

# **Module One - Information sources**

## **Introduction**

Information is power and an essential ingredient in decision-making. To obtain timely, relevant and quality information for your study or research work, you need to know the various sources of information available. This module is expected to deepen your knowledge of sources of information in print, non- print and electronic formats. It presents the definition, originators/producers, types, formats, and categories of information sources. The module also shows where information sources could be found e.g. archives, libraries and the Internet.

## **Learning Objectives**

Students/Trainees would learn:

1. The definition of information sources
2. The major producers of information sources
3. Types of information sources
4. The formats of information sources
5. Where to find information sources
6. Categories of information sources
7. Internet information sources

## **Learning Outcomes**

At the end of the module, students/trainees should be able to:

1. Define information sources
2. Identify and list producers/originators of information
3. Determine types of information sources
4. List formats of information sources
5. Determine where to find information sources
6. List and discuss the categories of information sources
7. Identify and use Internet information sources

**Table 1: Summary of Content**

<b>S/N</b>	<b>Content</b>	<b>Methods</b>	<b>Mode of Assessment</b>
4.1	Definition of information /information sources	Lecture Discussion Brainstorming	Question and Answers
4.2	Producers and originators of information sources	Lecture Brainstorming	Pre and post test Question and Answers
4.3	Types of information sources	Brainstorming Discussion	Question and Answers
4.4	Formats of information sources	Brainstorming Lecture Discussion	Assignment
4.5	Where to find sources of information	Brain storming Discussion	Question and Answer
4.6	Categories of information sources	Brainstorming Discussion	Question and Answers
4.7	Internet information sources	Discussion Lecture Brainstorming	Question and Answers Handson

## **Producers/Originators of Information**

There are three main producers/originators of information. These are:

1. Government Agencies
2. Academic institutions
3. The private Sector
4. Individuals

### **Government Agencies**

Government departments and agencies publish lots of information in print and electronic formats. In various countries of the world, governments at all levels play an important role in producing information for the society they serve. In many occasions, government officials may need information about the society in order to make decisions relating to economic, social and political issues [1]. Some of the information produced by government is grey literature comprising reports such as National HIV/AIDS reports, gazettes, population statistics, census

data, government notices, policy documents etc. Since government documents are generated with public funds, they are made available either free of charge or at low cost. This can be done through the various government agencies including the public libraries or the government Websites. In Nigerian for instance, some government departments and agencies Websites include:

- National Agency for the Control of AIDS (NACA), <http://www.naca.gov.ng>
- National Bureau of Statistics (NBS), <http://www.nigerianstat.gov.ng>
- Federal Ministry of Information and Culture (FMIC), <http://www.fmhc.gov.ng>

## **Academic institutions**

Academic institutions such as universities and colleges are major producers of information in a society or country. Academic institutions around the world especially those in the United States (Yale, MIT, Harvard, Johns Hopkins, Stanford, University of North Carolina at Chapel Hill, University of Wisconsin and University of California, Los Angeles etc), United Kingdom (Cambridge, Oxford, University of Liverpool) Africa (University of Ibadan, Nigeria; University of Zimbabwe; University of Zambia; Makerere University, Uganda; Kenyatta University, Nairobi; University of Bamako, University of Witwatersrand, South Africa, and University of Ghana, Legon etc) have conducted extensive researches in various specialties including the health sciences. Numerous publications and knowledge materials are generated from these research studies as technical reports, books and articles in peer reviewed journals. Academic institutions also have other publications such as Newsletters, Magazines, Technical reports, Manuscripts, Maps and lots of other Grey literature. Web addresses of some academic institutions in Africa are listed below:

- University of Ibadan, Nigeria – <http://www.ui.edu.ng>
- University of Zambia- <http://www.unza.zm/>
- Kenyatta University, Nairobi, Kenya- <http://www.ku.ac.ke/>
- University of Zimbabwe – <http://www.uz.ac.zw>
- Makerere University, Uganda – <http://mak.ac.ug>
- University of Bamako, Mali - [www.ml.refer.org/u-bamako](http://www.ml.refer.org/u-bamako)

## **Private Sectors**

A third major producer of information in a country is the private sector. This consists of print and electronic media organizations, commercial business outfits, publishers/vendors and aggregators, performing /film industry that publish and or make their information products and services accessible on the Web either free or by subscription. Others are:

- Non-profit professional organizations
- Profitable organizations and commercial agencies
- International Agencies
- Professional Associations or organizations
- Private institutions
- Corporate laboratories

Unlike government departments and agencies, published reports of research carried out by most organizations, agencies and commercial outfits in the private sector are not made available for public consumption. However, non-profit organizations and agencies do make their publications available to those that need them. Some examples of agencies in the private sector or non profit category are:

- The World Health Organization (WHO) – <http://www.who.int/>
- Joint United Nations Program on HIV and AIDS (UNAIDS) – <http://www.unaids.org>
- Elsevier Publishers – <http://www.elsevier.com>
- Cables News Network (CNN) – <http://www.cnn.com>

## **Private Individuals**

Individuals also create information. Many print and web documents available today are created by private individuals, some of whom have their own Websites/pages. Some individuals disseminate information through Facebook, Twitter, Blogs, You-tube etc, while others publish information in print as text books, monographs or articles in journals, magazines or newsletters. On the other hand, some important information is not published rather, it is passed on from generation to generation. For example, some parents pass information to their children by word of mouth on how diseases were treated using traditional unorthodox methods in their communities.

## **Exercises**

1. List the various producers of information in a country.
2. Give three examples of the type of information each produces or creates.

## Definition of Information /Information Sources

Information is processed data. An information source is where you got your information from; this can be a book or a Website. Information sources are the various means by which information is recorded for use by an individual or an organization. It is the means by which a person is informed about something or knowledge is availed to someone, a group of people or an organization. Information sources can be observations, people, speeches, documents, pictures, organizations. Information sources can be in print, non-print and electronic media or format.

## Types of Information Sources

Information can come from virtually anywhere: personal experiences, books, articles, expert opinions, encyclopedias, the Web. The type of information needed will change depending on its application.

Individuals generate information on a daily basis as they go about their work. In academic institutions, staff and students consult various sources of information. The choice of the source to consulted is usually determined by the type of information sought. The three types of information sources are:

- **Primary**
- **Secondary**
- **Tertiary**
- **Primary Sources**

Primary sources are original materials on which other research studies are based. Primary sources report a discovery or share new information [2]; they present first-hand accounts and information relevant to an event [3, 4a and 5]. They present information in its original form, not interpreted or condensed or evaluated by other writers [2]. They are usually evidence or accounts of the events, practices, or conditions being researched [4a, 6] and created by a person who directly experienced that event [7]. Primary sources are the first formal appearance of results in print or electronic formats [3]. Examples of primary sources are: eyewitness accounts, journalistic reports, financial reports, government documents, archeological and biological evidence, court records, ephemerals (posters, handbills), literary manuscript and minutes of meetings etc [3,4b and 6].

The definition of a primary source may vary depending upon the discipline or context. A diary would be a primary source because it is written directly by the individual writing in the diary [7]. Interviews are primary sources because the individual talks about the topic directly from what he/she knows about it. Other examples are:

- Video of the inauguration of the first female president in Brazil
- A scientific publication reporting the development of a new medication to manage patients with sickle-cell anemia

Print	Electronic	Others
<ul style="list-style-type: none"> <li>- Diaries</li> <li>- Letters</li> <li>- Speeches</li> <li>- Patents</li> <li>- Photographs</li> <li>- Newspaper articles</li> <li>- Journal articles</li> <li>- Theses and dissertations</li> <li>- Survey Research (e.g., market surveys, public opinion polls)</li> <li>- Proceedings of Meetings, conferences and symposia</li> <li>- Original Documents (i.e. birth certificates, wills, marriage licenses, trial transcripts)</li> <li>- Records of organizations, government agencies (e.g. annual reports, treaties, constitutions, government documents)</li> </ul>	<ul style="list-style-type: none"> <li>• Internet</li> <li>• E-mail communication</li>   <li>• Communication in Listservs</li> <li>• Interviews (e.g., telephone, e-mail)</li>   <li>• Video recordings (e.g. television programs)</li>   <li>• Audio recordings (e.g. radio programs)</li> <li>• Web sites</li> <li>• Communications through social networking applications (e.g. Face book, blogs, RSS, U-tube etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Artifacts (e.g. coins, plant specimens, fossils, furniture, tools, clothing, all from the time under study)</li>   <li>• Works of art, architecture, literature, and music (e.g., paintings, sculptures, musical scores, buildings, novels, poems).</li> </ul>

A newspaper article reporting the bomb blast in Abuja, Nigeria, during the celebration of the country's 50th Independent Anniversary.

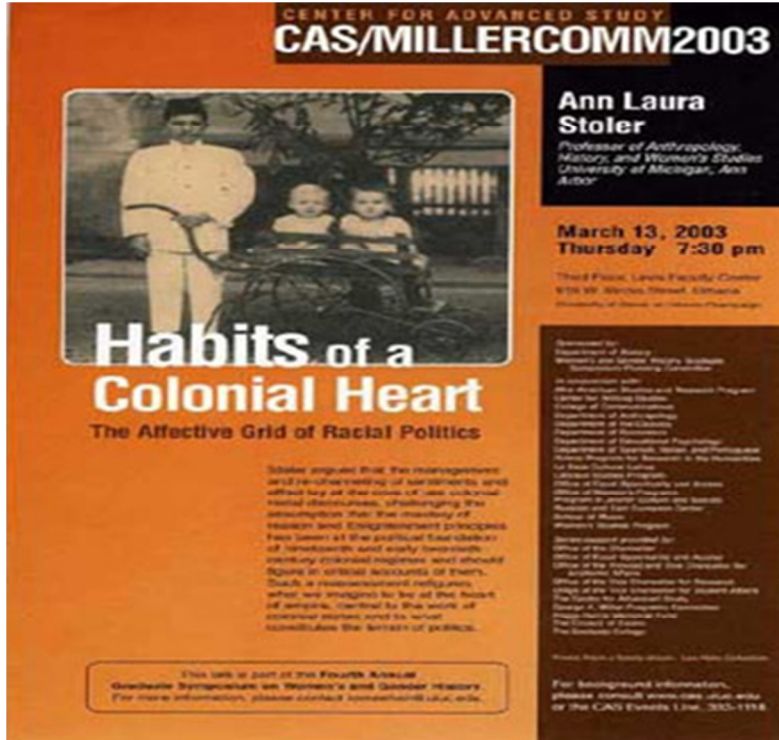
**Note:** The types of information that can be considered a primary source may vary depending on the subject discipline, and how the material is being used. **For example:**

- A research article in a peer-reviewed journal that proved the effectiveness of a newly developed vaccine for the prevention of HIV virus would be a primary source, however,
- A magazine article that reports the development of a new vaccine for the prevention of HIV infection would be regarded as a primary source.
- Information in a magazine article that reports a study of how compact fluorescent light bulbs are presented in the popular media could be considered a primary source [3].

### Grey literature

Grey literature is also important primary source material(s) not available through the usual systems of publication (e.g. books or periodicals) and distribution [11]. Examples are: Conference proceedings, data exchange, environmental impact statements, oral presentations, market research reports, online documents, oral presentations and working papers

**Table 2:** List of primary sources of information in various formats



**This poster advertises a lecture scheduled for March 13, 2003 (Courtesy University of Illinois Library)**



Photograph of PubMed/HINARI training by librarians at E. Latunde Odeku Medical Library, College of Medicine, University of Ibadan, Nigeria, for resident doctors at the University College Hospital

## Secondary Sources

A secondary source of information is one that was created by someone who *did not* have first-hand experience or did not participate in the events or conditions being researched [4]. They are generally accounts written after the fact with the benefit of hindsight. Secondary sources describe, analyze, interpret, evaluate, comment on and discuss the evidence provided by primary sources [2]. Secondary sources are works that are one step removed from the original event or experience that provide criticism, interpretation or evaluation of primary sources [7]. Secondary sources are not evidence, but rather commentary on and discussion of evidence. A secondary data is one that has been collected by individuals or agencies for purposes other than those of a particular research study.

However, what some define as a secondary source, others define as a tertiary source. For example, if a magazine writer wrote about the speech Nelson Mandela delivered when he was inaugurated President of South Africa in 1990, it will be a secondary source. The information is not original, but an analysis of the speech. If a government department has conducted a survey of, say, family food expenditures, then, a food manufacturer might use this data in the organization's evaluations of the total potential market for a new product [8]. Similarly, statistics prepared by a pharmaceutical company on the production of a particular drug will prove useful to a host of people and organizations, including those marketing the drug.

For secondary sources, often the best are those that have been published most recently [4b]. If you use a secondary source that was published decades ago, it is important to know what subsequent scholars have written on the topic and what criticism they have made about the earlier work or its approach to the topic. The definition of a secondary source may vary depending upon the discipline or context. Most often how a source is used determines whether it is a primary or secondary source [9]. For the purposes of a historical research project, secondary sources are generally scholarly books and articles. Also included in this category would be reference sources such as encyclopedias (also considered tertiary). Other examples of secondary sources are:

- Bibliographies (also considered tertiary);
- Biographical works
- Commentaries
- Criticisms
- Dictionaries
- Histories
- Journal articles (depending on the discipline, these can be primary)
- Magazine and newspaper articles (this distinction varies by discipline)
- Monographs, other than fiction and autobiography
- Textbooks (also considered tertiary)
- Websites (also considered primary)



- **Tertiary sources**

**Definition:** Tertiary sources consist of information which is a distillation and collection of primary and secondary sources [3]. Generally, tertiary sources are not considered to be acceptable material on which to base academic research [6]. Tertiary sources are usually not credited to a particular author. They are intended only to provide an overview of what the topic includes, its basic terminology, and often references for further reading. Some reference materials and textbooks are considered tertiary sources when their chief purpose is to list, summarize or simply repackage ideas or other information. Examples of tertiary sources include dictionaries and encyclopedias, *Wikipedia* and similar user-contributed online 'encyclopedias' and reference materials, as well as various digests (including the *Reader's Digest*) and schoolbooks [6]. In a nutshell, tertiary sources are:

- works which list primary and secondary resources in a specific subject area
- works which index, organize and compile citations to, and show secondary (and sometimes primary) sources can be used.
- Materials in which the information from secondary sources has been "digested" - reformatted and condensed, to put it into a convenient, easy-to-read form [10].
- Sources which are once removed in time from secondary sources

Table 3: General classification of selected primary, secondary and tertiary sources of information

Primary sources	Secondary sources	Tertiary sources
<ul style="list-style-type: none"> <li>• Autobiographies</li> <li>• Correspondence: email, letters</li> <li>• Descriptions of travel</li> <li>• Diaries,</li> <li>• Eyewitnesses</li> <li>• Oral histories</li> <li>• Literary works</li> <li>• Interviews</li> <li>• Personal narratives</li> <li>• First-hand newspaper and magazine accounts of events</li> <li>• Legal cases, treaties</li> <li>• Statistics, surveys, opinion polls,</li> <li>• scientific data, transcripts</li> <li>• Journal articles</li> </ul>	<ul style="list-style-type: none"> <li>• Biographies, Encyclopedias, dictionaries, handbooks</li> <li>• Textbooks &amp; monographs on a topic</li> <li>• literary criticism &amp; interpretation</li> <li>• history &amp; historical criticism</li> <li>• political analyses</li> <li>• reviews of law and legislation</li> <li>• essays on morals and ethics</li> <li>• analyses of social policy</li> <li>• study and teaching material</li> <li>• Articles, such as literature reviews,</li> <li>• Commentaries, research articles in all subject disciplines</li> <li>• Criticism of works of literature, art and music</li> </ul>	<ul style="list-style-type: none"> <li>• Chronologies</li> <li>• Classifications</li> <li>• Dictionaries</li> <li>• Encyclopedias</li> <li>• Directories</li> <li>• Guidebooks and manuals</li> <li>• Population registers statistics</li> <li>• Fact books</li> <li>• Abstracts</li> <li>• Indexes</li> <li>• Bibliographies</li> <li>• Manuals/Guide books</li> </ul>

- Records of organizations and government agencies
- Original works of literature, art or music
- Cartoons, postcards, posters

Map, paintings, photographs, films

### ▪ **Difference between Primary, Secondary and Tertiary Sources of Information**

Primary sources of information are original manuscripts, documents or records used in preparing a published or unpublished work. For example, an article in a peer reviewed journal that discussed the development of a new vaccine for the prevention of HIV infection will be considered a primary source. Secondary sources are published or unpublished works that rely on primary source(s). A commentary by a magazine reporter based on the peer reviewed journal article on the newly invented vaccine for HIV prevention, would be a secondary source. Tertiary sources are published or unpublished works that are based on secondary sources. Tertiary sources are index to primary sources. Science Citation Index would be considered a tertiary source. It is sometimes difficult to differentiate between primary, secondary and tertiary sources. The following publication details of the information adapted from University of Wisconsin libraries [12] can be helpful in determining whether a material is primary, secondary or tertiary source:

- **Timing of the event recorded**--If the article was composed close to the time of the event recorded, chances are it is primary material. For instance, a letter written by a soldier during the Second World War is primary material, as is an article written in the newspaper or a soldier's letter home during the Liberian Civil War. However, an article written analyzing the results of the battle during the Liberian Civil War is secondary material.
- **Rhetorical aim of the written item**--Often, an item that is written with a persuasive, or analytical aim is secondary material. These materials have digested and interpreted the event, rather than reported on it
- **Context of the researching scholar**--Primary materials for a critic studying the literature of the Civil War are different from primary materials for a historian studying Civil War prisons. The critic's primary materials are the poems, stories, and films of the era. The research scientist's primary materials would be the diaries and writings of the prisoners.

Your information needs and requirements will determine what source(s) you need to consult in order to meet that need. For example,

<b>If you need:</b>	<b>You might try:</b>
Current information about the political situation in your country or a disaster that has happened yesterday somewhere around the world	Newspapers and the Web
Scholarly articles that discussed research about using cassava for baking or cyanides in cassava	Journals and books (and e-journals or e-books on the Web)
Popular articles about scams on the Internet To search for scholarly articles on a topic such as malaria or HIV and tuberculosis	Magazines (and perhaps e-magazines on the Web) Databases (PubMed, Scopus, Web of Knowledge, EMBASE African Index Medicus (AIM))
General information such as definitions, contacts, Institutions etc	Search engines such as Google, Yahoo etc

### Exercises

1. What are primary, secondary and tertiary sources of information?
2. Differentiate between primary, secondary and tertiary sources of information.
2. List 6 primary, secondary and tertiary sources of information.

## Formats of Information Sources

Information is available and accessible in two main formats namely, print and non-print and these include published and unpublished sources.

### Print Materials (Published sources)

Information could be in print format and these include: all printed books, periodicals, maps, bibliographies, indexes and abstracts, photographs, government documents, technical reports, etc.

Books are the most common type of printed materials. The Oxford Advanced Learner's Dictionary defines a book as 'a set of printed pages that are fastened inside a cover so that you can turn them and read them [13]. A book is described by some people as a written work or composition that has been published, printed on pages bound together while others say it's just the content, separate from its container [14]. Books are categorized into two, namely: fiction and non-fiction. Fiction contains information that are not true and all the scenes and characters are

made up by the author. Non-fiction books deal with information that is true, about real things, people, events and places.

## **Non-Print Materials**

In addition to printed materials, information is also produced in other formats (non-print) including audio, audiovisual, multimedia, microform and electronic books, journals, images, texts/records from the Internet.

## **Audio-Visual and Multimedia**

In the past decades, much of the information created by members of a given society is produced in audio, audio-visual and multimedia formats. Example of audio information is music recorded on CDs and books on audio or video tapes. Video information includes VCR tapes of TV shows, movies and documentaries [1]. Other examples are information on CD-ROMs, DVDs, Flash drives and Web documents etc.

## **Microform**

The American Heritage Dictionary defines microform as an arrangement of images reduced in size, as on microfilm or microfiche. Microforms are any form, either [films](#) or paper, containing micro reproductions [15] of documents for transmission, storage, reading, and printing. Microform images are commonly reduced about 25 times from the original document size, (miniaturized or compressed images) which cannot be read without special display devices (the reader). Archival materials are frequently placed in microform format because this medium is very stable and economical for storage of information for extended periods of time. There are two major types, namely: Microfilm and Microfiche.

## **Microfilm**

Microfilm is a roll of transparent film (approximately 100 to 200 feet in length) used to store microscopic images of documents [1]. A microfilm reader is required to read the images in the microfilm. Documents are recorded in microfilm because of the risk of damage to a fragile original or to save storage space. Microfilm when properly processed and stored within special envelopes and placed in a climate-controlled room, has a life expectancy of approximately 500 years [16, 17]. Most libraries have a collection of microfilm stored in their archives.

## **Microfiche**

Is a small sheet of transparent photographic film usually 4 inches by 6 inches containing printed information in a size too small to be seen by the naked eye and needs a special device to read the images [18]. The major advantages of microfiche include storage in a small space, stability of the format, and not needing knowledge to read it. As long as a microfiche machine is available to magnify the print to a readable size, anyone who can read the language can read the information on microfiche. When kept in a temperature-controlled environment, it can last for approximately 500 years; it is a good medium for saving and preserving cultural documents [18].

## **Unpublished sources- Indigenous Knowledge (IK)**

In local communities in Africa, there is a rich body of information or knowledge which has been handed down by word of mouth from generation to generation. This is known as indigenous knowledge. It is neither written nor published but provides people in the community with strategies for survival. Indigenous knowledge is the sum total of knowledge and skills which people in a particular geographical area possess that enables them to get the most out of their natural environment [19]. This information/knowledge is not systematically documented. It is oral in nature, usually transmitted through personal communication; it is culture-specific and often generated within communities [20] for local level decision-making in agriculture, healthcare, food preparation, education, natural resources management and other activities [21]. Examples of areas where indigenous knowledge has been very useful include, among others, African traditional medicine, conflict resolution and culture - dance steps and traditional attire [20].

### **Exercises**

1. What are the formats of information sources?
2. List 2 examples of the various formats?
3. How are indigenous knowledge /information conveyed to among members of a community?
4. What are the uses of indigenous knowledge/information?

## **Where to Find Information Sources**

Places to begin looking for information are:

1. Human sources
2. Archives
3. Libraries
4. Internet

### **Human Sources (Colleagues/Peers)**

Communication with peers and colleagues are a good way of obtaining vital information. For example, doctors have been found to rely on their colleagues for information in order to solve a patient's problems. The value of informal sources of information especially colleagues and peers cannot be overstressed. The good side of it is that human sources (colleagues/peers) are readily available to provide needed information at the right time. If the right person is contacted, quality and up-to-date information will be obtained. The downside of using human sources is that there may be some element of bias in the information provided, or some people will say things from their own point of view or exaggerate it.

## **Archives**

Archives are places where records of all types and formats are kept and made accessible for research and other purposes. They are a good place to find primary sources, both unpublished materials and those that have been published for their parent institution's members or constituencies. Personal and institutional records of all types can be found in archives, as well as media, ephemera, oral histories, and even artifacts. The term *archives* can also refer to the records themselves [4]. The materials housed in the archives are unique, usually one of a kind items. Archives store, preserve and make accessible records of enduring value that have not been produced in great quantities for the general public for research and understanding. Archival materials are rare and irreplaceable and therefore they are not loaned out to users.

## **Library**

When you think about libraries, the first things that come to mind are probably printed materials such as books, journals and magazines. Libraries also provide access to resources such as full-text journal and magazine articles, periodical indexes, and online encyclopedias. Libraries collect quality information in a wide variety of formats. Academic libraries purchase these sources for their "community" of students, faculty, and staff. Unlike archives, libraries have mass produced items such as books, government reports, CDs, DVDs, magazines and journals. The exceptions are rare books, manuscripts, map and other special collections. These resources are different from most of the information that is freely available to you over the Web because they have been reviewed and recommended by the library with input from the faculty members.

Like archives, libraries have primary source materials in many forms: historical newspapers, published letters, diaries, and government reports are just a few of the types of primary sources that can be found in libraries. In addition, some libraries are similar to archives in that they specialize in information materials such as rare books and unpublished manuscripts.

## **Why Go to a Library for Information?**

The main purpose of libraries, particularly those situated in University campuses, is to collect a large quantity of scholarly materials from different time periods and on diverse topics to make research easier for members of the community they serve (staff and students in the case of a university.) Library resources are free for use by members of the community. Libraries purchase materials that are normally too expensive for library patrons. Library materials, unlike those found on the Internet, go through a review process. Librarians select books, magazines, journals databases and even Websites for use by their patrons. This selection process enables the library to collect resources considered to be reliable, relevant and valuable.

In addition, library resources are organized by subjects thus making them easy to find. For easy access, each item of library material has a call number that indicates where it is located on the stack/shelf. Libraries have collections with in-depth information that has been published over time. Both current and out of print books and magazines are stocked in libraries most of which are in print formats. With the advent of the electronic age, some of these are now accessible through digital libraries collections on the Web.

Libraries have trained staff called librarians who serve as a bridge between users and information sources. They assist users in sorting through the maze of information in their library collections. Librarians answer reference questions and also help patrons to learn how to use new information tools. If you need help with accessing information, contact your librarian.

### **Searching the Library Catalog**

For example, you can search the library catalog of a University such as the University of Maryland or University of Zimbabwe to find primary, secondary and tertiary sources of information. See table 3 below for sample searches in the catalog. Module 2 provides details about the library catalog.

**Table 3: Sample catalog searches**

<b>Primary</b>	<i>diaries</i> Nigerian civil war
<b>Secondary</b>	<i>biography</i> Nigerian civil war
<b>Tertiary</b>	<i>encyclopedia</i> Nigerian civil war

When seeking information for academic purposes, it is advisable to start your search from the library and save yourself time and effort, as well as obtain relevant and quality information. You can then search the Internet if you need more information. Also, if you do not have the skills to search the Internet for relevant information, the librarians are there to assist you.

### **The Internet**

#### **Definition of the Internet and the World Wide Web**

The Internet is a global system of networked computers that allow user-to-user communication and transfer of data files from one computer to another on the network [22]. It is a worldwide system of computer networks - a network of networks in which users at any one computer can, if they have permission, get information from any other computer (and sometimes talk directly to users at other computers) on the network [23]. On the other hand, the World Wide Web (WWW) provides the technology needed to navigate the Internet is vast sea of resources [22]. The WWW is a path-way of accessing information over the Internet via Uniform Resource Locator (URL) or web address.

#### **Types of Information on the Internet**

In the distant past humans sought to record information for future reference using clay tablets, papyrus, parchment and paper. However; the development of the printing press in the 16th Century forever changed the communication process [24]. Currently the introduction of computers and the Internet has sky rocketed the amount of information now available to students, researchers, scientist, healthcare workers, policy makers, and faculty among others. Unlike the libraries, some of the information available on the Web is not peer-reviewed or

referred as no one individual or group dictates what information should be published or how it should be presented. This freedom to post items allows individuals to publish their opinions, ideas and creative works on the Internet. As a result, the Internet has some information that may be interesting but cannot be referenced and used for academic purposes because no authority takes responsibility for it. Unlike libraries where librarians help users in accessing information, the Web is primarily a do-it-yourself endeavor.

The Internet contains all kinds of information sources including, among others:

- Bibliographic information such as library catalogs
- Multimedia- Audio, video and graphical sources of information
- Reference sources such as Encyclopedias, Dictionaries, Handbooks, and others
- Journals, Newspapers, Magazines and Databases
- Subject related gateways
- Reports /Grey literature
- Movies and videos

1. List three main places where information sources could be found?
2. What are the advantages of information obtained in a library over that of the Internet?

## **Information Sources in the Library/Internet**

The Internet has become a big library for all kinds of information. Some information sources are available online free of charge while others are fee-based. Examples include online books, databases, journals and reference resources. Some of these are free on the Internet while others are based on subscription or purchase. MEDLINE/PubMed is a good example of a free online database while EMBASE is based on subscription.

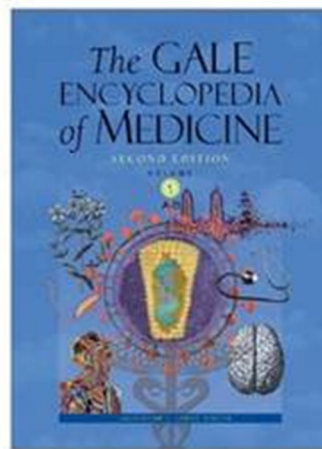
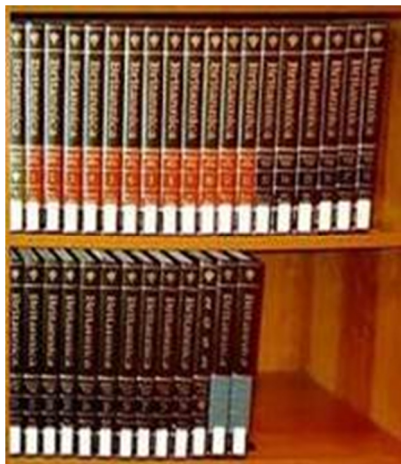
Below are the various categories of information sources that could be accessed through the Web.

- Reference
- Monographs
- Periodicals
- Indexes and abstracts
- Drug information
- Databases



## Reference Sources

These are authoritative works that provide specific answers or information. As you go through school, you will need to use reference sources to find information about topics, locate facts, and answer questions. There are many types of reference sources, including atlases, dictionaries, encyclopedias, thesauri, directories, almanacs, manuals, biographies, and handbooks, among others. Each type is available either in print, on CD-ROMs and the Internet. Reference information sources can be general or subject specific. For example, The Encyclopedia Britannica is general while The Encyclopedia of Stem-Cell Research, The Encyclopedia of Pain, and The Gale encyclopedia of Medicine are subject encyclopedias. Other reference sources such as dictionaries, atlases, directories also have both general and subject categories.



**A set of Encyclopedia Britannica Gale Encyclopedia of Medicine**

- **Monographs**

A monograph is a scholarly piece of writing in form of an essay or book on a specific, often limited subject [25]. It is a book that stands on its own rather than being part of a series. According to The National Research Council (NRC), a monograph is a specialized scientific book. Monographs are written by specialists for the benefit of other specialists and demand the highest standards of scholarship. Most monographic manuscripts are critically reviewed and edited resulting in books that are expected to have a reasonably long shelf life [26].

Monographs serve as an important means for conveying basic background information, such as a narrative description of a disease, path-physiology, diagnostic techniques and common therapeutic regimes etc. This trend remains true today, whether the monograph is in the print or electronic format [27]. Monographs can be located using bibliographies that list references of books with detailed bibliographic information (author, title, year of publication, publisher and date of publication). Bibliographies serve as tools for verification, location and selection of monographs. Today, many print sources for monographs are now in electronic formats. To locate monographs in a library collection requires using the library catalog and most libraries now have Online Public Access Catalog (OPAC). A good example is the National Library of Medicine LOCATORplus.



- **Periodicals**

**Periodicals are publications such as journals, newspapers, or magazines** published on a regular basis - daily, weekly, bi-weekly, monthly, bimonthly, quarterly, yearly, etc. The information in periodicals covers a wide variety of topics and is very up-to-date. Periodicals are available in both print and electronic formats. Common examples of periodicals include popular magazines (or general interest magazines), professional and trade magazines, scholarly journals, newsletters, and newspapers. The two basic types of periodicals are: popular (or general interest magazines), and scholarly.

- **Popular**

Popular magazines are periodicals of non-specialist nature. The published articles are usually written by staff writers, and chosen by the editor of the publication [29]. Magazine articles are usually shorter, written in non-technical language, and designed for the general population. Articles in popular magazines are reviewed by one or two members of staff of the organization where they are published [1]. Popular magazines have a glossy appearance, contains many photographs and advertisements.

Examples of popular magazines are:

1. O, The Oprah Magazine
2. Readers Digest
3. People
4. Time Magazine

- **Trade Magazines**

These are magazines that present information about a profession or a particular trade. They are written for members of a specific business, industry or organization. Trade magazines cover industry trends, new products or techniques, and organizational news written by staff or contributing authors. Good examples of trade magazines are: *The Economist*, *APA Monitor* and *Computer World*.

- **Scholarly Journals**

Journals are written by experts or specialists in a particular field/discipline and geared towards other scholars. The purpose of scholarly publications is to report research or advance knowledge [29]. The articles are usually longer and may contain charts, graphs, statistics, etc., as well as extensive bibliographies. The articles usually involve extensive research and in-depth studies. The writing style is more complex and the language may be technical. Examples of this type of periodical are academic journals and professional journals. Academic journals are written by members of an academic community and are reviewed by their peers while professional journals are written by member of a professional body including librarians, lawyers, doctors and nurses. Examples of academic journals are:

- British Medical Journal
- New England Journal of Medicine
- African Journal of Medicine and Medical Sciences
- East African Medical Journal
- African Health Sciences

Examples of professional/academic journals include:

- Journal of the American Medical Association
- Journal of the Medical Library Association
- African Journal of Library, Archival and Information Science

Access to journals either in print or electronic formats is based on subscription, however; full-text articles of some electronic journals can be accessed free on the Internet. Also, more than 7000 electronic journals are available to students, researchers, scientists, healthcare workers, and policy makers in Africa through the Health Internetwork Access to Research Initiative (HINARI). Using this resource requires institutional registration and login with the User Identification and Password.

- **Newspapers**

Newspaper articles are short and written in non-technical language. They provide first-hand account of an event and so are primary sources. Newspapers come in different forms and are designed for the general public and are business in nature. Newspaper articles are usually short and written in an easy to understand language by staff reporters and reviewed by staff within the organization. Newspapers are also good sources for secondary information. However, not all

information in newspapers is reliable. Newspapers are published daily, weekly or monthly. Example of newspapers include: The New York Times, The Guardian, and Nigerian Tribune etc.

- **Indexes and Abstracts**

Abstracts and indexes provide citations to papers dealing with specific topics in a field of knowledge. Indexes provide the essential bibliographic information needed to identify an article or other publications and usually include information about the author of the work, the source journal or other publication, volume, issue, and pagination [30]. Abstracting tools include the same key elements but also a summary of the work usually written by the author or sometimes generated by the reviewer where an author did not submit one. Most indexing and abstracting services allow access to their content through subject and author indexes. However, each tool differs on how data is presented and the nature by which access is organized. Examples of abstracts and indexes include:

- Index Medicus
- International Pharmaceutical Abstracts
- Index to Dental Literature
- Science Citation Index
- Current Contents: Clinical Practice
- Psychological Abstracts
- Cumulative Index to Nursing and Allied Health Literature (CINAHL)

Most of the popular databases searched by librarians and library users originated from print-based abstracting and indexing services. For example, the Index Medicus resulted in MEDLINE now accessible online through PubMed.

- **Drug Information Sources**

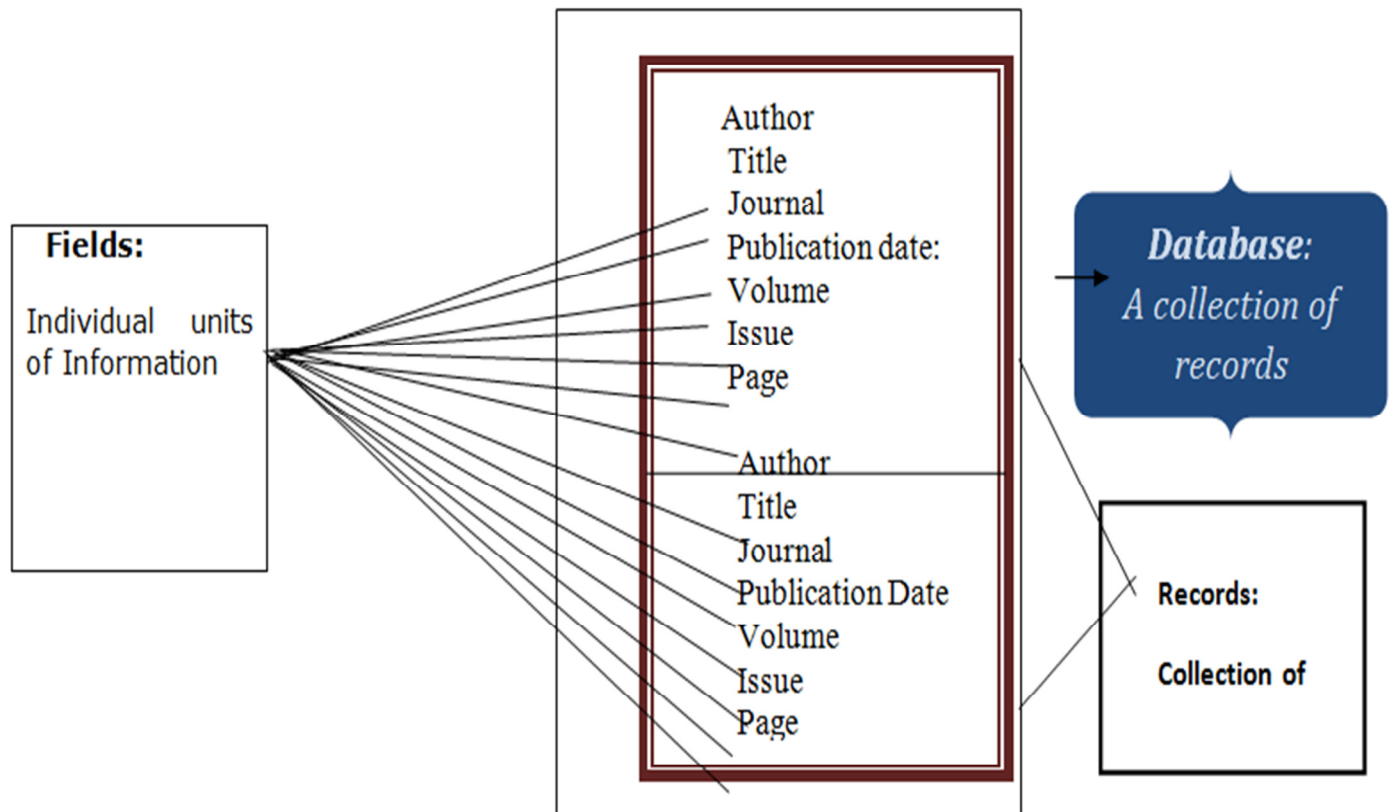
According to Butros and McGuinness (2004), drug information sources cover the fields of pharmacology (the study of the physiological actions of drugs), pharmacy (the compounding, manufacture and dispensing of drugs) and toxicology (the study of hazardous effects of chemicals) [31]. There are as many drug information sources as there are various specialties. Below are some sources for drug information:

1. Clinical Pharmacology. Tampa, Florida: Gold Standard Multimedia. Accessible online at: <http://cp.gsm.com>
2. MICROMEDEX. Greenwood Village, CO: Thomson MICROMEDEX. Accessible online at <http://www.micromedex.com>
3. Natural Medicines Comprehensive Database. Stockton, CA: Therapeutic Research Faculty, Accessible online at: <http://www.naturaldatabase.com>
4. Snow, B. Drug Information: A Guide to Current Resources 3rd Edition. New York, Neal-Schuman Publishers

- **Databases**

These are systematically organized collections of information covering different subject matters or specializing in one given subject or topic [32]. They may be arranged in a table of contents, alphabetically, in numerical order, in an index or in subject categories. A database is made up of records. Each item in the database has one record. Records consist of smaller units of information called fields. Common bibliographic database fields are: author, publication title, article title, subject or keywords, publication date, volume, issue and page number. For example, in the MEDLINE/PubMed database, each journal citation has one record. The record consists of the following fields: author, article title, journal title, date of publication, volume, issue, page number, PubMed ID, and abstract. A digital database is a computer program that organizes, describes, and indexes information. It permits the user to search for specific types of information, depending upon the selected search parameters.

**Figure 1:** Components of a bibliographic database



**Source:** NLM PubMed Training Manual, 2007

- **Invisible or Deep Web**

The "invisible Web" is what you cannot find using search engines and what you see in almost all subject directories [33]. They are gold mines of information you need to search directly. These includes all of the licensed article, magazine, reference, news archives, and other research

resources that libraries and some industries buy for those authorized to use them. There is lots of helpful information locked away in databases that can never be indexed by search engines. The services that let you search this "invisible Web" or "deep Web include: Invisibleweb.com, Lycos Invisible Catalog, Direct search (<http://www.freepint.com/gary/direct.htm>) and WebData. Examples of searchable databases containing invisible web pages valuable in academic research are:

- [ipl2](#)
- [Infomine](#)
- **Online Bibliographic Databases**
  1. African Index Medicus (AIM)
  2. MEDLINE/PubMed
  3. Cumulative Index to Nursing and Allied Health Literature (CINAHL)
  4. Web of Knowledge
  5. Scopus
  6. EMBASE

## 1. African Index Medicus (AIM)

African Index Medicus (AIM) is a collaborative effort between the World Health Organization (WHO) and the Association for Health Information and Libraries in Africa (AHILA). AIM gives access to information published or related to Africa and also encourages local publishing. A total of 140 journals published in Africa are indexed in AIM as of October 1, 2010. This database provides access to mainly abstracts and a few full-text articles published in African journals. It is at: <http://indexmedicus.afro.who.int/>

The screenshot shows the African Index Medicus (AIM) website. The header includes the WHO logo and the text "African Index Medicus - Access to African Health Information". Below the header, there is a navigation menu on the left with items like "Home", "Database", "National Focal Points", "African Medical Journals", "Other Regional Index Medicus", "AFRO Library", "Links", "Intranet", "Global Health Library", "Global Index Medicus", and "Tools for Cataloging & Indexing". The main content area is titled "Index Medicus (AIM)" and contains the following text:

In order to give access to information published in or related to Africa and to encourage local publishing, the World Health Organization, in collaboration with the Association for Health Information and Libraries in Africa (AHILA), has produced an international index to African health literature and information sources.

This index is called African Index Medicus (AIM).

[access the database...](#)

**Why index African literature?**

The need for improved access to what has been published on health issues in African countries, has long been felt by researchers, development agencies, health administrators and planners both inside and outside the continent. Very few African health and biomedical information sources are included in the world's leading bibliographic databases and there is a wealth of untapped information in books, reports and studies from international development agencies, nongovernmental organizations and local institutions.

Only by awareness of what work has already been done, can further advances be made; giving visibility to locally published material avoids overlapping, conflicting or redundant research work or the unnecessary duplication of health learning materials. New studies would then build on earlier reports or projects or research already undertaken. This would reduce costs of duplicated efforts, improve on methodology earlier used and make research more cost-beneficial and original.

Printed knowledge generated in African countries is given global exposure in the African Index Medicus. It will promote African publishing by encouraging writers to publish in their country or regional journals, whereas now scientists and researchers in developing countries are competing for publication space in the few world-wide "prestigious" journals.

The traditional North-South flow of information could be complemented by South-South and South-North communication: information on health problems in one country will be shared with those experiencing similar conditions.

**Which Journals are Indexed in the African Index Medicus?**

All African medical journals could be indexed in the AIM database. Articles on or related to Africa and published in other regional or international journals are indexed. Editors willing to integrate their journals into the African Index Medicus database are kindly invited to fill in the following [form](#) and send it to the [AIM coordinator](#) or [Technical support](#).

**Events / Evénements**

- **XVème Congrès international d'épidémiologie et de parasitologie**  
Actualités du Pharo - organisé conjointement par les associations ACELF - EPITER - ACTUALITES DU PHARO - 15 - 17 septembre 2010 Espace congrès du Pharo - MARSEILLE  
[aim.who.int](#)
- **1st Conference on Open Access Scholarly Publishing**  
OASPA offers a forum for bringing together the entire community of Open Access journal publishers  
[aim.who.int](#)

**New Journals in AIM**

**Le Courrier du Désert**  
souhaiter un support pour ceux qui souhaitent faire partager leurs expériences et leurs difficultés, et à cet effet nous invitons à travers cet éditeur, tous les indexeurs africains, visiteurs du portail à nous écrire, pour



## **2. MEDLINE/PubMed**

MEDLINE is the premier bibliographic database of the National Library of Medicine, Bethesda, Maryland, USA. It covers the field of medicine, nursing dentistry, veterinary medicine, the healthcare systems, the preclinical sciences and other areas related to the life sciences and is updated daily. MEDLINE records contain bibliographic citations from over 5,000 print and electronic biomedical journals published across the globe. It has over 12 million citations of which approximately 76% include abstracts [30]. It is accessible online free of charge through PubMed. MEDLINE/PubMed could be accessed at: <http://www.pubmed.nlm.nih.gov>. However, to retrieve full text articles, it is better to access PubMed through HINARI at: <http://www.who.int/hinari>. Details of how to search MEDLINE/PubMed and HINARI will be covered in Module 3.

**3. Cumulative Index to Nursing and Allied Health Literature (CINAHL)**CINAHL gives access to citations and abstracts for nursing and allied health information. It includes citations from over 2000 journals and abstracts are available for over 1,200 titles with full text of over 7,000 records available in the database [30]. This database also provides some coverage of biomedicine, alternative /complementary medicine and consumer health information. CINAHL is based on subscription. However, it could be accessed free of charge through HINARI by institutions in Africa.

## **4. Web of Science**

Web of science Provides access to the Science Citation Index Expanded and Social Science Citation Index. It covers science and provides technical journals in biochemistry, biology, genetics, biomedicine, genetics, microbiology, nuclear science with abstracts. It covers more than 8,000 journals [30]. It offers current and retrospective bibliographic information, author abstracts and cited references and allows users to conduct broad-based comprehensive searches that uncover all the relevant information they need. It provides cited reference searching, the unique ISI search and retrieval feature that lets users track the literature forward, backward and through the database. It is updated weekly. Web of Knowledge (PubMed) is accessible free of charge via HINARI.

## **5. Scopus**

Scopus is an interdisciplinary bibliographic database that indexes the content of more than 15,000 peer-reviewed journals from more than 4,000 international publishers. It covers subjects such as the physical sciences, engineering, earth and environmental sciences, life and health sciences, social sciences, psychology, business, and management. Scopus content includes MEDLINE and EMBASE citations. Also, Scopus covers 1,000 Open Access Journals, 500 Conference Proceedings, Over 600 Trade Publications and over 125 Book titles. In addition, Scopus covers 386 million quality Web sources including 21 million patents. Web sources are searched via Scirus [34, 35]. Scopus can be accessed at <http://www.scopus.com> or through HINARI for full text articles.

## **6. EMBASE**

Provides content to biomedical (clinical and experimental) information with extensive coverage of drug research, pharmacology, pharmacy, and toxicology, public health and mental health

topics with abstracts back to 1974 and it is updated daily with pharmacological information. The database indexes more than 7000 journals, has over 18 million records. It has more than the 11 million EMBASE records from 1974 to date and 7 million for unique MEDLINE records from 1966 to the present. This database can be accessed through subscription at <http://www.embase.com>

**Note:** All the above bibliographic databases except EMBASE are accessible free through HINARI (<http://www.who.int/hinari>)

- **Evidence-Based Medicine (EBM) Resources/Databases**

Evidence-Based Medicine is about using information from the medical literature in making informed decision about patient care. Many EBM databases are now accessible online including, among others:

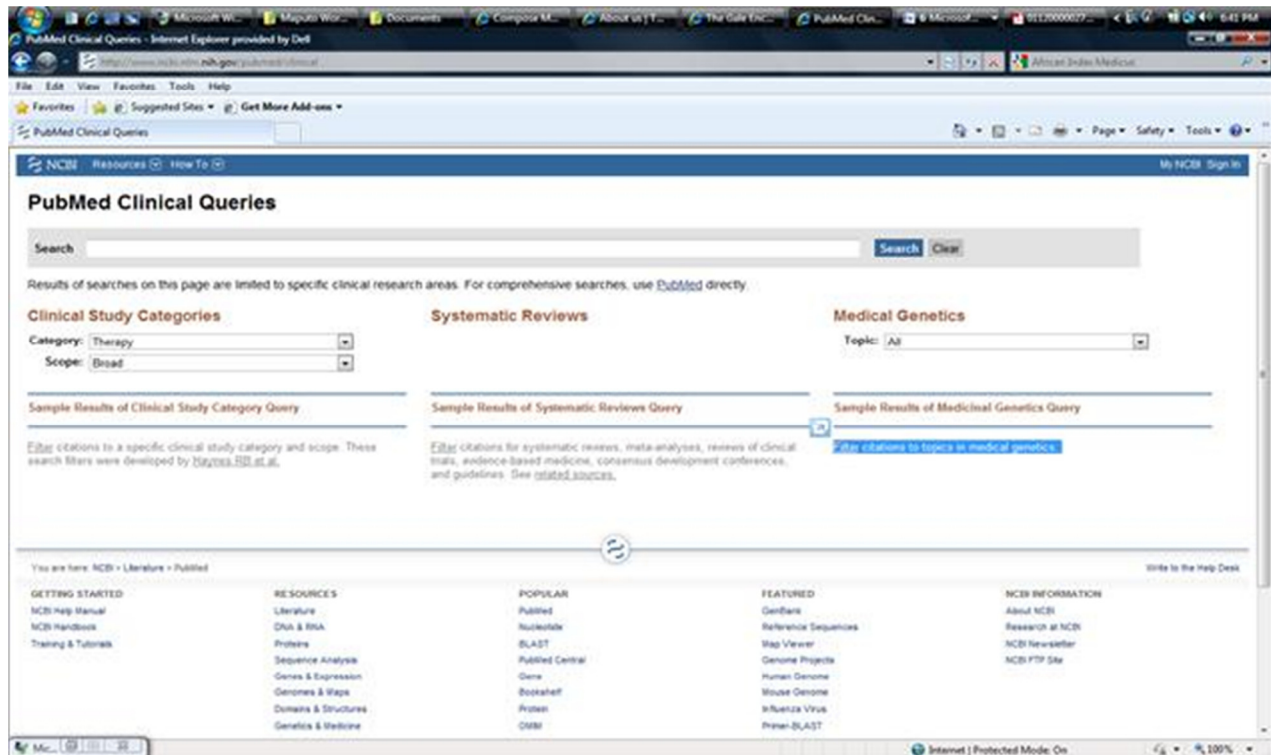
- Clinical Queries
- Cochrane Library
- Clinical Evidence
- DynaMed
- Best Evidence

In this module, Clinical Queries and the Cochrane Library will be discussed

**1. Clinical Queries:** This is accessible through PubMed and covers three main areas namely:

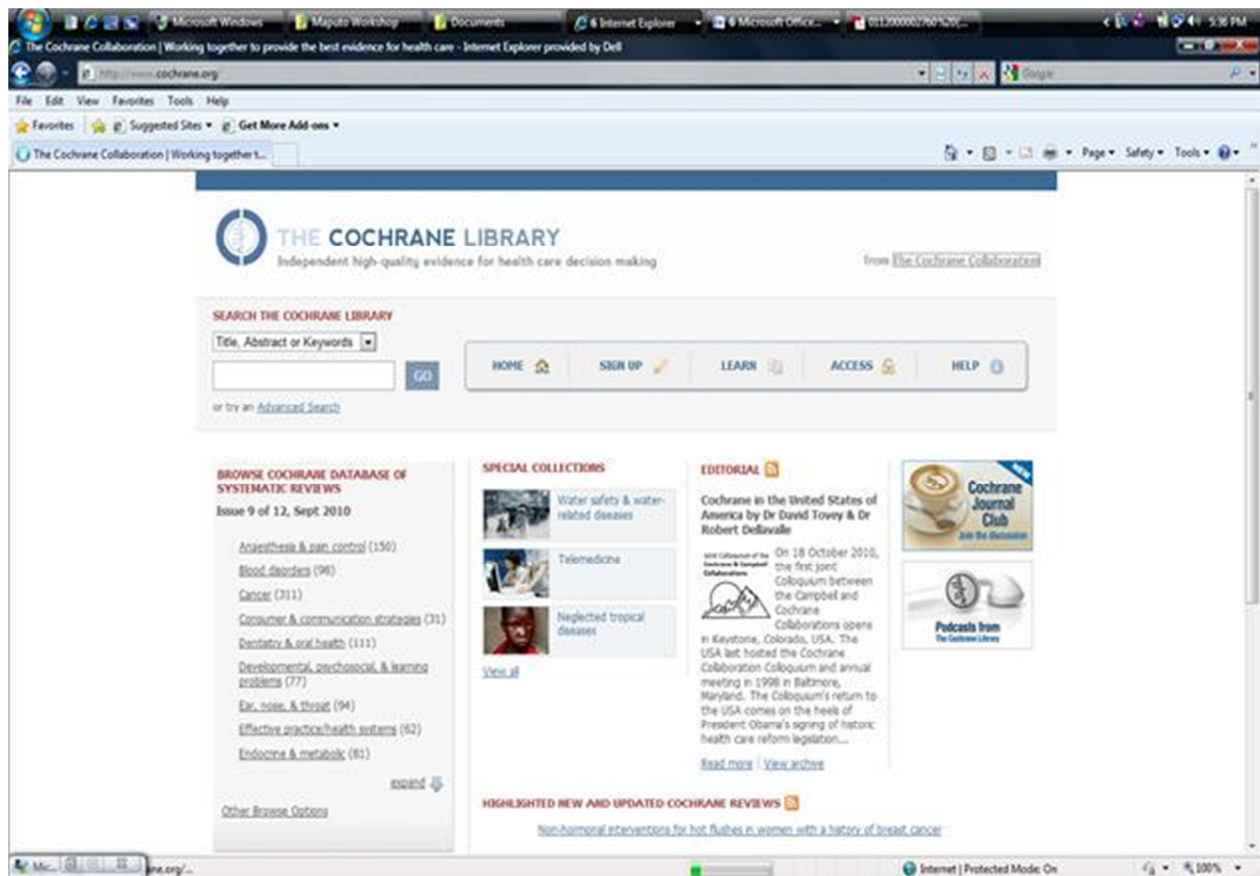
- *Clinical study category Query:* This [filters](#) citations to a specific clinical study category and scope
- *Systematic Reviews:* These filter citations for systematic reviews, meta-analyses, reviews of clinical trials, evidence-based medicine, consensus development conferences, and guidelines.
- *Medical genetics:* filter citations to topics in medical genetics.





**2. The Cochrane Library** is a collection of databases, published on CD-ROM and the Internet and updated quarterly, containing the **Cochrane Database of Systematic Reviews**, the **Cochrane Central Register of Controlled Trials**, the **Database of Abstracts of Reviews of Effects**, the **Cochrane Methodology Register**, the **HTA Database**, **NHSEED**, and information about **The Cochrane Collaboration**. **The Cochrane Library has about 4,000 reviews meant for use by health care workers to enable them to make informed decisions with respect to patient care [36]**. Reviews are unique because they are both produced by, and are relevant to everyone interested in the effects of health care. Based on the best available evidence, healthcare providers can decide if they should fund production of a particular drug. Practitioners can find out if an [intervention](#) is effective in a specific clinical [context](#). Patients and other healthcare consumers can assess the potential risks and benefits of their [treatment](#) [37].

- Systematic reviews seek to collate all evidence that fits pre-specified eligibility criteria in order to address a specific research question.
- They aim to minimize bias by using explicit, systematic methods.
- The Cochrane Collaboration prepares, maintains and promotes systematic reviews to inform healthcare decisions (Cochrane reviews).
- Cochrane reviews are published in the *Cochrane Database of Systematic Reviews* in *The Cochrane Library*



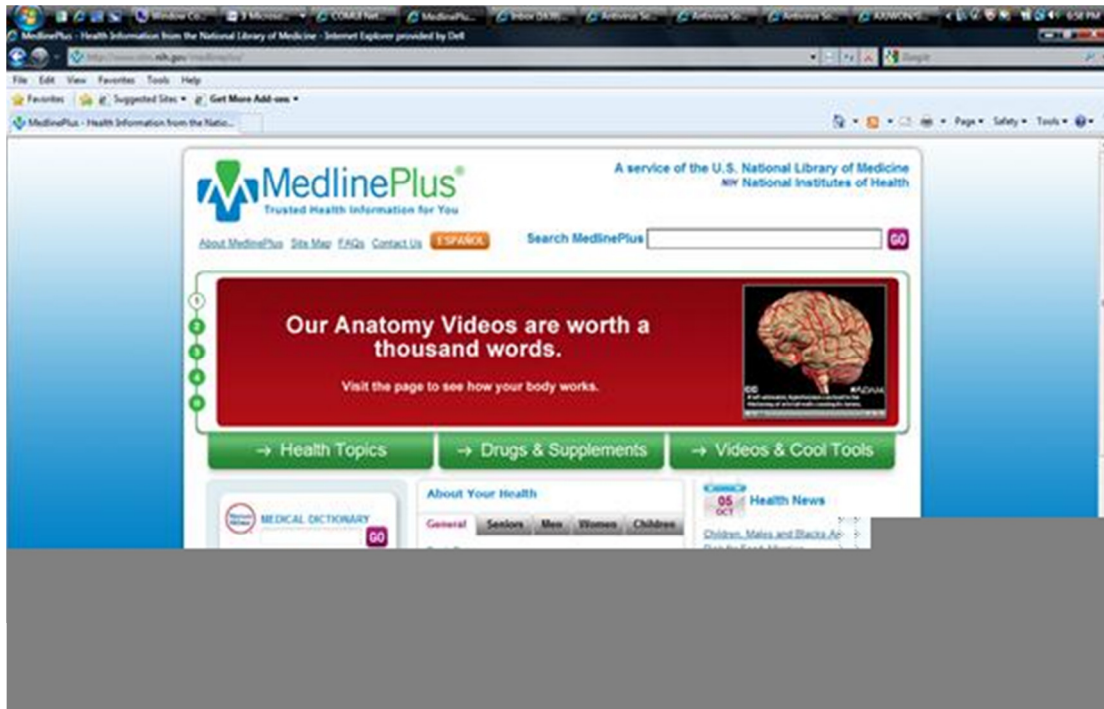
## ▪ Consumer Health Information Resources/Databases

1. MEDLINEplus
2. National Institute of Health (NIH) Senior Health
3. New York Online Access to Health (NOAH)
4. HealthyRoadsMedia
5. Toxtown
6. Toxnet
7. Household products database

### • Medline Plus

Medline Plus is a product of the National Library of Medicine (NLM). Medline Plus offers information on selected, organized links to online consumer health information on hundreds of topics about diseases, conditions, and wellness issues in language you can understand. Medline Plus offers reliable, up-to-date health information, anytime, anywhere for free. You can use Medline Plus to learn about the latest treatments, look up information on a drug or supplement, find out the meanings of words, or view medical videos or illustrations. You can also get links to the latest medical research on your topic or learn about clinical trials on a disease or condition. It also includes tutorials.

Also featured are an online encyclopedia, medical dictionary, audio-visual resources, and extensive links to Spanish-language health information. Medline Plus is the premier consumer health site. It should be any consumer health information seeker's first stop, and can fill the vast majority of information needs. The homepage is very well-organized; everything is accessible from there. When searching, multiple search terms automatically combined with "And". Search engine will detect misspelled words and suggest alternatives. To access Medline Plus go to: <http://www.nlm.nih.gov/medlineplus/>, or type medlineplus.gov into your browser's address bar.



- **NIH Senior Health**

This is a website for the elderly, developed by the National Institute on Aging and the National Library of Medicine. Senior-friendly features include the ability to adjust font size and contrast, an audio option that reads text on the page aloud, and videos. Seniors with low vision, and anyone with low literacy needs, although most topics are senior-specific (i.e. Exercise for Older Adults). A short list of topics is easy to browse. No search option is included. Audio text-reading function is very literal and function is spotty: may repeat phrases several times and / or skip words or sentences. To access this resource go to: <http://nihseniorhealth.gov/>

- **NOAH – New York Online Access to Health**

A collaborative effort of New York librarians, NOAH provides access to selected, organized links to online consumer health information. It has a wide range of topics and extensive Spanish-language content. Non-Spanish-speaking users can navigate organized topic pages in English, and then click on "en espanol" link at bottom of page to access available Spanish-

language links for that topic. It is well-organized and easy to browse; browsing is often more efficient than using the search engine [38]. Can be accessed at: <http://www.noah-health.org/>

- **HealthyRoadsMedia**

A collaborative effort of many different public health agencies, social services organizations, and librarians, HealthyRoadsMedia collects, creates and provides free online access to multilingual health information overviews on various topics in a variety of formats: audio, audiovisual, and written. Health topics provided in English and 8 other languages: Arabic, Bosnian, Hmong, Khmer, Russian, Somali, Spanish, and Vietnamese. It is best for patients with lower literacy English and / or need for information in a language other than English. Focus is on prevention and wellness, and safety. Not all topics are available in all languages [38]. To access this resource go to: <http://www.healthyroadsmedia.org/>

- **Household Products Database**

This database links over 10,000 consumer brands to health effects from Material Safety Data Sheets (MSDS) provided by manufacturers and allows scientists and consumers to research products based on chemical ingredients [39]. Household product database was developed by the Specialized Information Services Division at the National Library of Medicine, National Institutes of Health, Bethesda, Maryland, USA.

The database is designed to help answer the following typical questions:

- What are the chemical ingredients and their percentage in specific brands?
- Which products contain specific chemical ingredients?
- Who manufactures a specific brand? How do I contact this manufacturer?
- What are the acute and chronic effects of chemical ingredients in a specific brand?
- What other information is available about chemicals in the toxicology-related databases of the National Library of Medicine?

This database can be accessed at: <http://householdproducts.nlm.nih.gov/about.htm>



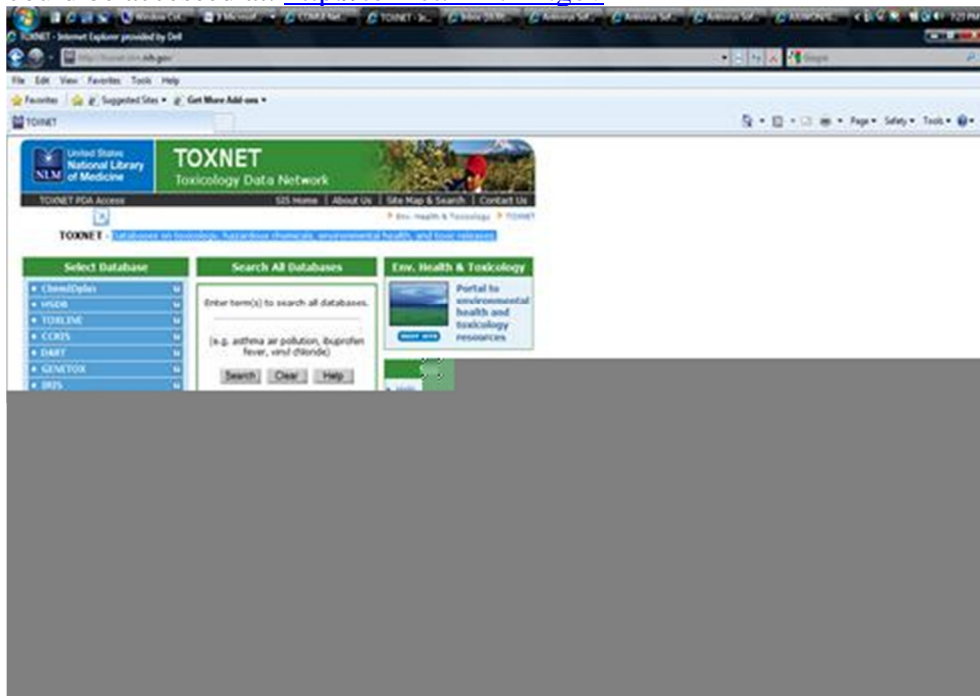
- **Tox Town:** is designed to give you information on:
  - Everyday locations where you might find toxic chemicals
  - Non-technical descriptions of chemicals
  - Links to selected, authoritative chemical information on the Internet
  - How the environment can impact human health
  - Internet resources on environmental health topics

Tox Town uses color, graphics, sounds and animation to add interest to learning about connections between chemicals, the environment, and the public's health. Tox Town's target audience is students above elementary-school level, educators, and the general public. It is a companion to the extensive information in the [TOXNET](http://toxnet.nlm.nih.gov) collection of databases that are typically used by toxicologists and health professionals [40]. This database can be accessed at: <http://toxtown.nlm.nih.gov/index.php>





6. **Toxnet:** Is a database on toxicology, hazardous chemicals, environmental health, toxic releases and other information resources from the Toxicology and Environmental Health Information Program. Developed by the U.S National Library of Medicine [40]. TOXNET could be accessed at: <http://toxnet.nlm.nih.gov>



- **Internet Portals, Digital Archives and Institutional Repositories**

- Health Internetwork Access to Research Initiative (HINARI) <http://www.who.int/hinari>
- African Journals Online (AJOL) <http://ajol.info>
- PubMed Central (PMC): <http://www.ncbi.nlm.nih.gov/pmc/>
- Bioline International (BI): Through this site you can search through free and open access medical journals at <http://www.bioline.org.br/is>
- Biomed Central: Open Access (OA) journal publisher that allow readers free access to published full text journal articles while authors pay fees to get published. <http://www.biomedcentral.com/browse/journals/>
- Scientific Online Library (SciELO): An AO publisher that gives access to full text articles. <http://www.scielo.org.ar/scielo.php?lng=en>
- Directory of Open Access Journals (DOAJ): Gives you free access to online journals related to your subject area. You can access the site at <http://www.doaj.org/doaj?func=findJournals>
- Loughborough University's Institutional Repository <http://www.lboro.ac.uk/library/resources/InstitutionalRepository.html>
- **Google Scholar**: While regular Google can be a helpful tool, sometimes you just need scholarly results, and that's just what this tool does, paring down results to the most reliable and academic sources. Google Scholar is accessible at <http://scholar.google.com/schhp?hl=en&tab=ws>

- **Information Sources on Social Networking Applications**

In recent years social networking applications popularly known as Web 2.0 are now being used as a means of communication, especially in sharing and dissemination of information. Libraries are also using this media to reach out to their clients. Common Web 2.0 applications that have become sources of information include:

- **Facebook**
- **Blogs**
- **Twitter**
- **MySpace**
- **YouTube**
- **RSS**

## **Exercises**

1. What is the difference between the Internet and the World Wide Web?
2. List 5 reference sources that are available on the Internet
3. Give examples of the following databases/resources:
  1. Bibliographic
  2. EBM resources
  3. Consumer health information resources
4. Give an example:
  1. Digital archive
  2. Gateway
  3. Institutional repository



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Network of African Medical Librarians

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