personal Collections**

Qn. 2 How important are personal collections as a source of information for the medical scientists?

Hy. 2 Personal collections are important as a source of information for the medical scientists but not the most important.

**Interpersonal Contacts**

Qn. 3 How important are scientific exchanges with colleagues (personal contacts) as a source of information for the medical scientists?

Hy. 3 Scientific exchanges are an important source of information for the medical scientists.

**Conferences and Meetings**

Qn. 4 How important are conferences (international and/or national) and meetings as an information channel to the medical scientists?

Hy. 4 International conferences are only of marginal importance as an information channel to the medical scientists.
**Information Sources**

Qn. 5 What sources of information do the medical scientists use for their research work?

Hy. 5 The medical scientists use a wide variety of sources for their research work but rely mainly on the journal.

**Information Gathering**

Qn. 6 To what extent does browsing form a part of the medical scientists’ information behaviour?

Hy. 6 The medical scientists do only a limited amount of browsing.

Qn. 7 To what extent does serendipity contribute to the medical scientists’ information acquisition?

Hy. 7 The medical scientists experience serendipity only to a limited degree.

**Research Dissemination Activities**

Qn. 8 How do the medical scientists disseminate the results of their research work?

Hy. 8 The medical scientists use the journal article as the main tool for the dissemination of the results of their research work.

**Research Milieu**

Qn. 9 How does the research milieu in the organisation influence the medical scientists’ information seeking?

Hy. 9 The medical scientists face many difficulties in their work environment.

**Medical Scientists’ Perceptions**

Qn.10 How do the medical scientists’ perceptions of their information environment, affect their information seeking?

Hy. 10 The medical scientists’ perceptions of their information environment
interviewees, These will be labelled S, T and R and not in that order. There are libraries at all three sites. Both medical schools have their own libraries separate from other branches of the university libraries. The Institute also has one central library that serves each of the Research Centres.

Moi university library is computerised and has an OPAC while the other two still rely on the traditional card catalogue. It was not possible to obtain any information relating to budgets, stock and other library statistics, as this was categorised as confidential information at all three sites. The reasons for this classification were not clear. However, a physical check of the stock at the three libraries revealed striking differences both in number of items, quality and age.

The Institute library is very small, clearly unsuited to its mandate and there is a lot of evidence that no housekeeping activity is performed. The catalogue here is out of date, and not maintained. Books are shelved on the stacks without having undergone any processing whatever. This renders the book stock effectively lost. The library is located a distance from the research centres in a wing of the administration building. The library, however, has Medline on Silver Platter running on a single PC. The staff here perform mediated searches when requested. Alternatively, the medical scientists can search on their own if they wish to.

The medical library at Moi University medical school is the smaller of the two medical school libraries. However, it has a newer stock of books, as the medical school is still young. The first batch of students was admitted in 1990. A Medline subscription on CD-ROM (Silver Platter) is made available from a link university in Sweden. The two PCs used for this purpose are located in a small room outside of the library though still within its control. The library is not purpose built but has the advantage of being physically located in the middle of the academic departments.
The University of Nairobi medical library is purpose built. However, the book stock is old and no new purchases are made. Medline is available through healthcare, which is situated in an annexe of the library but independent of it.

### 3.4.2 Interview Sampling Procedures

The techniques of stratified random sampling were used for the interviews. Stratified sampling involves dividing the population into a number of strata where members of each stratum share a particular characteristic. Once this has been done, random sampling within each stratum is carried out. The first task was to stratify the population of medical scientists according to position within the establishment. This involved first identifying the population of medical scientists by obtaining lists of all academic medical scientists and government medical scientists at each of the three sites. All three lists were already arranged departmentally and within departments, by position in the establishment.

Second, these lists had to be reorganised to fit the criteria that were developed for a medical scientist to qualify for participation in the study. In setting limits on the population of medical scientists to be included in the sampling frame, the following criteria were adopted:

1. Participants had to be active in research at the time of the study.
2. They were all expected to be between the ages of 25 and 65.
3. They all had to have attained a level of education of at minimum, bachelor's standard.

Once the sampling frame was constructed, random sampling within strata was carried out.
3.4.3 Observation Sampling Procedures

Apart from one requirement, sampling frame considerations were not an issue in the observation study because the subjects presented themselves at the library. The only requirement imposed was that only medical scientists included in the sampling frame constructed for the interview study, were to be considered as subjects eligible for observation in the library. The specifics of the sampling within the library are described in Section 3.5.2.

3.4.4 Analysis of Journal Articles Sampling Procedures

For the analysis of documents, non-probability sampling methods were used. Specifically, theoretical construct sampling was used which entails using properties of the construct under study to orient case selection (Patton, 1990). Strauss and Corbin define theoretical sampling as "sampling on the basis of concepts that have proven theoretical relevance to the evolving theory" (1990, p. 176). The specifics of the sampling procedure followed are described in Section 3.5.3 below.

3.5 METHODS OF DATA COLLECTION

The use of several sources of evidence is recommended for explanatory research (Yin, 1994, p. 91; Robson, 1993, p.227). This use of multiple sources is referred to as triangulation. Denzin, as cited by Janesick (1994, p. 214), identifies four types of triangulation:

1. Data triangulation: the use of a variety of data sources.
2. Investigator triangulation: the use of several different researchers or evaluators.
3. Theory triangulation: the use of multiple perspectives to interpret a single set of data.


Methodological triangulation was used in this study for two reasons: 1) different methods allow contrasting viewpoints to be brought to the problem resulting in better and deeper understanding of the phenomenon (Morse, 1994, p. 224); and 2) the data derived from each method can be used to confirm or corroborate the findings of the other methods (Rossman & Wilson, 1994 p. 319) if the data are found to converge.

As a result, the three different data collection methods used for this study were as follows:

1. Interviews.
2. Transient Observation.
3. Content analysis (including referencing patterns) of journal articles authored by the participants in the study.

3.5.1 Interviews

The use of interviews was chosen as the main data collection method for this study because they provide an effective way to find useful information about behaviour, beliefs and attitudes. There are five advantages to using interviews for data collection (Gorman and Clayton, 1997). They are as follows:

1. The first advantage is that with interviews, data collection is immediate. With other methods of data collection such as questionnaires, there is usually a fairly long lead-time, before data collection is completed.
2. The second advantage of interviewing is that it allows the interviewer to probe for more detail, especially where the interviewee makes a point that is unexpected or is unclear. Similarly, the interviewee is free to ask for clarification when in doubt as to the meaning of a question for example.

3. The third advantage of interviewing is that it allows the interviewer to explore causation. That is, to obtain from the interviewees, their reasons for behaving in the manner in which they say that they do – something that is very difficult to achieve in a satisfactory way when using other methods of data collection such as questionnaires or observation.

4. The fourth advantage of interviews relates to personal contact. It is sometimes easier to obtain data from an unenthusiastic respondent by the simple fact of being present. It is often more difficult to say no to someone’s face than it is to put aside or ignore a questionnaire. Also, being present gives the interviewer the opportunity to reduce or eliminate the potential objections to being interviewed.

5. The fifth advantage of interviews is that they allow a large amount of data to be collected in a fairly short time as compared to other methods of data collection.

However, though there are several advantages to interviews, there are some disadvantages that need to be taken into account. They are:

1. First, the cost of carrying out interviews can be quite high in terms of both time and money.

2. Second, because interviews are conducted in a one-to-one situation, it is possible that interviewees may tailor their responses to fit what they think the
interviewer wants to hear especially if the interviewee is a helpful kind of person.

Nonetheless, for this study it was felt that the advantages that interviews would bring to the study outweighed their disadvantages.

Once interviewing was chosen as the main method of data collection for this study, a choice had to be made regarding type of interview to use. A semi-structured design of interview was chosen for two reasons. First, interviewing was chosen as the main method for data collection because as Seidman points out, it "provides access to the context of people's behaviour and thereby provides a way for researchers to understand the meaning of that behaviour" (1991, p.4). The principal aim of this study was to obtain rich information; information that would uncover the realities of the experiences of the medical scientists in seeking and using information, and also that would uncover what the medical scientists think and feel about their experiences. "Qualitative interviewers listen to people as they describe how they understand the world in which they live and work" (Rubin & Rubin, 1995, p. 3). They further add that as such, interviews are useful "to elicit in-depth answers about culture, meanings, processes, and problems..." (1995, p.5). Apart from uncovering behaviour and experience, interviews are also useful for uncovering peoples' values, opinions, feeling and beliefs (Hannabus, 1995, p. 8). Interviews therefore seemed ideal.

Second, semi-structured interviews help to reduce the bias that may arise in a structured interview where a rigid template of interview questions is imposed upon the participants. Hannabus (1996, p. 24), warns against the dangers of structured interviews and notes that the participants "may feel obliged to fit their experiences" to the researcher's template, or worse, "may even try to deceive the researcher...."
Third, semi-structured interviews have as a major advantage their systematic approach. This make the results of such interviews easier to analyse than if the interviews are un-structured (Hitchcock and Hughes, 1989).

Consequently, in-depth, semi-structured interviews were conducted with the medical scientists participating in this study. An outline of topics to be covered was developed to guide the interview. The outline of topics to be covered was left as wide open as possible for amendment should new themes and insights emerge by an iterative process during the study.

To obtain a sample population, a list of staff at each of the three sites was obtained. Staff that fell outside the criteria outlined in Chapter 3.4.2., were deleted from the list. After final lists had been drawn, sampling was done on a purely random basis.

Several research reports were studied before preparation of the interview schedule. It was finally decided to draw on the following two researches for the interview schedule:

1. A study of the scientific, technical and medical information system in the UK (Royal Society, 1993.)

2. Factors affecting the information behaviour of agricultural research scientists (Palmer, J. 1990.)

These two studies were relevant to the present research and were of direct use in designing the interview schedule. The Royal Society study arose out of the realisation that there was increasing demand on resources within the scientific, technical and medical (STM) system and that there were “Difficulties in reconciling the increased supply of scientific information with the decreased
ability of libraries to acquire it..." (Royal Society, 1993.) The Royal Society study looked at all facets of the STM system drawing on the experiences of all major stakeholders in identifying the current state of the health of the system. For this study however, it was the section on the users of the STM information system that was relevant. The second study considered the factors affecting the information behaviour of agricultural research scientists working at an agricultural research institute at Rothamstead. Though this study looked into agricultural scientists, and was UK based, it was found to be useful in establishing a framework for an interview schedule for a study investigating information behaviour such as this one.

The interview guide was divided into a number of sections, each of which grouped together related questions. The first part of the interview was concerned with the respondent's bio-data and also with the topic of research the medical research scientist was working on. Control over the research and teamwork was also discussed.

The second part of the interview was about information gathering. Information seeking, attitudes towards information, serendipity, and information technology were some of the topics discussed.

Next came a section on sources of information. Preference for various sources was investigated and explanations sought for the reasons for these preferences. The medical scientists' perceptions about the amount of information in their field were explored as well.

The fourth section of the interview was about attendance at conferences and meetings. Motives for attendance and issues relating to funding for travel were discussed as was membership of learned societies and other professional organisations.
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The medical scientists' communications with colleagues was a section on its own. Inter-personal contact, benefits of such contacts, the role of mentors and modes of contact were discussed.

The sixth section related to personal collections. Emphasis was on the nature of such collections, inclusiveness, and reasons for and against having own collections were discussed too.

Communication/dissemination activities were the subject of the seventh part of the interview.

Finally, the interview closed with an invitation to the respondent to make a judgement about the research milieu in their organisation and how it affected them.

Two major problems were encountered in obtaining interviews. The first main problem was unwillingness on the part of many of the potential interviewees to take part in the study. This difficulty however was restricted to two of the sites only because this researcher was known at one of the sites and received maximum co-operation here.

The second problem that was encountered was the lack of an appointment culture. Often an appointment would be made but would not be kept. This made the data gathering more difficult than it needed to be and forced the researcher into a ‘lurking and pouncing’ role. This entailed lurking in corridors and libraries until a potential victim was identified and ‘pouncing’ to obtain an interview. It was found though that this system worked very well and only one person refused to grant an interview when caught entering his office.

The interview guide used in the study has been included as Appendix I.
Before turning to the observation study, mention needs to be made about three interviews that were held with librarians. Three interviews were held with librarians at two of the sites – R and S. These interviews were unstructured and were meant to provide background information about the libraries. The main points that emerged from the interviews is presented in Chapter Four.

3.5.2 Observation

Observation was the second data collection technique used for this study. It was intended that data from the observation study, together with that from the journal article analysis study -- which was the third data collection method -- would lead to a richer picture of the medical scientists’ information behaviour to be built.

There are two main types of observation: a) participant observation which is qualitative in style and originally rooted in the work of anthropologists such as Malinowski and particularly associated with the Chicago School (Robson, 1993); and b) structured observation which is more quantitative in style. Gorman and Clayton (1997) refer to the two main types of observation as structured and unstructured observation. Both of these observation methods have advantages that were considered to be important for this study.

1. The first advantage of observation is that it has what Gorman and Clayton call a ‘present orientation’ (1997). That is, the advantage of things being recorded as they occur. The chances of misrepresentation happening therefore are reduced.

2. The second advantage that observation brings is that of substantiation or corroboration. No matter how well planned and conceived a study is, there is always the possibility that people will tell you one thing when in fact they do another. Observation controls this to some extent by allowing a comparison to
be made between what people say and what they do. This, Gorman and Clayton refer to as the ‘reality-verifying’ character of observation (1997).

3. The third advantage of observation is that it allows behaviour to be observed in its natural setting.

Because of these advantages, it was decided to use observation as the second data collection method. A decision was then made about the perspective this researcher would assume in observing the medical scientists' behaviour.

Gorman and Clayton give an account of the four different perspectives that a researcher may assume in carrying out observation. The different perspectives are represented as a participation continuum as follows:

![Figure 9. The participation continuum in observation.
Gorman and Clayton, (1997).](#)

Unobtrusive observation was chosen as this researcher's perspective for this study. The characteristics of unobtrusive observation are that:

1. The researcher acts simply as a recorder of events. There is no interaction with the subjects of the study; and
2. None of the participants are made aware of the researcher's presence.

In this study, observation was carried out at two levels (a) observation of the participants' working environment, and (b) observation in libraries.
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The following kinds of things were observed in the participants' working environment: evidence of reading materials (journals, books, reports) and where possible, ownership, was determined; use of computers where they existed; use of telephone, facsimile etc.; evidence of information activity in labs.

In the library, a checklist of activities to observe in the library was drawn up. These included the following:

1. Catalogue use
2. Journal use
3. Enquiries at issue desk
4. Abstracts use
5. Borrowing of books
6. Returning of books
7. Browsing
8. Use of journal back runs
9. Newspaper reading

The one activity that is clearly missing from the list outlined above is use of a photocopying machine. The reason for this is that none of the libraries had photocopiers. However, at one library, academics are allowed to check out current journals for half an hour to go and copy elsewhere. For this study, when this happened, it was recorded.

Observation was performed in three parts of one week each at each of the three sites. The first part of the observation was in the first week of September 1997, the second part was in the first week of November 1997 and the final part in the first week of February 1998. The observation ran concurrently at each of the three study sites. This was achieved through the use of library staff that were
hired as research assistants for this purpose at two of the sites. This researcher acted as the third observer at a different site on each occasion.

The observation exercise was carried out alternately between 9am - 1pm, and 1pm - 5pm, Mondays to Fridays. This variation in times of observation was an attempt at capturing a snapshot of library activity at all times. Each observation period was divided into intervals of one hour each as was the coding scheme. The observation activity consisted in unobtrusively watching what happened, and making a frequency mark against the activity in the coding scheme that best represented what occurred during that interval. The respondents were at no time approached directly for an explanation of what they were doing.

This observation design had its problems. One problem that emerged was that it was not possible to tell if the academic scientists were in the library for teaching or research information [it was assumed that government scientists at the research institute were in the library for research information]. However, though it was not obvious what type of information (teaching or research), the academic scientists wanted, this seems not to have been a serious flaw because it was still possible to draw relevant conclusions about the medical scientists' information behaviour precisely because the data sought related to behaviour and not type of information.

The observation-coding scheme has been included as Appendix II.

3.5.3 Analysis Of Journal Articles

This method involved this researcher talking through with the scientists the references that they cited in papers that they have written. This method has also been used by Medhurst as a key part of his research (leading to a PhD), on journalists’ information behaviour (1991, p. 17).
Of the three methods that were employed, this last method was used not to test the respondents, but rather to gain an understanding of the following kinds of things:

1. How did the scientist hear about or discover the source?
2. Were the documents cited actually read?
3. Where were the documents cited obtained?
4. How does the scientist decide which references to follow?
5. Was the researcher satisfied with their referencing or would they have liked more?

The medical scientists were also asked for an explanation as to the average age of their citations. Further, the number of citations in the paper were reviewed and related to the levels of satisfaction with research materials as indicated by the participants in the interviews. The range of different types of sources quoted were noted. Reasons for the diversity or otherwise in sources, were sought. The relative age of citations were reviewed, and reasons for the pattern established. The effects of information availability and publication standards on communication activity were also investigated.

A main issue of concern when carrying out analysis of documentary sources is that relating to validity, reliability and representativeness (Hitchcock & Hughes, 1989). Questions such as: what is the nature of documents being studied and are they solicited or unsolicited are raised.

Validity refers to the extent to which the research method gives the correct answer and reliability to the degree to which a measurement procedure produces the same answer each time it is performed. Representativeness refers to the degree to which it is possible to draw general conclusions from the evidence one has obtained.
For the journal article study, validity has not been compromised in the choice of journal articles as the documents to study because the research question related directly to journal articles. Similarly, reliability is not compromised because the analysis was done with the authors of the articles.

Only ten medical scientists were interviewed. This was because it was very difficult to find respondents that had both recently published an article as a result of research and were willing to grant this researcher an interview to talk about their article. It was essential that the authors of the articles were interviewed because a lot of the data sought was about why the authors behaved in the way that they did. This type of information of course could not have been obtained in any other way. The difficulty described above meant that existing published articles were used to identify potential interviewees rather than vice-versa.

The actual procedure adopted was as follows:

- First, an article was selected at random from the first issue in 1998 of the *East African Medical Journal, 75*(1).

- Second, if it was authored by a medical research scientist that was included in the frame, the scientist was approached for an interview to discuss the article. A number of scientists declined to co-operate.

- Third, if the interview was granted, the article was analysed for both 'witting' and 'unwitting evidence' using the pre-determined scheme outlined above. Witting evidence is defined as everything the author intended to impart. Unwitting evidence is everything else that can be learnt from the document (Robson, 1993, p. 273).
This procedure was repeated until a sample of ten was reached using the first issue in 1998 of the *African Journal of Health Sciences, 5*(1) once all articles in the EAMJ had been 'used'.

It is recognised that the sampling system used for this part of the study introduced bias in that selection of cases for inclusion into this segment of the study was restricted only to scientists who had published in 1998. However, there was a reason for this. The other two data collection instruments were designed to obtain a contemporary account of the medical scientists' information behaviour. For this reason, the strategy outlined above was adopted to ensure that reasons the scientists gave for their information behaviour in writing articles were similarly contemporary. If the sampling was left random, a medical scientist might have volunteered to discuss his or her article published in 1985 say. Any information obtained would thus have been unreliable for comparison with the rest of the study findings, as situations would have changed in the intervening years.

The schedule used for the analysis of articles is included as appendix III.

### 3.6 PILOT STUDY

It was decided that a pilot study should be undertaken in advance of the main study, in order to refine the data collection instruments with respect to both content and the procedures to be followed. Therefore, once the first complete drafts of the data gathering instruments were completed, a pilot study was arranged. This involved interviewing three academics at a university in the United Kingdom. These interviews resulted in two changes being made; one change in content and another in procedure.

Two main problems were found during the pilot study. First, the interview
schedule was too loosely structured to work well. The initial approach that was adopted was an un-structured format in which the major topic questions that were to be covered in the interview were noted down and nothing more. The idea was that the interviewee would be allowed to talk freely. The problem that was found with this approach was that control over the interview was lost with the effect that not all the topics could be adequately covered in the allotted time. As a result, the interview design was changed to a semi-structured format rather than an unstructured.

The actual changes made to the interview schedule did not involve any change to the broad topics of discussion. Rather, under each topic, a number of unifying sub-topics were introduced. This had the effect of imparting a sense of direction to the interviews with the effect that interviewees knew exactly what was being asked and so gave clearer answers.

The second problem that was encountered concerned recording of the interview. In the unstructured format, verbatim note taking as the interviewee was speaking proved to be a difficult task. Use of a Dictaphone had to be considered only a possibility as it was possible that many of the interviewees during the actual fieldwork would object to having their interviews recorded. It was necessary therefore to devise a system where note taking could come as close to verbatim as possible and at the same time allow the interviewer to direct the interview. The semi-structured format achieved this.

After the changes were made, a second pilot study was undertaken with five academics at a different university in the United Kingdom, using the revised instruments. The academics were chosen to be representative of the academic hierarchy, which is similar to that in Kenya, and included one professor, a senior lecturer and three lecturers. The results of this pilot study revealed no further problems with the instrument. Consequently, this second instrument was used for
the main study in Kenya.

3.7 ANALYSIS OF DATA

For the quantitative data, appropriate analytical statistical techniques were used. These included frequency counts, cross-tabulations, use of the importance index to analyse data obtained from questions constructed using a Likert Scale and finally, use of Spearman's rank coefficient to compare the importance indices.

3.7.1 Quantitative Data

The medical scientists were invited to fill out card 5 in which they were asked to rank the frequency with which they had contact with various groups on a list, ranking their use on a scale of one to five ranging from Frequently, Fairly Frequently, Moderate, Seldom to Never. This scale method of ranking is known as a Likert Scale. The use of this scale has been described by Aaker and Day (1990.)

The use of the "Importance Index" as an attitudinal measure is described by Aaker and Day (1990). The important index is used to calculate an index number for each variable in a given list thereby allowing comparisons to be made easily between variables. The formula used to calculate the different indices is:

\[
\text{Importance Index} = \frac{5n_1 + 4n_2 + 3n_3 + 2n_4 + n_5}{5(n_1 + n_2 + n_3 + n_4 + n_5)} \quad \ldots (3.1)
\]

Where 

- \( n_1 \) = frequency of “Frequent” responses
- \( n_2 \) = frequency of “Fairly Frequent” responses
- \( n_3 \) = frequency of “Moderate” responses

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After calculating the importance indices for each of the variables in the Likert scale, it was desirable to measure the strength of the correlation if any, between the government scientists’ and academic scientists’ information behaviour. To do this, a non-parametric statistical test, (Spearman’s rank correlation coefficient), was used. The reasons for using this approach are described below.

Non-parametric statistical tests are useful when the phenomena under discussion are not capable of precise measurement but can be ranked in comparison to each other. That is, rank statistics are used with ordinal data.

In rank statistics, Spearman’s rank correlation coefficient provides a measure of correlation between pairs of ranks and is the measure most often used for this purpose. The following formula is used for calculating Spearman’s rank correlation coefficient, $r_s$:

$$r_s = 1 - \frac{6 \sum d^2}{n(n^2 - 1)} \quad \ldots(3.2)$$

Where: $\sum d^2$ is the sum of the squared differences between the pairs of ranks; and

$n$ is the number of pairs of ranks.

McClave et al. (1998), and Pagano (1990), give the following properties of Spearman’s rank correlation coefficient:
1. the value of $r_s$ is always between -1 and +1;
2. when $r_s$ is positive: the ranks of the pairs of sample observations tend to increase together;
3. when $r_s = 0$: the ranks are not correlated;
4. when $r_s$ is negative: the ranks of one variable tend to increase as the ranks of the other variable decrease.

3.7.2 Testing the Significance of Spearman's Correlation Coefficient

After calculating $r_s$ an important question remains to be answered. And that is whether the rank correlation coefficient indicates a significant correlation between the government and academic scientists. An appropriate test of significance therefore must be conducted. The most common approach to significance testing is hypothesis testing (Mason and Lind, 1993; Newbold, 1991).

In hypothesis testing, a statement about the sample population, referred to as the null hypothesis is presumed to be true until proven otherwise. An alternative hypothesis is a statement made about the sample population that is the opposite of the null hypothesis.

Thus, for this study, the following structure will be adopted for an hypothesis:

$$H_0 : \phi_s = 0 \quad \text{(there is no correlation between the government and academic scientists' behaviour)}$$

$$H_1 : \phi_s \neq 0 \quad \text{(there is correlation between the government and academic scientists' behaviour)}$$
Mason and Lind (1993) and Newbold (1991), recommend that for a sample of less than 10, the critical value is determined by referring to the values given in a $R_{Ho}$ table of critical values of Spearman’s rank correlation coefficient.

**Small samples**

For a sample of less than 10, if the computed value of $r_s$ is less than the critical value, the null hypothesis stands. Otherwise it is rejected and $H_1$ accepted.

**Large samples**

Where the sample size is 10 or more, the significance of $r_s$ is determined either by comparing the computed value of $r_s$ with the critical values given in the $R_{Ho}$ table as described above or alternatively, a $t$ test may be performed and compared with a critical value. The formula for the $t$ test is as follows:

$$t = r_s \sqrt{\frac{n-2}{1-r_s^2}}$$  \hspace{1cm} (3.3)

Where:  
$r_s$ is Spearman’s rank correlation coefficient  
$n$ is the number of pairs of ranks

Using this second method, the computed value of $t$ is compared with the critical value of 1.812 which is the value of $t$ for a sample size of 10. Therefore, if the computed value of $t$ is less than 1.812, then $H_0$ is accepted at the 0.5 level. Where the value of $t$ is greater than 1.812, $H_0$ is rejected and $H_1$ accepted.
3.7.3 Qualitative Data

For the qualitative data, a number of techniques were used. Because this study was based upon a conceptual framework, the theoretical propositions of this framework suggested certain research questions. These questions therefore formed the basis in guiding the analysis indicating where, and on what, attention should be focused. The most important initial step therefore guiding the analysis of the qualitative data was to revisit the theoretical propositions.

The specific tactics used in coming to conclusions were as follows.

1. Counting - Categorising data and measuring the frequency of occurrence of the categories.
2. Patterning - Noting of recurring patterns or themes.
3. Clustering - Grouping of objects, persons, activities, settings and so on, with similar characteristics
4. Factoring - Grouping of variables into a small number of hypothetical factors.
5. Relating variables - Discovery of the type of relationship (if any) between two or more variables.
6. Building of causal networks - Development of chains or webs of linkages between variables.
7. Relating findings to general theoretical frameworks - Attempt to find general propositions that account for the particular findings in this study. The models identified in Chapter Two were used where appropriate to inform analysis of the data collected.
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CHAPTER 4

Results from Interviews

4.1 INTRODUCTION

4.1.1 Data Collection Instrument

The main data collection instrument for this research was interviews. Alongside the interviews, observation and the analysis of journal articles were used, but only the findings of the interviews are presented in this chapter. Findings for the observation and journal article analysis will be presented in Chapter 5.

4.1.2 Presentation Of Results

The results are presented in a format consistent with the original research questions addressed in this thesis rather than serially as they arose in response to the interview schedule (which is reproduced as Appendix 1.) Two points need to be made about the presentation of the results. First, in addition to presenting the interview data, this chapter is also intended to provide an understanding of the environment within which the scientists are working, as matters of environment will be taken into account in the discussion and analysis of the data which follows in Chapter Six. Consequently, where appropriate, explanations regarding the working environment of the scientists are offered. Further, throughout this chapter direct quotes taken from respondents during interviews are included. No
generalisation can be made from these quotes, but they are included where they add insight to the issue to which they refer. This has been done because the perceptions of the medical scientists are important to this study in highlighting the information user's perspective. In some cases, the quotes are representative and have been chosen because the everyday language of the interview situation best articulates the views expressed. In other cases, the quotes express minority views but they have been included for the qualitative richness they add to the research by illustrating the diversity of the medical scientists' experience. An attempt will be made to synthesise all these views in the discussion chapter.

Secondly, this research was designed to encompass both qualitative and quantitative data. Hence, in addition to the above, the data amenable to quantitative analysis, are presented appropriately.

4.1.3 Outline Of This Chapter

The range of things which constitute information behaviour for the purposes of this research are: active search comprising library use, conference attendance, scientific exchanges and personal collections; passive search and passive attention, and finally, the dissemination of research results. The findings on the medical scientists' information behaviour in each of these areas are presented below.

4.2 INFORMATION SEEKING - LIBRARIES

4.2.1 The Need For Libraries

It was important to understand what the medical scientists interviewed for this study think about libraries. To properly understand their information seeking behaviour with regard to libraries. Question 2.8 was intended to provide this information. The majority of the scientists broadly accept the conventional view
that the library is important and that not much can be achieved in the way of research without a library. In this regard, comments such as the following were made of libraries:

- "Very important, we could not do without them";
- "You cannot run a programme without them, the library is the university";
- "Libraries play an important role in research and continuing education."
- "Very important, they are an integral part of any institution"

The most striking way of expressing this came from an academic scientist at S who said: "The library is as important to a researcher as fertiliser is to a farmer."

There were no comments that suggested that there is no place for libraries. How far the researchers said this because they felt that it was the kind of thing that true researchers should say, and how far they really believed it was not obvious.

Considering the many problems faced by the libraries at R, S and T, this support for libraries is at first reading quite curious. There are, nevertheless, two possible explanations for this if one accepts that these comments were made about libraries in general. First, the poor library service can itself help to reinforce opinion about the importance of libraries, especially when the frustrations of a poor library service are only too well known. Secondly, visits to libraries in information rich countries (either through study, placements abroad, conference attendance and so on), often can lead to a favourable assessment of libraries as these visits provide an opportunity to judge libraries that are not constrained by resource limitations.

About their own institutions' libraries, comments such as the following were made:

- "The library is poor";
Chapter Four – Results from Interviews

- “I haven’t been there for at least four months... what would I be going to do there?”;
- “We don’t have a library”.

Others gave lukewarm endorsements which typically were variations on the “It’s okay I guess” theme. On the whole, this researcher came away with a strong impression of general dissatisfaction with the library service at all the sites. The only somewhat positive remark was made by a professor at T who said, “The library is 75% all right for undergraduate work and perhaps the first year of the Masters programme.”

The most interesting thing to emerge however, was a sense that there is amongst the scientists interviewed, a widespread perception of their libraries’ inability to cope. As a result, their mindset when interacting with the library is invariably one of anticipated disappointment. This has the effect of conditioning their information behaviour and is often counter-productive as will be seen later. In essence, they believe that they need a good library and are frustrated because they do not have one.

4.2.2 Amount Of Information Available In The Field

Table 4.1 presents findings on the medical scientists’ perception of the amount of information available in their field. It is surprising that so many medical scientists in the study say that the amount of information available in their field is too little. Surprising because there is today so much medical information available in every sub-discipline, it is impossible to keep up. It is equally surprising that many other medical scientists judge that the amount of information is enough as opposed to too much. There are two possible reasons for these results: a) it is possible that the question was misunderstood to mean the amount of information available to the interviewee personally, in which case
Table 4.1  Perception of amount of information available in scientists' field of research

<table>
<thead>
<tr>
<th>Amount</th>
<th>Govt. Scientists</th>
<th>Acad. Scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 52 (%)</td>
<td>N = 58 (%)</td>
</tr>
<tr>
<td>Too little</td>
<td>40  77</td>
<td>35  60</td>
</tr>
<tr>
<td>Enough</td>
<td>8   15</td>
<td>3   5</td>
</tr>
<tr>
<td>Too much</td>
<td>4   8</td>
<td>13  23</td>
</tr>
<tr>
<td>Cannot decide</td>
<td>-   -</td>
<td>14  12</td>
</tr>
</tbody>
</table>

The percentages represent the percentage of the group citing each category.

The pattern of the responses to be found in Table 4.1 makes sense; or b) the question was correctly understood and the results portray an honest opinion of the respondents view of the amount of information in their field.

The typology too little, enough and too much found in Table 4.1 (see question 3.5) is what was originally in the question. The fourth category, cannot decide, was imposed by respondents who were unable to choose from any of the three categories insisting that their answer would be dependent upon the type of research and where it was conducted. This seemed a reasonable interpretation of the question and was accepted.

4.2.3 Stage Of Research At Which Need For Information Is Greatest

The aim of Question 2.3 was to determine at which point in the research cycle is the need for information greatest? To ensure "research cycle" was understood in the same way by each respondent, a three part framework to the research cycle was suggested thus:

1. Problem identification/background information
Chapter Four – Results from Interviews

2. Methodology/experimentation information

3. Presentation/dissemination activities

The respondents were asked to order the three stages of the cycle in terms of greatest need for information with a value of 1 representing greatest need and a value of 3 representing least need. The responses were as shown in Table 4.2.

Table 4.2  Point in research cycle at which need for information is greatest

<table>
<thead>
<tr>
<th>Greatest need for information ranked By importance</th>
<th>Government Scientists N = 52 (%)</th>
<th>Academic Scientists N = 58 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation Methodology - Background -</td>
<td>29 (56)</td>
<td>20 (34)</td>
</tr>
<tr>
<td>Even Use</td>
<td>8 (15)</td>
<td>15 (26)</td>
</tr>
<tr>
<td>Presentation Background - Methodology -</td>
<td>2 (4)</td>
<td>19 (33)</td>
</tr>
<tr>
<td>Background Methodology - Presentation -</td>
<td>13 (25)</td>
<td>2 (3)</td>
</tr>
<tr>
<td>Background Methodology - Methodology -</td>
<td>- (-)</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Undecided</td>
<td>- (-)</td>
<td>1 (2)</td>
</tr>
</tbody>
</table>

The percentages represent the percentage of the group citing each category

The most popular ordering has Presentation coming first followed by Background as can be seen from Table 4.2. This seems a fairly reasonable assessment of information need because depending on the type of dissemination chosen, there is usually need for supplementary information to set the study in context, compare it with others, meet stylistic conventions of publication and so on. In the same way, to avoid duplication, there is need for background information on similar studies done in the past. There is also the need for
background information to establish whether a proposed topic constitutes a researchable or valid problem in the assessment of the community of scientists in the discipline and so on.

The next most popular ordering was Even Use. The medical scientists that chose this option pointed out that one cannot say that information need peaks or is greatest at any one point in the cycle. For them, information need is present through the entire journey of the research in equal measure.

Whatever the order, the one thing that can be seen from Table 4.2. is that government scientists are well represented in combinations in which Methodology comes last. This corroborates the finding where government scientists reject ‘information on possible methodologies’ as a benefit of having personal contact with other scientists (See Chapter 4.4).

Ninety three percent of academic scientists cite either Even Use or a combination in which Presentation comes first. From this, one can infer that the pressures to publish (in order to advance one’s career for example, and so on) are present amongst those academic scientists who do research. This conclusion is based on an assumption that the answer to this question (Question 2.3) reflects not only the stage at which need for information is greatest, but also the stage in the research cycle that the medical scientists view as most important.

4.2.4 Libraries Used To Obtain Information For Research

In an ideal world, scientists engaged in research should be able to satisfy most of their information needs using their own library. To find out to what extent this was happening, the medical scientists were asked (Card 7) to indicate which of the following three categories of libraries they used to obtain research information:
Chapter Four – Results from Interviews

- Their own institution’s library
- Other academic/research libraries
- Public library.

All scientists reported using one or more of the categories to obtain research information as can be seen from Table 4.3. Fifty per cent of the government scientists do not use their own library. The reason they give for not doing so is the very poor quality of holdings that makes the library unattractive to use. Further, a good proportion of what the government scientists term use of the library consists in making requests to the librarian in charge, to obtain journal articles which have been identified at other research libraries and not actual use of library materials. This is probably why 87% of the government scientists report using other research libraries either exclusively or in addition to their own.

One consequence of this dependence on other libraries is that the government scientists, in having to rely upon some other library are denied the leisure of borrowing materials to use really well in their own time. Several of the government scientists said that they find the WHO library particularly useful. Other libraries cited were those of the International Livestock Research Institute

<table>
<thead>
<tr>
<th>Libraries</th>
<th>Govt. Scientists</th>
<th>Acad. Scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own organisation’s library</td>
<td>26 (50)</td>
<td>55 (95)</td>
</tr>
<tr>
<td>Other academic / research library</td>
<td>45 (87)</td>
<td>34 (59)</td>
</tr>
<tr>
<td>Public libraries</td>
<td>2 (4)</td>
<td>6 (10)</td>
</tr>
</tbody>
</table>

The percentages represent the percentage of the group citing that they use each category of library.
Chapter Four – Results from Interviews

(ILRI), Glaxo, International Centre for Insect Physiology and Ecology (ICIPE), The Primate Research Institute and the African Medical Research Foundation (AMREF).

This dependence on other libraries is a significant finding because of its implications. It is safe to assume that the government scientists are not working at optimum levels because of the lack of in-house information. A few government scientists pointed out that they are forced to batch their information requests to their own library because as one researcher put it, “there is at times no petrol to go and [fetch] the items.” They also batch their own visits to these libraries for various reasons including time, transport availability and expense, and so forth. This in turn causes unnecessary interruptions in the flow of their work.

Use of public libraries is minimal (as would be expected) because public libraries in Kenya place greater emphasis on provision for education than other uses and are as a result, more directed towards school children. The eight medical scientists that report using public libraries all use the British Council Library and the American Library. This use is related to specific research projects and should be considered ad hoc.

On the other hand, the academic libraries seem able to attract very high usage (95%), despite their shortcomings. This high use by academic scientists of their own libraries implies that the 59% (see Table 4.3) using other research or academic libraries can be safely assumed to be making supplementary or perhaps more realistically, complementary use, of these other libraries.

This contrasts sharply with the use pattern for government scientists outlined above, who clearly have trouble making any real use of their own library. It is however quite extraordinary that only five per cent of academic scientists report
not using their own library. The reason for this small number could be because all respondents in the sample were selected for among other things, being engaged in research. It is thus reasonable to expect that most active medical scientists would be using some library. On this premiss, the five per cent who report not using their own library are probably amongst the 59% using other libraries for their research information.

4.2.5 Use Of Library-Based Information Sources

The data for this heading is taken from Card 3 in which interviewees were asked to indicate their use or non-use of various information sources. Data relating only to library-based sources are reproduced here. The remaining data (which relate to personal contact and communication activities), will be presented under the relevant headings.

It can be seen from Table 4.4 that there is low use of abstracts and indexes. This can be explained in two ways. First, it is well known that the value of abstracts depends on the working environment. Because there are very few current journal titles held in the libraries covered in the study, (13 at R, 17 at S and 23 at T), there is little incentive in using abstracts as the likelihood of obtaining the articles referred to is small. Secondly, with the coming of electronic databases such as Medline, most medical scientists who are inclined to use abstracts, prefer to use the electronic version rather than wade through the hard copy. The reasons given for this preference for Medline were typically speed of retrieval, and the twin ability to use keywords and print output. Given this background, it is somewhat surprising that the one medical scientist in the table above citing use of abstracts and indexes daily, actually does use Index Medicus or some other tool daily. It is possible that this was mistakenly ticked for something else (particularly since these categories were pre-defined), and should be ignored as such.
The percentages represent the percentage of the sample citing that they used each information source.

<table>
<thead>
<tr>
<th>Source</th>
<th>No use</th>
<th>Sometimes</th>
<th>Monthly</th>
<th>Weekly</th>
<th>Daily</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reports</td>
<td>10</td>
<td>-</td>
<td>8</td>
<td>37</td>
<td>3.6</td>
<td>55</td>
</tr>
<tr>
<td>Photocopies</td>
<td>11</td>
<td>11</td>
<td>18</td>
<td>6</td>
<td>1.8</td>
<td>55</td>
</tr>
<tr>
<td>Journals</td>
<td>16</td>
<td>4</td>
<td>9</td>
<td>2.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conference Proceedings</td>
<td>11</td>
<td>11</td>
<td>16</td>
<td>4.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronic Databases</td>
<td>11</td>
<td>6</td>
<td>62</td>
<td>2.7</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Books</td>
<td>15</td>
<td>4</td>
<td>24</td>
<td>1.3</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Abstracts and Indexes</td>
<td>1.9</td>
<td>10.9</td>
<td>22</td>
<td>1.1</td>
<td>8</td>
<td>7.3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.9</td>
</tr>
</tbody>
</table>

*Table 4.4: Frequency of use of information sources used in libraries*
Chapter Four – Results from Interviews

The other source for which there is low use is reports. This low use is further emphasised in that over half the medical scientists sampled who use reports, 67%, do so only occasionally. The reason for this low usage is to do with access problems common to grey literature everywhere. However, the problem is exacerbated in this case because the cataloguing of reports is given low priority, and as a result, entries for reports and other grey literature are missing in catalogues, even though the documents are physically present in the libraries. This of course has the effect of further obscuring the report literature.

4.2.6 Catalogue Searches And Interaction With Library Staff

Card 1 was designed to find out what information seeking approaches were used by the medical scientists. The results are presented in Table 4.5.

4.2.6.1 Catalogue Use

A good number of academic scientists said they use their library catalogues (Table 4.5) to seek information. Almost one quarter of academic scientists do not use their catalogue. One explanation for this non-use could be that the small size of the libraries makes use of the catalogue unnecessary especially in cases of narrow research interest where browsing can be carried out rather efficiently. The inadequacies of the library at R are illustrated once again in the finding that 92% of government scientists do not use their catalogue. The reason they give for not using the catalogue is that it has been found to be an unreliable tool. This is in itself revealing; you would expect housekeeping in a small library to be efficient. Another reason they give for not using the catalogues is that the library at R is very small and therefore it is very easy to browse. They also have no expectation that the collection is growing so the catalogue remains unused. This
Table 4.5  Use made of library catalogues and library staff by medical scientists

<table>
<thead>
<tr>
<th></th>
<th>Use</th>
<th>Do Not Use</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td>N (%)</td>
</tr>
<tr>
<td><strong>Library Catalogues</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Govt. Scientists</td>
<td>4 (8)</td>
<td>48 (92)</td>
<td>52 (100)</td>
</tr>
<tr>
<td>Academic Scientists</td>
<td>45 (78)</td>
<td>13 (22)</td>
<td>58 (100)</td>
</tr>
<tr>
<td><strong>Library Staff</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Govt. Scientists</td>
<td>23 (44)</td>
<td>29 (56)</td>
<td>52 (100)</td>
</tr>
<tr>
<td>Academic Scientists</td>
<td>40 (69)</td>
<td>18 (31)</td>
<td>58 (100)</td>
</tr>
</tbody>
</table>

implies though, that known item searching does not happen, which is an interesting finding because it invites the question how do they find known items?

### 4.2.6.2 Library Staff

Library staff are used by a fair number of medical scientists. Those medical scientists who do not use library staff, presume that there is nothing useful that would come out of a request to library staff. The irony is that this is very often true depending on the nature of the enquiry, but because of resource limitations rather than inadequacies of the staff. For instance, if a medical scientist asked library staff where a copy of a journal not held in the library could be found, they probably would not know. This is because there are no tools to discover this kind of information (that is, there are no links to other catalogues or periodical union lists and so forth). Repeated incidents of this kind erode confidence leading to
disregard of library staff. This engenders a downward spiral in relations with library staff who become increasingly indifferent and worse, they no longer expect that such requests or questions should be put to them at all.

To illustrate the above, an excerpt of an interview held with an academic scientist is reproduced:

*The library staff need to be trained on how to use IT. I would like to learn how to use email but there is no one to teach me.*

"Have you asked any member of the library staff?"

*[Laughs] My friend – if I don’t know how do you expect people like them to know?* [still laughing].

Where did the medical scientists learn to search for information? Responses indicate that most medical scientists learnt as undergraduates (Table 4.6.) Fifty

<table>
<thead>
<tr>
<th>How and where information searching Was learnt</th>
<th>Government Scientists N = 52 (%)</th>
<th>Academic scientists N = 58 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate</td>
<td>43 (83)</td>
<td>48 (83)</td>
</tr>
<tr>
<td>Post-graduate</td>
<td>29 (55)</td>
<td>30 (52)</td>
</tr>
<tr>
<td>Methodology book</td>
<td>2 (4)</td>
<td>4 (7)</td>
</tr>
<tr>
<td>Employment</td>
<td>13 (25)</td>
<td>- (–)</td>
</tr>
<tr>
<td>Library staff</td>
<td>13 (25)</td>
<td>7 (12)</td>
</tr>
<tr>
<td>Placements abroad</td>
<td>16 (31)</td>
<td>8 (14)</td>
</tr>
</tbody>
</table>

The percentages represent the percentage of the group citing each category. The categories are not mutually exclusive.
four per cent of medical scientists also cited postgraduate studies as a time when they learnt to search for information. For many, they learnt how to use electronic information sources at this time too, usually at universities abroad. Only five per cent of medical scientists learnt from methodology books, and only government scientists cite learning whilst in employment. Academic scientists on the other hand mentioned learning from library staff whilst no government scientist did. This it seems, is more a reflection of the poor library at R than a characteristic peculiar to academic scientists. In summary though, it is likely that those who cite methodology books, employment, library staff and placements abroad really did learn something of value in this way. Those who cite undergraduate and postgraduate work do so because information searching was offered in their first year of study. This in itself does not necessarily mean that they learnt anything really useful.

### 4.3 INFORMATION SEEKING - CONFERENCES

Scientific associations often arrange conferences to which scientists are invited to give talks or lectures about their research. Part of the value of conferences to scientists is the opportunity to meet people and establish informal links. They are also used to discover new trends in the discipline. They are, however, time consuming and expensive to attend.

#### 4.3.1 Organising Conferences

Eleven academic scientists report that they have been involved in the organisation of a one-off conference at some point, while only four government scientists have. On the other hand, four government scientists have participated in organising a standing conference while none of the academics reported doing so. Though this finding appears to show some pattern, it can be discounted as insignificant as there is no good reason for such a pattern to exist.
4.3.2 Conference Attendance

Two thirds of the medical scientists in the sample have attended a conference in the last four years, while 45% have attended between two to six conferences (Table 4.7.) In total, 71 medical scientists have between them attended 194 conferences in the last four years which works out to just under three

Table 4.7 Number of conferences attended in the last four years

<table>
<thead>
<tr>
<th>Number of conferences attended in last four years</th>
<th>Government scientists</th>
<th>Academic scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 52 (%)</td>
<td>N = 58 (%)</td>
</tr>
<tr>
<td>One</td>
<td>7 (13)</td>
<td>11 (19)</td>
</tr>
<tr>
<td>Two</td>
<td>17 (33)</td>
<td>7 (12)</td>
</tr>
<tr>
<td>Three</td>
<td>8 (15)</td>
<td>5 (9)</td>
</tr>
<tr>
<td>Four</td>
<td>2 (4)</td>
<td>3 (5)</td>
</tr>
<tr>
<td>Five</td>
<td>2 (4)</td>
<td>2 (3)</td>
</tr>
<tr>
<td>Six</td>
<td>- (-)</td>
<td>4 (7)</td>
</tr>
<tr>
<td>Seven</td>
<td>- (-)</td>
<td>2 (3)</td>
</tr>
<tr>
<td>Eleven</td>
<td>- (-)</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Total</td>
<td>36 (69)</td>
<td>35 (60)</td>
</tr>
<tr>
<td>Non-attendants</td>
<td>16 (31)</td>
<td>23 (40)</td>
</tr>
<tr>
<td>Total</td>
<td>52 (100)</td>
<td>58 (100)</td>
</tr>
</tbody>
</table>

The percentages represent the percentage of the group citing that they attend that number of conferences.

conferences each on average in four years. Attendance is evenly spread between government and academic scientists, as is non-attendance. Only one medical scientist has attended more than seven conferences in the last four years. He is an academic scientist and is the Principal Investigator of a collaborative research project at T. As a result, his funding for conference attendance is paid for through this research project.
In the following tabulation, reasons for not attending conferences for both government and academic scientists are ranked by importance:

<table>
<thead>
<tr>
<th></th>
<th>Government scientists</th>
<th>Academic scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>Finance</td>
<td>Finance</td>
</tr>
<tr>
<td>Second</td>
<td>Teaching load</td>
<td>Teaching load</td>
</tr>
<tr>
<td>Third</td>
<td>Not prepared a paper</td>
<td>Not inclined</td>
</tr>
<tr>
<td>Fourth</td>
<td>Not inclined</td>
<td>Not prepared a paper</td>
</tr>
</tbody>
</table>

The funding problem is experienced equally by government and academic scientists with three-quarters of them citing finances as the major impediment to conference attendance. Several potential presentations have been cancelled for lack of funds. One academic scientist said,

> Even as we speak I have a conference in the States. Nina tafuta pesa juu chini Literally, [I'm looking for money high and low].

Teaching load is the next greatest barrier to conference attendance. The medical scientists who cite teaching load all have postgraduate students in addition to their undergraduate load. This puts pressure on their time making it difficult to get away especially since the postgraduate and undergraduate academic years do not run concurrently. Consequently, there is no point in the calendar year when they are free of teaching. Traditionally, universities in Kenya do not give time off for conference attendance when a lecturer has teaching responsibilities.

This does not apply to the senior teaching grades. It has been suggested that this requirement is one way of sifting potential applicants thus reducing the number of times a request has to be turned down on grounds of finance. The medical scientists who are not inclined (10%) say they are not convinced of the value of attending the kind of conferences that would be available to them. They point out
that because of funding, they would only manage to attend the Annual Scientific Conference of the KMA (if they were to attend any) and argue that everyone at the conference is a colleague anyway whose research is known to them. It is suggested that this latter point is questionable, but reflects a certain despair.

How is travel to conferences financed? No medical scientist reported self-sponsorship. Employers pay for most travel (Table 4.8.). No academic scientist was sponsored by an aid agency probably because there are no aid-funded projects being undertaken at the universities at present. Government scientists’

Table 4.8  Organisations funding medical scientists' travel to conferences

<table>
<thead>
<tr>
<th>How conferences are heard about</th>
<th>Government scientists</th>
<th>Academic scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 52 (%)</td>
<td>N = 58 (%)</td>
</tr>
<tr>
<td>Employer</td>
<td>30 (58)</td>
<td>28 (53)</td>
</tr>
<tr>
<td>Conference Organisers</td>
<td>6 (12)</td>
<td>11 (22)</td>
</tr>
<tr>
<td>Pharmaceutical Company</td>
<td>4 (8)</td>
<td>11 (22)</td>
</tr>
<tr>
<td>Aid Agency</td>
<td>18 (35)</td>
<td>- (-)</td>
</tr>
<tr>
<td>International Organisation</td>
<td>4 (8)</td>
<td>4 (7)</td>
</tr>
</tbody>
</table>

The percentages represent the percentage of the group citing each category. The categories are not mutually exclusive

sponsorship by aid agencies is a result of these agencies being responsible for the funding of a research project of which the government scientist is a part. International organisations on the other hand, though not necessarily sponsoring research, may pay for travel to conferences particularly if the conference is organised under their aegis. The UN specialised agencies such as the WHO and UNICEF were mentioned in this regard. This criterion for sponsorship may also
Chapter Four – Results from Interviews

explain the even spread of this type of sponsorship between government and academic scientists.

The respondents were also asked how many applications to attend conferences they had put in and had turned down by their employer? No government scientist reported experiencing this. Six academic scientists have had one application turned down, three have had two refused, and two have had three rejected. Only one academic scientist has had more than three applications rejected; he would not however commit himself on a number, preferring to describe the number only as ‘several’.

There is clearly a presumption (no doubt well founded), that there is no use in putting in an application for funding to travel to a conference. Many of the medical scientists said they have not tried because, in the words of one academic scientist at S to this researcher,

\[ I \text{ will not be given anything and you know this! How many people do you know who have been given money to go to a conference?’’} \]

But, it remains a presumption all the same and illustrates how behaviour is influenced by one’s perceptions that probably go on to reinforce those of others.

4.3.3 How Conferences Are Heard About

The most common way by which the medical scientists hear of conferences is through announcements in journals (Table 4.9.) Eighty one per cent of government scientists hear of conferences through journals, a finding that is unexpected. The other most common way that both government and academic scientists hear of conferences is through colleagues. More academic than government scientists have heard of conferences through brochures, probably because the academics have greater access to brochures through drug
representatives. Significantly more government than academic scientists have heard of a conference through the Internet. This is again probably because

Table 4.9 Means by which medical scientists hear of conferences

<table>
<thead>
<tr>
<th>How conferences are heard about</th>
<th>Government scientists</th>
<th>Academic scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 52 (%)</td>
<td>N = 58 (%)</td>
</tr>
<tr>
<td>Announcements in journals</td>
<td>42 (81)</td>
<td>37 (64)</td>
</tr>
<tr>
<td>Announcements in brochures</td>
<td>10 (19)</td>
<td>16 (28)</td>
</tr>
<tr>
<td>Colleagues</td>
<td>14 (27)</td>
<td>21 (36)</td>
</tr>
<tr>
<td>Internet</td>
<td>10 (19)</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Drug representatives</td>
<td>1 (2)</td>
<td>11 (19)</td>
</tr>
</tbody>
</table>

The percentages represent the percentage of the group citing each category. The categories are not mutually exclusive.

Internet access for government scientists is paid for as part of their research project (as will be seen later). Academic scientists have to go to an Internet cafe and pay their way if they are to use the Internet as the universities did not yet have e-mail that is open for use by everyone. Since this study was conducted though, the universities have obtained Internet access so presumably, things will change now. Drug representatives are also a source of conference news for academic scientists but not government scientists. It is suggested that the reason for this is because academic scientists are allowed to engage in private practice whilst in university employment and thus have drug representatives calling on them at their surgeries. Conversely, few government scientists practice medicine privately and so they do not have much contact with drug representatives.
4.3.4 Knowledge And Membership Of Professional Associations /Learned Societies

Almost all the academic scientists and two-thirds of government scientists sampled know of a professional association or society representing their research interest (Table 4.10.) All the government scientists reported that the professional association/society that they were referring to was local whereas at least 16 academic scientists knew of both a local and international organisation in their research area. However, looking at (Table 4.10), fewer government scientists say that they are members of an association (27) than those who know of an association or society in their discipline (36). This seems to suggest that knowledge of an association or society however does not necessarily imply membership of the same for government scientists.

Table 4.10 Knowledge and membership of professional associations/learned societies

<table>
<thead>
<tr>
<th>Medical scientists' knowledge of professional associations /learned societies</th>
<th>Government scientists</th>
<th>Academic scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes N (%)</td>
<td>No N (%)</td>
</tr>
<tr>
<td>Do you know of an organisation representing your research interest?</td>
<td>36 (69)</td>
<td>16 (31)</td>
</tr>
<tr>
<td>Is the organisation local or international?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local</td>
<td>36 (69)</td>
<td>16 (31)</td>
</tr>
<tr>
<td>International</td>
<td>- (-)</td>
<td>- (-)</td>
</tr>
<tr>
<td>Are you a member?</td>
<td>27 (52)</td>
<td>25 (48)</td>
</tr>
</tbody>
</table>

What benefit do the medical scientists draw from membership of these bodies? Both government and academic scientists cite a free journal as a major benefit, (Table 4.11), but the number of government scientists who do so is a bit smaller than might be expected. It is surmised that this is because there are more
government scientists in non-medical disciplines than there are academic scientists in non-medical disciplines. As a result, there would be proportionally fewer government scientists than academic scientists who are members of the KMA, thereby reducing the number of government scientists benefiting from a free journal.

**Table 4.11** Benefits of membership of professional association/learned society.

<table>
<thead>
<tr>
<th>Benefits of membership of professional association /learned society</th>
<th>Government scientists</th>
<th>Academic scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free Journal</td>
<td>20 (38)</td>
<td>32 (55)</td>
</tr>
<tr>
<td>Keep up-to-date</td>
<td>10 (19)</td>
<td>31 (53)</td>
</tr>
<tr>
<td>Fraternisation</td>
<td>8 (15)</td>
<td>27 (47)</td>
</tr>
<tr>
<td>Continuing medical education</td>
<td>13 (25)</td>
<td>14 (24)</td>
</tr>
<tr>
<td>Lobby type activities</td>
<td>- (-)</td>
<td>14 (24)</td>
</tr>
</tbody>
</table>

The results also indicate that the opportunity for keeping up-to-date is valued more by academic than government scientists, as is the opportunity to fraternise. These findings echo those for personal contacts where it will be seen that academic scientists seem to have more contact outside their institutions than do government scientists. The benefit of professional associations and learned societies as a lobby group (or "comfort in numbers" as one academic put it), does not rate mention at all for government scientists.

**4.4 INFORMATION SEEKING – PERSONAL CONTACTS**

Informal communication amongst scientists is an important information gathering activity. It is well known that most scientists talk about their work before they write it. They also discuss ideas with their students, colleagues and so
on. Research ideas and processes are often changed after an informal discussion at a conference or symposium. Often, this information gathering activity is non-specific and non-directed.

4.4.1 Personal Contacts

In Chapter Three, the formula for calculating the importance index for items on a Likert scale was given (Aaker and Day, 1990). This formula was used to calculate indices for the various levels of personal contact as described by the medical scientists. Following is a presentation of the results of that exercise. These results relate only to government scientists and are followed by a similar presentation of the results for academic scientists.

4.4.1.1 Government scientists' contacts

The results presented below are as shown in Table 4.12.

**Government scientists' contact with team leader - Importance index**

0.761

Contact with research team leaders has the highest importance index. However, frequent contact with the team leader is not as high as one might expect. It may be the case that most of the government scientists know what they need to be doing and so meet their leaders only fairly frequently. The few government scientists who have no contact with their leader probably are not part of a group or are very junior members of the group who would not normally meet with the team leader.
Government scientists’ contacts within the group - Importance index 0.507

Contact within the group is spread with some government scientists having frequent contact of this kind and others having none at all. Contact within the group is necessary to ensure that all members of the group are working together. For this reason, the findings are a bit surprising as you might expect that this type of contact should be more frequent. Those government scientists who say they have no contact of this kind are probably researchers that are not working as part of a team.

Government scientists’ contacts within the department - Importance index 0.434

The majority of the government scientists seldom have contact with colleagues within the department and 25% have no contact at all. It is not clear why this is the case as when asked, most just said that they would not benefit by such contact as they have different research interests though in the same field. However, the sentiments expressed by a few academic scientists who said that their colleagues are not co-operative and indulge in petty rivalries might shed some light on this finding. One academic scientist put it thus:

_There are so few opportunities to get on that everyone is distrustful... it’s not worth doing it at all!_

And later, one government scientist echoed this sentiment by saying that colleagues in her centre are not interested in research and so would not teach her anything. As a result, she does not initiate such contact.
<table>
<thead>
<tr>
<th>Rank</th>
<th>Index</th>
<th>N</th>
<th>Never</th>
<th>Sometimes</th>
<th>Moderate</th>
<th>Fairly Frequent</th>
<th>Frequently</th>
<th>Other Areas</th>
<th>Internationally</th>
<th>Subject Areas</th>
<th>In-house - Other</th>
<th>Internationally</th>
<th>National - Other Subject Areas</th>
<th>National</th>
<th>Between Groups</th>
<th>Within Department</th>
<th>Within Group</th>
<th>Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>0.215</td>
<td>52</td>
<td>0.215</td>
<td>30</td>
<td>0.215</td>
<td>2</td>
<td>0.215</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>0.226</td>
<td>45</td>
<td>0.226</td>
<td>7</td>
<td>0.226</td>
<td>-</td>
<td>0.226</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>0.242</td>
<td>41</td>
<td>0.242</td>
<td>11</td>
<td>0.242</td>
<td>-</td>
<td>0.242</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>0.261</td>
<td>44</td>
<td>0.261</td>
<td>2</td>
<td>0.261</td>
<td>4</td>
<td>0.261</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-1</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>0.307</td>
<td>37</td>
<td>0.307</td>
<td>5</td>
<td>0.307</td>
<td>7</td>
<td>0.307</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-1</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>0.357</td>
<td>21</td>
<td>0.357</td>
<td>21</td>
<td>0.357</td>
<td>10</td>
<td>0.357</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>0.434</td>
<td>13</td>
<td>0.434</td>
<td>13</td>
<td>0.434</td>
<td>1</td>
<td>0.434</td>
<td>4</td>
<td>2</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>0.507</td>
<td>25</td>
<td>0.507</td>
<td>25</td>
<td>0.507</td>
<td>25</td>
<td>0.507</td>
<td>4</td>
<td>24</td>
<td>27</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0.761</td>
<td>5</td>
<td>0.761</td>
<td>-</td>
<td>0.761</td>
<td>6</td>
<td>0.761</td>
<td>-</td>
<td>24</td>
<td>4</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-1</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4.12 Frequency of personal contacts made by Government Scientists

Chapter Four – Results from Interviews
This comment could be as much the result of competition as a lack of interest in research suggested by the respondent. It is difficult to determine what the true position might be but anecdotal evidence suggests that the institutional research milieu could easily encourage negative competition of the kind described above.

**Government scientists’ contacts between groups** - **Importance index 0.357**

Contact between teams is as little as that within the department. The only difference is that the respondents indicated that this form of contact is usually made at the suggestion of team members at a meeting called to chart progress.

**Government scientists’ contacts nationally** - **Importance index 0.307**

There is very little contact nationally and this is because the critical mass of scientists required to enable such activity is lacking. It has been pointed out earlier that for most government scientists, anyone that they may benefit from having contact with is usually also a colleague as there are so few medical scientists nationally. Moreover, there is no way of knowing what other medical scientists are doing as there are no indexes of current research. This again might be more a reflection of the low number of medical scientists engaged in research but this notwithstanding, it should be possible to find out what research is in progress. This is difficult to do as illustrated by the experience of one institution where the publication of abstracts of researches carried out between the years 1985 - 1995 only came out in 1997. Further, the articles referred to are not to be found in the library which somewhat negates the usefulness of the listing. Needless to say, the publication was only made possible through financing by a donor engaged in collaborative research with local medical scientists at the time of this study.
Government scientists' contacts internationally - Importance index

0.242

International contact as can be seen is low and is restricted for a number of reasons. Fax is too expensive and most researchers have no e-mail connection. Because conference travel is limited, there is little opportunity to initiate contact with international colleagues anyhow. Very few government scientists will resort to writing letters, though they exist. One government scientist commented,

There is absolutely no excuse for saying that you can't get an article that you require. I write! I mean, when I get references off Medline, I do a letter to authors for reprints and they are always happy to send them off."

It is instructive that it is this particular scientist's team that recently developed a cure for a tropical disease widespread in the country (Africaonline, 1996). There is another dimension to this. A lot of the research done by the Kenyan medical scientists is collaborative. As a result, they have their international contacts 'on-site' and would probably not seek to cultivate new contacts. These collaborative researches run for years but when they do end, contact is difficult to maintain for the reasons outlined above.

4.4.1.2 Academic scientists' contacts

The results presented below are as shown in Table 4.13.

The ranking for academic scientists' contacts is different to that of government scientists. The reason for this is probably because there is not as much group research among the academic scientists in the sample as there is for government scientists as can be seen from Table 4.13.
Academic scientists' contacts within the department - Importance index 0.555

Though this type of contact is the most frequent, almost four per cent of academic scientists have little or no contact of this kind. On the other hand, about 30% have frequent or fairly frequent contact.

Academic scientists' contacts nationally - Importance index 0.541

There is not much difference in the amount of contact reported within the department and that made nationally and the spread in the frequency of contact is very much the same too.

Academic scientists' contacts internationally - Importance index 0.458

The big difference for this type of contact is that 32% of academic scientists report having average to frequent contact with international colleagues as compared to no contact of this kind amongst government scientists.

Academics’ contacts within groups, with leader and between teams - Importance indexes 0.396, 0.393, 0.379

Team contact has low importance indices. This may be because 59% of academic scientists are not involved in group research and so would not be making these kinds of contact anyway. However, for those who do have this type of contact, the pattern is one of frequent to average contact with one’s leader and within the group, and slightly less frequently between groups. Therefore, the overall pattern is not dissimilar to that for government scientists.
<table>
<thead>
<tr>
<th>Rank</th>
<th>Index</th>
<th>N</th>
<th>Never</th>
<th>Sometimes</th>
<th>Modestly</th>
<th>Fairly</th>
<th>Frequently</th>
<th>Very Frequently</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>0.379</td>
<td>68</td>
<td>0</td>
<td>0</td>
<td>45</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>0.358</td>
<td>58</td>
<td>0</td>
<td>6</td>
<td>35</td>
<td>11</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.379</td>
<td>58</td>
<td>0</td>
<td>7</td>
<td>36</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>0.380</td>
<td>58</td>
<td>0</td>
<td>7</td>
<td>34</td>
<td>7</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.383</td>
<td>58</td>
<td>0</td>
<td>1</td>
<td>37</td>
<td>1</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.360</td>
<td>58</td>
<td>0</td>
<td>9</td>
<td>36</td>
<td>1</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.458</td>
<td>58</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td>14</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>0.541</td>
<td>58</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>12</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>1</td>
<td>0.555</td>
<td>58</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>12</td>
<td>7</td>
<td>0</td>
</tr>
</tbody>
</table>

Between Teams
Subject Areas
Nationality - Other
Between Groups
Subject Areas
In-house - Other
Leader
Within Groups
Internationally
Nationality
Within Department

Table 4.1.3

Frequency of personal contacts made by academic scientists

Chapter Four - Results from Interviews
Medical scientists' contacts with colleagues working in other subject areas

The results presented below are as shown in Tables 4.12 and 4.13.

Government scientists have the greatest frequency of contacts with scientists working in other subject areas, nationally. This is not a surprising finding because research centres and institutes are subject specific. This limits to some extent the scope for contact in-house. Hence, in-house contact comes second for government scientists and international contact third. The difference in frequency however is not marked between the three. Neither is it intense, In fact, there is not much contact with scientists in other subject areas. The low intensity of this contact is also reflected in the fact that no government scientist reported having frequent contact of this kind, and only two government scientists report having fairly frequent contact.

The pattern for academic scientists is very much the same as that for government scientists except that contact in house is greater than national contact. The reason for this must be partly because other departments exist in-house in greater numbers and diversity than they do at research centres and institutes. Overall, frequency of contact is greater than that of government scientists as can be seen from the index values. The proportion of medical scientists that never have this type of contact is very high, (particularly for government scientists, 84% or more have not) and it is the variation in this group that accounts for the difference in index values between government and academic scientists.

4.4.2 Ways In Which Personal Contacts Are Made

No academic scientist cited laboratory conversations as a place in which scientific exchanges took place as can be seen from Table 4.14. This is not really
surprising as most of the medical research that Kenyan academics do is either review or epidemiological in nature. Indeed, the scope for research is so limited at one university and is illustrated by the fact that there are no laboratories yet in this medical school at the time of the study. The students carry out their practical work at their sister medical school! Government scientists on the other hand, when they are doing experimental research, are almost always in a laboratory. In fact, there is little office accommodation for government scientists at their centres, and even that is shared.

**Table 4.14** Ways in which personal contacts are made

<table>
<thead>
<tr>
<th>Ways in which personal contacts are made</th>
<th>Government scientists</th>
<th>Academic scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td>Laboratory Conversations</td>
<td>34 (65)</td>
<td>- ( - )</td>
</tr>
<tr>
<td>Lunch Talk</td>
<td>6 (12)</td>
<td>11 (19)</td>
</tr>
<tr>
<td>After Office</td>
<td>3 (6)</td>
<td>14 (24)</td>
</tr>
<tr>
<td>Departmental Meetings</td>
<td>15 (29)</td>
<td>14 (24)</td>
</tr>
<tr>
<td>Discussing Manuscripts</td>
<td>(-) (-)</td>
<td>5 (9)</td>
</tr>
<tr>
<td>Preparing For A Conference</td>
<td>(-) (-)</td>
<td>- ( - )</td>
</tr>
<tr>
<td>Requests For Review</td>
<td>15 (29)</td>
<td>12 (21)</td>
</tr>
<tr>
<td>One to One</td>
<td>39 (75)</td>
<td>42 (72)</td>
</tr>
<tr>
<td>Telephone</td>
<td>2 (4)</td>
<td>15 (26)</td>
</tr>
<tr>
<td>Letters</td>
<td>1 (2)</td>
<td>14 (24)</td>
</tr>
<tr>
<td>Electronic Mail</td>
<td>17 (33)</td>
<td>9 (16)</td>
</tr>
</tbody>
</table>

One-to-one contact is clearly the favoured approach to making personal contact. This is to be expected because one-to-one contact is interactive and allows for feedback which is important. One-to-one also gives the opportunity for the medical scientist to benefit from the synthesis of several strands and ideas in a way that is not possible when reading. An academic scientist said of one to one,
Chapter Four – Results from Interviews

I usually just walk in and have a chat. In fact, often I learn more when just talking.

It is a bit unexpected that telephone should be cited by so many medical scientists, given that telephone use is severely curtailed. There is always the possibility however, that though telephone is used on occasion, it is not a frequent way of making contact. This point is made because at one site in the study, there are no telephone extensions in offices. The only telephones available are direct lines in the office of the head of department.

E-mail is cited more by government scientists because they have freer access to it than do academic scientists. The government scientists using e-mail are those engaged in collaborative research that includes funding for Internet services among other things. At the time of this study, academic scientists had to pay for any message sent or received. This of course discourages use of the e-mail facility.

Government scientists do not cite discussing manuscripts as a way in which personal contacts are made. This might be because they are more likely to publish with colleagues than on their own as they are heavily involved in group research. Any such discussion of a manuscript therefore would be more of a meeting than the one-to-one implied by the respondents who cite discussing manuscripts.

4.4.3 Benefits Of These Contacts To The Scientists

Question 5.3 asked what the chief benefit of these contacts was to the medical scientist? Table 4.15 shows the benefits that the medical scientists cited as accruing from having these contacts. Providing research ideas and support were cited by at least 33% of academic and government scientists.
Table 4.15 Benefits to medical scientists of having personal contacts

<table>
<thead>
<tr>
<th>Benefits of having personal Contacts</th>
<th>Government scientists N (%)</th>
<th>Academic scientists N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide Ideas</td>
<td>24 (46)</td>
<td>35 (60)</td>
</tr>
<tr>
<td>Provide Support</td>
<td>17 (33)</td>
<td>19 (33)</td>
</tr>
<tr>
<td>Spot Errors</td>
<td>2 (4)</td>
<td>16 (28)</td>
</tr>
<tr>
<td>Stimulate Development</td>
<td>6 (12)</td>
<td>22 (38)</td>
</tr>
<tr>
<td>Methodology</td>
<td>9 (17)</td>
<td>12 (21)</td>
</tr>
<tr>
<td>New Information</td>
<td>2 (4)</td>
<td>19 (33)</td>
</tr>
</tbody>
</table>

On the whole, academic scientists perceive a wider variety of benefits accruing from personal contacts than do government scientists. Apart from providing research ideas and support, the remaining options were cited by no more than 17% of the government scientists sampled. Although 17% of government scientists said they benefited from ideas on possible methodologies, several pointed out that this was of no use to them. One government scientist said:

*Given the labs and equipment we have here, procedures are more or less defined. We cannot buy new equipment and instruments whenever we want... so I would not benefit, not methodology.*

The benefits of spotting errors and obtaining new information are not important for government scientists, a finding that is unexpected. It would have been thought that this type of informal communication would involve the experienced government scientists discussing mistakes made in the past thus allowing the junior government scientists to spot errors in their own work. It is possible that this finding was influenced by the desire to be seen to not make errors in the first place. But, why would government scientists alone feel this way? However, one
government scientist would not pick from options and preferred to describe the benefits of such contacts thus:

It is all about shaping research, bringing it into focus. You know, ideas on how to mount it. Also potential sources of funds. Take Dr. X for example. He's great and very sympathetic. He's got research orientation.

4.5 INFORMATION SEEKING - PERSONAL COLLECTIONS

Question 6.5 was intended to find out how many of the respondents owned their own personal collection, what it consisted of and how it is organised if at all. Sixty seven per cent of government scientists and 81% of academic scientists report having their own personal collection of research materials. The different range of materials that the medical scientists report using are shown in Table 4.16.

Table 4.16 Different types of material to be found in personal collections

<table>
<thead>
<tr>
<th>Types of material in personal collection</th>
<th>Govt. Scientists</th>
<th>Acad. Scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
</tr>
<tr>
<td>Photocopies</td>
<td>29 (56)</td>
<td>47 (81)</td>
</tr>
<tr>
<td>Books</td>
<td>22 (42)</td>
<td>32 (55)</td>
</tr>
<tr>
<td>Journals</td>
<td>12 (23)</td>
<td>30 (52)</td>
</tr>
<tr>
<td>Internal reports</td>
<td>9 (17)</td>
<td>13 (22)</td>
</tr>
<tr>
<td>Reprints</td>
<td>1 (2)</td>
<td>8 (14)</td>
</tr>
<tr>
<td>Proceedings</td>
<td>- (-)</td>
<td>1 (2)</td>
</tr>
</tbody>
</table>
One thing to notice from Table 4.16 is that both government and academic scientists use similar research materials in the same proportions. Photocopies of journal articles take pride of place as the most common type of research material. All medical scientists who said that they own a collection also cite photocopies as one of the features of the collection and in some cases, as the only feature. One academic scientist said that the whole of his collection consisted of photocopies that he made when he travelled to Amsterdam to undertake a review of the literature as part of his doctoral studies. It is in a sense revealing that photocopies should be the primary component of a personal collection. It shows that the medical scientists as individuals face the same problems as libraries do in building up collections as they cannot afford to subscribe to journals or buy books. This also, implies that their collections are likely to be *ad hoc* as opposed to thematic.

Books and journals were also cited as forming parts of these collections. Internal reports, reprints and proceedings were mentioned by some medical scientists, and in all cases, more by academic than by government scientists.

More than half of both government and academic scientists who own collections said that they keep these collections in their offices. However, this researcher saw little evidence of such collections. In a few cases, at this researcher’s own institution where some of the interviewees were personally known, a probing question was asked thus:

"You say that you keep your research collection in the office (*looking round*) where?"

The respondent would then point out some papers, books and so on either on the desk or in a cabinet. The body of materials referred to in these instances, as a personal collection, was seldom large enough to merit the term 'collection'.
Nonetheless, there were some collections particularly those of senior staff, which merited the term collection.

The methods chosen to organise collections are those that are amenable to the handling of photocopies as can be seen from Table 4.17. The one surprising detail to emerge from Table 4.17 is that such a large number of medical scientists should construct an index of some kind to organise their personal collections.

### Table 4.17  How personal collection is organised

<table>
<thead>
<tr>
<th>Place where personal collection is kept</th>
<th>Government Scientists</th>
<th>Academic Scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
</tr>
<tr>
<td>Index</td>
<td>8 (15)</td>
<td>6 (10)</td>
</tr>
<tr>
<td>Folders</td>
<td>5 (10)</td>
<td>17 (29)</td>
</tr>
<tr>
<td>File Cabinet</td>
<td>1 (2)</td>
<td>4 (7)</td>
</tr>
<tr>
<td>Not organised</td>
<td>21 (40)</td>
<td>20 (34)</td>
</tr>
</tbody>
</table>

4.6 **PASSIVE SEARCH**

4.6.1 **Journal scanning behaviour**

The scientific journal is generally regarded as the most important information source for a researcher. It is not unreasonable to argue that most visits to the library by a research scientist are likely to be journal related in some way. Because of this reliance on journals, journal scanning behaviour can also be used to judge respondents’ opinions on current awareness. It is for these reasons that this study included an investigation of how many journals the medical scientists scan on average and where they obtain them.
Eighty nine of the medical scientists sampled said they scan journals on a regular basis (Table 4.18), with the number of journals being scanned ranging from one to six. Seventy medical scientists scan between two to four journals. It is interesting that all the academic scientists scan journals regularly while about

Table 4.18 Number of journals that medical scientists scan on a regular basis

<table>
<thead>
<tr>
<th>Number of journals</th>
<th>Govt. Scientists N = 52 (%)</th>
<th>Acad. Scientists N = 58 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>1 (2)</td>
<td>7 (12)</td>
</tr>
<tr>
<td>Two</td>
<td>10 (19)</td>
<td>15 (26)</td>
</tr>
<tr>
<td>Three</td>
<td>9 (17)</td>
<td>15 (26)</td>
</tr>
<tr>
<td>Four</td>
<td>8 (15)</td>
<td>13 (22)</td>
</tr>
<tr>
<td>Five</td>
<td>3 (6)</td>
<td>6 (10)</td>
</tr>
<tr>
<td>Six</td>
<td>- (-)</td>
<td>2 (4)</td>
</tr>
<tr>
<td>Total</td>
<td>31 (60)</td>
<td>58 (100)</td>
</tr>
<tr>
<td>Do not scan</td>
<td>21 (41)</td>
<td>- (-)</td>
</tr>
<tr>
<td>Total</td>
<td>52 (100)</td>
<td>58 (100)</td>
</tr>
</tbody>
</table>

The percentages represent the percentage of the group citing that they scan that number of journals.

40% of the government scientists do not. This may possibly be explained on the grounds that on the whole, academics are more likely to scan journals regularly, as they take an interest in journals for more than their value in relation to specific projects. The need to know current research directions, favoured research topics and so on is driven in part both for teaching purposes and to publish to advance one’s career and indeed, to secure tenure. Further, academics will also be influenced to routinely scan journals in the process of their socialisation to the academic culture.

At the start of each interview with an academic scientist, he or she was asked to disregard aspects of their information behaviour not related to their research
activities (such as teaching). Nonetheless, it is likely that some of their responses were distorted, as it is sometimes difficult to separate out in the mind which behaviour relates to what activity. Government scientists on the other hand, (in this context), only have one main activity to consider (that is research) and depending on their area of interest, may not scan journals as diligently as academics simply because they do not expect to obtain anything of real value. Put another way, in an environment where journals are scarce, a government scientist is likely to be harder pressed to find something to read than an academic scientist might be.

Twenty-one government scientists said they do not scan journals at all and neither do they subscribe to any. When asked why they do not scan journals, the reason they gave was that there are none in their disciplines and they were not aware of any other library that held a title they would be interested to scan regularly. A fair number of them also pointed out that they did not scan journals because they are not, and have not been for many years, involved in research because of funding problems, and so they have as a result, gradually stopped scanning journals. It should be noted though that 27 of the 89 scientists who scan journals, report doing so in spite of not owning any of their own.

Where do the scientists go to scan these journals? Fifty-one of the 89 scientists count their own copy of a journal amongst those that they regularly scan. However, they are all members of the Kenya Medical Association (KMA) and so receive the respected East African Medical Journal (EAMJ) as part of their subscription. There are two points to be made about this. First, these medical scientists cannot be considered to have subscribed to a journal purposefully and secondly, though they are a large proportion of the sample, they are all receiving the same title, and so the scope for information sharing is greatly reduced. If between them, they received 20 different titles for instance, these could be circulated or borrowed in some way amongst themselves. The one medical
scientist who has a personal subscription is an academic scientist and he has taken out a subscription to the British Journal of Surgery, at his own expense and also receives the EAMJ.

Sixty-three of the 89 scientists reported using their own library for journal scanning. It follows therefore that 23 scientists are unaccounted for and must be presumed to use some source other than their own library. They would seem to fall within the 48 who use other institutions' libraries for this purpose.

4.7 PASSIVE ATTENTION

Serendipity has been defined as the faculty of making happy and unexpected discoveries by accident (Thompson, 1995). Question 2.5 was the only question that specifically addressed serendipitous information acquisition. The medical scientists were asked if they had happened upon information useful to their research by chance, and if so, how it happened. The intriguing thing about this question was the way in which almost all medical scientists immediately identified with the question. This is best illustrated by a remark one government scientist made in saying "but it happens all the time!" There were only four respondents (three academics and one government scientist) who said they have never experienced this before. Only 40% of academic scientists report conversation as a way in which information was found by accident (Table 4.19 and 4.20).

Those medical scientists that cited listening in to conversations, point out that this is not done consciously. Rather, they might overhear a phrase that catches their interest and things would proceed from there. A few said that they might eventually join in the conversation making it a one to one type information activity.
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Academic significantly more than government scientists cite newspapers and in particular, the Daily Nation (a local Kenyan daily) as a source of serendipitous information. Comments such as “the Nation carries some interesting articles and features” were typical. It was also pointed out that a lot of this information is useful as background material for research. One government scientist said that he came across Prof. Joseph Mungai’s Our Aids against AIDS column, in the Nation when it first appeared in January 1997.

He has since made a point of reading subsequent articles because all the articles are based upon research findings. He said that it has since become a useful way for him to keep abreast of developments in HIV-Aids research in Kenya. An academic scientist also pointed out that the Daily Nation is good for scientific issues that are controversial in the public domain. Another academic scientist said that newspapers, and The East African in particular (part of the Nation

<table>
<thead>
<tr>
<th>How information was Obtained accidentally</th>
<th>Academic scientists N (%)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newspapers</td>
<td>31 53</td>
<td>1</td>
</tr>
<tr>
<td>Conversation</td>
<td>23 40</td>
<td>2</td>
</tr>
<tr>
<td>Browsing Medline</td>
<td>22 38</td>
<td>3</td>
</tr>
<tr>
<td>Radio</td>
<td>16 28</td>
<td>3</td>
</tr>
<tr>
<td>Browsing in library</td>
<td>14 24</td>
<td>5</td>
</tr>
<tr>
<td>Non-refereed papers</td>
<td>10 17</td>
<td>6</td>
</tr>
<tr>
<td>Pamphlets – drug representatives</td>
<td>9 16</td>
<td>6</td>
</tr>
<tr>
<td>Television</td>
<td>9 16</td>
<td>8</td>
</tr>
<tr>
<td>Browsing Internet</td>
<td>8 15</td>
<td>9</td>
</tr>
<tr>
<td>Listening in</td>
<td>4 7</td>
<td>10</td>
</tr>
<tr>
<td>Documents from colleagues’ offices</td>
<td>4 7</td>
<td>11</td>
</tr>
<tr>
<td>Workshops/conferences/seminars</td>
<td>4 7</td>
<td>12</td>
</tr>
<tr>
<td>Field observation</td>
<td>(-) (-)</td>
<td>13</td>
</tr>
</tbody>
</table>
group), is useful for gauging political opinion on scientific and other issues. In all these cases, a serendipitous discovery led to a directed information gathering routine developing.

Table 4.20 Ways in which information was obtained by chance by government scientists

<table>
<thead>
<tr>
<th>How information was Obtained accidentally</th>
<th>Government scientists</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversation</td>
<td>24 46</td>
<td>1</td>
</tr>
<tr>
<td>Field observation</td>
<td>18 35</td>
<td>2</td>
</tr>
<tr>
<td>Newspapers</td>
<td>12 23</td>
<td>3</td>
</tr>
<tr>
<td>Documents from colleagues' offices</td>
<td>12 23</td>
<td>3</td>
</tr>
<tr>
<td>Radio</td>
<td>10 19</td>
<td>5</td>
</tr>
<tr>
<td>Browsing Medline</td>
<td>8 14</td>
<td>6</td>
</tr>
<tr>
<td>Browsing Internet</td>
<td>8 14</td>
<td>6</td>
</tr>
<tr>
<td>Non-refereed papers</td>
<td>7 13</td>
<td>8</td>
</tr>
<tr>
<td>Television</td>
<td>6 12</td>
<td>9</td>
</tr>
<tr>
<td>Browsing in library</td>
<td>4 8</td>
<td>10</td>
</tr>
<tr>
<td>Listening in</td>
<td>3 6</td>
<td>11</td>
</tr>
<tr>
<td>Pamphlets – drug representatives</td>
<td>1 2</td>
<td>12</td>
</tr>
<tr>
<td>Workshops/conferences/seminars</td>
<td>(-) (-)</td>
<td>13</td>
</tr>
</tbody>
</table>

Some of the medical scientists cited the radio as one way in which they obtained information by chance. One academic scientist at S pointed out that he was one day listening to the radio when there was a programme on road traffic accidents. The things he learnt from the programme (statistics on injuries) stimulated his interest and he is now working in the area of blunt trauma injuries as a direct result of listening to this programme.
4.8 OTHER SOURCES OF INFORMATION

This research revealed that there are for government scientists, information circles that are exclusive to research groups. To explain this, some necessary background facts are given below.

The government does not finance research activity in government research institutes in Kenya. That is to say, there is no budgetary provision for research grants. The government undertakes to provide only the following: buildings, salaries for research and auxiliary staff and administrative costs. Research staff are expected to prepare proposals and win grants from interested organisations locally and abroad.

The consequences of this method of financing research are as follows:

1. Most big research projects are undertaken in collaboration with foreign research centres and universities with the United Kingdom, the US, Canada, Japan and the Netherlands being the main partners.
2. Foreign partners often dictate the research agenda because they are providing the funds and so are designated the lead partners. Also, they will only fund and engage in research that falls within their research priorities. As a result, the findings of the research may or may not be relevant to Kenya, because it may not be top of the list of local research priorities.

Part of the reason for this method of funding is the very large salary bill which eats into the amount allocated for research. In 1997, out of 5,832 personnel employed in government research centres in Kenya, only 797 are scientific researchers (Unesco, 1998). Of the remaining 5035 staff, 3687 provide ancillary services. If these numbers could be reduced, it would help in freeing resources for research work. The other and perhaps main reason for the funding problem is
that Kenya has not managed to allocate one per cent of GNP to research. The research allocation for 1997 was only 0.2% of GNP.

The scenario outlined above has meant that at every research centre, there are government scientists who are ‘idle’ because they have been unable to source funding for research. As one recently idle government scientist put it,

> Things work well when research is sponsored by some organisation. Otherwise, you can sit in your lab for years doing nothing.... Yes, I’m serious. I did nothing here for 7 years up to two years ago. I was then invited to join this group.

This researcher later established that he was employed in 1988 and had been idle up to the latter part of 1995. He also said, “Incidentally, it is those sponsored who do innovative research. The rest - they just play around.” Interestingly, an academic scientist at S echoed this sentiment and said:

> There is no academic doing innovative work in Kenya – how would we? But, our friends at ...[i.e. the government scientists] oh!, they are doing work that can be published anywhere.

Despite the foregoing, there are pockets of government scientists who have secured funding, and usually as a group. These research groups tend to be collaborative with partners on site, and are very well funded. It is the government scientists working in such groups that are of particular interest for this research. It was discovered quite by accident that these government scientists are working in a different world within the universe of the research centre.

The results of the interviews with these government scientists have been combined with the other medical scientists. A total of eleven of these
government scientists were interviewed. There are two reasons for this number not being higher a) these government scientists are busy and would not give easily of their time; and b) there are not many such groups. Moreover, the time spent in gaining entry to these government scientists was found to be excessive. In the event, members of only four such groups were interviewed.

The main findings from this group that are relevant to this study are presented below.

4.8.1 Provision Of Reading Materials

Under the funding agreements it is common to have budgetary allocation for subscription to core journals in the research area and purchase of books or other reading materials where necessary. This literature however, is not to be found in the main library. Rather, it is kept in a small library within the relevant centre and only staff working on the particular research project have access to it. One of the idle government scientists pointed out to this researcher that in his opinion, these ‘in’ groups are very cliquey. This means that information sharing or informal communication does not work too well. All respondents who are members of such groups were emphatic that they do not have any real problem in obtaining information relevant to their research. Special requests can usually be sent to the partner institution where arrangements are made for document delivery.

4.8.2 Equipment

Despite the inadequacies of libraries and other facilities discussed earlier, Kenyan research laboratories are very well equipped with scientific equipment, much of which were bought under various projects some of which have wound up. In fact, an FAO report (1984, p.34) makes the point that Kenyan agricultural research centres are notoriously well equipped for the amount of research being
conducted. The picture is the same in the medical research centres. What this means, is that government scientists in these groups not only have the necessary equipment, but also auxiliary equipment such as computers and more important, the consumables. Therefore, preparation of papers, presentations and the like is not the tedious exercise it normally is. This point is important. For the unlucky government scientists and certainly for the academic scientists, computers are found only in the head of department’s office where secretaries jealously guard them. Producing work to a standard that can be submitted to a journal in such an environment requires a lot of patience.

4.8.3 Finance For Travel

Nine of the government scientists in this group have been on placements abroad and travelled to conferences under their respective projects. As far as could be learnt, there seemed to be deliberate policy across all groups to accommodate such activity.

4.8.4 Communications

Access to the Internet and e-mail facilities is possible for the government scientists within their enclaves. Predictably, these facilities are not open to government scientists from outside the group no doubt with good reason. These facilities have eased communication and also allow for speedy transmission of requests to the partner institution. All groups had their own fax line. This too eases communication.

4.8.5 Staff Development

Three of the government scientists were working on their doctorates as part of these research projects. That is, their portion of the research has been designed to
lead to a PhD. Their supervisors are all from the partner institutions apart from one who is registered at the University of Johannesburg on the advice of the project leader. These three have particularly good and free access to research materials through their supervisors in their own assessment. They all pointed out that they easily obtain what even other members of the group would have to justify.

4.9 DISSEMINATION ACTIVITIES

4.9.1 Methods Chosen To Disseminate Research

Both government and academic scientists use the same methods to disseminate the findings of their research as can be seen from Table 4.21. Internal reports on original work is cited by many because it is mandatory to prepare such a report if it is known that you are engaged in research. This is usually the case for academic scientists whose research is funded by the Dean’s Committee. For government scientists, all research must be approved by the ethics committee who pass on to the chair of the publications committee the relevant information.

<table>
<thead>
<tr>
<th>Ways in which research findings are disseminated</th>
<th>Government scientists</th>
<th>Academic scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal Articles</td>
<td>26 (50)</td>
<td>24 (41)</td>
</tr>
<tr>
<td>Prototypes</td>
<td>1 (2)</td>
<td>- (-)</td>
</tr>
<tr>
<td>Books</td>
<td>- (-)</td>
<td>4 (7)</td>
</tr>
<tr>
<td>Blueprints</td>
<td>- (-)</td>
<td>- (-)</td>
</tr>
<tr>
<td>Conference Papers</td>
<td>29 (56)</td>
<td>17 (29)</td>
</tr>
<tr>
<td>Patents</td>
<td>- (-)</td>
<td>- (-)</td>
</tr>
<tr>
<td>Internal Reports On Original Work</td>
<td>16 (31)</td>
<td>33 (57)</td>
</tr>
</tbody>
</table>
Journal articles are the preferred dissemination channel where possible because they also count towards one’s promotion. For the government scientists, the publication committee offers guidance and where necessary, takes steps to ensure the publication of an article.

The one prototype cited by a government scientists is the prototype of a kit developed for the screening of transfused blood for the presence of the *Hepatitis B* virus. This too is the product of collaborative research.

4.9.2 Journal Articles

Table 4.21 shows the number of articles published by those respondents who have done so. A number of these articles have been published in international journals including:

- Lancet
- New England Journal of Medicine
- Social Science and Medicine
- Journal of Medicine – China
- Journal of Operations Research
- Tropical Medicine
- Review of Infectious Diseases
- Acta Tropica
- Transactions of the Royal Society of Medicine and Hygiene
- American Journal of Tropical Medicine and Hygiene
- British Journal of Clinical Pharmacy
- Journal of Chromatography
- Immunoepidemiology
- International Journal of Biochemistry and Physiology
- Tuberculosis
The scientists who have not published cited a number of reasons for not having done so. These will be discussed in the next chapter in more depth. However, one professor who has published a great deal said of his junior colleagues that he does not expect them to publish. He summed it up thus:

_The environment is not conducive for publication. You [sic] are always running throughout the day and night – rent, school fees, relatives! How do they [government] expect us to do anything on these salaries? I tell you, when I was with WHO in Geneva, aaah! I did wonders. I tell these young boys, go and open kiosks. Our scientific output is below par because of the environment._

**4.9.3 Factors Influencing Scientists’ Choice Of Journals To Publish In**

The respondents identified seven different factors that influence their choice of which journal to publish in (Table 4.22.) In some cases more than one of these factors was mentioned as influencing choice. The most common factor influencing choice for academics is the quality of the article. By this is meant the quality as perceived by the author. The medical scientists indicated that at times they may feel that the work is not of a particularly high standard and so they submit it to a less prestigious journal. The heading type of work refers to the nature of the research being submitted for publication. That is, whether it is a review article, a report of experimental research or innovative research for example.
Chapter Four – Results from Interviews

The most common factor for government scientists and second most common for academic scientists is either the author’s personal knowledge of a member of the editorial board, or in cases of multiple authorship, the principal investigator’s contacts of a similar nature. It was pointed out to this researcher however, that this does not guarantee publication but was useful in obtaining advice of a kind that would make the paper publishable.

On the other hand though, during a later interview when this point was being explored with an academic scientist, the following dialogue occurred:

“You say that knowing a member of an editorial board does not influence your choice of journal?”

No

“But you are a member of the KMA and you get the EAMJ?”

Yes.

“Your Dean’s the editor-in-chief. Surely you must have talked to him about publishing? In the EAMJ?”

Table 4.22 Reasons for choosing to publish in a particular journal

<table>
<thead>
<tr>
<th>Reasons for selecting journal</th>
<th>Government scientists</th>
<th>Academic scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>(%)</td>
</tr>
<tr>
<td>Type of work</td>
<td>4</td>
<td>(8)</td>
</tr>
<tr>
<td>Quality</td>
<td>10</td>
<td>(19)</td>
</tr>
<tr>
<td>Specialisation</td>
<td>2</td>
<td>(4)</td>
</tr>
<tr>
<td>Target audience</td>
<td>5</td>
<td>(10)</td>
</tr>
<tr>
<td>Membership</td>
<td>1</td>
<td>(2)</td>
</tr>
<tr>
<td>Editorial / PI contacts</td>
<td>15</td>
<td>(29)</td>
</tr>
<tr>
<td>Cost</td>
<td>4</td>
<td>(8)</td>
</tr>
</tbody>
</table>
Chapter Four – Results from Interviews

I didn’t know he’s the editor! Is he?

“You mean you don’t know this?”

No.

4.10 NON-PARAMETRIC STATISTICAL TESTS

Using equation 3.2, $r_s$ was calculated for the variables in tables 4.13 and 4.14 [scientific exchanges] for which the coefficient $r_s$ is 0.450. This value indicates only a moderate correlation between government and academic scientists in the way in which they make scientific exchanges. However, it is recognised that this value may be biased because of the differences between government and academic scientists in the amount of group research that they do.

$r_s$ was also calculated for the use of information sources (Tables 4.24 and 4.25) and the coefficient $r_s$ is 0.785. This indicates a strong association between government scientists and academic scientists in their use of information sources.

However, it still needs to be determined whether the coefficients obtained indicate a significant correlation. In Chapter Three, the methods for doing this were outlined.

4.10.1 Results Of Significance Tests

**Personal contacts**

For Tables 4.13 and 4.14 [personal contacts], the coefficient $r_s$ is 0.450 based on sample of nine. The null hypothesis that “government and academic scientists do not have similar patterns of personal contact” is now tested by comparing with
the values given in a table of critical values of $R_{H0}$ Spearman’s rank correlation coefficient, at 95% confidence.

**Table 4.23** Frequency of use of information sources by academic scientists

<table>
<thead>
<tr>
<th>Type of Contact</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Sometimes</th>
<th>Never</th>
<th>N</th>
<th>Index</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversation</td>
<td>20 (34)</td>
<td>26 (45)</td>
<td>8 (14)</td>
<td>4 (7)</td>
<td>58 (100)</td>
<td>.800</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Journals</td>
<td>7 (12)</td>
<td>30 (52)</td>
<td>11 (19)</td>
<td>10 (17)</td>
<td>58 (100)</td>
<td>.682</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Books</td>
<td>12 (21)</td>
<td>18 (31)</td>
<td>18 (31)</td>
<td>10 (17)</td>
<td>58 (100)</td>
<td>.675</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Computer databases</td>
<td>36 (62)</td>
<td>9 (16)</td>
<td>2 (3)</td>
<td>11 (19)</td>
<td>58 (100)</td>
<td>.641</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Photocopies</td>
<td>3 (5)</td>
<td>31 (53)</td>
<td>6 (10)</td>
<td>4 (7)</td>
<td>58 (100)</td>
<td>.617</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Departmental meetings</td>
<td></td>
<td></td>
<td>50 (88)</td>
<td>5 (8)</td>
<td>58 (100)</td>
<td>.562</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Reports</td>
<td>10 (17)</td>
<td>6 (10)</td>
<td>21 (36)</td>
<td>21 (36)</td>
<td>58 (100)</td>
<td>.417</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Departmental seminars</td>
<td></td>
<td></td>
<td>22 (38)</td>
<td>4 (24)</td>
<td>58 (100)</td>
<td>.400</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>1 (2)</td>
<td>6 (10)</td>
<td>10 (17)</td>
<td>12 (21)</td>
<td>58 (100)</td>
<td>.382</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Email</td>
<td>6 (10)</td>
<td>10 (17)</td>
<td>11 (19)</td>
<td>31 (53)</td>
<td>58 (100)</td>
<td>.368</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Supervision of MSc</td>
<td>7 (12)</td>
<td>9 (16)</td>
<td>42 (72)</td>
<td>58 (100)</td>
<td></td>
<td>.341</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Letters</td>
<td>1 (2)</td>
<td>10 (17)</td>
<td>11 (19)</td>
<td>36 (62)</td>
<td>58 (100)</td>
<td>.317</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Conference proceedings</td>
<td>7 (12)</td>
<td>18 (31)</td>
<td>33 (57)</td>
<td>58 (100)</td>
<td></td>
<td>.310</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Abstracts and indexes</td>
<td>7 (12)</td>
<td>5 (8)</td>
<td>1 (2)</td>
<td>45 (78)</td>
<td>58 (100)</td>
<td>.310</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Experiments</td>
<td>2 (3)</td>
<td>1 (2)</td>
<td>21 (36)</td>
<td>34 (59)</td>
<td>58 (100)</td>
<td>.306</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Supervision of PhD</td>
<td>3 (5)</td>
<td>6 (10)</td>
<td>49 (86)</td>
<td>58 (100)</td>
<td></td>
<td>.241</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Memos</td>
<td>1 (2)</td>
<td>1 (2)</td>
<td>6 (10)</td>
<td>50 (86)</td>
<td>58 (100)</td>
<td>.237</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Refereeing</td>
<td>1 (2)</td>
<td>7 (12)</td>
<td>50 (86)</td>
<td>58 (100)</td>
<td></td>
<td>.231</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Editorial work</td>
<td></td>
<td>8 (14)</td>
<td>50 (86)</td>
<td>58 (100)</td>
<td></td>
<td>.227</td>
<td>19</td>
<td></td>
</tr>
</tbody>
</table>

The tabulated $R_{H0}$ critical values for a sample of nine are given as follows:

<table>
<thead>
<tr>
<th>Confidence desired</th>
<th>95%</th>
<th>99%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of $R_{H0}$</td>
<td>.600</td>
<td>.783</td>
</tr>
</tbody>
</table>

As the computed value of $r_s < 0.600$, the null hypothesis that “government and academic scientists do not have similar patterns of personal contact” is accepted.
## Table 4.24 Frequency of use of information sources by government scientists

<table>
<thead>
<tr>
<th>Type of Contact</th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Some times</th>
<th>Never</th>
<th>N</th>
<th>Index</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer databases</td>
<td>6 (12)</td>
<td>27 (52)</td>
<td>15 (29)</td>
<td>2 (4)</td>
<td>1 (3)</td>
<td>52 (100)</td>
<td>.723</td>
<td>1</td>
</tr>
<tr>
<td>Conversation</td>
<td>19 (37)</td>
<td>12 (23)</td>
<td>11 (21)</td>
<td>10 (19)</td>
<td>52 (100)</td>
<td>.715</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Journals</td>
<td>9 (17)</td>
<td>16 (31)</td>
<td>19 (37)</td>
<td>2 (4)</td>
<td>6 (11)</td>
<td>52 (100)</td>
<td>.676</td>
<td>3</td>
</tr>
<tr>
<td>Photocopies</td>
<td>6 (912)</td>
<td>15 (29)</td>
<td>12 (23)</td>
<td>7 (13)</td>
<td>12 (23)</td>
<td>52 (100)</td>
<td>.584</td>
<td>4</td>
</tr>
<tr>
<td>Experiments</td>
<td>8 (15)</td>
<td>7 (13)</td>
<td>12 (23)</td>
<td>7 (13)</td>
<td>18 (36)</td>
<td>52 (100)</td>
<td>.523</td>
<td>5</td>
</tr>
<tr>
<td>Telephone</td>
<td>4 (8)</td>
<td>10 (19)</td>
<td>8 (15)</td>
<td>5 (10)</td>
<td>25 (48)</td>
<td>52 (100)</td>
<td>.457</td>
<td>6</td>
</tr>
<tr>
<td>Departmental meetings</td>
<td>4 (8)</td>
<td>24 (46)</td>
<td>24 (46)</td>
<td>31 (60)</td>
<td>52 (100)</td>
<td>.361</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Books</td>
<td>3 (5)</td>
<td>4 (8)</td>
<td>4 (8)</td>
<td>10 (19)</td>
<td>31 (60)</td>
<td>52 (100)</td>
<td>.284</td>
<td>8</td>
</tr>
<tr>
<td>Conference proceedings</td>
<td>1 (2)</td>
<td>2 (4)</td>
<td>4 (8)</td>
<td>8 (15)</td>
<td>38 (73)</td>
<td>52 (100)</td>
<td>.273</td>
<td>9</td>
</tr>
<tr>
<td>Reports</td>
<td>2 (4)</td>
<td>15 (29)</td>
<td>35 (67)</td>
<td>52 (100)</td>
<td>.273</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abstracts and indexes</td>
<td>1 (2)</td>
<td>3 (5)</td>
<td>3 (5)</td>
<td>48 (86)</td>
<td>52 (100)</td>
<td>.269</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Departmental seminar</td>
<td>3 (6)</td>
<td>10 (19)</td>
<td>38 (73)</td>
<td>52 (100)</td>
<td>.269</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-mail</td>
<td>2 (4)</td>
<td>6 (12)</td>
<td>44 (84)</td>
<td>52 (100)</td>
<td>.269</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Letters</td>
<td>2 (4)</td>
<td>2 (4)</td>
<td>48 (92)</td>
<td>52 (100)</td>
<td>.238</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memos</td>
<td>3 (6)</td>
<td>49 (94)</td>
<td>52 (100)</td>
<td></td>
<td>.223</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supervision of MSc</td>
<td>2 (4)</td>
<td>50 (96)</td>
<td>52 (100)</td>
<td></td>
<td>.215</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refereeing</td>
<td>1 (2)</td>
<td>51 (98)</td>
<td>52 (100)</td>
<td></td>
<td>.203</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supervision of PhD</td>
<td>52 (100)</td>
<td>52 (100)</td>
<td></td>
<td></td>
<td>.200</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Editorial work</td>
<td>52 (100)</td>
<td>52 (100)</td>
<td></td>
<td></td>
<td>.200</td>
<td>19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Use of information sources

For Tables 4.24 and 4.25 [use of information sources], the coefficient $r_i$ is 0.785 based on a sample of 19. The null hypothesis that “government and academic scientists do not have similar patterns of use of information sources" is now tested using the $t$ test at 95% confidence.

The value of $t$ obtained using formula (3.3) is 5.224.

The tabulated values for Student $t$ Distribution are for a sample of 19 given as follows:
As $t > 2.093$ and even $2.539$, the null hypothesis that “government and academic scientists do not have similar patterns of use of information sources” is rejected and the alternative hypothesis $H_1$ is accepted.

**4.11 INTERVIEWS WITH LIBRARIANS**

It was mentioned in chapter three that three interviews designed to provide background information were held with librarians at two of the sites – R and S. The main findings of these interviews are presented below.

The first interview was held with the librarian at the medical school at S in which useful contextual information was obtained. The librarian pointed out that the physical location of the library at S does not encourage unnecessary use of the library because it is situated some distance from the academic departments.

She also said that she was unable to purchase books because of budgetary problems and said that this was reflected on the stacks. A walk around the library revealed that the books on the stacks were generally old and that there is no ‘new books’ display area in the library. This contrasts sharply with the library at T where though smaller, the book stock is very much newer and there is a ‘new books’ display.

She went on to say that the library suffers from a general lack of resources, which has had an impact on its delivery of services. She only has one computer
and that is financed by private initiative and locked away in a room because it is not being used yet. She could not give any figures relating to her budget and warned that such information would not be forthcoming whoever was approached amongst the library staff.

In order to test this, and also to try and learn more about the financial health of the university library system given the information provided by the medical school librarian, an interview was arranged with one of the deputy university librarians at S. The deputy librarian would not divulge any figures relating to the library budget and said only that he had a copy of the university financial estimates which this researcher could use to obtain budgetary allocations. However, he added that the figures in the estimates were unreliable. He went on to say that though the gross amount budgeted for the entire university in the estimates was actually made available, it was not sufficient to run the university for a year. As a result, certain departments such as the library have their ‘paper’ allocations adjusted and in some years, the entire library budget for purchase of books and serials might be diverted to other services requiring immediate delivery.

He explained though that there is a rationale to his state of affairs even if it is unpleasant. He said that students would most definitely take to the streets if the provision of meals is not up to standard. On the other hand, a whole generation of students might go through the university cycle without being too concerned about the inability of the library to acquire new materials. Therefore, the library budget is changed in order to make savings at the expense of the library and this of course has repercussions for the entire university community and not just students.
CHAPTER 5
Results from Journal Article Analysis and Observation

5.1 INTRODUCTION

In this chapter are presented the results of the journal article analysis and observation components of the present study. The first part of the chapter is concerned with results from the analysis of journal articles while the latter part of the chapter is given over to results from the observation study.

5.2 JOURNAL ARTICLE ANALYSIS

Ten medical research scientists were invited to talk through with this author, information actions and decisions that they took in writing a specific journal article. To ensure uniformity in these interviews, topics of interest were formulated in advance and each interview was centred on and followed these topics. To protect the anonymity of the medical scientists and also for ease of discussion, they have been characterised 1-10 for purposes of this chapter. Following is a presentation of the results of these interviews.

5.2.1 Discovery Of Sources

The first topic discussed was the discovery of sources. Each of the ten medical scientists was asked to explain how they discovered the sources cited in their
reference list. One medical scientist (1) said that he discovered some of his sources through a process that he described as "fishing." That is, a system of networking among colleagues to identify sources.

*I spread word around to colleagues describing the work I'm, involved in and the type of references I want. Very often this works and I have been tipped on a number of useful references this way.*

This particular medical scientist, came across as practised in the art of literature searching. For the article under review, he said that he did not rely upon any one method but used a variety of methods. Apart from 'fishing', he also says that he went to his university library and described to the staff the topic of research he was working on, and asked them to continually update him with anything new and also to perform a literature search for him; in essence, a personalised current-awareness service. Though this system worked for him, he was one of very few medical scientists that reported using this approach. It should be pointed out that when asking to be kept informed of anything new, this usually meant an old publication that was new to the library, usually acquired as a donation. There were however of course, instances of the library receiving materials that were new in the sense of having been recently published, but this was uncommon.

He also relied upon his own knowledge of the literature in the discipline in identifying or discovering sources. This was a system which many of the medical scientists used. He also mentioned performing a search of Medline. Though this scientist came across as having been actively seeking information, the level of activity he describes was not reflected in his reference list, both in number and in recency as will be seen in Section 5.2.6. below.
Some of the medical scientists discovered their sources abroad as was the case for (2), a Professor, who discovered the bulk of the material he cites in his article through the library staff of the School of Hygiene and Tropical Medicine (SHTM) in London. He explains that he was on a two-day stopover in London on his way home from attending a conference in the United States:

> It had been arranged that I would be in London at the School of Tropical Hygiene [sic], for two days on my way home, to have discussions concerning the project we have jointly. I had it in my mind to use the library for this (pointing at the article) whilst there, and asked one of my colleagues to introduce me to the staff at the library, which he did. So, I had a chat with this woman and she was able to provide me with most of the stuff you see here. Actually, apart from these last four, all the rest I was given in London, I came with from London.

These last four documents referred to were Kenya Government Ministry and Statutory Board publications, one of which he owned and the remaining three he obtained through his university library. He explained that after his success in London, he felt that perhaps library staff could help him and so he approached a member of staff at his university library with a specific request for statistical information relevant to his topic of research:

> I rang X [head of the library] and explained what I needed. His people did the rest, so it was quite good.

His need was for local statistics relating to traffic accidents which he was unable to obtain in London. The result of his request he said was that he given these three documents which contained the information he required. Though he had said, "it was quite good", he was grudging in agreeing with this researcher that
this was an example of what the library can offer if only given a chance, and quickly said:

*The library is not to be congratulated for this. They were just doing their job. If they could do this all the time we would say they're doing a job, but I'm not going to say so just because of this...*

The foregoing account describes a situation where an article was required to be written but was put on hold until such time as a trip made it possible to collect information. This invited the question: “You say that you had been asked to write this paper before you knew you would be in London. What would have happened if the article were due before a trip was forthcoming? If the London trip didn’t happen?”

*I don't know. I would have written something else.... It is difficult to say. You are asking me to speculate!*

Yet another medical scientist (3) discovered his sources through a third party, a colleague at the SHTM in London yet again. The circumstances in this case were different however. This particular respondent was part of a local research team working in collaboration with academics at the SHTM. As a result of this project he said, he developed a particularly good relationship with one of the London based team members. It was to this colleague that he turned to for his information. He emphasised that though the article he was writing was outside the scope of the collaborative project, his London colleague offered to assist wherever possible, and provided the physical documents. He said that though he had discovered some sources locally that he might have relied upon, he found that these sources were invariably dated when compared with what his colleague was able to provide.
You would be surprised how much is in the library here. The problem is that it is not comprehensive. But I would not say that I could not have written this article. Actually, before he offered to do this [his London colleague], I had already started collecting. But when I compared what I had with what he could get, ours was obviously older. But as I say, I could still have published. Maybe not in the same journal, though you never know.

He said that how this arrangement worked was that he would perform searches on Medline, make a list of what might be useful but was unavailable to him and send this list to his colleague in London using email. This colleague would then arrange to obtain the physical document for him.

Another medical scientist (4) said that he did not bother with his own library but instead used the Glaxo Kenya Ltd library where he found a few sources both by using the catalogue and by browsing the shelves in the library. The remainder of what he cited in his reference list (apart from one journal article) were drawn from his own collection of research materials.

This one source he discovered in an unusual way. He says that he was in a staff meeting convened to discuss progress on a joint research project when he got talking to a colleague of his before the meeting began. In the course of his conversation, he mentioned to this colleague that he was working on a particular research topic and was unable to find anything relevant on the topic. To his surprise, his colleague asked him to come round to his office after the meeting as he thought he might have a journal article that might be useful to him. In the event, it was.
A different medical scientist (5) said that he discovered all the documents cited in his reference list through the efforts of a member of the library staff whom he acknowledged in his article. This finding was unexpected and prompted this researcher to ask: 'Didn’t you use Medline at all or browse the library'? He said that he did none of these things to write the article being discussed.

He explained that for him, Medline was a tool that he refused to use because he was sure not to find what he required in the library and there was no document delivery system in place. In these circumstances, he asked:  

*What would be the point of using Medline? It is much easier to go to the library and let them tell you what they have. You save time. But of course I tell them the kind of things I'm looking for and.... It's easier*

To this was asked: 'So you don’t browse the library'?  

*No, I do [sic]. We have good books - new books and a few journals too. There's one journal that I look at but that is just to keep in the picture. This library is not bad for teaching ....* 

Though this medical scientist relied upon his own library to obtain all his sources and had a few positive things to say, there was a sense that library staff do not ordinarily do anything worthwhile:  

*I often go to the library, you know, go there just to look at things.... It's research that's the problem and that's why when I have something serious to do like this, it's easier to let them do it. After all, what [else] would they be doing?*
Medical scientist (6) said that he used his own university library and other libraries:

I was passing through the library and decided to look around and see what I could find. It's near my office.... Anyway, I had a look and I found two items. This and this (indicating with his finger). The rest were mine and these three (indicating again) I found at the Institute of Primate Research [library.]

His colleague (7) did not use his university library but used the libraries of the African Medical Research Foundation (AMREF) and International Livestock Research Institute (ILRI). He also used his own collection.

Another medical scientist (8) said that he discovered most of his sources whilst he was a PhD student in Germany and pointed out that the article in question, was in fact reporting on an aspect of his PhD research. The two articles in his reference list that were not in his PhD work he found on his return and used them to "enrich" his article.

I had plenty of material to put into my thesis. In fact more than I could use.... That's why I didn't really have to do another literature search here [in Kenya] as it could be published as it was. I only added these two because I came across them accidentally and realised that they could enrich the article.

"You say accidentally. Tell me how it happened"

When I say accidentally I mean that I was just looking. How can I put it? When I came back, [from Germany] I realised that there were parts of the research that I didn't publish with my supervisor that could be written for EAMJ. And that's how I
wrote this. I think I had gone to read newspapers and then decided to look around. After all, I didn’t really know what was in the library. I had just come back.... And in the process I found these two.

The ninth medical scientist said that he relied upon his own institute’s library for discovery of sources including performing searches of Medline. He also said that his co-authors too, knew of relevant documents and he stresses that the documents cited in his article were the result of what he described as 'group effort.'

I was in charge of the day to day performance of the research but was under the supervision of a senior colleague. He was very helpful when it came to writing up... I would do a draft, hand it to him for comment and this was usually when he would call a meeting. We would go through the draft and he would sometimes say “look at this or that”. I would of course include such material [laughing].... This is why his name has been put in last – it was group effort. He contributed a lot.

The last medical scientist (10) discovered his sources through a number of ways:

I visited several libraries: College of Health Sciences, Chiromo Campus, ICIPE, and many others. Even ILRI! But you know, [sic] I have a huge collection myself you can see ... (turning in his chair and pointing). People ask me: Professor, where did you get all this? And I say to them, I’ve been around a long time (laughing). Anyway, this is a review article and as you may or may not know, I have been working in this area for many years now. And so it was relatively easy for me to do this using my
collections and the libraries that I’ve mentioned. Colleagues too. People bring me anything they think I might find interesting.

However, later in the discussion, he implied rather than said that this researcher should not be surprised at the long reference list because the list was more a result of his special circumstances than general availability of information. Further, this particular scientist was at one and the same time a Professor at the university and Chief Executive of a Quango. His personal collection that he mentions fills two entire walls of his spacious office.

### 5.2.2 Acquisition Of Documents

Under this heading were subsumed two questions: the first concerned where the medical scientist acquired the documents and second, whether they had actually been read.

The first medical scientist said that he acquired some of the documents he cites from his own university library and said that his request to be notified of everything relevant that could be found worked very well:

> They gave me a lot. Most of it I didn't use in this article but it was useful in other ways....

"Such as?"

> Oh it eliminated certain routes of investigation. Some was useful for other things I’m working on. Even teaching... I do teach! You see. Though it was not all directly useful, [for the article under discussion] it contributes [the service] to my work as a Professor here. In that sense, it’s a good thing.
He went on to say that he had visited the *Central Bureau of Statistics* library and the *National Public Health Laboratory* library, none of which he mentioned when talking of discovery of sources. This led to him being asked why he hadn’t mentioned these two libraries when talking about discovery of sources. He said that he already knew of the sources and knew that they were to be found at these libraries and therefore did not consider this to be discovery.

*I already knew that I would find some of what I needed there.*

*This is why I didn’t bother to mention it. But yes, I used them.*

The professor on the London stop-over, (2) brought back with him all but four of the documents he cites. Of the remaining four, one he owned and three he obtained from his university library, as has been described earlier.

The lecturer with the London contact (3) had photocopies of all the articles he cites posted to him or personally carried over to Kenya by his colleague-friend, when on a visit. He again emphasised that had he not had this assistance, he is confident that he would still have been able to “put together” an article using sources locally available, albeit of lower quality. This particular medical scientist was unique among the ten in that he alone obtained all of his sources from abroad without having left the country.

*Well I, we [in the project] are lucky. At least we have access to email under the project. This made it very easy to communicate with John [London colleague]. [This researcher’s note: Email is now available to all staff at this university but each message must be paid for by the sender.]*
The fourth medical scientist, with the exception of one document, obtained all his sources from either the Glaxo Kenya Ltd. library or he relied upon his own collection. When it was put to him that it seemed strange that he did not even visit his own library, he replied that he did not think it strange at all and went on to say:

_Na sasa wewe, ni ende huko kufanya nini?_ (now, why would I want to go there?)

This rhetorical question, expresses something of surprise at being asked a question, the answer to which is obvious: that in this case, a library visit would not lead to him finding anything useful, that this is a well known fact, and the question should never have been asked in the first place. The one document mentioned above he obtained from his colleague who had invited him round to his office to look at what he had. He said that he found some useful documents but only used one document in the article.

The fifth medical scientist was also unique in that he alone obtained all the documents he cites in his article from his university library. When asked whether he was surprised that he was given as much as he was, he said that he was not.

This prompted the question "Why and yet you don’t think much of the library?"

_It's not that I don't think much of the library. I'm just practical. I know the limitations. Let me tell you, when you go to visit your mother, you don't go into her kitchen to look for food. She knows how she arranges her kitchen and she also know what is there. No. She says: "Kijana, uta kula kuku?" [My son, will you eat chicken]."_
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The library is like your mother’s kitchen. It doesn’t have everything. It is for her to suggest that she can only give you chicken. But that does not mean that her chicken is bad! On this occasion, [the article], my mum had enough in her kitchen to prepare a good meal.

When asked where he obtained the documents he cites, medical scientist (6) said that he acquired ‘some’ of the documents that he cites from his university library but emphasised that:

I only went there because the library is near my office; otherwise I wouldn’t have bothered.

The above is yet again an expression of the low regard with which the library is held. It seemed curious to this researcher that a visit to the library should be deemed as somewhat ‘inappropriate’. The above remark where he mentioned once again that he only went to the library because it was near his office led this author to say:

“But then you wouldn’t have found these sources.”

I would have found them elsewhere. Not necessarily the same documents but I would have found something to use.

In addition, to the material he found in the library, he also obtained some documents from the Institute of Primate Research and used his own collection.

Some I got from Karen [Institute of Primate Research] and the rest came from my files.
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The seventh medical scientist said that he did not go to his university library at all but was later told by a colleague that he had seen documents that might interest him in the library and gave him the details. He then went to the library and found that they were indeed useful.

*These came from AMREF and ILRI, I don’t remember which.*

*But these ones I found in the library...*

"Which library?"

*Our library here. I didn’t know about them in fact [sic]. It was [Z] who told me that he had been to the library and seen them.*

*He knows that I’m doing this research. In fact, he noted down the journal...*

The eighth scientist obtained all of the documents he cites whilst in Germany doing his PhD with the exception of the two he found locally. The ninth, obtained his documents from his own institute’s library but points out that some were actually obtained through other libraries and he could not say which libraries they were:

*All I know is that I requested the library to try and find for me the documents that were not in the library. I had prepared a list... Some of them (articles) they managed to trace... No, I don’t know which libraries. I didn’t ask.*

When asked: 'would you say then that the library is able to obtain most of what you ask them for'?
The problem is not really the documents. Usually some of them can be found somewhere. Sometimes I even tell them that this one and this one (items on a list) can be found at ICIPE for example. But, the problem is, there may be no vehicle to go all the way to Duduville (ICIPE headquarters), or no driver, or petrol...

'You could go yourself!'

*Nani? (Who?)*

This latter retort was perhaps the most telling remark in the interview.

### 5.2.3 Reading of Articles

All but two of the medical scientists said that they had read all the articles / textbooks/ monographs that they had cited in their reference lists. One of these two said that he had relied upon one informative abstract he found on Medline.

*You know bwana, [sic] sometimes you have all the information you require in an abstract, so you just cite it.*

“But as an abstract from Medline.”

*Those are technicalities. The thing is, the information is published as an article, I know the details and I have not distorted what was reported. We have to do it. And after all, these professors you see here, they don’t read articles – they evaluate abstracts!*
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It was felt it would be pointless to further pursue the issue.

The other medical scientist said that he had used an abstract in a journal but cited it as an abstract and not as an article. This he pointed out, is acceptable.

5.2.4 Satisfaction With Sources

It had been pointed out in 5.2.1 above (Discovery Of Sources), that the level of activity described by the first medical scientist was not reflected in his reference list both in number and recency. This researcher had come across another article written by himself, [that is (1)] which had more and newer references. This second article was shown to him at the interview and before he could be asked to explain the differences in referencing, he exclaimed:

Ohhhh....! Surely God directed you to come here today. Where did you find this? I have been wanting this article for this work I'm doing (pointing at a heap of papers on his far left), and I haven't been able to find a copy. And now you bring it to me. Can I keep it? This is wonderful...

Eventually: “how come you were able to have such current references in this article and publish it in the New England Journal of Medicine?”

Ahhhh....!, what you do not know is that this was written when I was with WHO in Geneva (smiling). We had everything we needed.

'But the author affiliation indicates Nairobi.'
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Yes, I can see why you’re confused. You see, this was not done during my six year period there. At this time, I was just there for a season [sic] but working in Nairobi.

In relation to the article being discussed, he said that he would have liked to have had more references to cite, but said that it was difficult to obtain actual documents as there was no system of document delivery available. He went on to say that he did not cite recent articles simply because he could not obtain them.

It’s not that we cannot work. I can do excellent research but without the means, you end up with this kind of output.

He gave as an example of the difficulties medical researchers encounter, a Medline search that he had only three days before carried out on the subject ‘Nutrition of the elderly’. The search yielded 381 hits after being limited to post-1990 (He had a print-out of the results). Of these 381, 27 articles were directly useful, but none were in journals held by his university library or any other that he knew.

Coincidentally he says, a colleague of his, though at a different organisation, had authored one of these 27 articles.

You see, I told you that it’s good that you’ve come today. You now remind me I intended to ring this lady and get a copy of this article (making a note).

He went on to say that out of the 381 records retrieved, only two originated from Africa, including the one with Kenyan authorship. The low coverage of Sub-Saharan Africa this medical scientist describes, is corroborated by Levey (1997), who found that in 1995, less than one per cent of records in Medline were from
Sub-Saharan Africa. Lippman (1992) reports similar findings – only 2.2% of journals scanned by the Science Citation Index in 1979 were from developing countries.

The London professor would also have liked more material. He said that in his case, it was more a lack of time than difficulty in obtaining the required documents as he was in London for just two days. In a sense though, because he felt constrained to get everything he could in this two-day window, he could be said to have suffered problems of difficulty in obtaining material.

Yes I would have liked more but I was in London for just a short while so there was a limit to what could be done. You must realise too that 17 references in Medicine is not bad at all. So, much as I would have liked some more, I do not consider this to be inferior.

The third medical scientist said that though he had help from his colleague in London, he still felt that he would have liked more material and especially in two areas. First, he had particular need for background information that he would have used in context or scene setting and because this would only be locally available if at all, his colleague was unable to help. Second, he also required information about similar studies to his but based upon different diseases. He could not identify any.

The fourth medical scientist said that he would have liked to have had both more material cited in his reference list, and also more recent than what he had:

For me, the most important thing is that I do not know whether I am doing something that's been done before. It could be a waste of time.... You know that we have very little for research. So if
we are spending time and money doing research that has been
done, it would be too bad. And three is no way for us to know.
So, for me, this is why we really need information. The science
here (in the article), is good. I'm not too concerned about
methods and procedures; forget about that. What I want to know
is what others have done so that we can build on it instead of
going round in circles.

Medical scientist five said:

Oh yes, I would most surely have wished to have more. This
article here is actually a review article and you can see I have
only 21 references. 21!... Do you think that this would have been
published abroad? No way. So, it's difficult. But as to your
question, I'm satisfied in a way that I could manage to get even
this much.

Use of several libraries was no guarantee that one would find a lot of material as
the experience of respondent six shows. He described himself as 'very unhappy'
with his references. When asked why he achieved so little and yet he had used
several libraries he said:

It's because this article is not about experimental research. It's
in fact a retrospective study and it was very difficult to find
appropriate material that discusses this disease in the tropics.
This is why I say well stocked libraries are important for
research. When they tell us that we are supposed to do research,
I wonder what they're talking about because it cannot be done
with the kind of libraries we have.
The seventh medical scientist simply said he would have liked more, whilst the eighth medical scientist described himself as partially satisfied. He argued that:

*The problem we have is getting the actual document. For instance, If I did a search on Medline, now, on any topic, I wouldn’t get the real thing! And also, it is too stressful trying to determine what the library has out of that printout you’ve got of two, three, even four hundred. You give up before you start because you know that you will be lucky to get even one document out of what you have. So, why bother?*

When asked in response: “So you don’t bother to check if the library has any of the sources?”

*No I don’t. In fact, I’ve stopped using Medline because even though it’s a very good tool, it’s useless to me!*

Medical scientist (8) said that he could not make a judgement concerning the article under review because it represented work done abroad. However, he said:

*I do not think I could have written such an article here. But the important thing is do we need to? The trouble we have is that we all want to publish abroad. Why? Because we think it is more prestigious? We don’t really need external acclaim [international recognition]. What we need to do is publish locally and decide for ourselves what is prestigious.*

Whereas there is merit to this sentiment, there are pressures that make it unlikely that local publishing will predominate if the status quo persists.
Like all the rest before him, the ninth medical scientist said he would have liked more sources but said that he was not prepared to go out of his way to look for sources at his own expense. He took the view that it was the responsibility of the employer to provide all 'tools' required and said that even though he knew where some useful documents might have been obtained. He would not do so on his own. He described himself as unhappy with his whole working environment and not just the information support available to him.

The tenth medical scientist said that he was satisfied with this articles but went on to stress that in his view, a strategic plan was desperately required for library and IT development.

*I have told you this before and I will say it again. Research cannot thrive without proper support. This includes adequate salaries, labs, equipment, good libraries, IT infrastructure, materials, and so on. Everything! And I say to you, even with what we have today, if there were a strategic plan for library and IT development, and if it were implemented, much good research can be done.*

5.2.5 Reasons For Citing

The medical scientists were asked how they decide when to cite and the question was phrased in the following way: “when writing an article such as this, how do you decide where you need to cite?” The question was framed this way in order to obtain general reasons for citing rather than their reasons for citing in the specific article being looked at.
Each medical research scientist gave a number of reasons for citing in their own words. These were later translated into a classification developed by Eugene Garfield (1979). The results are displayed below in Table 5.1.

Table 5.1  Reasons for citing publications

<table>
<thead>
<tr>
<th>Reasons For Citing</th>
<th>Number of medical scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Providing leads to uncited work</td>
<td>1</td>
</tr>
<tr>
<td>Paying homage to pioneers</td>
<td>1</td>
</tr>
<tr>
<td>Authenticating data / facts</td>
<td>2</td>
</tr>
<tr>
<td>Identifying methodology, equipment, etc.</td>
<td>3</td>
</tr>
<tr>
<td>Giving credit for related work</td>
<td>7</td>
</tr>
<tr>
<td>Providing background reading</td>
<td>8</td>
</tr>
<tr>
<td>Substantiating claims</td>
<td>10</td>
</tr>
</tbody>
</table>

Many of the medical scientists made the general observation that the responses they gave to this question were what they would do in an ideal situation. However, they found that on many occasions, they knew they should cite but did not have any relevant published literature. They therefore resorted to tactics such as (Jones, personal observation) or (Authors' unpublished data) as in the following style taken from one of the articles:

“... is ranking fourth overall among childhood malignancies seen at Kenyatta National Hospital, the referral, teaching and only major centre for management of patients with cancers in Kenya (Authors’ unpublished data).”

It is interesting that only three out of ten medical research scientists indicated that they cite to identify methodology, equipment and so on. This could perhaps be
It is interesting that only three out of ten medical research scientists indicated that they cite to identify methodology, equipment and so on. This could perhaps be interpreted to mean that very little experimental research is being undertaken for lack of funding. So little, that a basic reason for citing such as given above does not naturally come to mind when they are presented with such a question.

This assumption is given added credence when the above statistic is read with that showing that only two medical scientists said they cite to authenticate data and/or facts; an activity the need for which is closely allied to the conduct of experimental research.

Others said that when confronted with a situation where they know they should cite but do not have relevant material, they re-word the relevant passage to remove the need for citing, and this they said, was a fairly regular occurrence.

5.2.6 Age Of Citations

Respondent one despite being the most active seeker of information interviewed in his group, had fairly old references on his list. When this was pointed out to him, he explained that he would have liked both more and newer resources but there were no materials available to him. He said:

*I could not invent what was not there.*

When asked if the papers he refers to in his article were references to seminal papers, he said that they were not. The only reason that he was using such old references was because he could not get anything newer.

Though the second medical scientist obtained most of his material from the SHTM in London, five out of 17 were quite old and ranged from the 1950s to the
1960s. When asked to explain this, he said that he relied upon old documents because they were crucial in substantiating claims he made in his article about historical events. The old publications he cites were the original publications in which these events were described.

The third medical scientist explained that his references are mostly new because he obtained them from London, and so for him, he was in the fortunate position where the issue at hand was more one of relevance than availability. In a sense, he could pick and choose rather than have to make do with what was available. Of all the articles reviewed, it is this article that clearly had the most recent references.

*That's because I was sending him a list of references that I found in Medline. So they were recent and of course obtaining them was not a problem for him.*

The fourth medical scientist had only one reference from the 1990s out of a total of 14 references. He explained that he took the view that getting published was enough. He was not too concerned about issues to do with quality such as recency of references. He made the point that so long as the science was sound, “window-dressing of references is not important.”

The fifth medical scientist had 18 out of 21 references all from the 1990s. The interesting thing about this case is that though he obtained all his material from his university library, he still managed to obtain relatively recently published material. This is also an interesting finding because this particular academic comes from the “best resourced” of the three libraries in this study. More will be said about this in the discussion chapter.

The sixth medical scientist had fairly old references too. He said:
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This was all that I could find. I’m sure that if I had looked harder and gone to other libraries, I would have found more and maybe a few recent ones; but the conditions we work under do not encourage...

Asked about how he felt of his reference list he said:

It isn’t really good enough. I know. But what can I do?

Another medical scientist (7) had only five out of 20 references from the 1990s. When asked what the reasons for this were, he said that he did not see that it mattered and he had no explanation for this. Even when assured that judgement was not being passed on his work, he maintained that he could not answer the question because it was not something he considered a problem.

But where is the problem? It doesn’t matter!

“Supposing something new has been written that contradicts what you have here?”

[Laughing] That’s not my problem. I have no figures but I’m sure that we are repeating research all the time. How many of us in Africa alone do you think are doing research? We must be thousands and it is almost impossible to know what we are doing. Even if I could know using some bibliography, I wouldn’t have the text anyway. So long as the editor’s happy, I’ve got my paper!
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One medical scientist (8) had all his material from Germany and as such, his references were fairly recent as can be seen from Table 5.1. The two references to articles in 1907 and 1945 he said were put in to substantiate the claim that he makes in the article that the behavioural issues raised in his conclusions are not new and have been the subject of discussion for a long time within medical research.

Respondent nine had only three references from the 1990s out of a total of 11 references.

I have already told you that I would not go out of my way to look for documents. Five of these I was given my director. In fact, he’s a co-author in all of them and that’s why I had to include them. They’re good papers though. The rest I got from the library through inter-library loan.

I don’t want to sound as though I don’t care about quality... after all, it carries my name [the article]. You mention the number of references, but this article is a good quality article, believe me.

5.2.7 Range Of Sources

The overwhelming number of references were citations to journal articles. There were various reasons put forward for this:

- It is conventional to use predominantly journal articles if you have them, because they carry the latest information.
- Journal articles provide the latest information
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- We generally rely upon journal articles because they have new information; they are also easier to obtain than reports or books.
- It is usual to use journal articles for this kind of thing.
- Journal articles and reports are the most important literature for research work.

Another medical scientist (7) had the following dialogue with this author:

Journal articles are preferred because of their new information.

But the articles you have cited are not that recent.

Yes, I know. And that is why we have a problem. You see, the type of information or data required for research usually cannot be found in books. If you want it you must go to journals or reports which makes it even more difficult for us because we don’t have them. And that’s why I have this type of list.

Another said:

What is a journal article? [rhetorically]. It’s like a report of research and that’s why we like them. In my case, I also used two books because I had no alternative. Let me show you, where’s the article? OK, this is reference number two. Here, read this sentence.

Taken from article - “However, despite the high prevalence of intestinal parasites in developing countries (2) no published data is available from East Africa evaluating the role of these parasites in patients presenting with dyspepsia”.

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OK? I had to defend my statement that there was no published data – I couldn’t just say so and leave it hanging. That’s why I needed this book. The other one is here, reference number four. This one was an issue of procedures. It’s a technical manual and I took part of the methodology from it; and so I had to put it in.

5.2.8 Effect Of Publication Standards On Dissemination

When asked what the effect of publication standards was on their dissemination activities, most of the responses were mainly negative and can be summarised in the following way.

There was the observation that it is difficult to get published in international journals because editors expect up-to-date references. These are difficult to find. This sentiment was expressed across the range of grades. One professor made a particularly insightful remark:

If you look back at our productivity in the entire university system in the 1980s, you will find that it was much higher then. And I’ll tell you why. We published more, because we had a few hundred journal titles then. Mrs. X at the library can confirm this for you. We now have less than twenty and it’s difficult, even for myself, to get published.... Don’t look at the output of research articles as a measure of research in Kenya. We are doing a lot, but not publishing! Because we cannot! It’s not just libraries, If you don’t have secretarial facilities or computers, like some of my younger colleagues, you won’t go very far... All these things go together... they are a package.
An academic medical researcher expressed a similar sentiment and went on to say that most of his colleagues opt to publish in the EAMJ because the peer review process is more sympathetic and understanding of the difficulties faced by researchers. He however pointed out that this was not to say that bad science or research results were accepted for publication. He also went on to say that in his experience, papers take far too long to be published in the EAMJ after acceptance and he speculated that this could be because of the huge number of submissions received from within Kenya and Africa too.

Another government medical scientist pointed out that:

*Literature is growing very fast in HIV-Aids. Because of this, only articles with very recent literature are accepted and so it is very difficult to publish abroad if you are working in this field.*

*I can honestly say that I know everyone working on HIV-Aids in Kenya. We have a network of some kind where we exchange literature and all sorts of things; meet for discussions and the like. And even with all this, [activity] it’s difficult to get enough recent literature and I mean very recent, to write a decent article.*

*I’m fortunate that I’m working on this funded project and get everything I need as I told you. If it were not for this, I don’t know how I would publish in this area.*
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5.3 OBSERVATION

5.3.1 Catalogue Use

In the three weeks of observation at R, no use was made of the catalogue at all as can be seen from Table 5.2. This is not surprising though because an inspection of this catalogue revealed that it was out-of-date, incomplete and could not be considered in any way as a representation of the stock at R.

Table 5.2 The number of medical scientists observed in various activities

<table>
<thead>
<tr>
<th>Activities</th>
<th>R Sep</th>
<th>R Nov</th>
<th>R Feb</th>
<th>S Sep</th>
<th>S Nov</th>
<th>S Feb</th>
<th>T Sep</th>
<th>T Nov</th>
<th>T Feb</th>
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<td>Catalogue use</td>
<td>9</td>
<td>3</td>
<td>5</td>
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<td>8</td>
<td>10</td>
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<tr>
<td>Enquiries</td>
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<tr>
<td>Abstracts</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Borrowing books</td>
<td></td>
<td>11</td>
<td>14</td>
<td>9</td>
<td>43</td>
<td>25</td>
<td>31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Returning books</td>
<td></td>
<td>12</td>
<td>5</td>
<td>13</td>
<td>32</td>
<td>19</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Browsing</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>22</td>
<td>12</td>
<td>8</td>
<td>36</td>
<td>38</td>
<td>25</td>
</tr>
<tr>
<td>Journal back-run use</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>15</td>
<td>6</td>
<td>2</td>
<td>39</td>
<td>23</td>
<td>31</td>
</tr>
<tr>
<td>Newspaper reading</td>
<td>16</td>
<td>27</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td>36</td>
<td>31</td>
<td>26</td>
</tr>
</tbody>
</table>

Key

| 0 | 1-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 |

Catalogue use at S was low and highest at T. It is difficult to make a judgement as to why this should be the case. It might have something to do with the fact that there is an OPAC at T and this encourages use. It could also be the case that
because of the newer book stock at T, catalogue use is encouraged. Use at T might also be high for each of these reasons combined.

As regards use of the catalogue at different times of the year, it peaked at both S and T in the month of September 1998. It is hypothesised that this might be to do with return of students for the new academic year. If this were true, it would in turn suggest that the academic medical scientists were using the library for teaching purposes on these visits rather than for their research work.

5.3.2 Journal Use

Journal use can mean different things. For this study, a distinction was made between browsing the current serials and actual use of a journal. Use was considered to be activities such as carrying the journals to a desk or seating area from where it was read. Alternatively, taking photocopies of an article was also considered ‘use’. Merely standing at the current journal display and flipping through was considered to be browsing.

It can be seen from Table 5.2 that the academic medical scientists at T made the most use of current journals, followed by those at S. Government scientists at R were lagging in their use of journals. It should be pointed out that this pattern is reproduced in the number of current journals taken with T taking 23, S, 17 and R, just 13. Whereas the level of holding will not account entirely for the pattern described above, it must contribute in some degree.

Just as in catalogue use, more use was made of journals in September by academic scientists than in any of the other two months. This could again be for the same reason advanced above.
Chapter Five – Results from Journal Analysis and Observation

All enquiries made at R by Government medical scientists were actually requests for inter-library loans. These requests were made at an open office adjoining the newspaper reading area. There is no issue desk at this library. Enquiries at S and T were more diverse than at R and can be summarised as follows:

Table 5.3 Types of enquiry made at desk

<table>
<thead>
<tr>
<th>Type of Enquiry</th>
<th>S</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation of CD-ROM – Medline</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Queries relating to the OPAC</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Queries about Journal Holdings</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Queries about Book Holdings</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Requests for Inter-Library Loans</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Queries about Reference Materials</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Requests for help on Literature Searches</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

There were no enquiries about CD-ROM or the OPAC at S simply because there is no OPAC at S and the CD-ROM workstations are provided by healthnet which is independent of the library.

5.3.4 Abstracts

No single observation was made of abstract use. This corroborates the findings of the interview study neatly and it would have been surprising to have observed any abstract use. Interestingly though, there are at S, current copies of *Index Medicus* at the journal display shelves. They also have uninterrupted back-runs. Because it was so unexpected, an enquiry was made about it and this researcher was told that it was part of the serials that the library gets on donation.
Chapter Five – Results from Journal Analysis and Observation

5.3.5 Borrowing And Returning Of Books

No books were recorded being borrowed or returned at R for the simple reason that there is no formal system of book-lending in the library. An arrangement exists whereby books are borrowed in an informal manner. This consists in the borrower’s name and title of books being borrowed being recorded in a record book. There was also an instance where book loans were recorded on scraps of paper. It was not clear to this researcher how these scraps of paper were filed.

It can be seen from Table 5.3 that there is much more book borrowing at T than at S. One reason for this could be that the book stock at T is far much newer than at S. This is because T is a younger university and so the collection is newer. However, S has the advantage of being a better collection for retrospective uses as it has a lot of old materials.

5.3.6 Browsing

Browsing for purposes of this study was defined as any activity in which a subject of observation wandered round the library, using material in a casual or leisurely way. Most of the browsing activity at all three sites took place either at the current journal display or at the books and journal back-runs stacks.

5.3.7 Use Of Journal Back-Runs

The lowest use of journal back-runs was at R as can be seen from Table 5.3. It is possible that this is because the holdings of back-runs in the library at R are considerably fewer than at S and T. Academic scientists at S are next in the use of journal back-runs followed by academic scientists at T, who make the most
use of journal back-runs. Again, the use of back-runs at T in September, was higher than at any other time.

5.3.8 Newspaper Reading

Of all reasons for visiting the library, newspaper reading was by far the most common. At R, almost all use made of the library seems to be for reading the daily papers. This can be seen quite clearly when the newspaper reading statistics are compared with the statistics for other activities. Newspaper reading at T is also high and this is perhaps more to do with the fact that the library is situated within the academic departments than because there is nothing else to read which is probably the reason for high use of newspapers at R.

However, at S, newspaper reading is not as popular. This could be for a number of reasons. First, the library is situated a fair distance from faculty offices. Second, there are far more users at this library competing for services (including newspapers) than there are at R and T. Third, academic medical scientist at S do not have as much time available to them as do their colleagues at R and T.
CHAPTER 6
Discussion

6.1 INTRODUCTION

The aim of this chapter is to discuss the results presented in chapters four and five. The study model will be used as a framework for discussing the results. Before embarking on the discussion, the concept of intervening variables, which is important in the study model, needs to be expanded upon. Intervening variables are considered to have the effect of barriers in preventing the information seeker from accessing the information sought in some way. It is also recognised in the model that the intervening variables can in some situations act to encourage or facilitate information seeking. Hence the term intervening variable in preference to barriers. In the model, the variables are grouped into four classes as follows:

<table>
<thead>
<tr>
<th>Personal characteristics</th>
<th>Social/interpersonal</th>
<th>Environmental</th>
<th>Source characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age and sex</td>
<td>Established behaviour</td>
<td>Time</td>
<td>Credibility of channel</td>
</tr>
<tr>
<td>Education</td>
<td>Social factors</td>
<td>Geography</td>
<td>Access</td>
</tr>
<tr>
<td></td>
<td></td>
<td>National culture</td>
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</tbody>
</table>

For most of the variables above, no explanation is required to show how they might act as barriers to information seeking. However, two of the environmental variables, time and national culture, require explaining to show how they might act as barriers to information seeking.
Chapter Six – Discussion

The first variable, time, is not used here in the ordinary sense to mean that the medical scientists do not have any time at all that might be diverted from other uses to information seeking. Rather, it means that the medical scientists give those other uses of time priority over the expenditure of additional time for information seeking. In essence, after a point, the opportunity cost of spending more time on information seeking is considered to be too great. In this sense, the idea of time as an economic variable as well as an environmental one is conjured.

The second variable, national culture, refers to an amalgam of sub-variables that might be activated together or singly in acting as barriers to information seeking. The most cited work on the impact of national culture on work-related values is *Culture’s consequences* (Hofstede, 1980). Hofstede explains that country or national cultures differ in four main dimensions. They are: power/distance, uncertainty avoidance, individualism/collectivism and masculinity/femininity. Steinwachs (1999), and Wilson (1996) have discussed the ways in which the four dimensions might manifest themselves in an information seeking situation. Each is explained below.

1. Power/distance is about the relationship between boss and subordinate. In the context of this study, power/distance refers to the degree and ease with which a subordinate interacts with his or her boss.
2. Uncertainty avoidance refers to the degree in which members of a society are comfortable and can live with uncertainty particularly with regard to the future.
3. Individualism/collectivism refers to the extent to which the interests of the individual in a given culture take precedence over societal interests.
4. Masculinity/femininity refers to the roles society deems appropriate for the male and female sexes and to the relationships between the sexes.
Throughout this chapter, the effect of these intervening variables and others will be explained and discussed as appropriate.

6.2 INFORMATION SEEKING

One theme of the present study is to show how the medical scientists obtain information to support their research work. The model that this study is based upon outlines four different channels for active information seeking. These are information systems, conferences and meetings, personal collections and personal contacts. The use of each of these four channels for active information seeking and the way that they support medical research is discussed.

6.2.1 Information Seeking - Libraries

The medical scientists were asked to indicate which libraries they used for their research work. Three pre-defined categories were available: own organisation’s library; other academic / research library; and public libraries. A summary of the results is shown in Table 4.3.

It is not unexpected that almost 60% of academic scientists and 87% of government scientists said that in addition to their own institutions’ libraries, they use other academic or research libraries for their work. That 87% of government scientists do so could be a confirmation of two things. First, that they suffer the inadequacies of their library more acutely than academic scientists as has been suggested when discussing the amount of information available to medical scientists. Second, this finding reinforces the observation that the government scientists have a very poor library.

Apart from the above, this use of other libraries may be brought about and understood for other reasons. One reason is undoubtedly the lack of inter-library
loan facilities. This forces the medical scientist to physically travel to other libraries. In richer countries, this would not happen in the same degree, as most information needs would be satisfied through inter-library loans. Thus this use of other libraries in Kenya, is simply a different manifestation of a familiar situation. Similarly, the total absence of a viable document delivery service such as the British Library Document Supply Centre further encourages and necessitates this use of other libraries.

Therefore, the use of other libraries identified in this study is not really a new phenomenon. Rather, it is a physical expression of a need common to scientists everywhere, the difference being that in richer countries, mechanisms are in place for the remote access of other libraries.

The finding that the medical scientists use libraries other than their own to seek information offers one explanation of how information is acquired to enable quality research to be done.

The medical scientists in the interview study cited a wide range of libraries that they use. Very often, this use is not regular at all. It can best be described as ad hoc because visits are many times one-off. Some of the libraries are particularly good while others are just average. However, each has something to offer and contributes to the research information on offer.

There are also many libraries that are attached to international organisations with specific mandates. These are rich information enclaves with very specific collections. As a result a medical scientist working on an inter-disciplinary research project might have to visit a number of these libraries to source all information that may be needed.
Chapter Six – Discussion

It would be untrue though, to say that all the medical scientists go about different libraries seeking information because they do not. However, when the medical scientists are sufficiently motivated for whatever combination of reasons, they go out and visit different libraries seeking information to support their research, and often find it. But it is hard work. The effect of time as a barrier to information seeking is seen most clearly here. For the majority of the medical scientists, the potential rewards in accessing the information do not match or exceed the opportunity cost of spending the additional time seeking information. And they do not do so.

What are the factors that militate against the medical scientists visiting other libraries in large numbers? The first of these is time, which has been mentioned. The amount of time you require to make a “fishing” trip to the library is far greater than you would allocate for a visit to your library down the corridor or in the next building. When this is considered alongside the fact that the trip will at best, be a speculative one, because there is no way to know of the holdings of other libraries, the prospect is even more unattractive.

The second factor is transport. Again, not many medical scientists will use their own transport to travel to another library. Only the motivated will do this. There is a strong feeling amongst the medical scientists that they should not have to subsidise their institutions in order to perform their duties. This is demonstrated by medical scientist (9) who said that though he sometimes knew where certain information could be found, he would not make any arrangements of his own to obtain the documents.

A third factor is the cost of photocopying. The idea of a subsidy is raised again and rejected outright. Many of the medical scientists said that the cost of photocopying could amount to a sum of money that they do not think they should be spending just in order to obtain information.
The alternative to photocopying is to use the documents in the library and take notes. Many of the medical scientists pointed out two problems with this. One problem is that it is almost impossible they argue to note down everything that might be of interest later in the research. If no copy is made therefore, the prospect of return visits to consult the document again is raised. Another problem is that to use the documents in the library means a further expenditure of time that many of the medical scientists would not consider.

It may well be the case that if the information available in these other libraries could be accessed remotely, many more medical scientists would take advantage of their holdings.

Mention has been made of motivation in the foregoing paragraphs. The use of the word motivation is not meant to imply that there are medical scientists who are de-motivated in the personal sense, or that there are perhaps some irresponsible or recalcitrant medical scientists. Rather, a motivated medical scientist is one who will use personal resources to overcome the barriers described above even when there is no obvious incentive for behaving in this way.

Thus there may be a medical scientist who generally performs well with what is available, but might not be prepared to do any more. There is nothing wrong with this. However, if the same medical scientist were to cover the costs of transport, photocopying, hiring of assistants and the like, he or she could be described as motivated. There are a few medical scientists motivated in this way though none was encountered that had hired a research assistant!

There is a second route to motivation. And that is through a medical scientist -- or group of scientists -- winning a research grant or sponsorship for research. The stimulus of having support and the enthusiasm that comes with working in an
accommodating environment ensure that the barriers discussed above are eliminated. In reality, information behaviour changes too. And it is when this happens that good research is produced in an environment that is at first sight, very hostile.

The effect of the barriers to information seeking is that a lot of useful research goes unreported in the journal literature. Because no one is given a research grant to publish an article, and to do so would require the expenditure of what is perceived as disproportionate effort, the medical scientists do not on the whole publish articles. One might think that the threat of being passed over for promotion say, should be enough to spur the medical scientists on to write articles.

However, it does not. The reason is simple. All the medical scientists are in the same position in terms of publication output. The human tendency to follow a path of least resistance is so strong, it ensures that few medical scientists will be willing to subsidise activity that might even lead to career advancement. Besides, other standards for promotion are used alongside publication counts including what Court refers to in discussing the higher education sector in Kenya as "the economy of affection" (1983).

In summary, there are several libraries and documentation centres that between them have holdings sufficient to support research. However, it has been shown that information consumers -- and in this case medical scientists -- will not use information services if to do so means to expend even the slightest bit more effort than they are convinced they need to. The only way therefore that use of these libraries and documentation centres can be maximised is if there are structures in place that minimise or eliminate the extra effort required.
6.2.2 Information Seeking - Conferences

Conferences offer an opportunity to make contacts and to find out what constitutes interesting research. This is an important function because research emphasis changes over the years. What might have been considered interesting, credible or worthwhile research four years ago may no longer be interesting in the present. Conferences are also ideal for discovering new techniques and the latest and main discoveries in a discipline (Seggern, 1995).

Conference attendance amongst the medical scientists is not as high as might be expected with two-thirds of the medical scientists having attended just 2.7 conferences in the four years previous to the study. Attendance is evenly spread between academic and government medical scientists, as is non-attendance. Thirty five per cent of the medical scientists had attended no conference in the previous four years to the study. The attendance rate at conferences is lower than one estimate given in which it is suggested that many scientists including those from poor countries attend at least one conference each year (Meadows, 1998).

However, because conference attendance is chiefly beneficial in allowing new contacts to be established, the usefulness of attendance will not be universal. Some people enjoy travel and meeting new people. Such people are likely to engage others at conferences and establish useful and lasting contacts. Other people do not like to travel and do not easily engage others. For such people, conferences will only be useful for the presentations if at all. This researcher had a conversation with a UK chemist involved in post-doctoral research who said:

*The thing I dislike most about my job is that I have to travel in Europe quite a bit... I’m never as happy as when I’m on a plane headed home with a copy of the Guardian!*
Chapter Six – Discussion

Amongst the medical scientists who have not attended a conference in the four years previous to the study, there are probably some medical scientists who have not done so for this reason.

However, for those who find them useful, conferences are important. In a study of Russian scientists in the Perestroika era (Markusova et al., 1996), the scientists emphasised the importance of scientific conferences as a means of scientific communication. They said that after attending conferences they would continue to communicate with colleagues who they met at the conference. For the Kenyan medical scientists, an important benefit of being able to attend conferences was this opportunity to extend their network of personal contacts as was seen in Chapter Four.

The medical scientists who would like to attend conferences often encounter barriers, the main one being money for travel. But this only affects a segment of the sample population, albeit a big one. The reason for this is that there are many research projects at both the universities and research institute that have money available for conference travel. In 1997, medical scientists had travelled in this way to Tanzania; Kampala, Uganda; Orlando, Florida, US; Cape Town, South Africa; Tel Aviv, Israel; Harare, Zimbabwe; Atlanta, US; Leeds, England; Tygerberg, South Africa; Tokyo, Japan; London, England; Linkoping, Sweden; Heidelberg, Germany; Antwerp, Belgium; Liverpool, England, amongst others.

Thus there exists a dichotomy in conference travel with the medical scientists that are working in the well-funded research projects able to travel as has been shown. On the other hand, for those who are not part of funded projects, it is very difficult to find the money to attend conferences.

Earlier in Chapter Four, it was seen that some medical scientists said that they did not attend conferences because they are not inclined. Those who said this
were in the minority but it is suggested that in fact, after finance for travel, this is probably the second most important reason for not attending conferences for the academic medical scientists. This belief is supported by a recent report in which it was disclosed that up to 50% of the lecturers in medicine spend no more than 12 hours a week on university related work (*Daily Nation*, October 11, 1999). Conference attendance will be very low in the priority list of such medical scientists as the university job is in a sense secondary.

Similarly, Court (1983) notes that social scientists at the University of Nairobi are engaged in work outside the university in order to supplement their income. Because they cannot cut back on teaching, the effects of this are usually seen in non-performance of research. There is no reason to suppose that the situation would be any different for medical scientists.

Turning to conferences as an information channel, there were two contrasting views. Three medical scientists said that the usefulness of conferences tapers off as you gain seniority. One academic medical scientist said:

*I don't find conferences useful anymore. When I was starting out I enjoyed them but now I try and avoid them. I could attend many more than I do but they're all the same. It's the same old people saying the same things over and over again. I personally find them a waste of time – I still go to a few though.*

You contradict yourself. Why do you go?

*It is difficult to explain, but it is mainly because I can’t get out of going. But also, every so often, I come away with something... though this is becoming rarer for me each year. Soon I shall be an endangered species at conferences.*
This appears to suggest that because senior medical scientists will have established contacts already, they do not find that they learn anything at conferences that they have not already learned from their contacts.

Three professors and two directors at the institute expressed this sentiment. It is an irony that because of their seniority, these medical scientists have all the facilities that enable one to establish and maintain contact and they also get to attend the conferences. This of course is because they are all high profile scientists and so easily obtain funding for travel either from sponsors or their employers. They all each have telephone in their offices including separate direct dial lines. They also have fax and access to e-mail for which they do not have to pay. It is natural that they should be less enthused than their colleagues who do not have the same.

The less senior medical scientists were all convinced of the information value of attending conferences. This finding is not unusual though and several studies have shown this including the Russian study where it was found that the Russian scientists said that conferences were particularly important for them because they did not have any other way of staying current with the literature. But, it is also the case that the less senior they are, the smaller the chance the medical scientists have of being able to attend conferences unless they have been invited to give a talk.

How do the medical scientists hear about conferences? The most common way in which conferences are heard about is through announcements in journals followed next by colleagues. A tradition has also developed where medical scientists who are so inclined, make photocopies of conference notices and calls for papers, and post these on notice boards to widen dissemination.
Chapter Six – Discussion

It may at first sight seem a contradiction that conferences should be primarily heard about through journal announcements, in an environment where there are few journals. However, many conferences are announced in the EAMJ, which many of the medical scientists receive. Also, though the libraries take very few journals, the few which are taken, are all core journals in different disciplines. These will carry many other announcements between them.

No medical scientist said that they had heard of a conference through the Internet. That the Internet is increasingly a place where conferences are announced should not be overlooked. It can be argued that because conference announcements are more and more disseminated on the Internet, many of the medical scientists will not be aware of such conferences for lack of Internet access. This argument can be rebutted though with the counter argument that when the probability of attendance is matched against the knowledge of conferences available, the medical scientists are in a sense, more informed than they need to be.

This point of view though could also be challenged on the basis that the ability to seek out the most relevant conference going is important for precisely the reason that opportunities are few to travel. Therefore, the medical scientists are in particular need of targeted conference information if they are to maximise the potential benefits of attending conferences.

The foregoing paragraphs all relate to ways in which the smaller conferences are heard about. Many of the medical scientists said that they know well in advance when the main international conferences will be held either through their learned societies or various other sources such as journals and conversation.
6.2.3 Information Seeking - Personal Collections

The natural place for anyone seeking information to go to is their own collection of research materials if they have one. Hence, personal collections are one of the information seeking channels in the model that guided this study.

A large proportion of the medical scientists – 67% of government scientists and 81% of academic scientists – reported having a personal collection of research materials. This finding is similar to findings of other studies done elsewhere. Bichteler and Ward (1989) in the geoscientists study found a heavy dependence on personal journal subscriptions in particular. Reprint collections and book collections were the next most important items in the geoscientists' collections. In this study, photocopies of journal articles and books were the most important items in the personal collections of Kenyan medical scientists.

Several studies have shown that scientists have a preference for accessing literature through their personal collections of research materials. Soper (1976), found that scientists found 74% of their citations in their personal collections. Ephraim (1993) found that some senior medical scientists in Nigerian medical schools had personal subscriptions to journals. In a study of rural health professionals in Hawaii, Dorsch and Pifalo (1997), found that for most physicians, the journal article was the information source that best met their information needs and that personal collections or a colleague's were the most common places for them to gain access to journal articles. Curtis, Weller and Hurd (1993), in a study of the information seeking behaviour of health sciences faculty found that medical faculty relied heavily on personal journal subscriptions as a source of journal articles: 77.9% of faculty in medicine met their journal article requirements through personal subscription. Studies of physicians have also shown that they prefer to use their own collections before going to the library or other information service (Leckie and Pettigrew, 1997).
However, though most of the medical scientists in the present study claimed to have some type of personal collection, they are not collections that can be used to support the medical scientists' research work in a meaningful way. This is because their collections are ad hoc as was described in Chapter Four. The reason for the patchy nature of their collections is that they find it too expensive to purchase books or subscribe to journals, thereby building up a collection of materials in a given area.

Instead, their collections are built up through retention of photocopies and other items acquired in the course of their work without the luxury of being able to choose what to acquire. Without a thriving publishing sub-sector in medicine, the medical scientists do not benefit from copies of books that they might have received for review, as do their colleagues in richer countries. The value of receiving books -- and in some instances proposals -- for review cannot be overemphasised. Neither are they paid an allowance for purchase of research materials, as is the practice in some countries. As a result, there is not much scope for the medical scientists to build up a useful collection in a directed way.

There is of course the alternative that a few of the medical scientists have chosen of writing to authors for reprints. This though is not an alternative that can be applied anywhere near universally for the medical scientists. Writing to authors requesting for reprints implies a psychological predisposition that only very few medical scientists will have. There are some medical scientists who like many other workers in different professions and sectors, are strictly eight to five workers; though competent, they believe that they should not have to go out of their way to get what should be provided. It would be unrealistic therefore to expect such medical scientists to be this proactive as many of the findings of this study point to the fact that they will not.
Returning to the medical scientists’ personal collections, it is interesting that despite the thin and disparate nature of the personal collections of the medical scientists, many of those who participated in the journal article study said that they had cited items found in their collections. The reasons they gave for citing from their own collections are not just to do with lack of access to journals and other research materials in libraries as might be expected.

They were also to do with the convenience of having and using material ready to hand and also the psychological preference for using items in a personal environment. This latter point appears to be very important and confirms that accessibility is important in any consideration of what is read. Meadows (1998) in discussing researchers’ contacts between groups, notes that contact is much less when the researchers are in different buildings. The same principle also applies to use made of the library and it is perhaps no coincidence that library use is lowest at R where the library is located in the administration block far from the medical scientists’ laboratories and research centres.

Given the medical scientists’ preference for personal collections, the consequences of not having reasonable personal collections for the Kenyan medical scientists are obvious. It means that they have to do things that they do not like to do more often such as visiting the library and making trips to other libraries. The effect of this of course, is that most opt not to do so.

It is quite possible that there are many potential articles that were not written because of the difficulties in obtaining all the information sources required to write an acceptable article.

The findings of this study on personal collections converge with findings of studies done elsewhere. The fact that most of the medical scientists’ collections are small is a detail. The real significance of this finding is that whereas Kenyan
medical scientists have similar need for personal collections as do their colleagues elsewhere, they do not have the necessary supporting structures to enable them to build up these collections.

If there were a thriving local publishing industry, it would be possible for the medical scientists to build up a collection of materials without incurring too great an expense, as Kenyan imprint would be cheaper than foreign materials. There is however very little publishing activity because of the narrowness of the market thus limiting the scope for acquisition in this way.

In 1995, university academic staff of all disciplines came together to lobby for a special allowance in their salaries to be paid directly to publishers. The idea was to allow academic members of staff to receive one journal of their choice within a fixed price range. The proposal however, was not accepted.

### 6.2.4 Information Seeking – Personal Contacts

Generally speaking, interpersonal contacts are in most situations extremely valuable and even more so where libraries are inadequate to support research work. Interpersonal contacts are also valuable when time is constrained and information is required fast. Interpersonal contact has been described as

> the exchange of a unit of useful information, bounded in time, retained in the researcher's memory or briefcase, that generates some later action ranging from immediately influencing his research work to expanding his general scientific competence (Liberman, 1997).
Information is exchanged through personal letters, telephone calls, e-mails, at meetings, through exchange of pre-prints and even sabbaticals abroad. These all have a stimulating effect on a scientist’s research.

In the present study, it was seen that contact with the leader was highest for the government medical scientists followed by contact within the research group. This was followed by contact within the department, between groups, nationally and finally, internationally. International contact is low for the reasons outlined in Chapter Five.

Academic medical scientists have a different pattern of scientific exchange to the government medical scientists. Their highest contact is within the department, followed by contact nationally, internationally, within groups, with research leader and finally between groups. This pattern might be an indication of the small amount of group research being undertaken in medicine in Kenyan universities.

In the geoscientists study it was found that interaction with colleagues at work was the most common form of professional contact made (Bichteler and Ward, 1989). In the present study, the government medical scientists make greater or more frequent interpersonal contacts than do their academic colleagues. This could partly be a reflection of the state of library services available to them. It may also be attributed in part to the government scientists working close to one another as their offices and labs are physically close to each other. Also, government medical scientists are at work the whole day, every day and so have greater opportunity to meet. Academic medical scientists on the other hand, could either be in the office, delivering a lecture, at their surgeries in the city or attending to patients at the teaching hospital. Opportunities to meet each other therefore do not present themselves too frequently for academic scientists thus making it difficult to establish contact regularly.
In the Russian study, Markusova et al. found that 80% of the Russian scientists said that their research could not be done efficiently without the support of Western colleagues who were their main source of up-to-date information (1996). In the journal article study, the medical scientist (3) who has established contact with a colleague in London is one example of international contact being a main source of the latest information.

Personal contacts are usually the first information seeking channel chosen by the medical scientists when faced with an information problem. Many said that they approach a colleague first for suggestions before moving on to use libraries. They also said that personal contacts were a good way to keep current on who was doing what. Personal contacts were also valuable in that colleagues are often used as a sounding board for new ideas and theories a medical scientist may have. A few of the medical scientists -- notably those involved in HIV-Aids research -- said that personal contacts were indispensable as developments in HIV-Aids were very fast and always far ahead of the literature.

The high level of contact between medical scientists in HIV-Aids research is interesting as it is a demonstration of the "invisible college" at work. Crane (1972) described the "invisible college" as the communication network that forms in research areas of rapid growth. Contact among HIV-Aids researchers is so important that apart from being one-to-one it has also been developed into an informal research network with meetings being held monthly.

It will be seen later in this Chapter, that the report literature is difficult to access for various reasons that will be discussed. However, the effects of this difficulty are reduced somewhat through the information obtained in informal exchanges. Socialising outside of office hours is a common occurrence in Kenya. Colleagues are often friends too and at some point in the evening, conversation will usually turn to work issues and quite a lot of information is exchanged in this way.
However, informal exchanges cannot of course be a substitute for the retrospective use of the report literature.

The main reason for the medical scientists not having greater contact than they do is barriers related to access. It was seen in Chapter Four that one-to-one was the most common way of making personal contact (Table 4.15) for both government and academic medical scientists. This is closely followed by laboratory conversations for government medical scientists. However, e-mail use is low. The low use of e-mail is particularly unfortunate, as e-mail is a useful and cheap way to communicate. One attraction of e-mail is that the message will always get there even if the receiver is not there to take it. Also a fairly immediate response is likely; most people will answer e-mail. The low use of e-mail by the medical scientists is more to do with access than the medium itself.

The geoscientists without libraries reported extensive use of the telephone to reach various personal contacts. Unfortunately, the medical scientists cannot do this as telephone use is restricted and all personal calls are paid for. Further, telephones at one university medical school are still only to be found in the offices of heads of departments. This further complicates things; few people would bother to time their calls to when the head of department is in the office especially when it will have to be paid for too.

Some of the academic scientists at this university said that they do not really consider telephone as a viable way to make contact. There is a sense that access is disproportionate to potential benefit. This sense has a certain resonance for this researcher who has on many occasions left home for the office late, in order to make a telephone call from home that was required to be made during office hours.
The lack of telephone is a real hindrance. In a study of biologists in the UK, it was found that some of the biologists felt that restrictions on use of telephone for long-distance calls and also on travel to conferences was somewhat unhelpful (Rolinson et al, 1995). Yet, these scientists experience nothing like the restrictions that the Kenyan medical scientists face.

Whilst e-mail is available at all three sites, there is a fee charged for its use at the universities and it is charged for both receiving and sending messages. It is not overly expensive, but to have to pay the equivalent of fifty pence each time you send or receive e-mail can add up to a lot of money and is obviously a deterrent. E-mail use is also discouraged by the fact that the medical scientists do not have it on their desktops but are expected to go to some central point to access it where there may also be several users waiting to use the service. The inconvenience of physical access is probably a more powerful deterrent than the financial cost.

At the institutes, e-mail is available for use by government medical scientists on specific projects. These are usually the well-funded projects and will have a budget set aside for e-mail connection. The trouble with this arrangement is that government medical scientists outside of these projects have no access to e-mail. Their only option is to use an Internet Café or to persuade a colleague with access to send a message on their behalf.

The real loss in lack of universal e-mail connection is that it is the one channel that would allow the medical scientists to maintain contact with colleagues abroad efficiently and cheaply.

Formal face-to face meetings are few. This is because nationally, the medical scientists are separated geographically by long distances which make face-to-face meetings difficult. They only happen infrequently. Yet, in view of there being
few medical scientists in any given medical discipline nationally, it is important that a broad range of ways to facilitate contact, including face-to-face meetings should be available. Informal face-to-face meetings between colleagues of a single employer happen much more frequently as was seen in chapter four.

Another barrier to establishing personal contacts is national culture. The effects of national culture will often prevent a junior colleague from making contact with a senior colleague especially one in a different department or group. This is to do with the African culture of respect for elders, which in the work environment translates to a high power /distance factor. Because personal contact is usually with a senior colleague when information of a certain type is being sought, the effects of this high power /distance characteristic can be quite restrictive.

Do these contacts hold any value for the medical scientists? Do they benefit them in any way? There are two kinds of benefit the medical scientists said they obtain from their personal contacts. The first is in obtaining research materials. This is shown by the findings of the journal article study. A few examples will demonstrate this. Medical scientist (1) described his discovery of sources as partly involving “fishing”. This in essence is the use of personal contacts. He said that he describes to colleagues the work he is involved in and said that this was a system that worked well for him and that he had been alerted to a number of useful references in this way.

The “London professor” also used a personal contact to gain entrée at the LSHTM library and thereby a number of references. His paper was largely based upon what was made available to him in London. It is debatable whether he would have had the same degree of success if he had just walked in to the LSHTM library with no introduction other than his credentials. As it was, a colleague and professor introduced him to the library staff.
Medical scientist (3) wrote his entire article relying exclusively on materials made available to him by his colleague in London. This again illustrates the value of having good contacts.

Medical scientist (4) was given an item that was relevant to his work by a colleague and this only happened because they engaged in conversation whilst waiting for a staff meeting to begin.

All of the medical scientists interviewed indicated that they received some benefit from making personal contacts. The benefit as has been shown above is usually in the form of a document or information about where a document can be obtained.

However, there is a second and perhaps more important benefit that is enjoyed through scientific exchanges. Most of the medical scientists that cited one-to-one as a way of making contact also referred to this. And that was the benefit of receiving know-how. There is always need for know-how in various areas such as the best way to approach a procedure for instance.

The important thing most of the medical scientists said about know-how is that it cannot be communicated efficiently, in writing, or even through a telephone conversation. Telephone though, may be second best where face-to-face meetings are not possible. The communication of know-how involves the communicator initially probing the receiver’s level of competence and understanding on the issue at hand. This helps in diagnosing where the gaps in knowledge lie and therefore in determining where emphasis needs to be placed.

Know-how is predominantly a function of experience and therefore senior medical scientists often have greater know-how than do their junior colleagues. Internationally, medical scientists and indeed all scientists in the West will
generally have greater know-how at comparable levels. An example will serve to explain why. In poor countries, certain kinds of surgery for instance are performed intermittently because of either a lack of funds, broken equipment and even a shortage of presenting cases for want of diagnosis or whatever. In the West, there will usually be continuous surgery and a plethora of presenting cases. It is inevitable that the Western medical scientists should develop greater know-how as they have plenty of practice. In summary, the greater the opportunity you have to practice, the wider your repertoire of know-how.

Thus the value of personal contact for know-how is invaluable for the medical scientists. Some of them said that often in experimental research, textbook procedures do not work at all as expected or not as well. This is because in textbook accounts, certain conditions assumed to be present may not in reality be present. It is thus only through the application of know-how that such problems are resolved.

6.3 PASSIVE SEARCH AND PASSIVE ATTENTION

Thus far, the main activity of information behaviour, information seeking has been discussed. The remaining dimensions of information behaviour proposed by the model are passive attention and passive search. These terms broadly refer to serendipity and browsing activity. Even though they have been included as separate dimensions in the model, the two will be discussed together because serendipity often happens during browsing.

6.3.1 Browsing

Browsing is referred to in the model as passive search. It has been termed passive search as opposed to active search because the aim of browsing is not to find specific information. This does not imply that browsing is a search without
direction. People generally browse to keep up-to-date and reassure themselves that there is no new information that might have been overlooked. To do this, they look at sources that they believe might contain the type of information they would be interested to have. In essence therefore, the main browsing activity will involve the scanning of various sources.

However, Kulthau (1999), makes the observation that traditionally, browsing has been considered to be at best, a haphazard way of information seeking. She goes on to suggest that in some cases at least, it might be useful to view browsing as an initial information seeking strategy.

In the observation study, the number of medical scientists that came in to the library to browse was recorded. It is safe to assume that people only come into a library to browse if they have some expectation that there are sources to browse and also that there is a chance of finding useful information in those sources. If this is true, then it can further be assumed that the greater this expectation of finding useful information, the higher the number of people coming in to browse will be. The findings of the observation study fit these assumptions. The library at R with the fewest number of journals had almost no medical scientists browsing. The library at T with the most journals recorded the highest number of medical scientists browsing.

It has been argued that a straightforward indication of searching technique is the extent to which searching tools such as library catalogues and abstract journals are used. It was also suggested in chapter four that because of the unreliable nature of the catalogue at R and the small size of the library, most government scientists would browse the library rather than use the catalogue. Though the government medical scientists did not use the catalogue in their library, browsing activity, which was consequently expected to be higher, was also very low.
This is not surprising though. There are only 13 journal titles and the rest of the library is not organised as has already been mentioned. Amongst the academic scientists however, both catalogue use and browsing, was high at T and lower at S. These results show that across all the three sites, the level of browsing activity matched the level of catalogue use.

It was also shown in Chapter Four that more academic medical scientists found information by chance while browsing than did government medical scientists. This is probably because the academic scientists browse more than the government medical scientists.

The findings of the observation study corroborate those of the interview study where it was seen that 21 government scientists did not scan any journal at all on a regular basis. However, 29 government scientists do and the observation data for R shows nowhere near this kind of level of browsing activity. Where do they go to scan these journals then? Many of the medical scientists said that they scan journals that are subscribed to and kept by their research groups. These were collaborative research groups including some Japanese sponsored groups, the American military (Walter Reed Institute) and the Wellcome Trust.

This finding offers another clue to explain how it is that research is performed. Though the institutional library the government scientists have is most inadequate, for many of them this is not really a problem and they do not suffer for lack of information because they work in international research groups. However, for those that are forced to rely on the institutional library only, there is no scope for the level of support required for innovative research.
6.3.2 Serendipity.

There are two types of serendipity that the medical scientists encounter. The first can be defined as social serendipity in which accidental discoveries are made in social settings. These could happen at lunch-time, after office hours, in corridors, in an office and so on.

It has already been mentioned in discussing the value of personal contacts that many of the medical scientists meet outside office hours and that a lot of information is exchanged in his way. However, the type of information shared in this way may not even be scientific. This does not lessen the impact of such information, as it may be instrumental in moving the research forward in some way.

Where such information is scientific, its quality is likely not to be as high as that obtained from reading for instance, unless it is know-how. The reason for this is to do with the difficulties of conveying scientific information orally. And this is why it is so important to have written resources to refer to after having been pointed in the right direction in an oral discussion.

One way in which quality scientific information can be found serendipitously is when browsing in the library. It happens sometimes that you come across information that is really important while browsing quite by accident. Many of the medical scientists said that this had happened to them. They also experienced serendipity while watching television, listening to the radio – such as the case of the medical scientist who developed an interest in blunt trauma injury from listening to the radio – and also the national press.

Similar findings but in a different setting were obtained by Williamson (1998), in a study of 202 elderly people in Melbourne, Australia. It was found that
incidental information acquisition was a common occurrence amongst the elderly while listening to the radio. It also happened while watching television, or reading magazines and newspapers. They also reported that in such situations, they often did not know that they needed the information until they stumbled on it.

6.4 USE OF INFORMATION SOURCES

Thus far, the different dimensions of information behaviour postulated by the model have been discussed. Following is a discussion of the detail that emerged in investigating the different dimensions of information behaviour outlined in the model. This will include a discussion of the medical scientists' use of information sources, dissemination and communication behaviour and finally, a discussion of the effects of their research milieu and perceptions on information behaviour.

The medical scientists were asked to mark on a card the library information sources that they used and also to indicate the frequency with which they did so. The findings were as shown in Table 4.4 of Chapter Four. Following is a discussion of the findings on the use of information sources.

6.4.1 Journals

Numerous studies can be identified that show that the scientific journal is the main source of information for scientists. In this study, comparable findings were obtained with 85% of the medical scientists saying that they used journals (Table 4.4). Further, 56% of the medical scientists said that they use journals at least weekly.
In addition, 81% of the medical scientists sampled said that they scan journals on a regular basis. Of these, 51 medical scientists receive the EAMJ as part of their membership. In the observation study it was found that journal use was in proportion to the number of titles available. Thus T had the highest use and R the lowest.

Turning to journal back-runs, use is low at R and S when compared to T as was shown in the findings of the observation study (Table 5.3) However, the overall use of journal back-runs at all three libraries is not great.

Taken together, these findings illustrate a number of points. The Kenyan medical scientists view the scientific journal as very important for their research work. They also scan journals where they can, and would perhaps do so in greater depth and number if more journals were available. The same might be said for actual use of current issues and back-runs.

The emphasis on journal literature was not unexpected though. Physicians in a study in Hawaii, reported that journal articles were the information source that best met their information needs (Dorsch and Pifalo, 1997).

Similar findings to these were obtained by Markusova et al. (1996), who investigated the information behaviour of Russian scientists in the *Perestroika* period. They found that 93% of the scientists ranked foreign journals as the most important source of information.

Bichteler and Ward (1989), in an interview study of academic geoscientists in the US, found that browsing new journals was the highest ranked activity during geoscientists’ visits to the library. Most of the academics they interviewed said that they scan between eight to 12 journals carefully. In the present study, the
medical scientists scanned a maximum of six journals with the majority of scientists scanning between two and three journals carefully.

Although the Kenyan medical scientists have a clear preference for journals, their libraries subscribe to very few journals so they are unable to access the journal literature in that way. The low level of library subscription to journals is due to inflationary book and journal prices. This is a problem that is experienced in many developing countries (Lundu and Lundu, 1989). In 1995, for instance, the British Medical Journal cost $260 to subscribe to. By 2000, the cost had risen to $380 and the British Journal of Sports Medicine cost $232 in 1995 and $300 in 2000. And yet, one Kenyan university library that was included in the present study had a nil serial budget in 1992-93, 1993-94 and 1994-95 (Clow, Sène and Rosenberg 1997). In the Russian study, scientists also talked of the difficulty they face in obtaining foreign journal literature and ranked foreign journals as the information source that was second only to books in difficulty to obtain.

One alternative open to the medical scientists is to take out their own subscriptions to journals they regard as important. The geoscientists in Bichteler’s study depended heavily on personal journal subscriptions. A study of health sciences faculty in the US revealed that they too rely heavily on personal journal subscriptions as a source of journals with 77.9% of faculty in medicine and 86.7% in pharmacy relying primarily on personal subscriptions for their journal information (Curtis and Weller, 1993).

Unfortunately, Kenyan medical scientists find it expensive to take out personal subscriptions to journals. They cannot therefore access journal literature through this means. Closer to home, Ephraim (1993) in a study of the users of medical school libraries in Nigeria obtained broadly similar findings to the present study and described the collections of Nigerian medical school libraries as having been “brought to an appalling and advanced state of deterioration”. However, the one
difference in the Nigerian study was that the senior medical scientists in Nigerian medical schools have taken out personal subscriptions to journals. The situation in Kenya is the exact opposite with none of the medical scientists having done so bar one.

It will be remembered that the three libraries R, S, and T take just 13, 17 and 23 journals respectively. No library is able to subscribe to all the journal titles that their users would require to satisfy their information needs. What happens in practice, is that libraries share resources and also make use of lending agencies where they exist. In Kenya, there is no national lending agency. Where resources are limited, it is even more imperative that they are shared and used to the maximum by all. However, this implies substantial co-operation by the universities and research institutes and this is not always easy to achieve. The co-operation of agencies granting research funds would also be required. Books and journals would perhaps be better utilised if acquisition were co-operative and collections held centrally rather than diluted across several libraries.

Garcha and Buttlar (1996) discuss some of the factors that stand in the way of inter-lending in African libraries, and note that inter-lending has been hampered by the high cost of postage, transportation and distances between libraries. Also, the many restrictions on various sections of library collections further reduce the scope for inter-lending. Africana and theses collections are a good example. Lack of reprographic facilities is another hindrance as is lack of adequate funds for collection development.

The situation outlined above is regrettable because there are rich holdings scattered in various libraries which could make a real difference to the medical scientists' information needs if these resources could be shared. The journal article analysis study revealed just how much information is held in different libraries. Citations to articles in a wide range of international journals found in
the different libraries were made in the ten articles analysed. It is an irony that these resources are not shared when they desperately need to be.

The implications of the above are clear. For most of the medical scientists, their research work must suffer in some degree if the most important source of scientific information is almost totally inaccessible. It may be argued that the majority of Kenyan medical scientists either receive or have access to the EAMJ and that because it has an international circulation, their situation is not that bad. This may be true in some degree but the danger in being assured of only a local journal to scan, is that it could lead to the development of an inward-looking scientific culture. This is especially so in an environment where there are in addition to poor libraries, few scientists nationally, further reducing the scope for exchange of information and cross-fertilisation of ideas.

6.4.2 Abstracts And Electronic Databases

The use of abstracts was unlikely to be high taking into account the level of serial holdings and the general state of collections and it was therefore no surprise that 81% of the medical scientists said that they did not use abstracts at all. Seggern (1995) argues that non-reliance on and non-use of secondary literature sources for staying current on a research front should not be surprising. This does not have to be true. In an environment where research libraries are well-stocked and alternative arrangements exist to make available what is not found on site (that is document delivery services), secondary sources will almost certainly be used. In this respect, what is surprising in this finding is that 19% of the Kenyan medical scientists said that they use abstracts.

This is surprising for a number of reasons. First, as has been mentioned earlier in Chapter Four, there is no real need for abstracts in the environment of this study.
Second, in a situation where there is little likelihood of obtaining the full text because of poor collections and the absence of document delivery services, it is even more difficult to see why a medical scientist would spend time searching abstracts.

Third, the medical scientists had stated a preference for electronic databases over the hard copy. It is almost certain that this stated use of abstracts is historical. A few of the medical scientists in the course of the interviews would reminisce about the days when they would as post-graduates, use *Index Medicus*. These were also the days when the library of the one medical school at the time, was taking in excess of 400 journal titles. Also, some of those saying that they use abstracts probably felt that it was the correct thing to say. This conclusion is lent credence by the findings of the observation study where no single use of abstracts was recorded.

On the other hand though, the use of electronic databases is high. There are only a few medical scientists (11.8%) that said they do not use electronic databases at all. Some of these medical scientists are those who have not yet been converted to the benefits of electronic databases. They are generally the older staff who have no experience of computer use and prefer not to use computers at all. Their antipathy for the computer extends across the range of computer applications. As an example, even where they have access to computers – and most do on account of their seniority in tenure - they have all their work word processed for them by secretaries. It should be expected that they would not therefore use electronic databases.

This behaviour or decision not to use computers is not unusual though. It happens everywhere. In the study of the information seeking behaviour of health sciences faulty at the University of Illinois at Chicago (Curtis, Weller and Hurd, 1997), it was found that most scientists continued to use print indexes as their
primary means of obtaining information from the literature, even after online versions became available.

These similar experiences coming from two technologically different societies suggest that the role of training in IT use cannot be ignored. Too often in Kenya, IT development is regarded as a panacea for all ills besetting libraries. Yet, if the introduction of IT is not well managed it can easily alienate a section of the user-community particularly where some users have had no experience of computing during their years in formal education. For the medical scientists described above, IT education is clearly a barrier to their use of electronic databases.

But education alone is not to blame. Age works in concert with education as a barrier to the use of electronic databases and computers generally. It is common to people in all professions and everyday situations to adopt and continue with the habits of the way they started at the beginning of their careers. This group of medical scientist falls into this category of people. For them to adopt new habits in middle age would require a total shift to an IT culture in their institutions. This would compel them to take an interest in IT lest they find themselves unable to cope. This however, will not happen in their lifetime.

Apart from those who do not want or like to use computers, there are amongst the 11.8%, a small core of medical scientists who do not use electronic databases because of problems with sourcing the full text of the article. The medical scientist (5) in the analysis of journal articles study was one of these who asked the rhetorical question, “what would be the point of using Medline?” in reference to the few journal titles available. He is a good example of a scientist that acknowledges Medline as a “useful tool”, but says there is no point in using it if it only serves to whet his appetite!
Amongst those who say that they use electronic databases often – that is daily or weekly – there is undoubtedly a small number who exaggerate their use out of a desire to be known as computer literate. The reason for reaching this conclusion is the reality that there is little prospect of ever seeing the full-text of whatever is retrieved. There are of course a small group of medical scientists that are dogged in their search for information, such as the government scientist that writes to authors to send him reprints of articles he has identified as useful from Medline. He has built up a vast reprint collection and also makes several photocopies of articles whilst at conferences. These medical scientists can rightfully claim to make use of electronic databases often.

Though in the foregoing paragraphs it has been argued that there is not much need for electronic database use it is recognised that there are two stages in the research process when their use is likely to be unavoidable. These are the background stage when a project is being initiated and also the writing up /dissemination stage. In the former, information on previous projects on a similar topic will be searched. At the latter stage, information that supports the completed research will be searched.

The use of electronic databases could not be monitored in the observation study because at all three sites, the electronic databases are situated outside the libraries where the observation was taking place. There is no observation data therefore to compare with that obtained in the interview study.

6.4.3 Conference Proceedings

The main function of conference proceedings is to bring current research quickly to the attention of interested scientists who were unable to attend the conference in question. This function assumes added importance in a situation where inability to travel to conferences is more the norm than the exception.
In the present study, it was found that conference proceedings are not used much with 62% of the medical scientists saying that they do not use proceedings at all. All the three libraries are ill equipped to make a serious job of collecting conference proceedings and this no doubt, is reflected in the high non-use rate. The high rate of non-use therefore, is driven more by the failure of the libraries to collect proceedings rather than by the medical scientists refusing to use conference proceedings.

However, in reality, conference proceedings will in many cases act just as a written record of the conference for Kenyan medical scientists because of the long lead-time between the event, publication of the proceedings and acquisition where applicable. In essence therefore, conference proceedings are less likely to serve the immediate needs of medical scientists in a country such as Kenya than they might in richer countries where there are not as many barriers to the acquisition of proceedings.

This said though, proceedings of conferences held in Kenya (both local and international) should be able to be obtained without too much difficulty. Also, they are more likely to have relevant information in them than would proceedings of conferences held elsewhere. Unfortunately, not all proceedings are collected by the libraries, especially those of the smaller meetings. Nevertheless, the proceedings of the Kenya Medical Association Annual Conference are readily available.

Turning back to proceedings of international conferences, one way of getting round the acquisition problem would be to make it a requirement that those who attend conferences should make available to the library on their return, a set of conference papers. This of course is a rule that would only work if it were established with the support of research managers and the library.
6.4.4 Books

Thirty seven per cent of the medical scientists said that they do not use books at all. This is almost two-fifths of the sample and under normal circumstances would be unusual. Bichteler and Ward in the 1989 geoscientists study, found that books were third in rank amongst information sources most used after journals and reprints. In the observation study, borrowing and returning of books was highest at T – almost intense – and non-existent at R. There are reasons why this might happen.

Perhaps the most important barrier to the use of books is access. The library at R has books but they are not catalogued or classified in any way. The book stock is shelved on stacks at the back of the library in no particular order; this deters use by all but the most determined scientist. This state of affairs will have contributed to the high number of medical scientists claiming no use of books. In fact, as was mentioned earlier, there is no formal system for borrowing of books at R and this can be seen in the findings of the observation study where not one single instance of book borrowing or returning was recorded. It should be said here that though there is no formal system for borrowing books at R, if a scientist wanted to use a book outside the library, the title of the book and borrowers name are recorded in a book to facilitate the transaction.

The library at S too, has a very old book stock, which would not attract much use by researchers except for perhaps retrospective use. It is suggested that it is because of the dated book stock at S, that use is not as high as at T even though the stock is at least twice as large as that of T. The foregoing read with the findings of the observation study would appear to suggest that there is very little use of books at S and none at all at R. In the case of R, it is conceivable that the little use made of the books by the government medical scientists is too marginal.
in their estimation to even warrant being described as “sometimes”, which was the next category of use to “no use”.

The findings of the observation study concerning books taken together serve to illustrate the very low tolerance scientists have for information seeking. The findings suggest that unless a library is well and efficiently organised, scientists will not use it no matter how great their information need. And this rule applies to every community of library user. Therefore, if there is a lesson to be learnt, it is that housekeeping, however mundane or passé it is thought to be, must be done. It seems odd that library staff should resent not being provided with adequate funds to undertake IT development – as was indicated by a senior library assistant at R – and yet ignore the fact that their library in its present state cannot be automated! The library staff seem not to be aware that no one after visiting the library would make money available for automation.

Like in the case of journals, the medical scientists have the option of buying personal copies of important monographs and books. However, medical books are notoriously expensive and this is the main deterrent to the medical scientists doing so.

6.4.5 Reports

Turning to reports, none of the three libraries collect reports in a systematic way including those originating in their own institutions. Reports share all the characteristics of grey literature, which are that they are distributed in small numbers and are produced outside of the formal publication channels. This means that they are difficult to identify, find and obtain. What usually happens therefore, is that reports are scattered among offices in different departments. This problem is partly a research management problem and partly a library
problem. Research managers need to ensure not only that the reports are written, but that they are delivered to the library.

The libraries in turn, need to shift their focus to reports and recognise that they are an important and legitimate information sources that should be effectively organised as they are a useful resource for their clients. Sturges and Neil (1998) note that, apart from the sheer size of grey literature published in Africa, its content is often very useful too and stress that it should not be ignored. Even where reports are available in the library, they are often not catalogued or classified. This is because reports are perceived by Kenyan librarians to be difficult to treat using the rules of AACR2.

For some unclear reason, librarians feel bound by cataloguing rules and are loath to develop a set of local, less stringent rules to enable them to organise their collection of reports. The effect of this inefficient bibliographic control is to obscure the report literature held in the libraries with the result that use of reports is seriously undermined. In a research setting, this is a severe drawback. This is because, even where medical scientists are not motivated enough to publish their findings as an article, the outcome of all research projects will usually at the very least, be documented in a report. If the report literature is unavailable therefore, there is little else to fall back on in an information poor environment.

Given the foregoing, it is no surprise that the medical scientists make little use of reports. Even those that do, often obtain them through their personal contacts and not through libraries. Medical scientists often hear of different reports and obtain them through friends and colleagues. It would however be better if it was possible to go to the library and find most of the reports produced in the institution, all in one place together with others produced at other institutions.
To achieve this would call for agreements to be reached between universities and institutes' research managers and libraries for the exchange of reports. This is the only way that acquisition of the report literature can be semi-assured.

Like everything else in the provision of research information in Kenya, there is light at the end of the tunnel and in the case of reports, positive initiative have been made. To perform any research in Kenya, permission must be obtained from the office of the president. It should be pointed out that the title office of the president is a bit of a misnomer, as it refers to a large ministry and not to the personal office of the president. One condition attached to the granting of a research permit is that the research outcome report should be made available to KENSIDOC (the national scientific information documentation centre) on completion of the research.

This move has drawn a lot of criticism for being unnecessarily bureaucratic and stifling academic freedom. These charges notwithstanding, it was a clever move in one sense as it has contributed a great deal to making available the report literature. KENSIDOC now has the largest collection of research reports in the country and is an important information resource.

However, even taking into account that physical accessibility is an important factor in the determination of what is read and cited by scientists, you would think that a resource like KENSIDOC would be used far much more than it is. But it is not. Over and over again in this study, the extraordinary inertia attaching to information seeking is demonstrated. The case of KENSIDOC is another example of physical access being a barrier. Clearly, what is required is an effective document delivery system to make the collection an active resource. It is the lack of such a facility that has diminished the value of the KENSIDOC collection.
In summary a number of the findings in the present study converge with those of previous findings. These are that the Kenyan medical scientists prefer to use journals as their main source of retrospective information, a finding that has been confirmed in several other studies. It was also found that some medical scientists continued to use print abstracts, but that this is not unusual. Medical scientists in the US were found to do the same thing.

On the other hand, a number of findings on use of information sources are different to those of previous studies. Kenyan medical scientists do not take out personal subscriptions to journals because of the cost. In Nigeria where circumstances are much the same as in Kenya. Senior medical scientists have personal subscriptions to journals.

Also, many of the medical scientists in the present study were found not to use books. Other studies have shown that scientists rely upon books as a source of information (Markusova et al., 1997). The same applies to conference proceedings.

However, all the divergent findings can be attributed to circumstances (mainly barriers) that have prevented the medical scientists from doing what they would like to do. Or in this case, using information sources that they would like to. In this sense, the aspirations of the medical scientists on the use of information sources rather than being divergent, are broadly similar to those reported in the literature.

What do these findings on information use imply for theory? The model on which this study was based postulates among other things that information users actively seek information and also that there are intervening variables that might act as barriers to information seeking. According to the model, an active search event will either end in success or failure. If the end-result is failure, there is a
choice to either abandon the search or reformulate it and persist with the information seeking activity.

Underlying the above is the assumption that information seeking activity takes place at conferences and meeting, using personal collections, through personal contacts and by using information systems such as libraries. There are therefore a number of ways in which a medical scientist for instance, can access information sources such as journals or books. And so, unless specifically asked, it is not possible to say which of the four ways above is used to access the information sources used.

This is not a drawback of the model. It has methodological implications though. If this data is to be available, it will be important to control for the four different ways of obtaining information sources, when asking questions about the same. This was not possible for this study as it would have meant either inordinately long interviews, or other aspects of the model would not have been investigated. It is suggested therefore that future studies on the same topic should control for access of information sources.

In terms of practice, the findings also have implications. There is currently a debate in the literature over the benefits of access against ownership. In a country such as Kenya, the debate is different because ownership is clearly constrained. No one would argue that it is preferable that a research institution should maintain a certain level of ownership so as to meet as many information needs as immediately as possible. A collection is also required to allow browsing and to provide current awareness conveniently

Kane (1997) has summarised the benefits and disadvantages of ownership and access. She points out that a library based solely on ownership and particularly a research library, would not be able to survive in the present day on account of the
ever rising costs of books and serials. On the other hand, a main problem of access only is the delay implied in access to materials and also the loss of the ability to browse.

However, because ownership is so difficult, it is even more imperative that information managers make suitable arrangements for access. It has been pointed out that there is a lot of information held in various institutions and organisations. Inter-library loan and document delivery systems should be a priority.

This is particularly so because there is at present serious under utilisation of most collections. The small budgets that each of these libraries have are not being maximised and represent waste.

6.5 DISSEMINATION /COMMUNICATION

Advances in knowledge, indeed the progress of research, depend on adequate communication. The findings of research are only useful if they are disseminated as widely as possible. In this way, information users are also information creators and in the process, the boundaries of knowledge are extended.

Apart from the need to know how the medical scientists carry out this important function of communication activity, there was a second reason for investigating the medical scientists’ dissemination activity. And that was to determine to what extent the methods of dissemination chosen by the medical scientists promoted or hindered their colleagues’ access to local research findings.

It was found that the medical scientists’ predominant way of disseminating research results is through internal reports, the journal article, and conference papers in that order. Internal reports are mandatory but because of the problems
outlined earlier, they are not an effective way of disseminating the results of research. Even without the problems that were discussed, reports typically are issued within an institution and are rarely obtainable outside of the institution. This situation of course is different when the research is government sponsored say. The distribution of a government commissioned report may be wider.

The journal article with its wider potential audience is clearly a more effective form of dissemination. Before discussing the effect of dissemination method on access, the effects of poor access on publication will be discussed.

In the journal article study, all bar one of the medical scientists interviewed was unhappy with their reference list because it was shorter than they would have liked. Apart from the number of references, most of the medical scientists were also unhappy with the quality of the references in terms of age and source. They all cited access to the literature as the main problem they faced.

This problem is perhaps best illustrated the situation of medical scientist (1) who was unable to trace a copy of his own article -- as was seen in Chapter Five -- until this researcher made it available to him. And yet, it was in the library at R. When this was made known to him, he appeared surprised. He clearly did not expect that it would be available at R.

Medical scientist (1) drew two assumptions. First, that his article would and could not be at R because the library lacks credibility. Second, having arrived at that conclusion, the choice not to visit that library became part of his established behaviour. This attitude towards their libraries is insidious as it develops over time eventually leading to non-use in some cases.

The above is not the only obstacle though because even if he thought that he could find it at R, he would either have had to make a long journey to obtain a
copy or he might have been able to make some arrangement to have the article sent to him.

Given the foregoing, most of the medical scientists have little incentive to go beyond the internal report stage with their results because of the difficulties in getting supporting material to frame the research in such a way as to meet publication standards. And yet, research does go on in Kenya leading to publication of articles internationally. To give an example, a study of the Science Citation Index shows that Kenya was the leading science publishing country in the east African region in 1993 contributing 45% of the region’s output or 549 scientific articles (Teferra, 1995). The east African region is defined to include Burundi, Djibouti, Ethiopia, Kenya, Rwanda, Somalia, Sudan, Tanzania and Uganda.

However, where they do publish, the quality of the articles is said to suffer. It was thus decided to informally test whether the quality of the ten articles sampled in the journal article study might have suffered because of problems of access to literature and what the effects of this were on the articles’ publishability.

One main way to test the quality of research publications is to count citations. This however was not going to be possible in this study. The reason for this is that though the EAMJ is covered by the ISI Citation Index, the African Journal of Health Sciences which is the other journal that was used for this exercise, is not. It was therefore decided to hold interviews with three different academic medical scientists at a large medical school in the UK instead. Each of the three UK medical scientists were given copies of the ten articles and asked to comment on the quality of the articles. In effect, this was an exercise in peer review.

The three academic medical scientists were a professor who shall for this study be called A, a consultant and senior lecturer who shall be called B, and a lecturer
Chapter Six – Discussion

who shall be called C. All three are on the editorial boards of journals in their specialities and A in particular, is on several boards and is also the editor of a main journal.

C’s first impression on having a look through the articles was that on the whole, all the ten articles were in his judgement, well written. He singled out medical scientist (4’s) paper as being particularly well set out and said that this might have something to do with the fact it was reporting on a controlled prospective scientific study.

On the potential impact of the articles, C commented that many of the articles were in effect, case reports and said that the scientific value of case reports was limited.

A went a step further and made the point that case reports are unlikely to be published in main journals unless they are augmented in some way. However, he said that case-reports are very important and that he expects all junior doctors under him to publish case reports as articles. In this regard, he has meetings once a week with each doctor to discuss the case reports.

He also said that he had noticed that one medical scientist had relied upon and referenced abstracts but said that there was nothing wrong in doing this. What was questionable though, was the practice of relying upon an abstract of an article rather than the full text. He warned that you might pick something in an abstract for example, mistakenly think that it was criticised for X and report it as such, when in fact, it was really criticised for Y. He also said that relying upon abstracts can help to perpetuate errors.

The practice of relying upon abstracts is not uncommon. He said that a number of times he has caught out people when reviewing a paper and said “no, that paper
doesn't say that". He believes the reason for this happening is that the authors of
the papers in question were simply not reading the full text.

B thought some of the papers were good and particularly singled out (6's) paper
which he described as good. (8's) paper he also thought was good and said this
was because of the references to articles published in international journals.
Needless to say, this was the article written by the medical scientist who obtained
all of his sources from Germany.

On the other hand, he described medical scientist (5's) article as very good. This
was the article that was written entirely from sources obtained locally at T. This
article had 22 references out of which three were to articles in the EAMJ and all
the rest to articles published in international journals.

Concerning the age of references, C thought that the references were on the
whole quite old, and said that this increased the probability that the research
would be a duplication of previous research. However, he also made the point
that some of the old references were justified because they were citing people
who were first to describe a phenomenon.

Turning to the number of references in each paper, two of the articles had 11
references each and two others had 14 and 17 references each. C was of the
opinion that the articles were under-referenced. He said that for a scientific
article, a reasonable range would be between 20-30 references. For a review
article, a range of between 50-100 articles would be expected.

B noted that in general, the references were dated. He said that this -- apart from
the danger of duplication -- meant that there was a possibility that what the
scientist was reporting had been superseded and this was especially so for a case
report. He emphasised that for a case report to be of any value, the literature cited must be up-to-date.

B was also of the opinion that many of the articles had references that were too provincial; many of the references he said, were to articles also published in the EAMJ. He said that this might prejudice the chances of being published and said that for this reason, “the message may not be received very well.”

About the age of references, A said that he immediately noticed the number of old references and that the danger of having old references was that it introduced the possibility of duplication. He also said that he had noticed that the articles that had international references were in the main, references to articles in well-respected journals. He was also of the opinion that the number of references per article was "perhaps a bit lower than you might expect."

Concerning the choice of methodology, B said that methodology was important in terms of whether an article will be publishable. He said that a machine being used to carry out a test for example might no longer be considered reliable in carrying out the test. This would invalidate the results obtained in the eyes of reviewers and editors. He also said that ideally, the results should be related to results of what has been found elsewhere and that this might be difficult to do in Kenya for reasons of equipment and access to the literature.

On methodology, A had a different view to his colleagues and said that for the kind of articles he was looking at, choice of methodology would not have an impact and said that he could not immediately think of methodologies that would have improved the researches in any way. What some of the medical scientists might have done he said, would have been to look at more than simple relationships. Even though he said, judging from the quality of the articles, he suspected that problems with financing research were more to blame for the
medical scientists not looking beyond simple relationships, than was scientific ability.

C’s opinion on whether the articles were publishable in the UK was that one of the review articles would not be publishable in the UK for having too few references. Similarly, one of the prospective studies would not be publishable because of what he described as a flawed control group. The remaining prospective studies and the case reports were in his view, publishable.

B was of the view that apart from the three articles he had talked about, the rest might have been difficult to publish abroad because of the old references. He also said that there has been in the West, a move away from retrospective studies and case reports towards more prospective research. Some of the articles therefore would be more difficult to publish internationally for this reason.

When asked to comment on whether the articles were in his view publishable, A said that “if I had not seen the journal titles, they could have come from one of the lesser journals.” He went on to say, “… they could easily have been published in niche journals…” and once again said that with the right support, “I see no reason why they shouldn’t do internationally competitive research.”

What are the effects of the medical scientists not being able to publish as much as they would like internationally? Thornber (1990) observes that scientists publish for professional, personal and institutional reasons. It is reasonable to expect therefore that the result of non-publication will be experienced in these areas.

Professionally, the medical scientists publish to announce their findings. If they are unable to do so, then the whole rationale for having done the research is negated. Further, the money spent on the research is as good as wasted. However,
in the Kenyan situation, there is a benefit that comes from the medical scientists not being able to publish as much internationally. And this is that the EAMJ receives more articles for publication than it can publish. In this way, only better articles are published, and research results which would had been obscured for lack of access to international journals, are more widely available in Kenya for being published in the EAMJ.

An important personal motive for publishing is to stake a claim on the research done. In this way, a reputation is built which apart from securing promotion, may lead to invitations to speak at conferences, examine theses, act as a referee or be a book reviewer. This reputation will further opportunities for research and benefits the scientist and his or her employer.

Similarly, at the institutional level, there are benefits that accrue from having faculty that are visible internationally. One benefit is that it makes it easier to attract donor or funding agency support as the institution itself will be rated for attracting and retaining productive faculty. This is something that the university medical schools in Kenya and the research institute should continue to improve on. Therefore, investment in information should be viewed in the long term and regarded as an important asset in maintaining the institutions’ reputations. Second, where faculty are visible, research students are easier to attract and through them, the reputation for research grows.

6.6 RESEARCH MILIEU / PERCEPTIONS

6.6.1 The need for libraries

The medical scientists were broadly of the view that a library is important for research and most said so. However, they were unequivocal in their description of the poor state of their own institution’s libraries and their dissatisfaction with
library services was pervasive. Despite this view, one professor described his institution's library as "75% all right for undergraduate work and perhaps the first year of the Masters programme."

It is not surprising that the majority of the medical scientists should say that a library is important for research. This is a universally agreed view and one that few would wish to challenge. However, this is not to say that the medical scientists do not believe that it is important to have a library. This researcher came away from the interviews with a strong sense of real frustration on the part of the medical scientists with the general state of library facilities. This sense served to persuade that there is among the medical scientists, a tangible and genuine recognition of the need for good library facilities.

In Chapter Five it was shown that many of the medical scientists had reservations about the quality of library service available to them. However, all but one of the medical scientists used some library to discover and obtain part of the material they required to write their articles. Even the one medical scientist that had all he needed brought from abroad said that he would have used his library if his colleague in London had not sent him what he did. The use of these libraries suggests that though there are problems with the provision of library services, there is not for the medical scientists, a perfect substitute available for the library. If there were, they would almost certainly have found or developed such a substitute.

Two issues are raised here. First, it would appear that the use of a library if one is to do research is inescapable. It was shown that where their own library was insufficient for their work, which was often the case, the medical scientists used other libraries. If inter-library agreements were in place and working, this use of other libraries would have been invisible. In this case, it was overt and illustrates that for many there is no alternative to visiting another library if information
needs are to be met. The fact that the medical scientists actually make trips to other libraries further reinforces the sense that the medical scientists have a genuine need for libraries.

Second, the use of other libraries confirms that the medical scientists do not rely wholly on their institution's libraries for their research work. The findings, particularly those in chapter five, show that a good proportion of the materials that the medical scientists used for their research work were obtained elsewhere. It was also made clear that without the use of these other libraries, the relevant articles would not have been written, or at best, would not have been of the same standard in which they were eventually published.

6.6.2 Amount of information available in the field.

The medical scientists were asked to indicate how much information they thought was available in their field. Seventy seven per cent of government scientists and 60% of academic scientists thought that there was too little information (Table 4.1). These figures indicate that most of the medical scientists find a problem in securing enough information for their use; and this is particularly true for government scientists. Only eight per cent of government scientists think there is too much information in their field as opposed to 23% of academic scientists.

This could be because the government scientists are more likely to be adversely affected by inadequate information as their sole work role is to perform research. In an information poor environment therefore, they will be acutely aware of the lack of information. Academic scientists on the other hand, are only partly engaged in research as they have teaching too as a primary work role.
6.6.3 Stage of research at which information need is greatest.

The medical scientists were asked to indicate the stage of the research process for which they had the greatest need for information. The research process was divided into three parts labelled background, methodology and presentation to guide the medical scientists in their answers. They were required to order the three stages in descending order of information need.

It was intended that the findings from this question would be used to ascertain whether there was a stage of research for which most medical scientists require information and whether this had implications for the kind of information that they might require.

In discussion with the interviewees, it became apparent that information need in the sense that this question was asked might be influenced by a number of things. Some of the things mentioned to account for their chosen ordering were as follows:

1. Personal collections. The nature of collections in terms of coverage and breadth will determine the ordering of the three stages given above. It may be that a medical scientist has built up a large collection of research materials in a particular area and so may not need information on methods for example, as much as the latest information for presentation / dissemination purposes.

2. Quality of supervisor / team. Some of the medical scientists pointed out that in the overall scheme of the research project, they were nothing more than “spanner boys”, to quote the term used by one government scientist. What he meant by this is that a junior member of a research team might be assigned duties to perform which may be to do with experimentation only for instance. Such a scientist will be provided with more or less everything that is required to perform
the duty. Therefore, any answer that he or she might give to such a question the medical scientists said, would be applicable only in similar situations.

They went on to say that when a junior medical scientist is in doubt, the leader of the team or a senior researcher in the team will usually be on hand to resolve the problem. As such, the pressure or need for information is not felt as strongly by such medical scientists. Apart from this, it was also pointed out that a medical scientist's role may not be equally important throughout the life of the research and this would also have an effect on the construction they placed on the question.

Conversely they said, if the research were a single person research, the answer to the question might be entirely different, as the support of team members in the former example would now be support from colleagues in this example. This they pointed out makes a big difference because the amount of time and effort a colleague will put in to help you will be less than a colleague who is also a team member will do.

3. The affective also plays a part in the construction put on answering this question. Two government scientists made the point that what was called background information was for them of utmost importance for the following reason. It was mentioned in chapter four that government scientists are not allocated funds to finance research. Instead, they are expected to write proposals and win funding. These two government scientists said that most funding agencies are based abroad and expect a certain quality of proposal. However, without adequate facilities (and they cited the full gamut: research information, photocopying, production/secretarial etc.) they find this initial stage of attempting to win funds for research a source of much stress.
However, when invited to join a large research team, this bit of the research process is bypassed and therefore in answer to the question, they point out, they may say something entirely different. Motivation is therefore important as many government scientists they said did not bother to write proposals as they have no expectation of being able to do so adequately.

4. A final factor mentioned by both academic scientists and government scientists was the nature of the research project being undertaken. It was said that in practical terms a prospective experimental research project is very different to a retrospective epidemiological research. Each type of research project will make different demands in terms of information need at different stages in the life of the research.

What has been established from these findings? It is clear that the medical scientists have a genuine need for good and functioning libraries. It has also been shown that when they must, the medical scientists will use their libraries, but on the whole they do not regard their libraries as worth visiting. Most of the medical scientists and more the government scientists, find that there is too little information available for them to adequately perform their work. Finally, it has been shown that depending on various factors, it is not possible to say that information need and use will peak at a certain point in a research project.

Given the scenario outlined above, these findings have a number of implications for information service managers if a good service is to be provided to the medical scientists.

There is a need for periodic user studies in order to develop a profile of the population of medical scientists being served and also to establish the nature of research being conducted.
This would allow the development of information services that are tailored to the needs of the medical scientists. Because the medical scientists have little faith in their libraries, it is incumbent on library managers to engage more with the medical scientists and let them know how the library can be of help to them beyond what they think.

6.7 RESEARCH MILIEU

There are certain aspects of the research milieu that have an impact on the medical scientists’ information behaviour. These can either be negative or positive in their effect.

It was seen in Chapter Four that often when a research project is funded by a partner institution, there usually is a component of money made available solely for the subscription to journals, purchase of books and costs of document delivery. This is clearly a useful and advantageous arrangement where it exists. It is also usual to have e-mail access and fax machines dedicated to the research group. However, such arrangements also create problems of their own.

Usually, these collections are for the use of project members only. This is not perhaps the most efficient way to use what is a scarce resource. These collections should be open to all government scientists. Keeping them closed also has the effect of drawing artificial boundaries between the government scientists in which there is an ‘in’ group and the rest. The effect of this is that the scope for things such as personal contacts for instance is greatly reduced for the cliquey nature of the organisational structure.

The ultimate consequence of the above is that hose government scientists that are not part of these funded projects develop an attitude that they cannot do any research at all because they lack the same level of support. It must be
remembered that for government scientists, the conduct of research is their job, and not just one of their work roles as it is for academics.

The high number of government scientists that come to the library at R to do nothing than read the daily newspapers is surely a severe indictment of the library.

6.8 Appropriateness of the Methodology Chosen for the Study.

The methodology that was chosen for this study had two main strategies attached to it. The first was concerned the theoretical framework. It was resolved to use both quantitative and qualitative methods for the study. The results of the study show that this was useful as it allowed complementary data to be collected, which gave a more holistic picture of the reality of the medical scientists' information behaviour. An example might show how. The qualitative information given shows in the case of conference attendance for instance, that there are many problems that some of the medical scientists face. It would be easy to arrive at the conclusion that most of the medical scientists are unable to travel to conference. However, the quantitative data obtained showed that whilst conference attendance is not high, it is certainly greater than the qualitative data on its own might have suggested.

The second strategy was the use of triangulation. That is three different data collection methods. The use of triangulation in this study was important because there are several findings from each of the three data collection methods that read on their own, might have misrepresented the medical scientists' information behaviour. To take one example, in the interview study, the overwhelming response to the question on library use was that the medical scientists do not use the library. However, during the journal article study, all of the medical scientists except for one reported using their respective libraries.
These two seemingly contradictory positions are in fact not contradictory. Rather, the two findings help to deepen understanding about the medical scientists' information behaviour, and demonstrate that people give answers according to their perceptions of the level of generalisation and abstraction of the interview. It is therefore important for some degree of triangulation to be built into studies in which context is important such as this study.
CHAPTER 1

Introduction

1.1 PREAMBLE

The focus of this study is on the information-seeking behaviour of Kenyan medical scientists. The choice of the topic for this study was influenced by a sense of the role that scientific research plays in national development. This role of research is widely recognised and is factored into most national development policies. The principal aim of defining a national development policy is to map a strategy for positive growth in key socio-economic indicators such as education, health, housing, social welfare and so on.

Positive growth in key indicators, defined as economic development, is characterised by a rise in a people’s standard of living. In developing countries (particularly those of Africa where a deterioration in key indicators has been seen in the 80s and 90s (Singh, 1990)), the goal of economic development is even more challenging and compelling.

One important instrument in attaining the economic development of a nation is its ability to conduct research. Research has been defined as “systematic enquiry with the aim of producing knowledge.” (Ernest, 1994, p.8). The Oxford dictionary defines research as “careful study and investigation, especially to discover new facts” (Thompson, 1995).
7.2.1 Information Gathering

The first main finding was that both government and academic scientists use their institutional libraries for research information even though they were almost all critical of their libraries. It was also found that government scientists use their library less than do academic scientists.

The results of the study also reveal that some of the medical scientists use other libraries nationally in order to obtain information in support of their research work, particularly the libraries of international research centres.

A number of problems were identified that plague the libraries included in this study. All three libraries face an acute shortage of information materials. Services such as current awareness are not offered, and in some cases even general housekeeping is not maintained at an acceptable standard. Although all three libraries have Medline on CD-ROM, its usefulness is diminished by the inability of the libraries to provide hard copies of searches retrieved.

However, the first hypothesis that because of the inadequate development of university and research libraries, Kenyan medical scientists do not rely on these libraries for information for their research work has to be rejected as it has been shown that they do. That the medical scientists use their libraries for research information is a positive and welcome finding, as it illustrates that the foundations for a research information service exist that can be improved upon.

7.2.2 Personal Collections

It was shown in chapter Four that 67% of government scientists and 81% of academic scientists have personal collections of reprints. There is no doubt that these collections are important to the medical scientists because, as was seen in
Chapter Five, all the ten medical scientists that had authored journal articles had cited from their own collections. However, though their collections are important, it was also found that these collections are often thin and that as a result, the medical scientists do not consider them to be their principal source of information. The second hypothesis that personal collections are important as a source of information for the medical scientists but not the most important is therefore accepted.

7.2.3 Interpersonal Contacts

It was also shown in Chapter Four that both academic and government scientists have contact with various individuals and groups to exchange information. Even so, geographical distances, the few number of scientists nationally in various medical sub-disciplines, and restrictions on the use of telephone and e-mail all mean that the scope for initiating and maintaining personal contacts is limited.

For those medical scientists who do establish contacts, the difference between government and academic scientists' behaviour is in the type of contact and frequency. This is attributed to the different ways in which research is conducted at the universities and the institute. For all medical scientists, one-to-one was the favoured approach to making these contacts. This is partly because it is often the only way to effect contact and also because it offers the opportunity for feedback. Given the foregoing, the third hypothesis that personal contacts are an important source of information for the medical scientists is accepted.

7.2.4 Conferences and Meetings

It was found that conference attendance by the medical scientists is not high. Though some of the medical scientists attend international conferences, they tend to be the more senior medical scientists or those working on well-funded
projects. The majority of medical scientists attend only local conferences. The fourth hypothesis that international conferences are only of marginal importance as an information channel to the medical scientists is therefore accepted. However, it is recognised that international conferences are not regarded as important only because most of the medical scientists are unable to attend.

7.2.5 Information Sources

The medical scientists were found to use a number of different library-based sources of information for their research information. These included journals, books, conference proceedings, reports, electronic databases and abstracts. However, the journal was found to be the main information source used. As a result, the fifth hypothesis that the medical scientists use a wide variety of sources for their research work but rely mainly on the journal is accepted.

7.2.6 Browsing

In Chapter Four, it was found that all academic scientists scan journals and that 60% of government scientists do so. The remaining government scientists do not scan either because resources limit them or they were not at the time of the study engaged in research and so did not do so. Overall, the medical scientists scan between two to four journals regularly. The extent of browsing activity by the medical scientists is constrained by the few journals taken and the almost nil acquisition of new materials. However, the sixth hypothesis that the medical scientists do only a limited amount of browsing is rejected as it was found that browsing is an ongoing activity for most of the medical scientists.
7.2.7 Serendipity

One medical scientist described serendipitous discoveries of information as “happening all the time.” It was seen in Chapter Four that conversation, newspapers, radio and browsing in the library were the most important vehicles for serendipitous discoveries. It was also found that serendipity occurred just as much in social settings. It was shown in Chapter Five that medical scientist (7) was told in the course of a conversation with a colleague that there were some documents in the library that might be useful to him. The same type of thing happened to medical scientist (4) who discovered while waiting for a staff meeting to begin that his colleague had a journal that might be useful to him. The seventh hypothesis that the medical scientists experience serendipity only to a limited degree is rejected because there is evidence that this happens quite often.

7.2.8 Research Dissemination

In Chapter Four it was shown that the medical scientists use the journal as the main tool for dissemination of the results of their research work. The medical scientists said that the reason for doing this is that the journal article is the conventional way to disseminate research findings in the scientific community after conference papers, and that their employers expected them to publish journal articles. However, they cited a number of difficulties, including a lack of recently published material and secretarial/computer facilities. These problems notwithstanding, the eighth hypothesis that the medical scientists use the journal article as the main tool for dissemination of the results of their research work is accepted.
Chapter Seven - Conclusions

7.2.9 Research Milieu

The research milieu in both the universities and the institute is not as supportive of research as it could be. The medical scientists talked of the many difficulties that they face in trying to perform research. Poor libraries and inadequate information sources mean that the medical scientists either spend more time on information searching activities than they need to, or they do not bother at all to seek information. They also face problems in obtaining funding for research with the effect that many, particularly government scientists, face long spells of inactivity. This inactivity, of course, has a negative effect on personal development in the discipline. There is also uneven access to infrastructure and equipment such as telephone, Internet connectivity, e-mail and computers. The lack of transport or money in lieu, and very tight controls on subsistence allowances make it particularly difficult for medical scientists outside of Nairobi to take advantage of the many special libraries found in the city. Consequently, the ninth hypothesis that the medical scientists face many difficulties in their work is accepted.

7.2.10 Medical Scientists' Perceptions

All the problems that the medical scientists face have come together to influence their perceptions of their information environment. It was seen in Chapter Four that one medical scientist said that he had not been to the library in four months because “we don’t have a library.” Though this was said with tongue in cheek, it does reflect a negative attitude. Another medical scientist said that the library staff would not know how to use e-mail, yet they do. He formed this opinion because of the poor state of the library, which he assumed to be all embracing including unqualified staff.
Yet another medical scientist said that he does not apply to attend conferences because he knows that his application will be unsuccessful. This again is a counterproductive attitude to have. In Chapter Five, it was also seen that there was a professor who could not quite believe that a copy of an article he authored that this researcher gave him, was found in the library at R. It is quite clear that the tenth hypothesis that the medical scientists' perceptions of their information environment negatively affects their information seeking is valid, and it is accepted.

7.3 OBJECTIVES

In Chapter One, five study objectives were defined. In the following section, a discussion of how each objective was achieved is undertaken and a summary of relevant findings is given to illustrate this.

7.3.1 Objective One

To describe and evaluate how Kenyan medical scientists use libraries and other information providers for their research work.

To achieve this objective, the findings of the four main elements of the study model – information seeking in libraries, at conferences, among personal contacts and using own collections, were reviewed. This was done in Chapters Four, Five and Six.

For example, evidence emerged that the medical scientists use their own personal collections more than any other resource even though most personal collections are thin. It was also revealed that the medical scientists make use of their institutional libraries for research information (95% of academic scientists and 50% of government scientists). Further, the medical scientists that do not use
their own institutional libraries use other academic/research libraries for their research information.

The above notwithstanding, it was also revealed that the medical scientists do not use their libraries effectively. The reasons for this include the presumption that nothing of value will be found, a lack of confidence in library staff, the general lack of resource and in some cases, the unfavourable location of these libraries discouraging the medical scientists from using them.

Academic scientists are less inclined to rely on personal contacts than government scientists because academic scientists are less involved in team or group research. Both the government scientists and academic scientists are constrained in establishing and maintaining personal contacts because of the restrictions on the use of (and in some cases total absence of), telephone and e-mail. However, several government scientists working in well-funded research groups have no such restrictions and are thus able to communicate with colleagues freely. Further, for these medical scientists, literature is freely available from partner institutions.

Conferences are attended by only a few of the medical scientists and infrequently. Again, it is the senior medical scientists and those working in well-funded research groups that get to attend conferences.

7.3.2 Objective Two

To evaluate what the role of the under-resourced university and research libraries is in the provision of research information for Kenyan medical scientists.

To achieve this objective, it was necessary to evaluate from the study findings, the function of university and research libraries in making research information available to the medical scientists. This was done in Chapters Four, Five and Six.
Though anecdotal evidence suggests that little or no use is made of academic and research libraries in Kenya, this was shown not to be true. The university and research libraries though severely under-resourced, play an important if limited role in making available research information to the medical scientists. This is especially true for medical scientists engaged in research outside of the well-funded groups. Such medical scientists are forced to rely on their university and research libraries and some have done this with great success as the case of Medical Scientist (5) shows.

He wrote an article relying entirely on his own university library collection and his article was judged as very good by the three reviewers at a UK university. This proves that a lot can be achieved if the barriers to the use of these libraries (which have been discussed in Chapters Four, Five and Six), are set aside.

The role of the libraries has been further emphasised because of the inability of the medical scientists to exploit alternative information providers such as personal contacts, conferences and personal collections. As a result, in spite of poor collections, these libraries are generally speaking, the medical scientists' only source of periodical literature and monographs.

It is somewhat ironic that despite being in this advantageous position, the libraries have failed to exploit their monopoly over the provision of information.

**7.3.3 Objective Three**

To identify problems Kenyan medical scientists encounter if any, in the process of their research information acquisition.

Throughout this study, the medical scientists gave their reasons for behaving in the way that they do. These reasons were often symptomatic of the problems the medical scientists encounter. Thus this objective was easily achieved.
Several problems were identified that stand in the way of the medical scientists' research information acquisition. At the institutional level, weak libraries and poor communication infrastructure are the most obvious. Inadequate or the total absence of resource sharing between libraries and within institutions is another problem. A chronic shortage of funds has also contributed to the evolution of a less than supportive research milieu.

At the personal level, a deterioration in terms of service has meant that most medical scientist have divided loyalties and choose not to make a personal investment in research. This general lack of a research orientation contributes to and abets the erosion of the institutional research milieu.

7.3.4 Objective Four

To analyse the implications of Kenyan medical scientists' information behaviour in the context of their research information acquisition.

A review of the results presented in Chapters Four and Five reveal several information behaviour actions that negatively impact on the medical scientists' research information acquisition. Two examples illustrate this

First, as a result of the divided loyalties mentioned above, many of the medical scientists choose to engage in private practice to supplement their income rather than actively pursue research. Therefore, many medical scientists do not have the time to actively seek information. Because they already have a poor opinion of the university and research libraries, their use of these libraries is restricted to those occasions when they have a research project that they are working on. Even then, the weak collections mean that they are usually dissatisfied and this further affects their research activity negatively.
Second, an unfortunate consequence of the weak libraries has been that the medical scientists on the whole have a low opinion of library staff. In this regard, their ability to source research information is further constrained because precisely the people that might have helped them in this, they judge incompetent and so do not use their skills. Medical Scientist (5) is unusual in this respect - he prefers to use library staff and is an excellent example of what can be achieved by doing so.

Thus it has been possible to show what the implications of the medical scientists’ information behaviour is in the context of their research information acquisition.

7.3.5 Objective Five
To assess how the information seeking behaviour of Kenyan medical scientists resembles or differs from what is already known about scientists.

This objective was achieved by comparing data on how the Kenyan medical scientists use information sources with the findings of studies undertaken elsewhere. This was done in Chapter Six.

For example, one main finding of this study has been that the medical scientists rely principally on the scientific journal for their research information. Indeed, the main problem the medical scientists cite is the lack of periodical literature. This reliance on periodical literature by scientists has been shown to be true all over the world.

Thus, this study has re-affirmed the universality of science. It is precisely because scientists need to communicate with each other and also to use journals, databases, and books that Kenyan medical scientists are disadvantaged in their pursuit of medical research. The baseline is that there is no shortcut to having adequate information resources. Neither are there home-grown solutions to
ameliorate the effects of this; if there were, these would have been developed sooner.

7.4 RECOMMENDATIONS

What can be done to improve access to research information? With the conclusion of this study, it is now possible to make a number of recommendations which if implemented by all the stakeholders concerned, would go some way in improving the availability of research information and therefore medical research in Kenya.

7.4.1 Government

1. The main problem that stands in the way of provision of research information to the medical scientists is money. The solution to this problem in theory is seemingly simple. Allocate more money to the institutions and libraries. Since this study was conducted, there have been new developments with the Kenyan government undertaking a major restructuring exercise which includes among other things, retrenchment of surplus staff in the public sector including universities and research institutes with a view to freeing money for service delivery. It remains to be seen though how effective this will be.

2. Terms of service for university and research staff should also be improved alongside the envisaged improvements in service delivery outlined above. It is recognised that university and research staff terms of service must reflect conditions in the wider public service, but without corrective action, the steep rise in the brain-drain witnessed in recent years will accelerate as professionals leave the country in search of positions that offer job satisfaction.
1. Universities /Research Institutes

1. Libraries need to be given their full annual financial allocations. The situation that exists at present where library budgets are taken over to meet shortfalls in other departments needs to be abandoned. This is a very inefficient way of providing a service in that where library staff are under-utilised because of lack of money, a poor work ethic develops. Consequently, even when things improve, it is difficult to get staff to do what they are employed to do.

2. Links with universities in other countries should be established and extended to include some element of information support where possible.

3. A lot of the research done in poor countries is donor driven (Thulstrup, 1998), and tends to have a bias towards agriculture and tropical health. A visit to any research institute in Kenya will reveal much scientific equipment warehoused for lack of money to do research. This equipment is often purchased through collaborative projects and warehoused at the end of the project. This study has revealed that the basics, such as photocopying facilities, are missing throughout public institutions. It would be more useful if some of the money that goes into surplus scientific equipment were to be spent on purchase of photocopiers for the libraries and other library equipment. This might in the long run reap dividends as it would enable the most essential /rudimentary elements of dissemination to be undertaken by more of the scientific community.

4. The results of this study showed that conference attendance is uneven. The main reason for this was found to be money to travel to conferences. For those in international research projects this is not a problem. However, for the medical scientists sponsored by their institutions, it was found that it is usually the more senior scientists that are funded. In the absence of money,
the problem of conference attendance could perhaps be minimised by careful planning and co-ordination. This is a role for research managers to decide who might benefit most from what conference and try to make arrangements for the right people to attend. Perhaps even more important is to develop a system for the rationing of conference attendance that is seen to be equitable by all concerned.

5. The universities and institute should make the acquisition of computers, Internet connectivity and e-mail a priority with a view to making them as widely available as resources will permit. Computers and e-mail can no longer be considered luxuries in universities and research institutes if these institutions are committed to performing and delivering research and teaching at an internationally acceptable standard.

7.4.3 Librarians

1. Librarians from different institutions (both universities and research institutes) should come together and seek ways to establish formal agreements for the sharing of resources. In addition, a reliable document delivery system would have to be established. Both inter-library loan and document delivery implies formal agreements and division of responsibility among the co-operating libraries for acquisition and provision of the literature. It is suggested that without these, the agreements would not stand. A union catalogue would also have to be compiled and maintained and reprographic services would have to be established.

2. Though all three libraries take few journals, there is still scope for a current awareness service. Such a service may have limited impact but will have the advantage of making the library visible and appear proactive. In this way, some of the medical scientists who do not use the libraries because they do
not know what is on offer may change their opinion and start using the library.

3. It is clear from the findings of the study that research managers at the institute and perhaps deans at the universities, need to work together with librarians to see how the private libraries attached to individual research projects could be used better. Systems could be agreed between research managers and the librarians to try and arrange that when a project is wound up, some continuity exists in the journals taken.

.5 FURTHER RESEARCH

7.5.1 Institutions Covered

This study was limited to one research institute and two university medical schools. While the findings of this study have been illuminating in giving an insight into the information environment in public institutions, it would be useful to have similar studies to this carried out in other institutions to test the homogeneity of the information environment in public sector institutions. This is because medical research for instance, is expensive. It would be useful to compare what provisions for research information are in place in other research centres, particularly the non-public centres.

7.5.2 Subject Disciplines

This study was restricted to scientific researchers in the field of medicine only. Because government and university research in Kenya is not restricted to the medical discipline, it would be interesting to see how the findings of similar studies to this but centred on other disciplines such as industrial, forestry, fisheries and agricultural research, would compare with the findings of this
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research. The results of such researches when combined would provide a holistic picture of the information environment that research workers in Kenya work in. Better solutions to the many problems facing scientific researchers might be formulated on the basis of the results of such studies.

7.5.3 Methodology

The main subjects of this study were medical research scientists. The views of other stakeholders important in research information delivery such as librarians, administrators responsible for policy creation at public institutions, government officials responsible for the creation of scientific policy and so on, were not taken into account for this study. It is suggested that a study of such stakeholders purely to determine the reasons for them making the choices that they do would be very useful in creating an understanding of the problems and difficulties that institutions face in providing infrastructure for research. It would also be possible to determine using the results of such research, what changes could be made to the research system without involving additional expenditure of money, in order to improve the delivery of research information.

7.6 SUMMARY

In summary, this study has revealed that though there are problems with the availability of research information for medical scientists in Kenya, they still manage to perform useful research. If the recommendations put forward above were implemented, the research enterprise would be that much easier and more important, the quality of medical research in Kenya would almost certainly improve.

Finally, because no similar study to this can be identified, this study has made a useful contribution by focusing on an area of study that is important nationally.
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Maguire, J. 1995. *Sustainable research for developing countries: a case study of how the information needs of research are being met at the Papua New Guinea University of Technology*. Oxford: Learned Information.


APPENDIX 1 – INTERVIEW SCHEDULE

WORK RELATED INFORMATION SEEKING BEHAVIOUR OF MEDICAL RESEARCH SCIENTISTS

Please Tick Where Appropriate

<table>
<thead>
<tr>
<th>PERSONAL DATA</th>
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<tr>
<td>AGE: 25-29 □</td>
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<tr>
<td>SEX: MALE □</td>
</tr>
</tbody>
</table>

| EDUCATION: |
| Qualification | Where Obtained |
| Qualification | Where Obtained |
| Qualification | Where Obtained |
| Qualification | Where Obtained |

Name of Organisation:

Department:

Fields For Research:

Fields For Teaching:

Position

Number of Years in Research
I am carrying our research to find out how medical scientists at your organisation obtain information for their research work. Information throughout this interview is to be understood to mean anything that you need to know in order to do your work. It could be factual data, advice or opinion.

### RESEARCH TOPIC

1. I would like to start by asking how long you have been working here?

2. What is the topic of the research you are doing at present?

3. How long have you been working on this research?

### CONTROL

4. Did you choose to research into this area or was it decided for you?

5. Do you work as part of a team? Yes [ ] No [ ]

   **If yes, who are the other members of the team?**

6. Is your research in any way related to other research being done here? Yes [ ] No [ ]

   **If yes, how?**

### INFORMATION GATHERING

I now want to move on to talk about how you search for information

1. Please think of a recent information problem you have had and tell me about how you set about solving it.

2. On this card (card 1), are listed a number of approaches to information seeking. Please indicate which of these approaches you use by ticking the appropriate response.

   | Problem identification [ ] | Methodology /experimentation [ ] |
   | Presentation /dissemination [ ] |

3. At which of these stages of the research process do you use information most? Please tick giving a value of 1 to highest use and 3 to lowest use.

4. Do you engage in ongoing information seeking in any subject area?
5. Can you think of any occasion when you happened upon information relevant to your work by chance? If yes, ask: can you tell me about it?

6. How and where did you learn about searching for information?

7. Has information technology had an impact on the way in which you search for information? If yes, ask how?

8. What is your personal view of the role of the library in an organisation such as this?

9. On this card (card 2), are listed a number of approaches to problem solving. Please indicate which of these approaches you use by ticking where appropriate. Please ignore the last column for the moment.

10. Going back to this card again, could you please rank your use of these approaches by indicating in the last column, a value of 1 against the approach you use most, 2 to the next and so on?

SOURCES OF INFORMATION
I would now like to turn to the different types of information sources you use for your work.

1. On this card (card 3), are listed various sources of information. I would like you to indicate how often you use these sources if at all, by ticking where appropriate. If editing and refereeing are used at all, prompt for more details.

2. Would you like to comment on any of these?

3. On this card (card 4), I would like you to indicate how important you regard each of these as a source of information, by ticking where appropriate.

4. Why do you prefer these sources?

5. How would you rate the amount of information in your field? Too little, enough, too much? If answer is too much, ask: how do you cope with this problem?
6. Do you have any preference for receiving information in written form or by word of mouth? Please expound.

### CONFERENCES AND MEETINGS

I would now like us to turn to conferences and meetings

1. What conferences have you attended in the last four years? What benefit have you derived by attending these conferences? If no conference has been attended, go to qn. 4.

2. Who funds you attendance at these conferences?

3. Are you involved in any way in the organisation of a standing or regular conference? If yes, which and how?

4. Why don’t you attend conferences? If answer is lack of funding, then 5

5. How many applications for attendance at conferences have you put in and had turned down in the last 5 years?

6. How do you hear about conferences in your area?

7. Is there any association/society that represents your research interest? Locally, Internationally? Yes [ ] No [ ]

8. Are you a member? If yes, what would you consider to be the main benefit to you of membership?

If no, why aren’t you a member?
COMMUNICATION – PERSONAL CONTACTS

I now want to talk about personal contacts you may have with other researchers. By this I mean the giving or exchanging of information and access to researchers elsewhere.

1. With regard to your research, to what extent do you have contact with other people working in the same area? Please place a tick where appropriate on ticket 5, and ignore the last column for the moment.

2. Looking at the card again, can you estimate the number of other researchers working in these categories and put the figure in the last column?

3. What would you consider to be the chief benefit to you of these contacts?
   Provide ideas ☐ Spot errors ☐ Stimulate development ☐ Provide support ☐

4. Do you have contact with researchers working in other subject areas? **If yes, ask what subjects.**

5. Could you fill in a similar card for me (card 6), showing to what extent you have contact with people working in other subject areas?

6. Is there any one person whom you consistently go to for information? **If yes: Why?**

7. What shape/form do these contacts take?
   - Laboratory conversations ☐ Discussing manuscripts ☐
   - Lunch-time talk ☐ Planning conferences etc. ☐
   - After-hour gatherings ☐ Requests to peers for reviews ☐
   - Departmental meetings ☐

PERSONAL COLLECTIONS

1. Do you subscribe to any journals? **If yes, which ones?**

2. Who funds this subscription?

3. Can you estimate how many journals you read, scan or use on a regular basis?
| Appendixes |
|-----------------|-----------------|
| 4. From where do you get these journals? | |
| 5. Do you have your own personal collection of research materials? **If yes, ask: how is the record maintained?** | |
| 6. Do you keep a reprint collection? | |
| 7. Do you keep a record of references to books and articles? **If yes, ask: how is the record maintained?** | |
| 8. On this card (card 8), is a list of information outlets. Please indicate which of these outlets you use on a regular basis by ticking where appropriate. | |

**COMMUNICATION / DISSEMINATION ACTIVITIES**

1. How do you disseminate the results of your research work? **On this card (card 8), is a list of channels you might use to disseminate your work. Please indicate which channels you use.**

Ask the following questions of any of the channels that the interviewee indicates that they use

2. Do you publish articles in journals? **If yes, ask: Which journals?**

3. How do you choose which journals to publish in?
## RESEARCH MILIEU

Lastly, I would like to turn to a discussion of the research milieu in the organisation.

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<tr>
<td>1.</td>
<td>How would you evaluate the formal flow of information in the organisation as a whole?</td>
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<tr>
<td>2.</td>
<td>How would you evaluate the informal flow of information in the organisation as a whole?</td>
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<tr>
<td>3.</td>
<td>To what extent would you say that the overall environment here is supportive of research? On a scale of 1-5, 1 being very supportive and 5 being not supportive at all.</td>
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<td>Can you explain your answer please?</td>
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<td>4.</td>
<td>Just to wind up, is there anything you want to tell me that you think might of interest to me?</td>
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<tr>
<td>5.</td>
<td>Is there any question I asked that surprised you? <strong>If yes, ask:</strong> how /why?</td>
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</table>

Thank you very much for making the time to talk to me. I would like to assure you once again that nothing you have said to me will be presented in a way that it would be known as coming from you.
# Appendices

## CARD 1

On this card (card 1), are listed a number of approaches to information seeking. Please indicate which of these approaches you use by ticking the appropriate response.

<table>
<thead>
<tr>
<th>APPROACH</th>
<th>USE</th>
<th>DO NOT USE</th>
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<tr>
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<td>Personal recommendations from colleagues at other organisations</td>
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<td>Reviews</td>
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<td>Research staff (e.g. Research assistants etc.)</td>
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## CARD 2

On this card (card 2), are listed a number of approaches to problem solving. Please indicate which of these approaches you use by ticking where appropriate. Please ignore the last column for the moment.

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<th>Approach</th>
<th>Use</th>
<th>Do not use</th>
<th>Priority</th>
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<tr>
<td>Trial and error</td>
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<tr>
<td>Rely upon own past experience</td>
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<td>Talk to colleagues</td>
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<tr>
<td>Use the library</td>
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Card 3

On this card (card 3), are listed various sources of information. I would like you to indicate how often you use these sources if at all, by ticking where appropriate.

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</table>
Card 4

On this card (card 4), I would like you to indicate how important you regard each of these as a source of information, by ticking where appropriate.

<table>
<thead>
<tr>
<th>Source</th>
<th>5 Very Important</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1 Not Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Letters</td>
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<td></td>
</tr>
<tr>
<td>Memos</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Telephone</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Electronic mail</td>
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<td></td>
</tr>
<tr>
<td>Computer databases</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Books</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Abstracts and indexes</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Journals</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Photocopies</td>
<td></td>
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</tr>
<tr>
<td>Reports</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conference proceedings</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Editorial work</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Refereeing</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Experiments</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Departmental meetings</td>
<td></td>
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</tr>
<tr>
<td>Departmental seminars</td>
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</tr>
<tr>
<td>Supervision – Ph’D</td>
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</tr>
<tr>
<td>Supervision – M’Sc</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

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Card 5

With regard to your research, to what extent do you have contact with other people working in the same area? Please tick where appropriate on Card 5.

### Own Research Area

<table>
<thead>
<tr>
<th>Source</th>
<th>5 Frequently</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1 Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your department</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your leader</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Among team members</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between teams</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other departments (in – house)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other organisations (nationally)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internationally</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Card 6

With regard to your research, to what extent do you have contact with people working in a different subject area? Please tick where appropriate on Card 6.

### Other Research Areas

<table>
<thead>
<tr>
<th>Source</th>
<th>5 Frequently</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1 Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other departments (in – house)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other organisations (nationally)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internationally</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Card 7

On this card (card 7), is a list of information outlets. Please indicate which of these outlets you use on a regular basis by ticking where appropriate. Also, could you rank them in terms of use giving a value of 1 for the most used and so on.

<table>
<thead>
<tr>
<th>Library</th>
<th>Use</th>
<th>Don not use</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own institution’s library</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other academic library</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public library</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own collection</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Card 8

On this card (card 8), are listed a number of ways of disseminating research results. Please indicate which of these methods you use by ticking where appropriate.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal articles</td>
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</tr>
<tr>
<td>Books</td>
<td>□</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conferences papers</td>
<td>□</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal reports on original work</td>
<td>□</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Prototypes</td>
<td>□</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blueprints</td>
<td>□</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patents</td>
<td>□</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Research Group

A research group is defined as:
1. At least three (3) people working together,
2. For at least six (6) months, with an expected time span of at least one year
3. And at least one leader, significantly involved in the group’s work.


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## APPENDIX 2a – OBSERVATION SCHEDULE

<table>
<thead>
<tr>
<th>ACTIVITIES</th>
<th>MORNINGS</th>
<th>DAY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8-9</td>
<td>9-10</td>
</tr>
<tr>
<td>CATALOGUE USE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JOURNAL USE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENQUIRIES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABSTRACTS USE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BORROWING OF BOOKS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RETURNING OF BOOKS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BROWSING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JOURNAL BACK ISSUE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEWSPAPER READING</td>
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</tbody>
</table>
# APPENDIX 2b – OBSERVATION SCHEDULE

## AFTERNOONS | DAY

<table>
<thead>
<tr>
<th>ACTIVITIES</th>
<th>1-2</th>
<th>2-3</th>
<th>3-4</th>
<th>4-5</th>
<th>5-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATALOGUE USE</td>
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<td></td>
</tr>
<tr>
<td>JOURNAL USE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENQUIRIES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABSTRACTS USE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BORROWING OF BOOKS</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>RETURNING OF BOOKS</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>BROWSING</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>JOURNAL BACK ISSUE USE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEWSPAPER READING</td>
<td></td>
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<td>---</td>
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<td></td>
</tr>
<tr>
<td>1.</td>
<td>How did you learn of /discover the sources in this document?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Where did you obtain the documents from?</td>
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</tr>
<tr>
<td>3.</td>
<td>Did you read the full-text document or rely upon abstracts?</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4.</td>
<td>How do you decide what publications to cite in your list of references?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. Were you satisfied with your reference list or would you have liked more? Why?

6. Note the age of citations and point out. Find an explanation for this.

7. Note the range of sources and ask about reasons for diversity or otherwise.

8. How has your communication activity been influenced by publication standards in terms of availability of information?
Chapter Three – Methodology

Information Sources

Qn. 5 What sources of information do the medical scientists use for their research work?
Hy. 5 The medical scientists use a wide variety of sources for their research work but rely mainly on the journal.

Information Gathering

Qn. 6 To what extent does browsing form a part of the medical scientists’ information behaviour?
Hy. 6 The medical scientists do only a limited amount of browsing.
Qn. 7 To what extent does serendipity contribute to the medical scientists’ information acquisition?
Hy. 7 The medical scientists experience serendipity only to a limited degree.

Research Dissemination Activities

Qn. 8 How do the medical scientists disseminate the results of their research work?
Hy. 8 The medical scientists use the journal article as the main tool for the dissemination of the results of their research work.

Research Milieu

Qn. 9 How does the research milieu in the organisation influence the medical scientists’ information seeking?
Hy. 9 The medical scientists face many difficulties in their work environment.

Medical Scientists’ Perceptions

Qn. 10 How do the medical scientists’ perceptions of their information environment, affect their information seeking?
Hy. 10 The medical scientists’ perceptions of their information environment