INDIAN SUPERCOURSE NETWORK IN EPIDEMIOLOGY – DEVELOPMENT AND EVALUATION

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There are many advantages to using locally produced health information, such as its cultural appropriateness, geographic specificity, and flexibility. The Indian Supercourse is an online repository of lectures in Epidemiology, written by authors in India, on topics of particular interest to teachers and students in India.

The purpose of this dissertation is to describe the planning, development and evaluation of the Indian Supercourse Network. The Indian Supercourse Network has 6,000 faculty members in India, and more than 200 epidemiology lectures written by authors in India. Evaluation of the Indian Supercourse Network included an assessment of utilization of these educational materials in India using page views measured by web statistics analysis software. The main hypothesis compared page views from India, between the Indian Supercourse and the Main Supercourse. The results of the Wilcoxon Rank-Sum test showed that there were significantly more page views from India to the Indian Supercourse as compared to the Main Supercourse ($p < 0.0001$). This means that users in India prefer to use the Indian Supercourse more than the Main Supercourse. This may be because information in the Indian Supercourse is more pertinent to the epidemiology education needs of users in India. In contrast, there were significantly more page views from non-Indian countries to the Main Supercourse as compared to the Indian Supercourse ($p < 0.0001$). Interestingly, there was no significant difference ($p = 0.0642$) in total page views

from all countries considered together, between the Indian Supercourse and the Main Supercourse.

Public Health Significance – In India, there is a lack of an adequate system for formal epidemiology education. The Indian Supercourse has made epidemiology education available to everyone interested in learning epidemiology in India. The results of this study have shown that the Indian Supercourse is being utilized by people in India. Information contained on the Indian Supercourse website can eventually be disseminated across the digital divide via low-bandwidth methods and the postal system in India.

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PREFACE

I would like to thank my advisor Dr. Ronald E. LaPorte for his innovative ideas and vision which have guided my graduate studies and this dissertation. I thank him for his guidance and support. I would also like to express my appreciation and gratitude for my dissertation committee members Drs. Rycheck, Songer, Sekikawa and Chang. I would like to thank my husband Tushar and my children Mihir and Rucha for being there for me all the time.

1.0 INTRODUCTION

In India, there is lack of a formal system of public health education. There are no schools of public health in India, and very few professionals trained in public health. Most of these have received a Master's in public health (MPH) from a university in a developed country, usually the United States, and have returned to India to work there. There is also lack of access to quality epidemiology and public health education in India.

In India, a few physicians receive training in Preventive and Social Medicine (PSM) or community medicine which integrates medicine and public health. Every year, only about 200 physicians get a postgraduate degree in PSM[1]. This is a very small number compared to the population of India, which is more than 1 billion. Only 1 physician is trained in epidemiology and public health per year per 5 million people in India. Most of the physicians trained in PSM work as community medicine teachers in medical schools or join international non-governmental health organizations (WHO, UNICEF, World Bank, UNFPA, and USAID). Some work in medical research institutions. Ironically, the government has not created enough job openings for public health professionals in spite of the clear need for physicians trained in PSM at the central, state, and district level[1]. This is in stark contrast to the situation in a developed country like the United States, where there are 40 accredited schools of public health[2]. These schools graduate about 6000 students with a degree in public health every year[2]. The population of the United

States is about 300 million[3]. This means that about 100 public health professionals are trained every year for every 5 million people in the United States.

Even within India, there is an expanding chasm between the haves and the have-nots and their ability to access information. There is a vicious cycle. Poverty leads to a lack of access to information, which leads to disease, which in turn leads to more poverty. People who most need the information are denied access to it. There is a need to break this vicious cycle. The best way to do it is to formally train health care professionals in India, especially at the grassroots level in epidemiology, public health and prevention. Paying for a costly postgraduate degree in epidemiology/public health is often beyond the reach of most students in India. It is necessary to have flexibility of epidemiology/public health training courses in terms of content, form and outcome (certificates, diplomas, Master of Public Health degrees and doctoral degrees)[4].

This dissertation focuses on the planning, development and evaluation of an innovative approach for the delivery of epidemiology education to all interested individuals in India, free of charge. The Indian Supercourse Network is a group of 6,700 academics and physicians in India, who have contributed 218 of their best lectures for distribution in India. These lectures are locally produced and culturally appropriate. Their content is tailored to meet the information need in India. The Indian Supercourse contains lectures on topics such as malaria, leprosy, endemic flourosis and iodine deficiency. These topics are not covered in medical textbooks even in India, since the medical textbooks used in India are often written by authors in developed countries, mostly the United States. Thus, the Indian Supercourse could fill an important gap in epidemiology education in India.

In order to justify the effort required to develop the Indian Supercourse as a part of the Main Supercourse, it is necessary to assess if the Indian Supercourse is achieving its main

objective which is teaching epidemiology to interested students in India. The evaluation of the Indian Supercourse included the comparison of utilization of lectures in the Indian Supercourse and lectures in the Main Supercourse by users in India. The primary hypothesis was designed to test if users in India prefer the locally produced lectures of the Indian Supercourse more than the lectures in the Main Supercourse. For assessing the utilization of Indian Supercourse lectures, it is necessary to identify the number of page views and the geographic location (country) of each user. This was done using Web server log files. Additional hypotheses included comparison of the Indian Supercourse and the Main Supercourse as regards page views from non-Indian countries and total page views.

The analysis also included an assessment of the utilization statistics for the Indian and Main Supercourse lectures to identify topics in epidemiology that interest users in India. This provided information about which lectures need to be included in the Indian Supercourse in the future.

The results of this study prove that there is a need for customized epidemiology education for users in India, and when such information is available, it is utilized by the intended users. There is a need for more similar resources in epidemiology education for interested people in India.

2.0 REVIEW OF RELEVANT LITERATURE

2.1 DISTANCE LEARNING ON THE INTERNET

2.1.1 Health information on the Internet

The Internet has the potential to reach millions of users worldwide. Since it was created in the late 1960s, the Internet has provided many functions, foremost among which, is the transmission of information. The total numbers of Internet users in the world are more than 1 billion, as compared to only 45 million in 1995 and 420 million in 2000. The number is expected to rise to 2 billion by 2011. In developed countries, 65 to 75 percent of the population has access to the Internet, while the access is at 20 percent or less in developing countries[5]. The Internet plays a significant role in the lives of people who have access to it. For example, 88 percent of online Americans say the Internet plays a role in their daily routines. The activities they identified as most significant are communicating with family and friends and seeking information online[6]. At the end of the year 2005, there were about 200 million Internet users in the United States[5].

In spite of the routine availability of the Internet in the United States, the country is beginning to fall behind in terms of the rate of growth of Internet users. The rate of Internet user growth is falling in much of the other developed countries too. In contrast, there is a continuing growth in many developing countries. A large percent of the growth in Internet users is

happening in developing countries such as China, India, Brazil, Russia and Indonesia. China and India are now ranked 2nd and 4th respectively in terms of the number of Internet users[5].

With new developments in the fields of information and computer technologies, there has been an increasing demand for online health information. The Internet is now increasingly available even to those with low income and education[7]. There are thousands of health-related Web sites on the Internet. Due to this, the Internet is a very important means for the dissemination of health information[8,9].

An estimated 93 million, or approximately 80 percent of adult Internet users in the United States, have searched for health information online[10]. Most of these users look for information on a specific health related condition, or information on lifestyle and behavior change.

According to Graham and Abram there is a strong market demand for accessible health information[11]. Data collected by them shows that health information on the Internet may represent the only contact with the health care system for those who do not have access to a health care provider. The authors also state that individuals living with a chronic illness or disability are more likely to search for health information online than those who are healthy (85 vs. 61 percent).

There are many advantages to having epidemiology/public health information available on the Internet. The Internet is accessible any time of the day. If the Website is open access, the epidemiology/public health information is available free of charge. This is especially important for people in developing countries, as well as poor people in developed countries. Text on a health education website can be copied, pasted, searched and printed. In contrast, print media (books and hard copy journals) is costly, and needs to replaced if damaged or lost. It is very difficult to search for material in a hard copy journal unless one knows which issue contains the

information one is looking for, making the search for required information time consuming and inefficient.

2.1.2 What is distance learning?

The terms "distance learning" and "distance education" are often used interchangeably. The United States Distance Learning Association (USDLA) defines distance learning as the acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance[12]. As is obvious, the term distance learning or distance education means that the teacher and student are separated or at a distance. In this situation, the teaching or learning has to be mediated by some type of technology, such as print, television or other electronic media. Distance learning is used at all levels of education including preschool through grade 12, higher education, home school education, continuing education, corporate training, military and government training, and telemedicine.

2.1.3 History of distance learning and computerized learning environments

"If we anticipate a future when more students need more learning, there is only one way to meet that need without diminishing the quality of students' learning experiences: We must change the way we deliver education" Twigg, 1993[13]

Distance learning has been popular since the mid-19th century. Over time, many different types of media have been used in distance learning. These media included the postal system, telephone, radio, television and computers. The medium used for distance learning has changed over time, but it has always been the best available "cutting-edge" technology of its day.

Distance learning via the postal system[14] – The postal system was used for distance learning first in Europe and then in the United States in the mid-19th century. It was the first medium to be used in distance learning. The students who took advantage of this new phenomenon were mostly nontraditional students, who were not able to attend conventional schools. These students included people with physical disabilities, women who were not allowed to enroll in schools open only to male students, people who were doing jobs and wanted to further their education, and those who lived in remote regions where schools did not exist[14].

An early example of this distance learning via the postal system was that of a man in Bath, England in 1840, Isaac Pitman, who taught shorthand by a correspondence course[14]. The students copied short passages from the Bible in shorthand and returned them via the postal system for grading. More students than ever before now learn from distance learning courses. As in the mid-19th century, these students tend to be older, with more job and family commitment, as compared to traditional students.

Other "correspondence" courses - According to the California Distance Learning Project website[14], university level distance learning in the United States began at the Wesleyan University at Illinois in 1874, where bachelor level and graduate degrees could be obtained.

Correspondence education became more popular with the Chautauqua movement[15] in around 1882. By 1900, both academic and vocational courses taught by correspondence were popular. As more and more people obtained degrees by correspondence, the ethical practice and quality of these courses came into question[14]. In 1915, the National University Extension Association started accreditation of college and university distance learning programs. The National Home Study Council (NHSC) was also formed in 1926 to address these issues[14].

Distance learning by telephone – Long-distance telephone systems were first developed in the early 1900s. This increased the ability of teachers in distance learning to reach more students. A significant barrier to the use of the telephone as a distance education medium is the inability of the students and the teacher to interact with each other. One solution suggested was the use of an answering machine, where students could leave messages for the instructor. This method also has an obvious drawback, as there was a significant time lag between the students asking the question, and the instructor giving an answer.

Due to their limitations, until the introduction of new teleconferencing technologies in the 1980s and 1990s, telephone systems never played a prominent role in distance learning[14].

Educational radio - In the first half of the 20th century, newer forms of media were being used in distance education. These included educational radio in the 1920s and educational television in the 1940s.

In the fall of 1932, the National Advisory Council on Radio in Education (NACRE) undertook the biggest experiment in educational broadcasting in the United States. NACRE presented more than a dozen series on airtime donated by the networks, believing that educational radio could be saved only by the cooperation between educators and commercial operators. The experiment failed due to the small audiences attracted by the NACRE shows[12].

Educational Television and the "Telecourses" - Ken Freed provides a good overview of the use of television in distance learning in "A History of Distance Learning, the Rise of the Telecourse"[17]. The author writes that the first true educational television program was Sunrise Semester, based in Chicago. Sunrise Semester started in 1959 and it featured a teacher, standing before a class with a camera shooting over the heads of the students. The effort ended in the

early Sixties, as it was not economically sustainable. Also, the program often failed to captivate the audience as the best teachers were often not the best television performers[17].

According to Ken Freed[17], the next major effort was between 1970-1972 when California funded a task force to design the television course or "telecourse". This effort was led by Coast Community College vice chancellor, Dr. Bernard Luskin and involved all California community and state colleges along with the University of California. Students are separated from the teacher, standing or sitting before a camera in a classroom or studio somewhere else, in real time or not. Colleges and universities using the telecourse would pay a licensee fee to the telecourse distributor, which paid telecourse producers[17].

In his overview, Ken Freed mentions that a new institution, Coastline Community College was assigned the job of coordinating the telecourses. Coastline was thus the first "virtual college". The demand for telecourses grew and each college added its own variation on the telecourse theme[17]. The Mind Extension University (M/EU) was launched by Glenn Jones in 1987. It was a cable channel that carried varied educational programs. In 1997, the M/EU was renamed Knowledge TV for carriage in the US and Europe as a source of programs for college students and adult home learners[13].

Discovery documentaries are routinely used in the curricula of educational institutions, at all levels. Discovery Communications runs the Learning Channel, Animal Planet, Discovery Health, The Science Channels and other networks devoted to learning[13].

Computerized Distance Learning Environments – Even though computers have been used as learning tools since the late Sixties, the Internet became widely available in US universities only in the early Nineties, radically changing the field of distance education. By the mid-1990s, the first World Wide Web (WWW)-based learning environments appeared and

facilitated Internet use in academic learning environments[17]. Since then, the use of computerized distance learning environments has expanded rapidly, and today, they are used in every possible field of study. The interactive nature of learning on the Internet allows group activity and lets students interact closely with the instructor. As with all other forms of distance learning, students can learn at their own pace.

The Internet has been able to overcome many of the shortcomings that have plagued older media used in distance learning. The first big advantage of the Internet, as mentioned previously, is its capability to mediate real-time interaction between the teacher and student. The second advantage is the Internet can deliver "multi-media" education, with simultaneous use of text, graphics, audio and video. Also, using a browser, students can access huge repositories of academic publications. Another advantage is the ability to search within these materials. Also, the Internet is cheaper as compared to other new media such as video conferencing.

The biggest disadvantage of the Internet is the lack of adequate bandwidth, especially in remote rural areas in the USA and also in most developing countries. In many places, people use a dial up Internet connection and a 36 or 56K modem, which works at the speed of 36 or 56 kilobytes per second respectively. It can take a long time to download a large file such as a graphics heavy PowerPoint presentation or a video clip. The gap between those who can access and effectively use new information and communication tools, such as the Internet, and those who cannot is called the digital divide[18]. The digital divide is an impediment to progress because often the people who will benefit most from available information are the ones who do not have access to it. The Internet is available for a relatively low cost, and its interactive and multimedia nature makes it very conducive to learning.

The future and better technology[19] – The next step is the use of television which is more and more "interactive". This includes video on demand and personalized programming carried by digital cable, satellite television and wireless television networks. Educational television programs have the added advantage of being able to carry text, graphics, video and audio very fast, unlike most of the Internet systems available today.

In addition to the Internet, electronic mail and bulletin board systems, some of the most sophisticated communication technologies available today are audio conferencing and videoconferencing. Audio conferencing is telephone based. Audio conferencing is often combined with compressed video or FAX for transmitting graphics. This is a low cost option as compared to videoconferencing[19]. Videoconferencing includes 1- or 2-way video and 2-way audio via broadcast, cable, telephone, fiber optics, satellite, microwave, closed circuit or low power television. The biggest disadvantage of videoconferencing is the very high cost of operating the system. Audio conferencing and videoconferencing make the distance learning experience extremely interactive, almost as much as learning in a classroom.

In addition to academic settings, computer-based distance learning is also used in the business setting as well as for people who learn from home, out of interest in a particular subject, to enhance their knowledge. For example, "Video Arts" was established in 1972 by a small group of television professionals. There are over 200 Video Arts titles - on DVD, video and online. These materials have been used in about 100,000 organizations, across 50 countries[20].

Teaching the teachers the technology of distance learning – As the media used for distance learning become more and more complex, it is essential to educate teachers about the use of this technology. Help for teachers in the technology of distance learning is often provided

by support personnel in universities and institutions where such courses are taught. Formal training for teachers in the technology used is also available.

Telecommunications, Inc. (TCI), a big cable company in the US, has built teacher training centers in Denver and Washington DC. TCI recently donated these centers to Cable in the Classroom. A leading example of teaching the teachers about distance learning is the "Blueprint for Interactive Classrooms" (BIC) constructed by University College Dublin. This is an interactive classroom for teaching through various audiovisual technologies, including the Internet, videoconferencing and interactive television. In addition, both the TCI and the BIC classrooms activities are transmitted to students sitting in remote classrooms[17].

2.1.4 Theories of distance learning

Distance learning theories are based on general education theories, even though distance learning is a different type of education, with target groups, methods and media that are distinct from traditional education[21]. There are two opposing views in the field of distance learning, which impact the way distance learning courses are taught – symbol processing and situated cognition.

The traditionally accepted theory of distance learning is the information processing theory. The teacher represents an abstract idea as a concrete image and then presents the image to the learner via a medium. The learner, in turn, perceives, decodes, and stores it, like a computer performing formal operations on symbols. Two additional factors affect this process. The first is the student's context (environment, current situation, other sensory input). The second is the student's mind (memories, associations, emotions, inference and reasoning, curiosity and interest). The student then develops his own image and uses it to construct new knowledge, in context, based on his own prior knowledge and abilities[22].

The second theory of distance learning is based on constructivist principles. The student constructs an internal representation of knowledge by interacting with the material to be learned. To implement this theory in distance learning, one must shift focus away from the traditional model to one which is much more complex, interactive, and evolving[22].

An effectively designed distance learning program involves both these theories. The design starts with empirical knowledge which mirrors the everyday environment of their designated learners. Then, with a firm theoretical grounding, a presentation is developed, which enables learners to construct appropriate new knowledge by interacting with the instruction[22].

2.1.5 University of Phoenix Online

The University of Phoenix[23] was founded in 1976. It is the largest private accredited University in the United States, and a large part of its teaching activity is carried out online. The University of Phoenix Online founded in 1989, was among the first accredited universities to provide college degree programs over the Internet.

Students enrolled in the University of Phoenix online require a computer, a phone connection, and an Internet Service Provider. The students use special software to retrieve lectures, questions and assignments from their instructor. The students also interact with other professionals in their field. Via email, the instructor provides guidance and feedback throughout the class. The university has library resources online. All the learning is via the Internet, so students have considerable flexibility, but doctoral programs require residency.

The University offers associate, undergraduate, graduate and doctoral degree programs, as well as professional certifications and non-degree courses. The tuition rate ranges from $494/credit hour to $720/credit hour. The University of Phoenix also offers programs for

international students in 40 countries, but the cost of tuition is especially prohibitive for potential students from developing countries.

The University of Phoenix Online does not conduct any courses in epidemiology or public health[23].

2.1.6 United Kingdom's Open University

The Open University[24], which started in the 1960s, is the first successful distance learning university in the world. The admissions criteria at the Open University are less restrictive than in some campus universities. Most of the courses taught at the Open University are available throughout Europe. More than 25,000 students studying at this university are international students, living outside the United Kingdom. The university conducts some courses outside Europe too.

The Open University offers undergraduate certificates, diplomas, degrees, postgraduate qualifications and a research degree. The degrees and certificates awarded by the Open University are recognized by academic institutions throughout the UK, the European Union and the rest of the world, and by a wide range of professional bodies. Distance learning at the Open University utilizes a variety of media, such as printed materials, books, audio and video cassettes, television, CD-ROMs, other software, and the Internet. Tutor-student interaction is by face to face meetings, by phone, online on the Internet, or via email.

Many Open University courses require access to a computer and an Internet connection. Fees range from about £100 for short courses to about £2000 for longer and advanced courses. Financial support is provided mainly for undergraduate studies, and availability depends on where the student lives.

The Open University does not conduct any online courses in epidemiology or public health[24].

2.1.7 Other distance learning systems in the world

Other distance learning systems in the world are the state ETV efforts in Sweden, Vancouver's Open Learning Agency[25] and Norway's NKS[26].

2.1.8 Assessment of the quality and effectiveness of distance learning

A recent report estimated enrollment in all distance education courses. In the 12-month 2000–2001 academic year, there were an estimated 3 million enrollments in all distance education courses offered by 2- and 4-year institutions. There were an estimated 2,876,000 enrollments in college-level, credit-granting distance education courses, with 82 percent of these at the undergraduate level[27]. A search on the ASPH website[2] and the ASPH distance learning webpage did not reveal any information about the enrollment in distance learning courses or the number of graduates who have obtained their degree by distance learning.

Concerns are often raised that the quality of learning is often compromised in online learning settings[28], but no research studies have directly compared distance learning to traditional classroom education, in the field of public health or any other field. Herrington[29] describes a checklist of items that can be used to assess quality of resources in online courses – accessibility, currency, richness, purposeful use of the media, and inclusivity. Other studies have described evaluation instruments for determination of the effectiveness of particular online courses. A

study by Beck lists the essential evaluation criteria - authority, accuracy, objectivity, currency and coverage[30].

A recent study revealed that a majority of Chief Academic Officers rated the learning outcomes for online education "as good as or better" than those for face-to-face instruction[31].

2.2 EPIDEMIOLOGY AND PUBLIC HEALTH EDUCATION

2.2.1 Epidemiology and public health education in the United States, Europe and in developing countries

In the United States and in Europe, there is a long history of training in the field of epidemiology and public health[32,35]. But in spite of the many years of experience in training in epidemiology and public health, the current organization and delivery of epidemiology/public health services are inadequate for emerging challenges. The development and ongoing training of the epidemiology/public health workforce has been neglected over recent decades in both wealthy and poor countries[4].

United States – The schools of public health accredited by the Association of Schools of Public Health (ASPH)[2] form the primary educational system that trains personnel needed to operate epidemiology, public health, disease prevention and health promotion programs in the U.S. According to the 2004 Annual Data Report[33] of the ASPH, in the fall of 2004, there were 36 accredited schools of public health in the United States, at 12 private and 24 public universities. Currently, there are 40 accredited schools. Students at the ASPH accredited schools of public health in the United States train in a wide range of fields, including epidemiology, biostatistics,

health administration, community health education, managed care, environmental health, public health practice and program management, nutrition, biomedical and laboratory sciences, international health, and behavioral and social sciences. ASPH accredited schools educate over 19,000 students annually from every state in the U.S. and many international students from most countries in the world.

The schools of public health in the United States grant a variety of degrees such as Master of Public Health (M.P.H.), Master of Science (M.S.), Master of Science in Public Health (M.S.P.H.), Master of Health Administration/Master of Health Services Administration (M.H.A./M.H.S.A.), Doctor of Public Health (Dr.P.H.), Doctor of Science (Sc.D.), Doctor of Philosophy (Ph.D.), and joint degrees which combine a school of public health degree with an outside degree, such as the Doctor of Medicine (M.D.), Doctor of Dental Medicine (D.D.S.), Juris Doctorate (J.D.), etc.

During the last decade, the total number of applications reported by the schools of public health has been steadily increasing despite a slight dip in applications in 2000. In 2004, 27,969 applications were submitted, a 12.0 percent increase from 2003 (24,973). The program area with the highest number of applications was epidemiology (19.5 percent).

Of the total applications in 2004, approximately 56.4 percent were accepted. In 2004, there were 8,340 new enrollments. The remaining 25.3 percent of the students were enrolled in doctoral degree programs. In 2004, 29.0 percent of the students were studying part-time. The proportion of part-time students varied greatly among the schools. More than half of the students (53.0 percent) were enrolled in M.P.H. programs and 74.7 percent of the students were enrolled in master's degree programs.

For the past ten years, the program areas that comprise the largest proportions of students (epidemiology, health services administration, health education/behavioral sciences, and environmental sciences) have remained constant, though the proportions have been changing in the various program areas.

In the academic year 2003-04, there were 6,399 graduates from the schools of public health, a 40.5 percent increase from 1993-94. Since 1993-94, the proportion of graduates with prior MD degrees has decreased from 16.3 percent to 14.0 percent in 2003-04.

Many of the ASPH accredited schools of public health have a distance learning component. This is described in a separate section.

Europe – The Association of Schools of Public Health in the European Region (ASPHER) has over 72 institutional members[34]. These are located throughout the member states of the European Union (EU), the Council of Europe (CE) and the European Region of the World Health Organization (WHO). Detailed data about the number of applications, students and graduates are not available.

Developing countries – Exact data about the number of schools of public health, enrollment and the number of graduates, in developing countries, are lacking. In developing countries, as seen in developed countries, there is strong policy level support for epidemiology/public health and a new determination to confront the health inequalities. Public health is being increasingly viewed as one of the important approaches for achieving national health goals[4].

For example, in 1996, an Indian Expert Committee on Public Health Systems recommended the development of a contemporary national health policy, a modern Public Health Act, development of a career track for public health professionals, and establishment of

regional schools of public health. Also, the Calcutta Declaration made in 1999 at the Regional Conference on Public Health in South-East Asia in the 21st Century, made specific recommendations for building public health capacity in South-East Asia. This included the creation of appropriate career structures, and strengthening public health education, training and research. The National Health Policy–2001 for India refers to the shortage of public health expertise and the outdated curricula that are unrelated to contemporary community needs[4].

There is a serious lack of public health training in most of the developing countries. South-East Asia has about 12 schools of public health for a population of well over 1.5 billion people[4]. To date, there are no schools of public health in India.

International agencies such as the WHO and UNICEF have carried out short training programs in India and other developing countries. These programs focus on training health care personnel in fields such as infectious disease control and maternal and child services. These agencies do not conduct training programs leading to a postgraduate degree[4]. The Rockefeller Foundation initiated the International Clinical Epidemiology Network (INCLEN) in the mid-1980s. This group focused on improving the epidemiological skills of clinicians over a 20-year period, but did not address the need for a modern epidemiology/public health workforce in situations with limited resources[4].

The failure of the short term training programs by the WHO and UNICEF to develop a sustainable workforce trained in epidemiology/public health in developing countries, proves that in-country training programs need to be developed. In 1992, the Rockefeller Foundation launched the Public Health Schools without Walls (PHSWOW) initiative in Africa. This later expanded to Asia. The PHSWOW program places emphasis on community-based services and decentralization of resources[4].

Paying for a costly postgraduate degree in epidemiology/public health is often beyond the reach of most students in developing countries. It is necessary to have flexibility of epidemiology/public health training courses in terms of content, form and outcome (certificates, diplomas, Master of Public Health degrees and doctoral degrees). Such a program has been implemented at the University of the Western Cape in South Africa, which has improved access to postgraduate public health education[4].

There is a lack of data on the size and composition of the epidemiology/public health workforce and effectiveness of training in the field. The WHO is trying to fill this information gap by the World Health Survey and by its support for development of knowledge as to the best approaches for strengthening public health capacity in developing countries[4].

Many schools of public health in the United States have centers for international health that carry out research and preventive programs in developing countries. But, there are few formal educational programs to train epidemiology/public health professionals in these countries. In most developing countries, a limited amount of epidemiology/public health is taught to students in medical colleges. For example, in India, students attend a few epidemiology and biostatistics lectures. There is a great need for formal education in epidemiology and public health in the developing countries, including India.

There is no record of distance education in public health or epidemiology in any of the schools of public health in the developing countries.

2.2.2 Distance learning in epidemiology and public health in the United States

The schools of public health (SPH) in the United States have been at the forefront of distance learning in this field. Most of them offer some distance learning courses. Information about these

distance learning components at the schools of public health is available on the website of the ASPH[2]. Some schools offer degree programs leading to a Master of Public Health (MPH), and some offer individual courses taught via distance learning technologies. Distance learning programs include satellite-based courses, audio, print-based, or Internet-based course work. Many schools offer non-traditional degree programs such as executive programs, certificate programs, and summer institutes.

As is mentioned on the website of the ASPH[2], distance learning in the field of public health has many obvious advantages. Distance learning is convenient. It is flexible, and courses can often be taken anytime. Students can learn from a distance, from expert faculty, without having to move to the site of the school. Students can set their own pace, and learning can be customized to meet the requirements of individual students. When the instruction is Internet-based, teachers can update online course material easily. Instruction can be continued beyond the time limit of normal classroom hours. Teachers can reach a broader audience. Due to the flexibility, distance learning can better suit the needs of non-traditional students - those with more job and family commitments. Students who can learn independently, are self-disciplined and self-motivated, have good time management skills and are comfortable with technology particularly benefit from distance learning.

An ASPH task force is considering ways in which schools can develop and expand distance education in public health. The task force includes representatives from each school nominated by the deans. The group meets regularly and shares ideas on the development of courses, degree programs and continuing education programs[35]. Of the 40 ASPH accredited SPH, 23 schools (57.5 %) offer some form of distance learning, either distance learning programs or programs with some distance learning components.

The degrees that can be earned are mostly Masters Degrees. The School of Public Health at the University of North Carolina at Chapel Hill offers a Doctor of Public Health degree in leadership, but on-campus time is required. The degrees commonly offered are Executive Master of Health Administration, Master of Health Administration, Executive Master of Public Health, Master of Health Services Administration, Master of Public Health, Master of Public Health in Health Services Policy and Management, Master of Science, and a Dual Degree - MPH and Masters of Nursing. Many schools offer certificate programs too[28].

The program areas of study vary. They include bio-security, clinical research design and statistical analysis, community practice, core public health concepts, cultural competency, disaster management, environmental health, epidemiology, food safety, general public health, health administration policy, health care management, health care outcomes, health education, health policy, humanitarian assistance, industrial hygiene, informatics, leadership, maternal and child health, nursing, occupational health, public health practice, preparedness response and recovery, prevention, program development, and tobacco control methods[2].

Some schools such as the Drexel University School of Public Health, Johns Hopkins Bloomberg School of Public Health, Loma Linda University School of Public Health, and University of Illinois at Chicago School of Public Health offer certificate programs. The Graduate School of Public Health at the University of Pittsburgh and San Diego State University offer some distance education courses, but not a certificate or degree[36,37].

The faculty members who teach regular courses teach distance education courses at these institutions. Unlike traditional courses in public health, admission into some distance education courses requires the student to have a minimum period of professional experience, usually 3 to 5 years. Many students in these courses are professionals working in public health settings, or

related health fields. For example, admission to the distance learning M.P.H. program in Occupational and Environmental Medicine at the School of Public Health at the University of Michigan is restricted to physicians currently employed in occupational medicine practice or physicians seeking a mid-career change into occupational medicine. Some programs are tailored for state, local and federal public health officers. In general, distance learning students in the field of epidemiology/public health are similar to distance learning students in other disciplines. They tend to be older, and are often mid career professionals with more job and family commitments.

Some of the ASPH accredited schools of public health that offer Masters Degrees by distance learning require at least a couple of weeks of attendance on-campus. For example, at the Johns Hopkins Bloomberg School of Public Health, students enrolled in the distance learning M.P.H. program have an on-campus orientation.

The biggest drawback of distance education in the United States is the high cost. Distance education reduces travel and living costs for a student, but by no means is it cheap. Most distance learning courses cost almost as much as the on-campus courses. Also, many schools add special fees to the tuition, which is not added to on-campus courses. These extra fees include fees for software, for equipment such as laptop computers and for technical support. The distance learning student also has to spend extra money for travel and living expenses for on-campus sessions, which are a required part of some of the distance learning programs. In addition, if distance learning students live out of state, they have to pay higher tuition, as compared to in-state students.

Tuition for the distance learning degree programs varies from about $275.11 (in-state University of South Florida) to $11,400 (Emory University Rollins School of Public Health).

2.2.3 Why is distance learning in public health not accessible to everyone?

The main function of distance learning is to improve access to education for those students who are not able to attend on-campus classrooms. Distance learning in the area of epidemiology/public health has been successful to a limited extent. Mid-career professionals, mainly physicians, who are unable to attend on-campus classes due to work commitments, can now get a degree in epidemiology/public health. In recent years, there have been an increasing number of distance learning students taking courses at the schools of public health.

One of the biggest stumbling blocks to the availability of distance learning to all is the prohibitive cost. As mentioned in a previous section, many schools charge additional fees over and above the fees charged for on-campus study. Because of the high tuition, traditional distance learning courses are not accessible to those without the means to pay, making distance learning accessible only to those with the ability to pay the high tuition costs. This excludes almost all the students outside developed countries.

Other factors are also involved in limiting access to traditional distance learning degree programs. Many programs have restrictive admissions criteria, including limiting admission to United States residents. Some programs require attendance at a local campus for a few days.

Many schools still rely on traditional media for distance learning, which are more costly as compared to using the Internet[38]. Traditional media used in distance learning are also less flexible (for example, students have to sit in a classroom when teleconferencing is used) and less interactive (for example, when video or audio lectures are used students do not have a chance to ask questions in real time).

In developing countries, even access to the Internet is costly. Subscribers to Internet service providers often have to pay on an hourly basis. This makes it time consuming and costly to download large files, that are typically needed in distance learning classes.

The problem of lack of access to an efficient Internet connection is called the digital divide. The digital divide[39] is a unique problem of the information age. The digital divide refers to the gap between those who can access and effectively use new information and communication tools, such as the Internet, and those who cannot[18]. The digital divide is an impediment to progress because often the people who will benefit most from available information are the ones who do not have access to it. The digital divide hinders access to distance learning via the Internet for almost all students outside the United States.

As elaborated in this section, distance learning is not accessible to many students in the United States and almost all the students outside the United States and other developed countries.

2.3 WEB STATISTICS ANALYSIS SOFTWARE AND PREVIOUS RESEARCH IN WEB SITE UTILIZATION

2.3.1 Assessing utilization

In order to justify continued development of the Indian Supercourse Network and other distance learning programs, it is essential to assess their utilization among the target population. The two main methods of assessing utilization of distance learning Websites are by using surveys and by Web statistics analysis software.

Surveys or questionnaires are the only method to obtain demographic information and uniquely identify each user. But surveys have their own inherent disadvantages. If a questionnaire is mailed, the correct email address or mailing address of each recipient has to be known. Also, there is the problem of non-compliance. Many people are unwilling to answer the questions in the survey. Also, some people are unwilling to take the time required to return the survey, either by email or by mail. Surveys that are posted open-access on the Internet often attract pranksters who are not really concerned with the project, and it is impossible to ascertain whether or not the person filling the survey is a user of the material on the website in question. Also, obtaining personal identifying information can raise legal and ethical problems.

For assessing the utilization of Supercourse lectures, it is necessary to identify the number of page views and the geographic location (country) of each visitor. Most of the Web statistics analysis software packages available are capable of obtaining these data, and it is not necessary to obtain identifying information about each visitor to assess utilization, more so as the Supercourse audience is not limited to a few students who have registered for a class. For these reasons, Web statistics analysis software has been used to assess utilization of the Indian Supercourse lectures.

2.3.2 Web server log files – what are they?

Web server log files are text files on the Web server. They record website traffic during a certain period of time. Depending on the traffic at a given website, the size of the Web server log files can range between 1 megabyte to more than 100 megabytes. The 4 types of Web server log files are -Access Log, Agent Log, Error Log and Referrer Log. Web server log files contain important

data such as the IP address of a visiting computer, which can be used to determine the country of the visiting computer.

2.3.3 Important considerations in using Web server log file data

In order to accurately analyze Web server log files, it is essential to have an intimate knowledge of the structure of the Web site. An interesting point to note is that page views measure log entry for HTML pages only. Sound, movie and PDF files are not included in the page view count. Lastly, since web site traffic is often volatile[40], it is essential to monitor Website logs over a long term.

2.3.4 Previous research – website utilization of educational websites

There is a paucity of literature on Web site utilization of educational websites. Web statistics analysis software appears to be used, for the most part, in e-commerce. Very few educators are using Web usage tracking applications as a tool to refine course development[41].

Peled and Rashty have proposed three models to facilitate the analysis of Web server log files generated by students. Each model calls for a different institutional (i.e., university or college) and individual (i.e., teacher) input. Each model provides different outputs (i.e., reports) for various "clients" (i.e., professor, student, computer-network administrator, Dean)[42]. These models are not mutually exclusive.

The Institutionalized model: The educational institution has a central repository containing Web server log files for every online course. The repository also contains demographic and academic-performance information. Teachers receive a summary of students'

online activities in a given course. The teacher may choose to compare the results with old courses and old student data reports, information about which is also present in the repository.

The Vendor Model: An external vendor analyzes the Web server log files for a fee. The software required to do this analysis can be purchased online or run on a local personal computer. The instructor provides the Web server log file data to the service provider along with optional data about each student and receives a report created by the service provider.

The Network model: A group of technically skilled instructors will create public domain applications on the Internet and customize them for their own needs. These will be used to analyze log files for their courses.

Peled and Rashty state that infrastructures for monitoring online learning will first emerge as a network of shared tools among technically skilled teachers. It is essential for universities to start preparing such an infrastructure early. Commercial vendors will ultimately step into the field of monitoring online learning[42]. In the same paper[42], Peled and Rashty describe the use of Web server log files, and demographic and student survey data for evaluation of a freshman introductory political science course at the Hebrew University of Jerusalem. This course was offered in a mixed mode format with weekly meetings with the faculty inside a classroom and the option of using a Web-based learning environment for after-class discussion and assignments. The course's website included summaries for all lectures in English and Hebrew, basic information about the course and a message board. Anonymous questionnaires were used before and after the course to measure student characteristics with expectations of online learning, and effectiveness of the online course, respectively. The answers were ranked on a 1 to 5 scale. The log files recorded online student activity and the authors built a software application to facilitate detailed analysis of statistics including the number of logged students,

students' preferences in using the learning environment tools, and student use of the discussion groups system. Demographic data were obtained from the school records and matched with the log file data. There were a total of 189 registered students. The authors discovered that the majority of students adopted a passive, "read only" approach towards the course's Website. Discussion group activity was monopolized by 2 students who posted over fifty messages each. Most students preferred to access the course site between 4:00 PM and midnight, due to increased availability of computers on campus during those hours. The first three days of the academic week (Sunday, Monday, Tuesday), were the busiest days for the website. Because the authors had matched log file data with demographic data, they were able to assess difference in online activity between male and female students. The post course questionnaire data showed that students were highly satisfied with their online experience and they felt that it contributed greatly to the course. Many students expressed an interest in enrolling in similar online courses in the future. Interestingly, most students (about 70 percent) stated that they began the course with a low level of confidence about using computers, but felt much more confident in this respect by the end of the course.

Zuboff, a sociologist from Harvard Business School, was the first to propose that computer-generated log files could be used to monitor online mental learning processes. According to her, information technology provides us with a unique opportunity to learn how to execute tasks more efficiently the next time we tackle them. In addition, she was also concerned about the potential misuse of "informated data", where managers have acquired the means to achieve a new computer-mediated work process that transparently "reports itself" to management[42].

A study by McKnight and Demers[41] evaluated course website utilization by students. The purpose of the website was to enhance course content, provide guidelines for assignments, and allow flexible access at the student's convenience. Web tracking software called WebTrends™ (www.webtrends.com) was used to assess utilization. Evaluation of the tracking data showed that students accessed particular web pages more often. The assignment page was accessed often, second only to the home page of the website. They spent more time at web pages about particular assignments when the assignment was due. It was noted that students used the website most, just prior and just following the face-to-face classes, and at late hours and on weekends. The website and approaches to teaching were modified in semester two based upon data from semester one. Web log data showed that students used the website more in semester two. Changes in the website based on the web tracking software data may have resulted in a greater use of the website in the second semester[41].

Graham and Abrams conducted a large-scale, evaluation of QuitNet[43], an Internet-based social support system for smoking cessation. The aim of this website was to disseminate behavioral science interventions via the Internet in order to decrease the prevalence of behavioral risk factors for cancer. The US Public Health Service guideline[44] had reported a better cessation outcome with greater duration and frequency of treatment. Using logistic regression, the authors demonstrated that high website users were more than twice as likely to be continuously abstinent for 2 months, as compared to low website users. Website utilization intensity was measured as the number of log-ins times the duration in minutes per log-in. Website utilization intensity was very highly correlated with the use of support resources (number of emails sent and received, number of email senders, number of email recipients). Surprisingly, baseline motivation was not significantly correlated with website use or with smoking outcomes. Although the authors do not

give figures about overall utilization of their website, this study highlights the effectiveness of health information disseminated over the Internet.

Two Master of Science theses by students at Brigham Young University evaluated the utilization of two family life education websites. The Forever Families website (http://www.foreverfamilies.net) is a family life education website sponsored by the School of Family Life at Brigham Young University. In the thesis by Brynn Marie Blake Steimle[45], the utilization of thisWwebsite was assessed using the Web statistics analysis software SuperStats (http://www.superstats.com/). The number of unique visitors, returning visitors and page views were analyzed. The data revealed that approximately 24 percent of the unique visitors were returning visitors. The researchers were disappointed that visitors viewed only 4 pages on average. This suggested the need to make this website more interesting, so that visitors would view more articles. The second thesis on another Family Life Education website was by April Steed[46], who studied the extent to which the website Foundations of Parenting (http://foundationsofparenting.org) had been utilized. This author also looked at unique visitors, returning visitors and page views, using SuperStats. An examination of the most popular pages report showed that the home page was the most popular, with 22.8 percent of the total number of page views, as would be expected. Visitors were taken to the consent form once they reached the third page on the website and the consent form was the second most popular page viewed. An examination of the page depth report showed that 111 out of 823, or 13.5 percent of the page views were due to the invitation to take the survey.

2.3.5 Previous research – comparing utilization of e-books and print books

Numerous studies at academic research libraries have looked at the circulation analysis of e-books by library patrons. A 1998-2000 longitudinal study by Rogers at Ohio State University[47] used a survey to gather data on the frequency of use of print journals and electronic journals. This study looked at journal usage in aggregate, rather than the relative usage of individual journal titles. The conclusion was that electronic journal usage had increased, while print journal usage had decreased. By the end of the study period, usage of both formats was roughly equal[47].

One of the most comprehensive studies was the Columbia University Online Books Evaluation Project. In this study, 105 non-reference e-books and 6 reference e-books that were available in print format were made available to Columbia University patrons. Data were collected on circulations of the print books and accesses of the e-books between winter 1995 and autumn 1999. The conclusion was that for both the reference and the non-reference titles, e-books were used more than the print versions of the same titles[48].

The netLibrary collection is the largest collection of recent scholarly e-books available. Usage data were available from more libraries and covers a longer period of time than is obtainable from other e-book service providers. The California State University Libraries Electronic Access to Information Resources Committee and Coordinating Team concluded that e-books had a 92.8 percent usage rate, whereas print books had a nearly identical usage rate of 92.4 percent. They arrived at these percentages by dividing the total number of accesses and circulations by the study set size. The conclusion of this study was that when titles were available in both electronic and print formats, both formats were used. The coordination team noted that the campus was traditionally print-oriented. E-books were a new concept and there may be a lag time between introduction of the resources and their use. As more members of the

community become familiar with e-books, their rate of use is likely to rise. However, the e-book coordinating team also noted that the use of e-books is most likely over-represented and the use of print books is under-represented, and in house use raises the use level of the print books beyond that of e-books. This means that a patron could read a print book in the library without checking it out, so that there is no record of this usage. This study set included all the e-books that were available to Fresno patrons, not just e-books that were available in both print and e-book formats. This e-book collection is likely to contain titles that were not appropriate for Fresno patrons, and therefore unlikely to be accessed by Fresno patrons. Also, the usage rates for the e-books and print books were accounted for by accesses and circulations of a small number of titles[48].

A much smaller study at the University of Rochester looked at 1 title in print and the corresponding e-book from the netLibrary collection. This title circulated 13 times over its lifetime in paper and was accessed 310 times in the spring of 2001 in its electronic format[49].

A pilot study by Connaway at the University of Pittsburgh in 2001 compared usage of e-books and print books[48]. During the 4 month study period, each netLibrary e-book title was accessed 3.7 times on average, while each print book circulated 1.4 times on average. 30 percent of e-book titles were accessed at least once, while 10 percent of print titles circulated. The short time frame of the study is a shortcoming that prevents major conclusions from being drawn.

A parallel can be drawn between e-books and websites. Both can be used for educational purposes. Users can access both remotely without actual presence in the library. Both are economical in terms of not requiring shelving space, repairs and replacement, unlike print media. They can both be updated easily and do not need to be created all over again; only the relevant parts need to be updated. Both can be searched using a search engine. Once created, they are

both economical to reproduce, and as such can be made available for free in resource poor populations, such as in developing countries.

2.3.6 Previous research – estimation of utilization of e-commerce websites

With increased availability of the Internet, having an online presence is important and almost obligatory. Big corporations have a strong presence on the World Wide Web. A corporation's website may sell the products and services it generates or may serve to advertise the company. Electronic commerce or e-commerce is a very important part of today's business word.

E-commerce websites are of two types. Those conducting services between corporations are called Business-to-Business (B2B), and those conducting services between a corporation and an individual user are called Business-to-Consumer (B2C) e-commerce websites. Delphi which provides services to corporations like General Motors is an example of a B2B site, and Amazon.com which provides services to general users is an example of a B2C site[50].

An e-commerce website is a huge investment in terms of time, skills and money. In order to justify this expenditure, it is essential to know if the website is doing what it is supposed to do – attract customers, retain customers, sell them products and make them come back for updates and more purchases. It is necessary to measure if and how customers are using the website. Website developers, architects and administrators also need to know if the website design is effective. Considering the huge investments made in e-commerce websites, it is not surprising that most of the pioneering and advanced work in assessing website utilization has been done in this field.

Considering the large amounts of money invested in building an e-commerce website, corporations are always interested in improving their return on investment or ROI. In order to

achieve this goal, to improve their marketing strategy, and target it toward the right group of people, corporations need to get information about their online customers and visitors. Web Server log files are text files generated on the Web Server every time someone visits the website. Web statistics analysis software can be used to retrieve and analyze the valuable data contained in these log files, or the quantitative usage information. Log files contain a plethora of useful data – visitor information, temporal changes, system information, server load, etc. Assessing utilization of an e-commerce website is a difficult project.

Web mining can be viewed as the extraction of structure from unlabeled, semi-structured data. The logs kept by Web servers provide a classic example of such data which is obtained passively and can be mined[51]. The Web logs from e-commerce websites provide information about which products interest potential customers, how many visitors buy something from the website, and how many of these visitors and customers return to become loyal customers. There are tools that can provide an aggregate statistical analysis of data obtained from web logs from the web server[43]. However, a very accurate analysis may require the creation of a database with the log entries, and writing customized code to analyze the entries.

2.3.7 Path analysis

An important aspect of Web log analysis for e-commerce websites is "path analysis" or analyzing the navigational/browsing pattern of visitors and customers[52]. This information helps Web site designers improve the structure of the Web site, and offers opportunities for personalization. In addition, path analysis also includes a study of the similarities and differences in navigational behavior of various classes of visitors such as new visitors vs. repeat visitors, purchasers vs. non-purchasers, and one time purchasers vs. repeat purchasers[52]. Path analysis is

complex and involves an enormous amount of data. The cookie associated with the visit is matched with their names and personal information of the visitor[52]. This provides the "complete picture" of Web behavior of a particular customer.

Many published papers have described the role of Web log analysis in the field of e-commerce. A study by Theusinger and Huber[52] showed that the Internet shop operated by ASK|net GmbH could be improved using knowledge generated through the study of Web logs. ASK|net GmbH is a software vendor that sells its software solely via the World Wide Web at www.softwarehouse.de. The project involved gaining e-intelligence from user navigation records, which was then used to optimize the website. The transaction-based data came from the Web logs recording the click stream. The customer-based data were derived from the customer purchase database. Two types of click stream analyses were done to determine customer behavior patterns. The first analysis looked at the ease of actions required by the customer in order to make a purchase. It was discovered that about a third of the customers forgot their password, and this lead to new registration for the same users. Also, it was difficult to pay for the purchase online. ASK|net modified the Website after reviewing these results. The second analysis looked at typical user navigation behavior and profiled users, based on data derived from log files. Predictive modeling was performed after merging the results of the sequence analysis with the customer data. The goal of this project was to use the information derived from the log file analysis to make changes to the Website[52].

A project has been carried out with one of the biggest Irish online book shops, where about 2 percent of the overall sales are from Internet users[53]. The aim was to determine the usability of existing customer, transactional and browsing data, for Internet marketing intelligence. Dynamic online promotions were created using Website navigation sequences.

Three types of Web mining activities have been described by Etzioni - resource discovery, information extraction from newly discovered pages and generalization[54].

2.3.8 Internet marketing intelligence

Corporations that sell their products and services online need a well developed system to monitor their e-commerce Website[53]. The customer relationship lifecycle can be divided into 4 steps – attraction, retention, cross-sales and departure. Internet marketing intelligence can help in each of these steps. The customer attraction step includes the selection of prospective customers and the acquisition of potential customers. The customer retention step aims to make the online customer a loyal customer. The goal of cross-sales is to sell products horizontally and/or vertically to an existing customer base. The aim of customer departure analysis is to prevent customer departure[53].

Web mining can provide corporations with a lot of information about their online visitors and customers. Typically, the load on B2C sites is greatest during the holiday buying season. B2B sites experience a similar surge when new products are launched[50].

2.3.9 Some definitions

Cookie – A small file or part of a file stored on a World Wide Web user's computer, created and subsequently read by a Web server, and containing personal information (user identification code, customized preferences, or a record of pages visited)[55]

Domain name - Address of a computer, organization, or other entity on a TCP/IP network such as the Internet e.g. www.pitt.edu. A domain name is ultimately mapped to an IP address, but two

or more domain names can be mapped to the same IP address. A domain name must be unique on the Internet, and must be assigned by a registrar accredited by the Internet Corporation for Assigned Names and Numbers (ICANN)[56]

Hit - The retrieval of any item, like a page or a graphic, from a Web server. For this reason, hits often aren't a good indication of Web traffic[57]. A hit is any file from a Web site that a user downloads. A hit can be a text document, image, movie or a sound file. If a user downloads a Webpage that has 6 images on it, then he "hit" the Webpage 7 times (6 images + 1 text page). This can obviously lead to an overestimation of the utilization of the Webpage.

HTTP (HyperText Transfer Protocol) - Standard application-level protocol used for exchanging files on the World Wide Web. HTTP runs on top of the TCP/IP protocol[56]

Indian Supercourse – Supercourse lectures by authors from India

Internet - An electronic communications network that connects computer networks and organizational computer facilities around the world[55]

Internet Protocol (IP) Address - Number that uniquely identifies each computer on the Internet[56]

Internet Service Provider (ISP) - An ISP is a company that provides Internet connections and services to individuals and organizations[56]

Main Supercourse - Supercourse lectures by all authors, except those in India

Page access – Same as "page view".

Page hit – See hit

Page load – See page access

Page view – A page view is an entire page downloaded by a user, regardless of the number of images, sounds, or movies. If a user downloads a Webpage that has 6 images on it, then the user accesses 1 page of the website.

Page views from India - Page views by users from India

Page views from non-Indian countries - Page views by users from non-Indian countries

Page visit - Same as "page view".

Server - Network computer, computer program, or device that processes requests from a client[56]. A computer in a network that is used to provide services (such as access to files or shared peripherals, or the routing of e-mail) to other computers in the network[55]

TCP/IP (Transmission Control Protocol/Internet Protocol) - Standard Internet communications protocols that allow digital computers to communicate over long distances[56]

Total page views - Page views by users from all countries. (Page views from India) + (Page views from non-Indian countries)

Uniform Resource Locator (URL) - Address of a resource on the Internet[56]

Web – See World Wide Web

Web server – A computer that uses the HTTP protocol to send Webpages to a client's computer when the client requests them, on the World Wide Web[56]

Web server log files - A record of Web activity that automatically records use, and information such as the date, time, IP address, HTTP status, bytes sent, and bytes received[58]

World Wide Web – A part of the Internet designed to allow easier navigation of the network through the use of graphical user interfaces and hypertext links between different addresses. Also called Web[55]

2.3.10 Choosing Web statistics analysis software

The features of the web statistics analysis software that are important for this project are – ability to identify the visitor country, report generation and a user friendly interface.

Many web statistics analysis software packages were analyzed. For sake of simplicity, it was decided that Motigo Webstats (http://webstats.motigo.com/) would be used. Motigo Webstats was also appropriate because in spite of its analytical capability, it did not produce Server Side Includes (SSI) on the University of Pittsburgh Web server.

2.4 PUBLIC HEALTH IN INDIA

2.4.1 History of public health in India

Ancient India - There is a very long history of Public Health in India[59]. There were planned cities, with environmental sanitation, in the Indus valley civilization dating back to 3,000 BC. In India, the Ayurveda and Siddha systems of medicine came into existence around 1,400 B.C. The "Manu Samhita" prescribed regulations for personal health, nutritional guidelines, and hygienic rituals at birth and at death. The religious teachings of Buddhism and Jainism dominated between 600 B.C. and 600 A.D.[59].

Toward the end of this period and with the subsequent changes in the political systems in India, this ancient knowledge became static. Partly due to belief in blind superstition and lack of any new developments, people started believing that diseases are caused by "God's wrath". For

example, the actual name of small pox in India was "Devi", which means Goddess in the Indian language, and small pox was thought to be caused by the anger or curse of some divine force.

British India - After a period of lack of progress in public health and preventive medicine, some important developments in the 19th century included the Quarantine Act, appointment of sanitary commissioners, the public health commissioner and statistical officer, and the plague commission[59]. In the earlier part of the 20th century, the Central Malaria Bureau was founded, the Indian Research Fund Association (Indian Council for Medical Research - ICMR) was founded, the All India Institute of Hygiene and Public Health was established at Calcutta, and the Child Marriage Restraint Act was passed. Other important events in this time period included appointment of the Health Survey and Development Committee (Bhore Committee) to assess the health situation in the country and to make recommendations for the future[59]. In spite of many efforts, this system failed to improve the health of the Indian population due to a general lack of trust in the ruling government among the people, hostility towards interference with traditional practices, inadequate administration and lack of uniform practices. In spite of initiatives by the ruling government, modern medicine and public health was still unavailable to most of the population.

Independent India - India attained independence in 1947. The government started a step by step plan to improve the health of the people. India was declared a "welfare state", so that the responsibility of improving the health of its people rested primarily with the central government[59]. The government set up many national health care programs, set up the ministries of Health at the center and at state levels, and set up training centers. Some of the important governmental public health programs in India are[60] – the National Malaria Eradication Program, the National Filaria Control Program, the National Leprosy Eradication Program, the National

Tuberculosis Program, the National AIDS Control Program, the National Program for Control of Blindness, the Iodine Deficiency Disorders (IDD) Program, the Universal Immunization Program, the National Cancer Control Program, the National Family Welfare Program, the Reproductive and Child Health Program, the National Water Supply and Sanitation Program, the Minimum Needs Program, the 20-Point Program, and programs addressing health conditions prevalent in India such as guinea worm, Japanese encephalitis, kala-azar, dengue fever and diabetes.

2.4.2 Impact of the national health programs on health of the Indian population

Most of the National Health Programs initiated by the government have been successful. During the last 6 decades, there has been a significant increase in life expectancy in India. Life expectancy at birth has increased from 28 years in 1947[61] to more than 60 years in 2001 – 2006[62]. This has been mainly due to the National Health Programs, as well as the work of NGOs in India. Various National Health Programs have resulted in the control of many communicable diseases (polio, measles, malaria, leprosy), improved maternal and child health, and better nutrition, but there is a scope for improvement.

For example, the family welfare program had been successful to a large extent in reducing the rate of growth of the population of India. But the country is still faced with the problem of female infanticide and feticide, due to the desire for a male child, which has lead to a severe reduction of the sex ratio. The National Iodine Deficiency Disorders Program has been very successful in limiting the prevalence of goiter and cretinism in the population at risk. The National Guinea Worm Eradication Program has been successful in eliminating the disease. The

Universal Immunization Program and the Pulse Polio Program have been very successful in reducing the incidence of vaccine preventable diseases in the pediatric age group.

On the other hand, some programs such as the National Tuberculosis Program and the National AIDS Control Program have not been successful to a large extent. India is poised to have the largest population of HIV positive people in the world. To a large extent as a result of the HIV epidemic, there has been a resurgence of drug resistant and extra pulmonary tuberculosis.

All the National Health Programs initiated by the Government of India are ideal in theory. But, there remain some shortfalls in their application. The failure of some of these programs to reach their objectives can be attributed to many factors, some of which are remediable while others are not. A potential remediable factor is the lack of adequate control and oversight during implementation of the programs, so that all the people involved do not do what they are supposed to, often due to a lack of knowledge and/or inadequate resources. Some of the factors beyond the control of the government are a lack of basic knowledge among the users, illiteracy, and poverty which leads to underutilization of available resources. People in rural areas often are paid to work in the fields on a daily basis, and cannot afford to take a day off to visit a health camp. They do not have even the small amount of money that is required to pay for the bus ride to the health camp.

Other factors that are deep rooted in the Indian mentality are fatalistic attitudes and superstition, so that people believe that their situation cannot be changed. This can actually lead to lack of cooperation from people who could benefit the most from these programs. Some of the dangerous tendencies in Indian society are the increasing disparity between the haves and the have-nots. This disparity is often perpetuated by the structure of the society. For example, in

spite of the availability of flush latrines, many households in rural areas still prefer to use dry latrines that are scavenged by poor people, who have been doing it for generations. In spite of the fact that dry latrines are a common source of dangerous gastrointestinal infections, people are reluctant to accept change.

A complete success of these National Health Programs will require a tremendous effort on part of the government, public health professionals, and the users of these programs.

2.4.3 The role of NGOs in India

Several NGOs such as SIDA (Swedish International Development Cooperation Agency), DANIDA (Danish International Development Agency), NORAD (Norwegian Agency for Development Cooperation) and USAID (United States Agency for International Development) help the Indian government with implementing its National Health Programs.

Since the early 1990s, India chose to liberalize its economy and reduce the budgetary deficit. This inevitably led to a reduction in the governmental expenditure on the social sectors, including the health care sector. Of the three tiers of government (central, states and local) that contribute to the public sector spending on health care, the primary responsibility rests with the states, with almost 90 percent of the expenditure coming from the states' budgets. There has been a steady decline in the grants to the states from the central government for the health sector, from 19.9 percent of the states' health expenditure before 1982, to 5.8 percent in 1982–89, to 3.3 percent in 1992–93. This reduction in funding is most significant in the case of specific-purpose grants for public health and disease control programs. This falling share of central grants has had a more pronounced impact on the poorer states[63].

This sets the stage for increased need of voluntary and non-governmental organization (NGO) involvement in the public health sector in India. Voluntary and non-governmental agencies supplement and complement the work of the government in the health sector[64]. Non-governmental organizations have one or more of the following functions in the field of public health – providing health services, providing health education, promoting health research, and advancing legislation for health.

NGOs currently working in India[64] are the Indian Red Cross Society, Indian Council for Child Welfare, the Tuberculosis Association of India, the The Kasturba Memorial Fund, the Family Planning Association of India, All India Women's Conference, All-India Blind Relief Society, and professional bodies such as the Indian Medical Association, All India Dental Association and the Trained Nurses Association of India. Some of the international non-governmental organizations working in India are[64] the Rockefeller Foundation, the Ford Foundation, CARE (Co-operative for Assistance and Relief Everywhere), the International Red Cross, Save-the-children fund, International Planned Parenthood Federation, International Agency for the Prevention of Blindness, World Federation of the Deaf, International Leprosy Association, World Federation of Medical Education and the International Union against Cancer, among others.

2.4.4 Health problems in India

Changing patterns of health and disease occur in a population due to "epidemiologic transition"[65]. These changes occur either rapidly or slowly over a period of many decades. The epidemiologic transition involves 4 sequential stages - pestilence and famine, receding pandemics, degenerative and human-induced disease, and aging, chronic diseases, emerging and

resurgent diseases. In general, as a population advances further in the epidemiologic transition, the presence of infectious diseases declines, and the prevalence of chronic diseases increases. Typically, developing countries such as the India lag behind the developed countries in the epidemiologic transition. In addition, India is now suffering from a double burden of diseases - infectious diseases in the young and chronic diseases at older ages due to the epidemiologic transition[66].

Many infectious diseases as well as chronic diseases are extremely amenable to prevention. For example, HIV infection is spreading very rapidly in India. A simple change in lifestyle as well as the practice of medicine can stop the spread of this disease. Chronic diseases result from inadequate diet, physical inactivity, smoking and obesity. Some chronic diseases occur as a result of an infection. For example, cervical cancer, which is very prevalent in India, occurs following Human Papillomavirus infection[67]. Prevention of these diseases requires education of the health care work force in the areas of epidemiology, prevention and public health.

There is a lack of access to quality epidemiology and public health education in India. In the United States, for a population of about 250 million, there are 40 accredited schools of public health[2]. In India, with a population of 1 billion, there are no schools of public health. There is only one school where students learn about public health, but it is not a school of public health like the schools in the United States.

Even within India, there is an expanding chasm between the haves and the have-nots and their ability to access information. There is a vicious cycle - poverty leads to a lack of access to public health information, which leads to disease, which in turn leads to more poverty. People who most need the information are denied access to it. There is a need to break this vicious

cycle. The best way to do it is to formally train health care professionals in India, especially at the grassroots level in the areas of epidemiology, public health and prevention.

The medical textbooks used in India are often written by authors in developed countries, and they often lack culturally appropriate information about diseases that are major health concerns in India. In addition, subscribing to journals is costly. For example, the cost of an annual personal print-only international subscription to the American Journal of Public Health is $ 275[68], often out of reach for a health care worker in India. The situation is complicated by the fact that a lack of education in epidemiology means that it is difficult or often impossible to interpret the findings in published papers. Due to this, health care workers do not have access to the information they need to support clinical and public health decision making. This limits the quality of health care. Good information support provided to physicians improves clinical decision-making[69].

2.4.5 Locally produced and culturally appropriate health information

Locally produced health information is customized to the target population. It often figures little in international literature or on the new information technology materials, even though it is pertinent to the unique medical problems occurring in poor countries[70].

2.4.6 Lack of culturally appropriate health information in India

There is a lack of culturally appropriate health information in India. Most of the physicians in India are trained in the allopathic system of medicine. While this means that there is a great amount of regulation of medical education and training, it also means that there is a lack of

culturally appropriate health information in India. There is a great disparity between "what the doctors say", and what is believed to be true. Many of these cultural beliefs can lead to a lack of trust in the physician and a subsequent lack of compliance with health advice.

Indians believe in the concept of "hot" and "cold" foods. For example, eggs are supposed to be "hot" and not to be eaten during pregnancy; bananas are supposed to be "cold", and people who have a cold are not supposed to eat bananas. Indian babies are generally smaller in stature than babies in the United States. Indian mothers often feel that baby formula may be too "strong" for their small baby, and they dilute the formula with excess water before feeding it to their baby. These practices can give rise to malnutrition, in a country where healthy food is often scarce. Many Indians believe that antibiotics cause gastrointestinal upset and constipation. As a result they often stop taking antibiotics as soon as the symptoms of their infection are relieved. These beliefs are often dangerous and harm the patient. However, they are rooted in generations of traditions and it is almost impossible to remove them from the minds of people.

If health care practitioners want to be believed, they have to connect their health advice with the cultural beliefs of the people. If their patients do not believe them, the patients will turn to alternate systems of medicine or faith healers. In contrast, some practices are beneficial, such as the practice of eating turmeric to treat a sore throat. There needs to be more research into the beneficial and harmful effects of these cultural beliefs and practices. Such research can be done only in India. In order to do this and other research, health care professionals in India need to be trained in Epidemiology. The findings of this research will greatly benefit healthcare in India.

Epidemiology training in India needs to be built from the ground up. Currently, there are a few foreign trained epidemiologists who advice people working in the field of public health in

India on how to do epidemiologic research. Instead, most of the people involved with healthcare in India need to be trained in Epidemiology.

2.4.7 The need for formal education in epidemiology in India

Epidemiology is the study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to control health problems[71]. Epidemiology is important for public health practitioners in India. Historically, epidemiology was used in the investigation of communicable diseases. Over the course of the past 40 years epidemiology has been used to understand a wide range of health issues. These include injuries, health behaviors such as smoking and physical activity, chronic diseases such as diabetes and arthritis, child and family health, occupational health, birth defects, and environmental concerns such as air pollution and water safety. Due to this, knowledge of epidemiology is useful to public health practitioners, and people who are involved in decision making about spending in public health[72].

In order to make correct decisions about public health issues in populations, it is necessary to have experience and knowledge of the community. A careful analysis of the available data and research findings helps public health practitioners make "evidence-based" decisions. In order to make such decisions, it is necessary to identify the right information and reliable research results, analyze this data and convert this knowledge into effective community action. Epidemiology can help in every step of this decision making process[72].

Knowledge about the epidemiology of diseases can help physicians read and interpret literature on medical research, and use that information to make sound clinical decisions. Knowledge of epidemiology can help physicians understand study design, data measurement,

statistical analysis, interpretation and the statistical significance of research studies. Understanding journal articles is very important for physicians to further their knowledge.

Medical training in India would previously be imparted only at schools run by the central and state governments, and local municipalities. Admission into these schools is highly competitive. In recent years, there has been a rapid increase in the number of private medical schools, which have been recognized by the Indian Medical Council. Since becoming a physician in India is seen as a means to a good pay and lifestyle, many parents put their children through medical schools. Medical training includes a period of compulsory internship in rural areas. But the period of internship is too short to lead to any meaningful increase in the number of physicians in rural areas.

Fresh medical graduates come to know that they cannot earn enough money to make a living in rural areas. The only way to make a decent living is to do "private practice" in a large city, after "super specialization" studies often done abroad. This creates a glut of qualified physicians in urban areas, all competing for a limited pool of patients. A patient's access to such a highly qualified physician is dependent of his or her ability to pay, as most people in India do not have medical insurance. In contrast, there are very few physicians in rural areas, as this is not seen as a lucrative practice.

In 1943, the Government of India appointed the Bhore Committee to survey the then existing health situation in the country and to make recommendations. It was decided that preventive and curative services would be integrated at all administrative levels. Education in medical schools would include a compulsory 3 months training in preventive and social medicine. The aim was to train "social physicians"[73]. Preventive and social medicine is a compulsory subject for all medical students before they graduate, but the emphasis is on clinical

medicine. The PSM course in medical schools includes a few lectures on basic concepts in epidemiology, but there is no emphasis on teaching students how to do research or how to interpret public health and medical research literature in journals.

Training is epidemiology is even more ignored in India. There are no schools of public health. Many of the people who work in the field of public health learn "on the job". This training is often insufficient. This situation exists in India, because most physicians and even lay people consider epidemiology, public health and preventive/social medicine as not very lucrative. This is in spite of the fact that epidemiology and public health have a greater impact on improving the health status of the population, than clinical medicine.

2.4.8 The healthcare system in India and its overemphasis on tertiary care

Tertiary health care is the complex and often costly health care provided at teaching hospitals and specialized hospitals. In India, there is an overemphasis on tertiary health care. Patients in India can see two types of physicians. The physicians who work at government hospitals and health centers are either allopathic physicians or those trained in an Indian system of medicine such as Ayurveda. These physicians are mostly untrained in epidemiology/public health. The private medical practitioners also do not have a formal education in epidemiology/public health. A few of these physicians may have studied at schools abroad and earned a degree in epidemiology. But, this is rare[74].

The public health system in India is three tiered, with primary, secondary and tertiary health care. In India, most of the government spending on health care is concentrated on the development of tertiary health care. In comparison, less money is allocated to primary health care and prevention, and even less money is allocated for epidemiology/public health programs.

Except for services such as immunization and contraception, the public health system in India is underutilized. There is also a great need to link the public health infrastructure with private practitioners and NGOs[75].

High cost of health care in India - Very few people in India have medical insurance. Most of the cost of medical treatment is paid "out of pocket". Thus medical treatment is often very costly. Tertiary health care especially is out of reach of most people. Even if patients see physicians in free clinics, such as a Primary Health Center (PHC), they have to buy drugs at private pharmacies, since these centers often lack essential drugs. Interestingly in India, new advances in health technologies have led to an escalation of the cost of health care/treatment. In contrast, technologies in other fields have reduced the cost structure of commodities[75].

Medical training in India has not produced the personnel suited to meet the challenges of community health[75]. The emphasis on tertiary health care, lack of health insurance and predominance of private medical practitioners creates a dangerous situation, such that most of the underprivileged people in India have no access to any medical care.

Even if the situation is similar in many developed countries, a developing country such as India can least afford to have a health care system with an overemphasis on tertiary health care. An alternative and much better system is one which is built from the bottom up, with an emphasis on primary health care, prevention and training in epidemiology/public health.

The World Bank assisted State Health Systems (SHS) project, which is under implementation in the State of Andhra Pradesh, Karnataka, Punjab, West Bengal, Maharashtra and Orissa, includes some measures for improving the management of health care including a cut back in secondary and tertiary spending and channeling these resources into interventions at the

primary level[75]. Training in Epidemiology is essential for the success of this program in India, and for improving the overall accessibility and quality of the health system in India.

2.5 INFORMATION TECHNOLOGY IN INDIA AND ITS ROLE IN EPIDEMIOLOGY EDUCATION

2.5.1 The "wiring" of India

A recent paper by Chandrashekhar and Ghosh[76] highlights the increasing availability of information technology in India, albeit with the limitations that have been discussed in the previous sections. The authors say that electronic health care can be useful even in developing country environments, such as in India.

One such example cited in their paper is the Indian Healthcare Project. This project was started in 1994 as a collaborative project, involving the Government of India and Apple Computers among others, in the state of Rajasthan[77]. In India, an auxiliary nurse midwife (ANM) is a health care worker responsible for 5000 people distributed over several villages. Each ANM calls on the families in her charge once a month to collect demographic data and administer immunization. She also counsels the family on family and child welfare, and mother–child health programs. As a part of this project, a personal digital assistant (PDA) was made available to each ANM. This reduced the time they spent doing paperwork and increased the accuracy of the data collected by them. This ensured the availability of village level health care data in an electronic form. The midwives were provided with training that helped them to improve the effectiveness

of the services. The availability of new, cheap and extremely powerful PDAs in India makes it possible to build on the experience gained from the pilot project.

In the paper, the authors also mention that in India, efforts are under way to ensure that the population at large has access to information technology. An example of this effort is the disaster management project. This project has been developed as a part of the Maharashtra Emergency Earthquake Rehabilitation Project. It is supported by the World Bank, the Department for International Development of the British Government and the United Nations Development Program. The project is now complete in all districts in the state of Maharashtra.

The paper also describes the "wired village" project being implemented around Warana Nagar in the Kolhapur and Sangli districts of Maharashtra[78]. This is a village level project aimed at bringing computers to rural and semi-urban areas. The aim of this pilot project is to demonstrate how an information technology project can contribute to the socioeconomic development of a cluster of 70 contiguous villages. Villagers will be provided access to the Internet via the National Informatics Centre Network. In addition, agricultural, medical and educational information will be provided at facilitation booths. The project will also make distance learning facilities available to both primary and higher educational institutes. The project is being financed jointly by central, state and local governments, and is being implemented jointly by the National Informatics Centre, the Government of Maharashtra, and the education department. Results from this pilot project suggest that it is making a positive difference in terms of more informed use of facilities at the village level primary health centers. Information technology has the ability to deliver health care services to remote areas in India, to people who need it most. This can improve the health status of the population of India.

According to the Information Technology Annual Report 2005-06 of the Government of India[79], Ministry of Information Technology, a National e-Governance Plan (NEGP) has been drawn up covering 26 Mission Mode Projects and 8 support components to be implemented at the central, state and local government levels. India is one of the fastest growing information technology markets in the Asia-Pacific region. The Indian software and Indian IT-enabled business services' contribution to the national gross domestic product has risen from 1.2 percent during the year 1999-2000 to a projected 4.8 percent during 2005-06[79].

As stated in the annual report[79], the Government of India has approved of a plan to establish State Wide Area Networks (SWAN) to extend data connectivity of 2 mega bits per second up to the block level in all states and union territories in India. The block level nodes will have a provision to extend connectivity further to the village level using contemporary wireless technology. Under the scheme, proposals from 20 states and union territories have been sanctioned. The report[79] also describes what are called the Common Service Centers (CSC) in rural areas in India. Two thirds of the population of India lives in rural areas. The government has formulated a proposal to establish 100,000 Common Services Centers in rural areas, which will serve as the front end for most government services and as a means to connect the citizens of rural India to the World Wide Web.

The Government of India has adopted a policy conducive to enhancing Internet access in the country. It has adopted a liberal approach to register a large number of .in domain names, since October 2004. There were more than 154,000 .in domain name registrations by December 2005. There are four Internet exchange nodes at the four major cities in India - Noida (Delhi), Mumbai, Chennai and Kolkata. 40 Internet service providers have been connected with these nodes. Three mirror Internet root servers have been installed at Delhi, Mumbai and Chennai, by

the Department of Information Technology of the Government of India and National Internet Exchange of India (NIXI). The root servers form a critical part of the global Internet infrastructure. They help in reducing the international bandwidth load, increase the internet resilience by bringing down dependency on root servers abroad and improve host name resolution from hundreds of millisecond to less than 10 milliseconds[79].

Community Information Centers have been set up at 487 blocks in 7 North-Eastern States and Sikkim, 41 in government schools in Andaman and Nicobar Islands, and 30 in Lakshadweep Islands for imparting Information and Communication Technology (ICT) based education and to overcome the digital divide[79].

According to a recent survey (December 2007), the number of Internet users in India was about 60 million or 5.3% of the population of India[80]. In Asian countries, including India, there is a wide socioeconomic and literacy difference between Internet users and nonusers[81]. No information is available about the number of physicians and public health professionals in India, who access the Internet regularly. A recent cross-sectional survey among urban populations in India has revealed that about 10% of the urban population in India has access to the Internet. The factors that limit access to the Internet are illiteracy, lack of English language literacy, lack of access to the Internet and a personal computer[82]. Physicians in Indian learn medicine in the English language. Since most of the physicians in urban areas would be able to afford a computer and Internet connection, it is expected that most of them do have access to and are able to access information on the Internet.

2.5.2 Alternate methods for epidemiology and public health education in India

Traditional distance learning helps traditional distance learning students – those with enough monetary resources, but unable to sit in a classroom environment to study mainly due to career or family commitments on their time. Such traditional distance learning students are overwhelmingly mid-career professionals from developed countries. For the rest of the students such as those with limited resources from developing and developed countries, some other form of distance learning is required. There needs to be an alternate method for delivering distance learning to students without access to traditional distance learning.

In his recent paper, Ajit Kembhavi writes about the University Grants Commission (UGC) program in India called the UGC-INFONET, which provides online access to more than 4000 research journals to over 100 universities throughout India[83]. This program was started three years ago to address the problem of providing Indian university libraries with required literature. The main components of this program are - ensuring adequate connectivity within the universities, negotiation of affordable rates from research journal publishers, training librarians and users, and ensuring good local administration. The Internet service provider ERNET has provided more than 150 universities in India with broadband access, through either terrestrial or satellite links. The Information and Library Network (INFLIBNET) is an interuniversity centre of the UGC, and it administers this program.

This is a well coordinated program, and has been successful in most of the universities where it has been implemented. This is especially true at universities which have taken steps to make access available for students and faculty from their own departments, which has led to higher usage. The program has a wide geographic range, covering universities in every corner of

the country. The challenge this program faces is to provide access to the colleges that are affiliated to the universities, most of which are devoted to undergraduate education.

There is a need for public health workers and physicians in India, to become familiar with information exchange through the Internet[84]. A very feasible method to make high quality distance learning available free of charge to people in India is the Global Health Network (GHNet) Supercourse (http://www.pitt.edu/~super1).

Information technology (IT) can help to promote epidemiology and public health in developing countries such as India in three ways. The first is the role of IT in distance learning, especially continuing education and lifelong learning. IT can be used to train the public health workforce in developing countries as well as help them to be up to date with advances in the field. The second way in which IT can enhance epidemiology and public health education is that it can be used to deliver information about public health, including emergency advice on how to deal with the consequences of disasters, to remote regions in the country. The third role of IT in enhancing epidemiology and public health education is its potential to increase efficiency and transparency of governance which would, in turn, improve the availability and delivery of publicly provided health services.

Even though the Internet does not reach all the people in rural areas, it is estimated that most of the teachers and students in medical schools in India have access to a computer and the Internet, either at home, at school or through an “Internet café”. These teachers and their students can easily view the Supercourse lectures. Also, teachers in India are uniquely equipped to use the information contained in the Supercourse, since English is the medium of education in all higher level courses in the health sciences in India. Teachers and students in India are also well versed

in one or more Indian languages, and can easily translate lectures from English to their local language if required.

2.6 GLOBAL HEALTH NETWORK SUPERCOURSE

2.6.1 Mission of the Global Health Network Supercourse

The Global Health Network (GHNet), founded in 1992, is a group of scientists, joined by a belief that the Internet is the best way to disseminate knowledge. The primary aim of the GHNet is to use the Internet to improve teaching in the field of epidemiology and public health[85]. The Global Health Network consists primarily of members in academia - deans, chairpersons and professors. The GHNet also includes professionals from a wide range of agencies, organizations, and businesses such as the World Health Organization (WHO), World Bank, National Aeronautical and Space Agency (NASA), Pan American Health Organization (PAHO), International Business Machines (IBM), and Centers for Disease Control (CDC).

The working group of the Global Health Network at the Department of Epidemiology, at the University of Pittsburgh, and the WHO collaborating center for disease monitoring and telecommunications, initiated the Supercourse in 1997. The goal of the Supercourse is to improve global health through better education in epidemiology, public health and information technology, by using the internet. The Supercourse is based on information sharing[86] and free availability of lectures to all without copyright restrictions. The Supercourse is located at http://www.pitt.edu/~super1.

This global system of prevention training is not based upon traditional distance learning paradigm as practiced by most universities. Perhaps the major difference is that the Supercourse is not really a course, as neither a degree is awarded or credentialing takes place. Instead, it is designed so that the focus is on enabling the teachers[87]. Teachers can use the lectures, or the slides from the lectures to create their own research and teaching materials.

Currently, there are 56,063 Supercourse faculty members of the Global Health Network from 156 countries. Supercourse faculty members have contributed 3,455 PowerPoint lectures to the Supercourse. This global network of Supercourse faculty members around the world, serves as a common meeting ground for experts in prevention in various fields.

Table 1. Supercourse faculty members world-wide as of June, 2008

Continent	Number of Supercourse faculty members	Number of countries represented
Africa	867	37
Asia	9136	46
Europe	2205	39
North America	34715	16
Oceania	256	7
South America	544	11
(Country not listed in database)	8340	
Total	56,063	156

2.6.2 Unique features of the Supercourse model

The Supercourse is "open source" - open source software is one that allows free redistribution, shows the source code, and allows modifications and derived works[88]. The full content of

Supercourse lectures are provided for free, Supercourse lectures are fully customizable and there are no copyright issues[89].

The Supercourse aims to overcome the digital divide - The digital divide refers to the gap between those who can access and effectively use new information and communication tools, such as the Internet, and those who cannot[18]. The Supercourse strives to enhance distribution of lectures in developing countries without high bandwidth Internet access, and use the Internet to allow free flow of ideas in both directions, in order to "leapfrog the digital divide"[90]. Access over low-bandwidth Internet connections has been improved by ensuring that Supercourse lectures have small file sizes. To enhance local access, there are Supercourse mirrored servers at 45 centers around the world[91]. Moreover, since December 2000, Supercourse CD-ROMs containing Supercourse lectures, have been distributed free of charge around the world. Finally, the Supercourse is multi-lingual in order to reach a larger population. In fact, 34 lectures in the Supercourse are in languages other than English – Spanish, Turkish, Russian, Arabic, Croatian, Chinese and Hindi.

The Supercourse is a teaching support system - The Supercourse aims to "teach the teachers". The teacher can use a Supercourse lecture just like borrowing a book from a library.

The Supercourse can provide timely information - Another unique feature of the Supercourse is the "just in time" lecture[92]. An example of this is the lecture on air safety and terrorism, written by a faculty member who specializes in injury and disaster epidemiology. This lecture was opened on the Supercourse website on February 2002, just weeks after the plane crash in Tampa, Florida. There is a Supercourse lecture on Anthrax provided by an expert in tropical medicine in Peru. The Supercourse lecture on SARS is another example of a just in time lecture[93].

2.6.3 The Supercourse and traditional distance learning

The Supercourse differs from a traditional distance learning course in epidemiology. The Supercourse is not a degree granting institution, but Supercourse lectures can be used to develop course material. Supercourse content is available free for everyone interested in epidemiology. Traditional distance learning is very costly, and out of reach for many people, especially in developing countries such as India. Traditional distance learning on the Internet often uses high bandwidth systems. In contrast, in the Supercourse, PowerPoint slides are converted to the Supercourse format, with HTML and GIFs, so that downloading speed is greatly increased, even over a slow Internet connection.

2.6.4 Other national Supercourse networks

An important feature of the Global Health Network Supercourse is the National Supercourse networks. These consist of lectures that have been customized for specific regions or groups in the world. In addition to the Indian Supercourse Network, there are 3 additional regional Supercourses - The Islamic Global Health Network (IGHNet), The Former Soviet Union (FSU) Network, the Pakistani Supercourse Network.

2.7 DISSEMINATION RESEARCH

Broadly speaking, dissemination research is the study of the extent and effectiveness of methods used to promulgate various objects. The objects that are disseminated may be concrete or

abstract, such as concepts, skills, tools, and innovative practices or programs that are either new or perceived as such by potential users[94]. Dissemination research is important in traditional public health research. It is also used to study the effectiveness of health information websites such as the Indian Supercourse Network.

There are various factors that affect the dissemination of an object[94]. A study of these factors is important to understand the characteristics, conditions, facilitators, and barriers to dissemination. The factors that affect dissemination can be divided into four broad categories - characteristics of the dissemination object, environmental factors, factors associated with users, and the relationships between producers and users[94].

According to Everett M. Rogers[95], getting a new idea adopted is often difficult, even if the new idea has obvious advantages. Many innovations need a period of many years before they are widely adopted. A common issue is discovering methods to speed up the rate of dissemination of an innovation. In this context, research to understand diffusion of an object is necessary, since it can pinpoint road blocks to the diffusion of an object, reasons for the obstacles and means to overcome them.

Dissemination research on the Internet – the RE-AIM model - According to a report by the Pew Internet & American Life Foundation, people looking for health information on the Internet judge the trustworthiness of a Website based on four main criteria – information consistency with prior health beliefs, information repetition on multiple sites, commercial sponsorship of a website and if the source of the information presented on the Website is available for review[1]. Many tools have been proposed to evaluate the quality of health information on the Internet. They include accreditation by an independent entity and rating systems, the use of various logos, and the disclosure of key information about a site[11].

The Commission of the European Communities has proposed six criteria for rating the quality of a website[96]. They include transparency and honesty (the provider, purpose, target audience, and funding of the site should be easily identifiable), authority (the source of information should be clear, including credentials of all authors), privacy and data protection (the privacy and data protection policy should be clearly defined), regular updating of information to ensure relevance, accountability (oversight, relationships with partner sites, and selection of content should be held to the highest standards), and accessibility (guidelines on physical accessibility and usability should be followed).

In addition to these criteria, it is also important to estimate the effectiveness of the health information in achieving the desired objectives[11]. The RE-AIM model (reach, efficacy, adoption, implementation and maintenance)[94,97,98] defines five dimensions for evaluating public health interventions: reach, efficacy/effectiveness, adoption, implementation, and maintenance. It provides a model for moving from translational to dissemination research, and outlines the principles needed to obtain dissemination research knowledge for the Internet.

The few dissemination research studies with interventions on the Internet have been done on behavior change intervention research programs, such as the randomized controlled trials of Internet interventions to modify cancer risk factors[99,100], and pilot and uncontrolled studies in smoking cessation interventions[101,102].

The application of RE-AIM criteria to Internet dissemination research presents many challenges. There is a need for definition of a broader set of standards for dissemination research trials for Internet programs. This is a formidable task, since there needs to be a balance between preserving internal validity and maximizing external validity[11]. There is a need for definition of specific criteria for reporting results of program, process, and outcomes evaluation of Internet

programs, including the minimal acceptable standards for evidence for success (such as those for the CONSORT criteria for clinical trials). Standardized methods of reporting will allow meaningful comparisons between intervention studies[11].

Cobb et al wrote about a preliminary evaluation of QuitNet[101]. QuitNet is an Internet-based social support system for smoking cessation. 1501 consecutive registrants to the QuitNet site were surveyed 3 months after they registered in order to assess 7-day point prevalence abstinence. A composite measure of website utilization intensity (number of log-ins × duration in minutes per log-in) was very highly correlated with use of support resources (number of emails sent, number of emails received, number of email senders, number of email recipients).

Pennebaker et al have used techniques derived from psycholinguistics to conduct studies of Internet and real-world support groups for 20 different diseases[103].

Internet interventions that are known to be efficacious, low cost, accessible, sustainable, and that can reach large target populations are needed. There is a need for closing the gap and integrating basic mechanism research with translational and dissemination outcomes research for delivery of health information via the Internet[11].

2.8 PURPOSE OF STUDY

The purpose of this dissertation is to describe the planning, development and evaluation of the Indian Supercourse Network. The development of the Indian Supercourse included recruitment of participants from India, and collection of content or lectures from participants in India. Evaluation of the Indian Supercourse included evaluation of utilization and evaluation of dissemination.

Evaluation of utilization of Indian Supercourse lectures was the main focus of this dissertation. The main utilization parameter was the number of page views from India. The study compared page views from India between the Indian Supercourse and the Main Supercourse.

The purpose of this study was to test if the locally produced and culturally appropriate lectures of the Indian Supercourse were being used more by people in India, as compared to lectures from the Main Supercourse. The results of this test will provide justification for developing a separate Supercourse for India, and potentially for other developing countries.

3.0 METHODOLOGY

3.1 PLANNING THE INDIAN SUPERCOURSE NETWORK

As discussed in previous sections, epidemiology training in India has been severely neglected over the last several decades, in terms of manpower, funds and other resources. There is a great need to teach epidemiology in India. One of the ways to increase the availability of epidemiology education and make it relevant to everyone is to make it available to teachers and students from a wide range of backgrounds, including physicians, nurses, paramedical personnel, civil engineers, computer engineers, business majors, architects, etc. These are the students who will eventually work in the public health workforce in India, and it will greatly benefit the country if they have formal education in epidemiology.

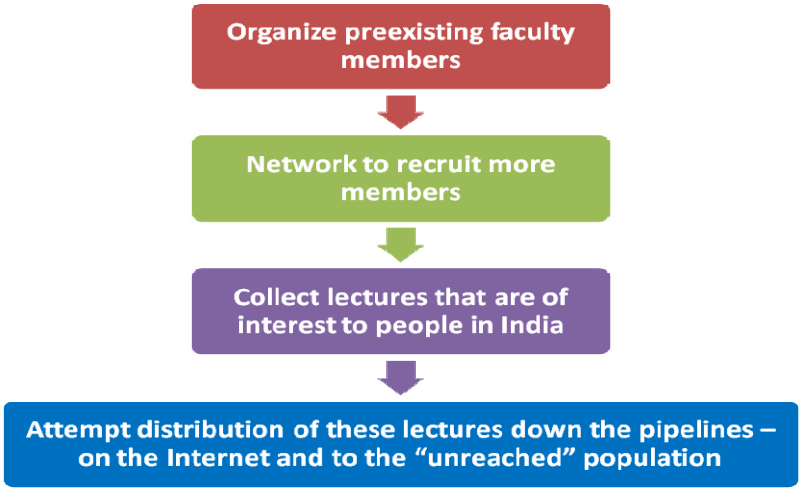

Figure 1. Plan for the Indian Supercourse Network

The best way to achieve this goal inexpensively is to develop a specialized Indian Supercourse, as a part of the Global Health Network Supercourse. The Indian Supercourse Network was started 4 years ago, when a need was felt for a specialized network for India, given the large population and the need for epidemiology education. The goal was to develop the Indian Supercourse as a collection of lectures in Epidemiology, Public Health and Community Medicine, on topics of particular interest to teachers and students in India. Four stages were planned to develop the Indian Supercourse. The time frame for these stages overlapped each other. The stages were:

1. Recruitment of faculty – When the Indian Supercourse was started in April 2004 there were 100 faculty members from India in the Global Health Network Supercourse. They were the initial participants in the Indian Supercourse. Various recruitment methods were used to increase the number of participants to 6,700 over the course of the next 4 years. These methods will be described in the next section.
2. Collection of content – Lectures on topics of interest to users in India were collected from participants from India.
3. Distribution of content – The participants from India and their students were the users of lectures in the Indian Supercourse. Information about the Indian Supercourse was disseminated by means of the Indian Supercourse newsletters, list servers, Indian Supercourse Website, writing to people in India and word of mouth.
4. Evaluation of content and utilization – Lectures in the Indian Supercourse undergo usual quality control for their content similar to other lectures on the Main Supercourse. In addition, utilization of these lectures by users in India was evaluated. This was the main focus of this dissertation.

The main idea behind the Indian Supercourse was that it would be an epidemiology education network by people in India, for people in India. The Indian Supercourse Network is probably the most cost effective way to bring epidemiology training to India, where it is sorely needed. The Indian Supercourse is potentially a very effective means for the delivery of epidemiology knowledge to teachers, students and lay people in India.

All of these lectures of the Indian Supercourse Network are available for free. The vision for the Indian Supercourse is that it will make epidemiology knowledge on topics of interest to Indians easily available for everyone. Many of these topics are often neglected in textbooks written in developed countries.

3.2 INDIAN SUPERCOURSE NETWORK WEBSITE DEVELOPMENT

A separate website was developed for the Indian Supercourse at the University of Pittsburgh Web server http://www.pitt.edu/~super1/India/India.htm

This is the website where Indian Supercourse lectures were uploaded.

3.3 DEVELOPMENT OF THE INDIAN SUPERCOURSE NETWORK

Development of the Indian Supercourse consisted of recruiting faculty from India and collection of locally produced lectures from them.

3.3.1 Network building

The first 100 faculty members of the Indian Supercourse were 100 faculty members of the Global Health Network from India. More Indian faculty members were recruited by the following means:

1. **Internet based viral marketing** – The method used to recruit Indian faculty members over the Internet is called Internet based viral marketing. Viral marketing is a marketing process that facilitates and encourages people to pass along a marketing message. If a large percentage of recipients forward something to a large number of contacts, the overall growth snowballs very quickly by rapid geometric multiplication. On the Internet, viral marketing is any marketing technique that induces Web sites or users to pass on a marketing message to other sites or users, creating a potentially exponential growth in the message's visibility and effect[104]. The message of the Indian Supercourse Network was spread using the India Supercourse newsletter that was forwarded via many mailing lists, as well as links to and from the Supercourse website.
2. **Referrals** – Many of our original Indian Supercourse faculty members referred their colleagues to the Indian Supercourse. This works very well, as the newly referred individuals already have some knowledge about the Indian Supercourse. Also, their colleagues that referred them to us were aware about their similar interest in promoting epidemiology education in India.
3. **Online surveys** – Many of the Indian Supercourse faculty members filled out our online survey for participation in the Indian Supercourse Network. They were referred to our Website after reading our newsletter, via search engines or from links to the Supercourse Website.

4. **Newsletter** – The Indian Supercourse Newsletter was sent about once a month to all the Indian Supercourse faculty members. This newsletter contains updates about the Indian Supercourse, as well as requests for lectures. This newsletter is often forwarded by Indian Supercourse members to their colleagues as well as to mailing lists, which helps more people to join our network
5. **Journal watch** – Every month, journal articles related to epidemiology in India were read. These articles were written by faculty at academic institutions in India. These faculty members were informed about the Indian Supercourse and invited to join and contribute lectures for the Indian Supercourse, based on the topic of their journal article. Many Indian Supercourse faculty members have been recruited by this method.
6. **Websites of Indian Medical schools** – Increasingly greater numbers of medical schools in India have an online presence. In a method similar to the journal watch, faculty members in the field of preventive and social medicine at Indian medical schools were contacted. They were requested to join the Indian Supercourse and contribute lectures.

3.3.2 Collection of content

After building the Indian Supercourse network, the next step was to extract culturally appropriate locally developed lectures from members of this network. These lectures had to be relevant to teachers and students of epidemiology n India. Most of the textbooks of epidemiology, public health and medicine in India are written by foreign authors. While these textbooks are excellent reference books, they often do not have much information about the epidemiology of diseases that are very prevalent in India. These include infectious diseases such as polio, malaria, tetanus, tuberculosis and leprosy.

Lectures were requested from Indian Supercourse faculty members on these neglected subjects. The following were the main sources of these lectures –

1. **Requesting lectures from Indian Supercourse faculty members** – Lectures on topics of interest to users in India, were requested via the Indian Supercourse Newsletter.
2. **Journal watch** – Many journals published in India are open source and can be viewed without charge online. Authors who had written articles in these journals were contacted and they were requested to contribute a lecture on a topic in their field of research for the Indian Supercourse.
3. **Searching for lectures on the Internet** – Using the advanced search function on Google, PowerPoint lectures on epidemiology written by Indian authors were identified. The authors of these lectures were contacted, invited to join the Indian Supercourse and to submit their lecture.
4. **Translations** – 3 lectures in the Indian Supercourse are translations of Main Supercourse lectures into Indian languages. The lecture "Understanding September 11" was translated into Hindi, the "Golden Lecture" which was translated into Marathi, and the "Tsunami" lecture was translated into Telugu.

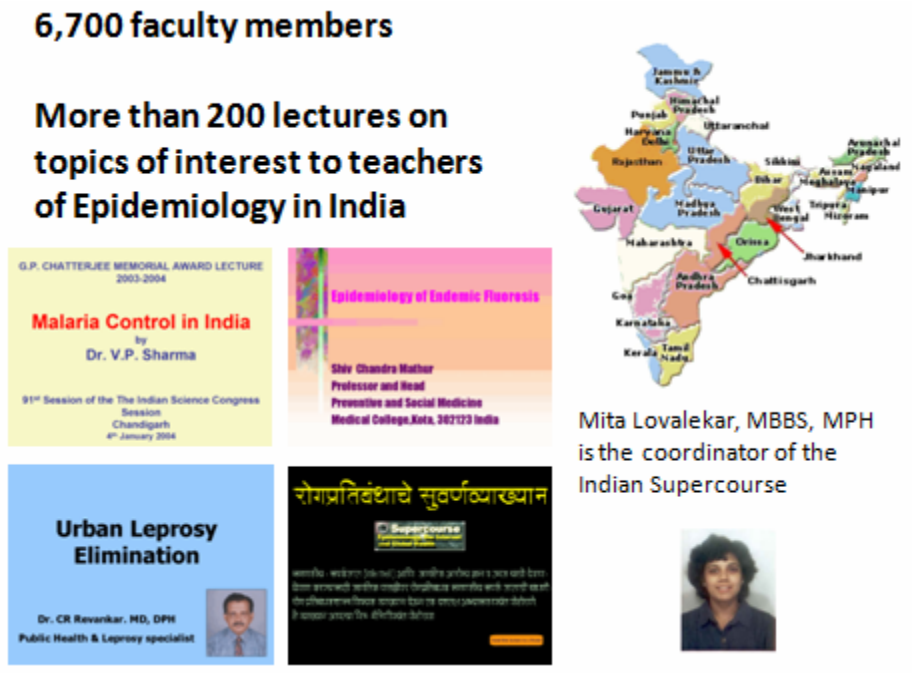

Figure 2. Description of the Indian Supercourse

Using the 4 methods outlined above, 218 lectures were collected over a period of 4 years. These lectures were sent to us in PowerPoint format. The PowerPoint lectures are converted into the "Supercourse format". The slides are converted to .GIF image format. The notes as text and the slides as .GIF images are uploaded on the Indian Supercourse website. Recently, we have also made the lectures available as downloadable PowerPoint files.

All these lectures are available online at the Indian Supercourse website http://www.pitt.edu/~super1/india/india.htm. Mita Lovalekar, M.B.B.S., M.P.H. is the coordinator of this network.

3.4 ASSESSMENT OF UTILIZATION

3.4.1 Lecture selection

The first step in this study was to identify epidemiology lectures from the Indian Supercourse and the Main Supercourse, to be included in the study. At the time the study was completed, there were 218 lectures in the Indian Supercourse and 3237 lectures in the Main Supercourse. A total of 134 and 1030 epidemiology lectures were identified from the Indian Supercourse and the Main Supercourse respectively. Only lectures in English were included in the analysis.

Some of these lectures had more than 1 part. The Web statistics analysis software was installed on the front page of each lecture, and was measuring page views only from the front page of every lecture. In this respect, if the lecture had more than 1 part, the front page of part 1 was comparable to the front page of other lectures. Only part 1 of a multi-part lecture was included in the analysis. The first slide of the first part of such a lecture was similar to the first slide of other lectures.

Using this method, 120 lectures from the Indian Supercourse and 848 lectures from the Main Supercourse were included in the final analysis. The lectures that have been included in the final analysis are listed in Appendix A.

3.4.2 Installation of Web statistics analysis aoftware

The Webstat software (http://webstats.motigo.com/) was installed on the front page of each lecture that was selected for inclusion in the study. Utilization statistics were collected for each lecture – page views from India, page views from non-Indian countries and total page views.

The study period was from January 2007 to April 2008. Most of the lectures had the Web statistics analysis counters on them for a period of at least 1 year. For the lectures that had counters for less than 1 year, data were extrapolated to a year, to ensure that all lecture data were comparable. All the data that are mentioned in the study represent data per lecture, per year, unless specified otherwise.

3.4.3 Sample size calculation and power

Pilot counters had been inserted on 17 epidemiology lectures in the Indian Supercourse and 35 epidemiology lectures in the Main Supercourse, before this analysis was started. Data obtained from these pilot counters were used to calculate the sample size required. Table 2 shows the data that were obtained from the pilot counters.

Table 2. Pilot data – page views from India, per lecture per year

	Indian Supercourse	Main Supercourse
Mean page views, per lecture, per year	42.1	20.5
Standard deviation	38.8	29.5
Number of pilot lectures	17	35

$$N = \frac{(\sigma_1^2 + \sigma_2^2)(z_{1-\alpha/2} + z_{1-\beta})^2}{\Delta^2}$$

$\alpha = 0.05$ (95% confidence level)

$\beta = 0.80$ (power = 80%)

$\Delta = |\mu 2 - \mu 1|$

Mean and variances of the two groups are (μ_1, σ_1^2) and (μ_2, σ_2^2)

Figure 3: Sample Size calculation for continuous data

Using the pilot data and the NCSS/PASS software (http://www.ncss.com/) table 3 was created plotting the ratio of standard deviations and the Δ value (difference between mean page views that can be detected). Knowing the means and standard deviations from the pilot data, the analysis as set up had sufficient power (at least 80 percent) to detect a difference of 15 page views between the Indian and Main Supercourse. As can be seen in table 3, the actual difference in means for the pilot data is 21.6. This means that the analysis as set up had more than enough power to detect the difference.

Table 3. PASS sample size software Δ and the ratio SD1/SD2 ($\alpha = 0.05$ $\beta = 0.80$)

$\Delta = \lvert\mu_2 - \mu_1\rvert$	R = N2/N1 = 4		Power
	N1 – Indian Supercourse	N2 – Main Supercourse	
2	3381	13524	0.80
5	541	2164	0.80
10	136	544	0.80
15	61	244	0.81
20	34	136	0.80

It was decided to include all the eligible lectures in the analysis. Thus, 120 epidemiology lectures from the Indian Supercourse and 848 epidemiology lectures from the Main Supercourse were included. As will be discussed in more detail in the results section, the page view data were not normally distributed. Comparison was done using non-parametric tests.

3.4.4 Main hypothesis – page views from India

The main utilization parameter was the number of page views from India. The number of page views from Indian was compared between the Indian Supercourse and the Main Supercourse by using a non-parametric test, the Wilcoxon Mann-Whitney test.

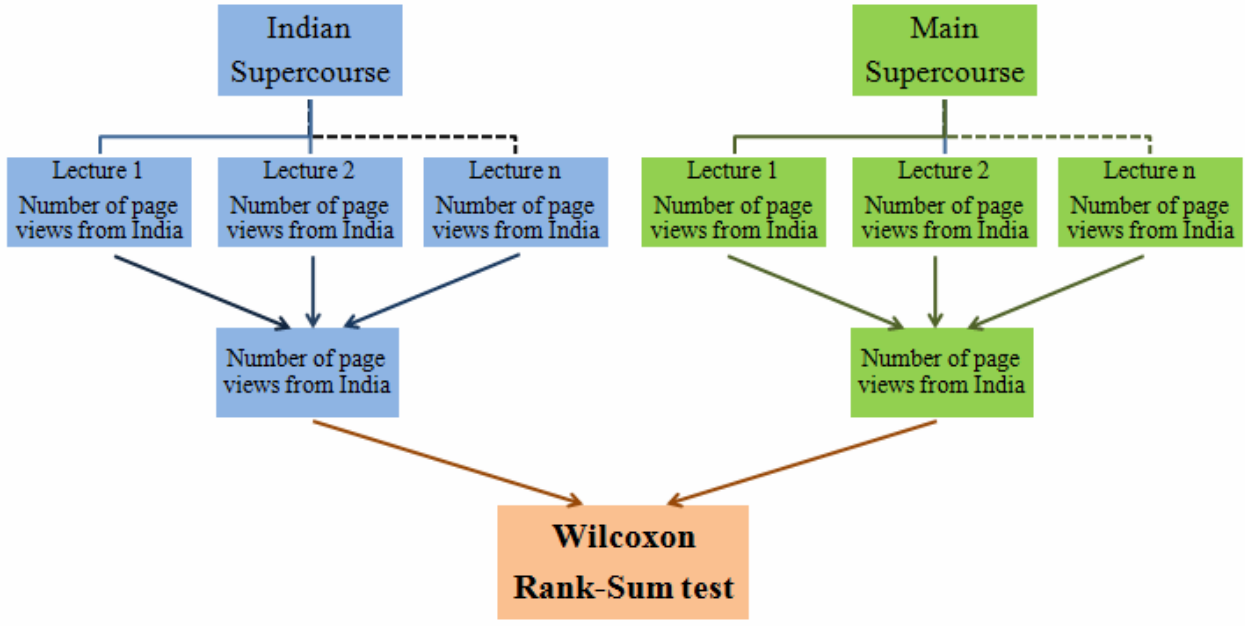

Figure 4. Flowchart for comparison of page views from India between the Indian Supercourse and the Main Supercourse

Null hypothesis - For lectures on the Indian Supercourse and the Main Supercourse, the number of page views from India, per lecture per year, are equal

Alternate hypothesis - For lectures on the Indian Supercourse and the Main Supercourse, the number of page views from India, per lecture per year, are not equal

Figure 4 is the flowchart that shows the analysis for comparison of page views from India between the Indian Supercourse and the Main Supercourse.

3.4.5 Other hypotheses

The number of page views was compared between the Indian Supercourse and the Main Supercourse by using the Wilcoxon Mann-Whitney test.

3.4.5.1 Page views from non-Indian countries

Null hypothesis - For lectures on the Indian Supercourse and the Main Supercourse, the number of page views from non-Indian countries, per lecture per year, are equal

Alternate hypothesis - For lectures on the Indian Supercourse and the Main Supercourse, the number of page views from non-Indian countries, per lecture per year, are not equal

3.4.5.2 Total page views

Null hypothesis - For lectures on the Indian Supercourse and the Main Supercourse, the total page views, per lecture per year, are equal

Alternate hypothesis - For lectures on the Indian Supercourse and the Main Supercourse, the total page views, per lecture per year, are not equal

3.4.6 Comparisons after stratification

All the English-language epidemiology lectures from the Indian Supercourse and the Main Supercourse have been included in the analysis. These lectures have been divided into four strata, based on their topic. The strata are – basic epidemiology lectures, chronic disease epidemiology lectures, infectious disease epidemiology lectures and other epidemiology lectures. The stratum other epidemiology lectures includes lectures on specialized topics in epidemiology such as molecular epidemiology, injury epidemiology, clinical epidemiology, family, child and women's health epidemiology, and environmental epidemiology.

For the initial analysis comparing page views from India, page views from non-Indian countries and total page views, between the Indian Supercourse and the Main Supercourse, lectures from the four strata were pooled together. The analysis was then repeated within each stratum by comparing the Indian Supercourse and Main Supercourse lectures within that stratum. This ensured that comparison was done between similar lectures. These plan for these comparisons after stratification are illustrated in tables 4, 5 and 6.

Table 4. Page views from India, per lecture per year, after stratification

	Indian Supercourse Network	Main Supercourse Network	Comparison
Basic epidemiology lectures	A	B	A = B
Chronic disease epidemiology lectures	C	D	C = D
Infectious disease epidemiology lectures	E	F	E = F
Other epidemiology lectures	G	H	G = H

Table 5. Page views from non-Indian countries, per lecture per year, after stratification

	Indian Supercourse Network	Main Supercourse Network	Comparison
Basic epidemiology lectures	A	B	A = B
Chronic disease epidemiology lectures	C	D	C = D
Infectious disease epidemiology lectures	E	F	E = F
Other epidemiology lectures	G	H	G = H

Table 6. Total page views, per lecture per year, after stratification

	Indian Supercourse Network	Main Supercourse Network	Comparison
Basic epidemiology lectures	A	B	A = B
Chronic disease epidemiology lectures	C	D	C = D
Infectious disease epidemiology lectures	E	F	E = F
Other epidemiology lectures	G	H	G = H

3.4.7 Comparison of utilization of similar lectures

Eight lectures were selected at random from the Indian Supercourse. For comparison, matching lectures were selected from the Main Supercourse. Lectures that were selected from the Main Supercourse were similar to corresponding Indian Supercourse lectures regarding their strata and topic. For example, a diabetes lecture from the Indian Supercourse was compared to a diabetes lecture from the Main Supercourse.

Page views from India were compared between the Indian Supercourse lectures and corresponding lectures from the Main Supercourse.

3.5 DISSEMINATION ANALYSIS

The numbers of page views from India to 4 lectures in the Indian Supercourse were measured before and after an Indian Supercourse newsletter. Two of these lectures were mentioned in the

newsletter, and 2 were not. This will serve as an assessment of the effectiveness of the newsletter in promoting the Indian Supercourse and helping dissemination. The newsletter is expected to bring more visitors from India to lectures in the Indian Supercourse.

Two lectures were selected at random from the Indian Supercourse. The page views from India for a period of 15 days before and after an Indian Supercourse newsletter were compared. These 2 lectures had been mentioned in the newsletter. A similar test was done for 2 lectures that had not been mentioned in the newsletter. These lectures were also selected at random from the Indian Supercourse.

The Indian Supercourse newsletter was sent only to the Supercourse participants in India.

4.0 RESULTS

4.1 INDIAN SUPERCOURSE NETWORK DEVELOPMENT

When the Indian Supercourse Network was started 4 years ago, there were 100 participants. Since then there has been a rapid increase in the number of participants, so that in April 2008, there were 6,700 participants from India in the Indian Supercourse Network. This includes professors in medical colleges, physicians, and people from the Ministry of Health, the UNICEF, public health researchers and medical students.

Figure 5 shows the rapid growth in the number of participants in the Indian Supercourse.

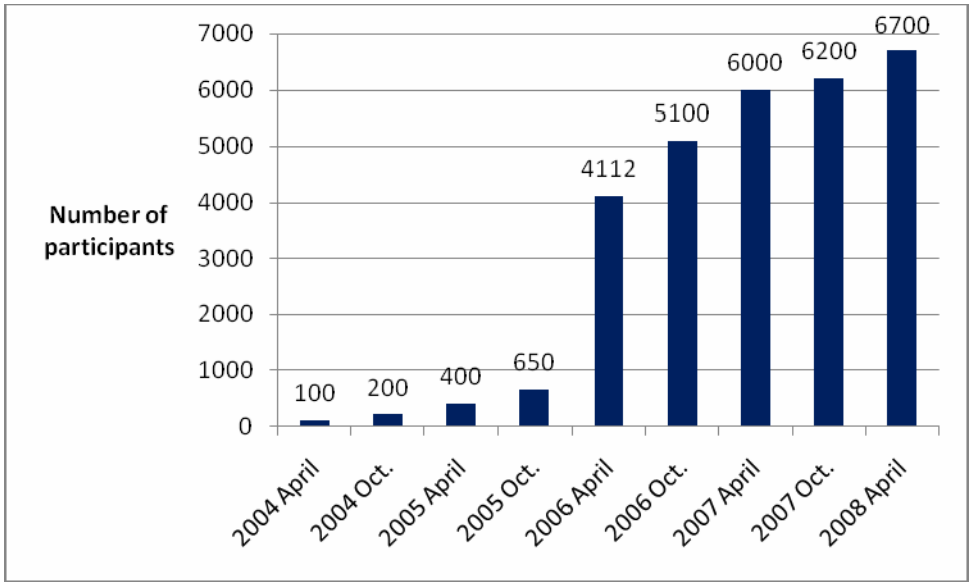

Figure 5: Growth in the number of participants from India

4.2 COLLECTION OF CONTENT

In April 2008, there were 218 lectures in the Indian Supercourse. These lectures can be divided into broad categories. Table 7 lists the main topic areas in the Indian Supercourse and the number of lectures in each topic area.

Table 7. Main topic areas and number of lectures in the Indian Supercourse Network

Topic Area	Number of Lectures
Basic Epidemiology	13 (6.0 %)
Chronic Disease Epidemiology	16 (7.3 %)
Infectious Disease Epidemiology	62 (28.4 %)
Other Epidemiology Lectures	53 (24.3 %)
Biostatistics	2 (0.9 %)
Global Health	24 (11.0 %)
Public Health	21 (9.6 %)
Occupational Health, Military Health	3 (1.4 %)
Health Information	3 (1.4 %)
Environmental Health	3 (1.4 %)
Human-Animal Interaction	2 (0.9 %)
Others	16 (7.3 %)
Total	**218 (100 %)**

Figure 6: Indian Supercourse lectures

The greatest numbers of lectures in the Indian Supercourse (62 lectures, 28.4 percent) are in the field of infectious diseases. This reflects the fact that infectious diseases are still the greatest threat to public health in India. Of these, 22 lectures are on HIV/AIDS (Human Immune Deficiency Virus / Acquired Immune Deficiency Syndrome). In recent years, there has been a large increase in the number of HIV positive people in India, and India is poised to become the country with the largest population of HIV positive people in the world. The lectures on HIV cover various aspects of the disease such as epidemiology, prevention of HIV, pediatric HIV, infant feeding and HIV, and stigma and discrimination related to HIV/AIDS. Another important infectious disease in India is polio. Polio used to be a scourge in India. Due to programs such as the Pulse Polio Immunization Program and the Polio Eradication Program, there has been a drastic reduction in the incidence of this crippling disease. Malaria is endemic in India. The section on infectious diseases contains 2 lectures on malaria and 3 lectures on leprosy, which is

also very common. Other topics covered in this section include Japanese encephalitis, tetanus, meningococcal meningitis, leptospirosis, mad cow disease and yellow fever. This section also includes lectures on the National Tuberculosis Control Program, the Pulse Polio Immunization Program and the Universal Immunization Program. These programs have been responsible for the recent decrease in the incidence of vaccine preventable infectious diseases in India, though they still continue to be a major public health concern.

There are also a large number of lectures (18 lectures) in the area of the epidemiology of Maternal and Child Health. There include lectures on diverse topics, such as neonatal, infant and child mortality, reproductive and child health in India and the Reproductive and Child Health (RCH) Program, female feticide, development goals, prevention of mother to child transmission of HIV, needs assessment, adolescent health, policy reform in the family welfare program of India, and violence against women and reproductive health. It is important to have so many lectures in this area because in India, women in the reproductive age group and their young children make up a large proportion of the population, and they are very vulnerable to diseases that are mostly preventable. Also any disease prevention program in this demographic group has a rapid and profound effect on the health of the population.

The Indian Supercourse has 24 lectures on global health on topics such as the epidemiologic transition, cyber-pharmacies and international health. In addition, the Indian Supercourse contains 21 lectures on public health, on topics such as Population Policy, Decentralized Planning, Consumer Healthcare Education, Human Resource Development in Healthcare Organizations, Project Management, Public-Private Partnerships in Health, and Customer Satisfaction and Service Marketing.

In addition to the lectures described above, the Indian Network also contains 16 lectures on Basic Epidemiology such as descriptive epidemiology, case-control studies, cohort studies and clinical trials. There are 13 lectures on Chronic Disease Epidemiology. An interesting lecture in this group is the one on the National Iodine Deficiency Disorders Control Program. This lecture describes how iodized salt succeeded in reducing the prevalence of endemic goiter in school children, planting the seeds of the National Iodine Deficiency Disorders Program. The lecture goes on to explain the true power of prevention. Iodine added to salt costs a few cents extra per person per year. This can prevent the costly and often irreversible effects of iodine deficiency.

Three of the lectures are translations of original lectures that were written in English. There is a Hindi translation of the lecture "Understanding September 11", a Marathi translation of the "Golden Lecture of Prevention" and a Telugu translation of the lecture on tsunamis.

Figure 7 shows the growth of lectures in the Indian Supercourse. There has been a steady growth of lectures over the past 4 years. The Indian Supercourse currently has 218 lectures.

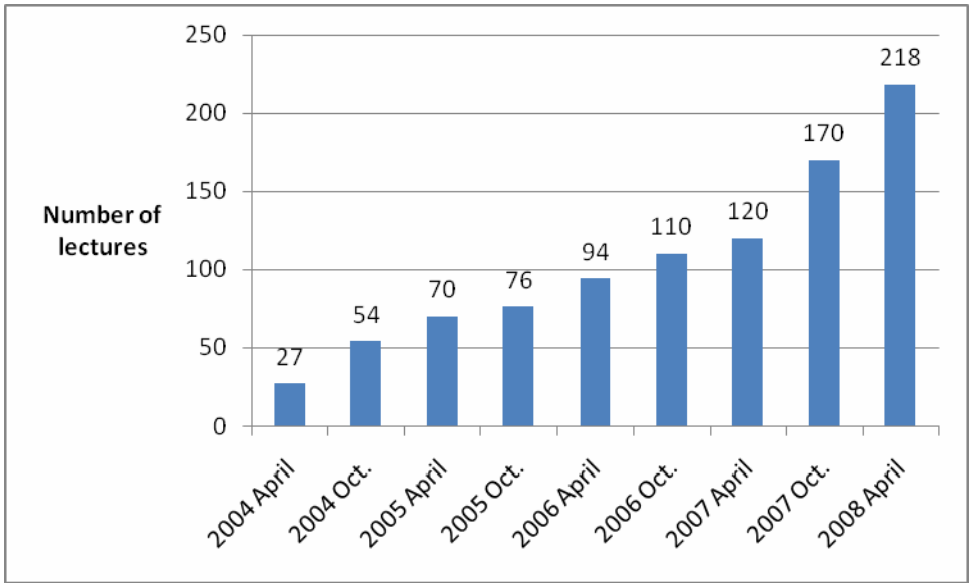

Figure 7: Growth of lectures in the Indian Supercourse

All of these lectures of the Indian Supercourse are available without charge on the Website of the Indian Supercourse.

4.3 EVALUATION OF THE INDIAN SUPERCOURSE

The evaluation of the Indian Supercourse Network included an assessment of utilization of the Indian Supercourse lectures by users in India. For this purpose, only epidemiology lectures from the Indian Supercourse, and for comparison, epidemiology lectures from the Main Supercourse were included in the analysis. A total of 968 epidemiology lectures from the Supercourse qualified for inclusion in the study. Of these, 120 were from the Indian Supercourse, and 848 were from the Main Supercourse. The 2 criteria for inclusion in the study were that the lectures were on a topic in epidemiology and were written in the English language.

The following is a brief description of the lectures, and the utilization data that were collected about the lectures.

4.3.1 Descriptive statistics

4.3.1.1 Categories of lectures

The lectures that were included in the analysis were divided into 4 main categories – Basic Epidemiology, Chronic Disease Epidemiology, Infectious Disease Epidemiology and Other Epidemiology Lectures. The category Other Epidemiology Lectures included lectures on special topics in epidemiology such as Molecular epidemiology, Injury epidemiology, Clinical

epidemiology, Family, Child, Women's Health epidemiology, and Environmental epidemiology. Table 8 shows the numbers of lectures from each of the 4 categories included in the analysis.

Table 8. Four categories of lectures included in the analysis from the Indian and the Main Supercourse

	Indian Supercourse	Main Supercourse
Basic Epidemiology	12 (10.0 %)	159 (18.8 %)
Chronic Disease Epidemiology	13 (10.8 %)	177 (20.9 %)
Infectious Disease Epidemiology	52 (43.3 %)	159 (18.8 %)
Other Epidemiology Lectures	43 (35.8 %)	353 (41.6 %)
Total	**120 (100 %)**	**848 (100 %)**

As expected, the majority (52 lectures, 43.3 percent) of lectures in the Indian Supercourse were in the field of Infectious Disease Epidemiology. This reflects the fact that in India, infectious diseases are still very much a great threat to public health, and there is a considerable interest in this field among Indian Supercourse authors. In contrast, the greatest numbers of lectures (353, 41.6 percent) in the Main Supercourse were in the category Other Epidemiology lectures. This category included lectures on special topics in epidemiology, as mentioned in the previous paragraph. Since many of the Main Supercourse authors are from the United States and other developed countries, where much of the research in special topics in epidemiology is done, there are many lectures on these special epidemiology topics in the Main Supercourse. The title of these lectures is included in Appendix A.

All the 848 epidemiology lectures from the Main Supercourse and 120 epidemiology lectures from the Indian Supercourse were included in the analysis. The Indian Supercourse and the Main Supercourse were compared by pooling all the lectures from the 4 strata together, at

first. After this analysis, comparisons were also done within each stratum between the Indian and Main Supercourse. Stratification of the lectures provided a way to test for difference in page views between comparable lectures. Stratification also gives an idea of the distribution of lectures by subject matter.

4.3.1.2 Age of lectures

The age of each lecture, was calculated as the time period between the dates when the lecture was uploaded on the Supercourse website, to the date the data were read. Table 9 shows the distribution of the lectures according to their age in years.

Table 9. Age distribution of the lectures included in the analysis

	Indian Supercourse	**Main Supercourse**
<1 year old	16 (13.3 %)	244 (28.8 %)
1 – 2 years old	42 (35.0 %)	25 (3.0 %)
2 – 3 years old	29 (24.2 %)	86 (10.1 %)
More than 3 years old	33 (27.5 %)	493 (58.1 %)
Total	**120 (100 %)**	**848 (100 %)**

Since the Indian Supercourse was started about 4 years ago, the age of most of the lectures in the Indian Supercourse was 4 years or less. The Main Supercourse has been operational for more than 10 years. The lectures from the Main Supercourse included in the analysis, were distributed over this time period of 10 years. However, as can be seen in table 9, because of the rapidly growing interest in the Main Supercourse, a large percentage of lectures were available in just the past few years.

The average age of lectures included in the analysis from the Indian Supercourse was 2.2 years and the standard deviation was 1.0 year. For the Main Supercourse, the average age of the lectures was 2.6 years and the standard deviation was 1.3 years.

4.3.1.3 Length of time the Web statistics analysis software (counters) had been on the lectures

The counters (Web Statistics Analysis Software - http://webstats.motigo.com/) were first inserted into the Indian Supercourse lectures, and then into the Main Supercourse lectures. As a result, the majority of lectures on the Indian Supercourse (56 lectures, 46.7 percent) have had the counters on them for about 14 months. Counters were then inserted into the Main Supercourse lectures. The majority of lectures on the Main Supercourse (525 lectures, 61.9 percent) have had the counters on them for about 12 months.

Table 10. Length of time the counters were on the lectures

	Indian Supercourse	Main Supercourse
4 months	1 (0.8 %)	7 (0.8 %)
5 months	54 (45.0 %)	3 (0.4 %)
6 months	2 (1.7 %)	245 (28.9 %)
7 months		
8 months		1 (0.1 %)
9 months		1 (0.1 %)
10 months		
11 months		
12 months	2 (1.7 %)	525 (61.9 %)
13 months	1 (0.8 %)	64 (7.6 %)
14 months	56 (46.7 %)	

Table 10 continued

15 months		1 (0.1 %)
16 months		
17 months	1 (0.8 %)	
18 months	2 (1.7 %)	
21 months		1 (0.1 %)
33 months	1 (0.8 %)	
Total	**120 (100 %)**	**848 (100 %)**

4.3.1.4 Relative frequency distribution of total page views by month

In order to understand the distribution of total page views by month, and to visualize any month to month variation, histograms of the relative frequency distribution were created. Twenty lectures were randomly chosen, from the Indian Supercourse and from the Main Supercourse. In order to make the lectures comparable, the 20 lectures included 5 lectures from each of the 4 categories - Basic Epidemiology, Chronic Disease Epidemiology, Infectious Disease Epidemiology and Other Epidemiology Lectures. For the Indian as well as the Main Supercourse, the numbers of total page views per month were used to calculate an average number for each month. From this average, the relative frequency for each month was calculated, as a percentage. The relative frequency was the percent of total page views that happened during each month. The relative frequency was plotted on the Y-axis, with the months on the X-axis.

The distribution of relative frequency of the total page views by month for the Indian Supercourse and the Main Supercourse is illustrated in Figure 8.

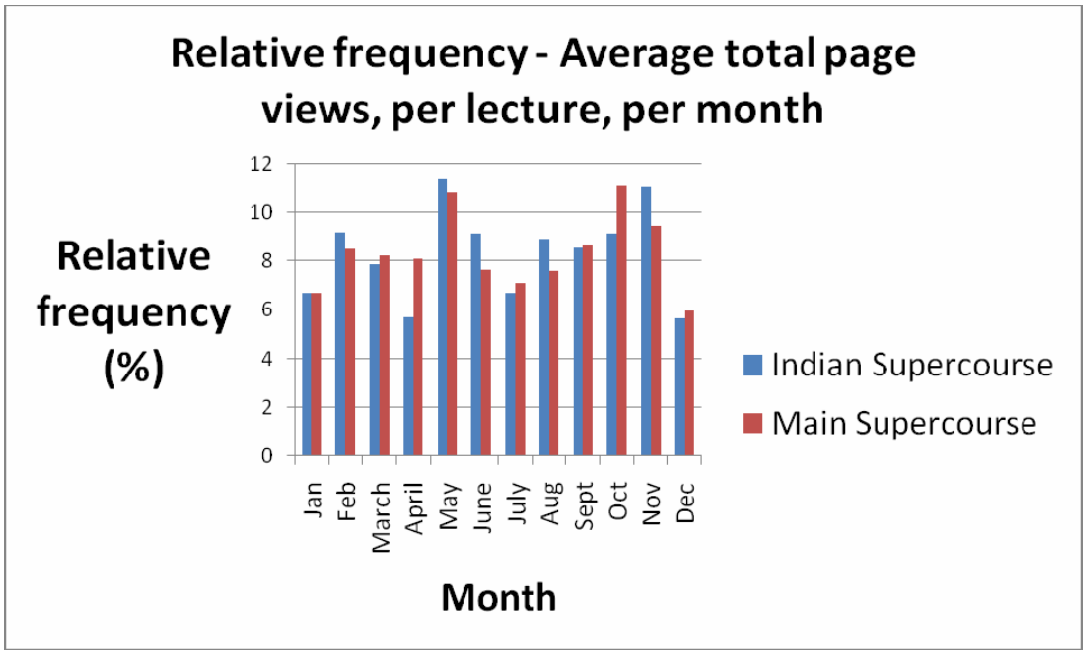

Figure 8: Indian Supercourse and Main Supercourse - Distribution by month – Relative frequency of average total page views, per lecture, per month (Random N = 20)

Interestingly, the Indian Supercourse and the Main Supercourse showed a similar distribution of the relative frequencies of the average total page views over the months. There were two peaks – one in May, and the second in November for the Indian Supercourse and October for the Main Supercourse. These peaks may correspond to examination time, when more teachers and students are utilizing the Supercourse.

4.3.1.5 Column charts of page views

Simple column charts of the page views from India, page views from non-Indian countries and the total page views were graphed for the Indian Supercourse and the Main Supercourse (figures 9 - 14).

Simple column charts were plotted to evaluate the distribution of page views. What is obvious is the great variability in the page views between lectures. This is exciting because it may mean that there are many factors that influence the utilization of each lecture. Further analyses of these data attempted to identify some of these factors, which will be described in later sections.

Figure 9 is a column chart showing the distribution of page views from India to lectures in the Indian Supercourse. There was a great variation in the number of page views from India. This is true for all the column charts as seen below. The lecture from the Indian Supercourse with the highest number of page views from India was the lecture on "Pulse Polio Immunization". It received 1060.9 page views from India in one year. In India, the pulse polio campaign of immunization with the Oral Polio Vaccine (OPV) was started since the last few years, to reduce the incidence of polio. So, it is expected that there would be a great interest in this subject from users in India. The lecture from the Indian Supercourse with the second highest number of page views from India (761.1) was the lecture on Reproductive and Child Health in India. In India, there is a great interest in the field of maternal and child health due to the reasons outlined before.

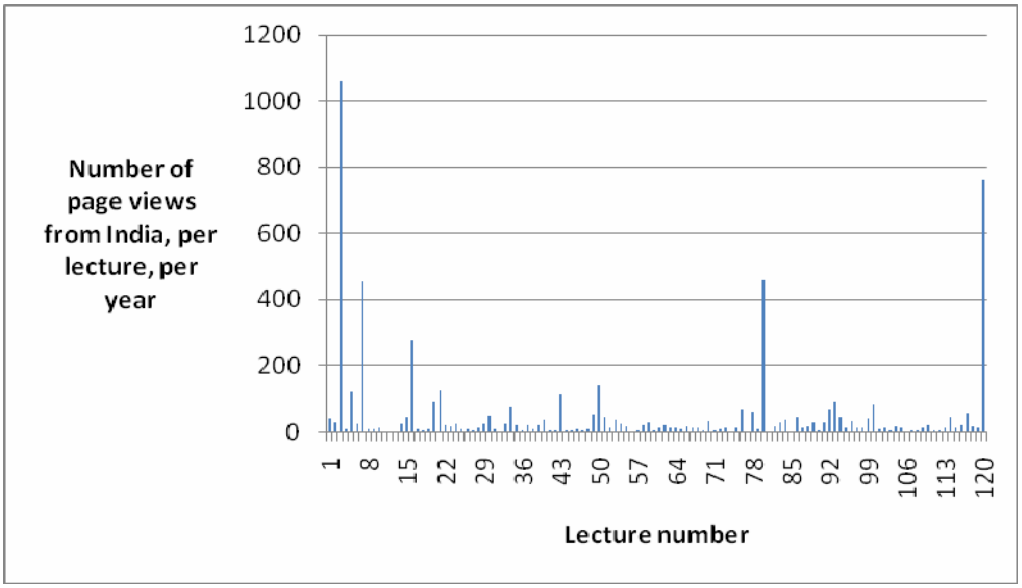

Figure 9. Indian Network – Number of page views from India, per lecture, per year (N = 120)

Figure 10 shows the distribution of page views from non-Indian countries to lectures in the Indian Supercourse.

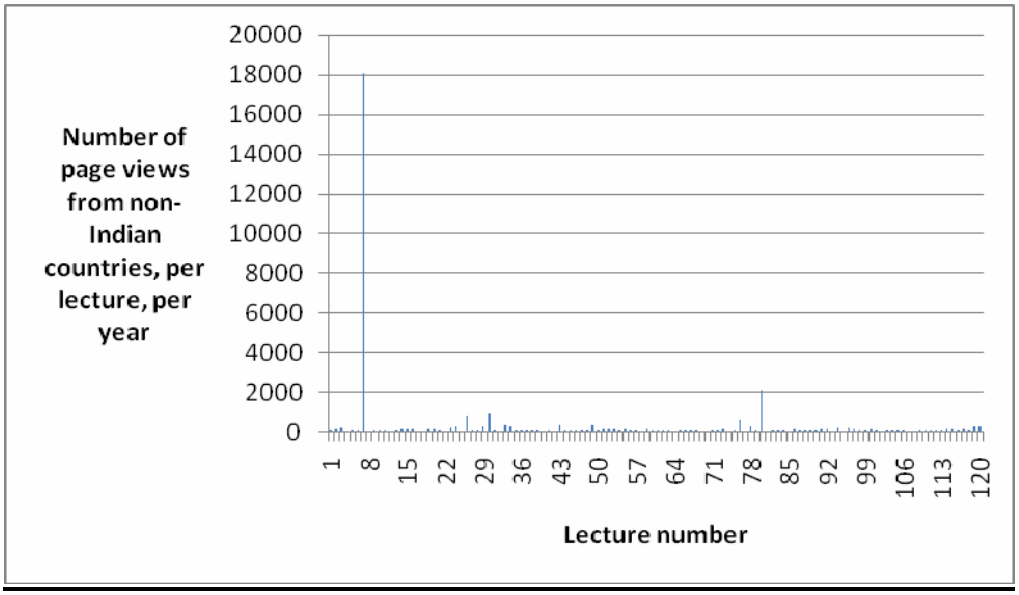

Figure 10. Indian Network – Number of page views from non-Indian countries, per lecture, per year (N = 120)

Figure 11 is a column chart of the distriution of total page views to the Indian Supercourse.

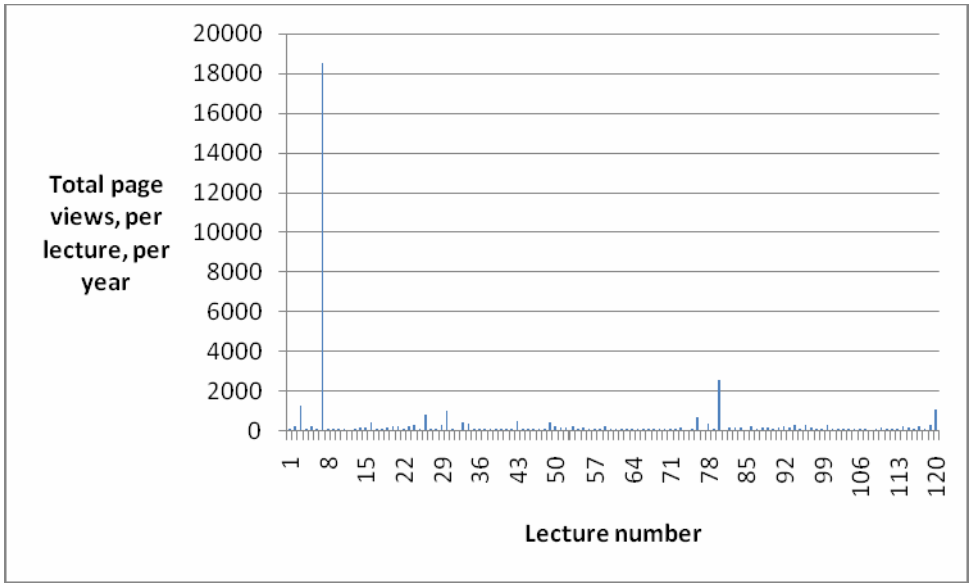

Figure 11. Indian Network – Total page views, per lecture, per year (N = 120)

What is striking about figure 10 and figure 11 is that the lecture with the highest number of page views in both figures is the same. It is the lecture "How to Conduct a Meta-Analysis" (lec 1171). It was the most popular lecture in the Supercourse, among the lectures that have been included in this analysis, with 18508.2 total page views per year. Of these, 18052.9 were from non-Indian countries. The subject matter of the lecture is one that would probably appeal more to people in developed countries. This is evidenced by this lecture being the highest ranking in terms of page views from non-Indian countries, and total page views.

Similar column charts showing the distribution of pageviews by lecture were created for the Main Supercourse.

Figure 12 shows the distribution of page views from India to lectures in the Main Supercourse. The Main Supercourse lecture with the highest number of page views from India was the lecture on Pharmacoepidemiology with 423.6 page views from India, per year. The lecture in the Main Supercourse with the second highest number of page veiws from India was the lecture Public Health Disaster Consequences of Disasters, with 277.2 page views per year from India.

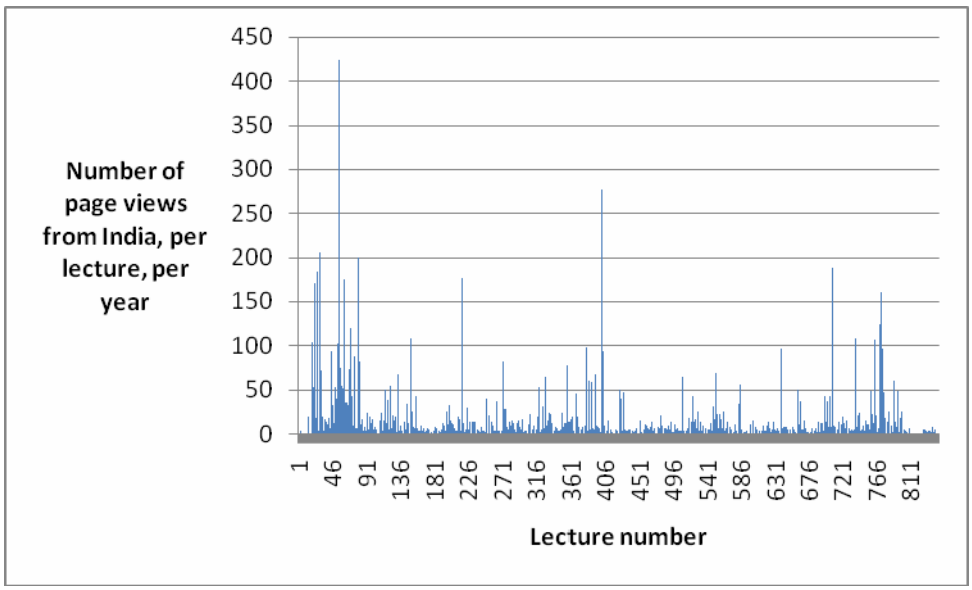

Figure 12. Main Network – Number of page views from India, per lecture, per year (N = 848)

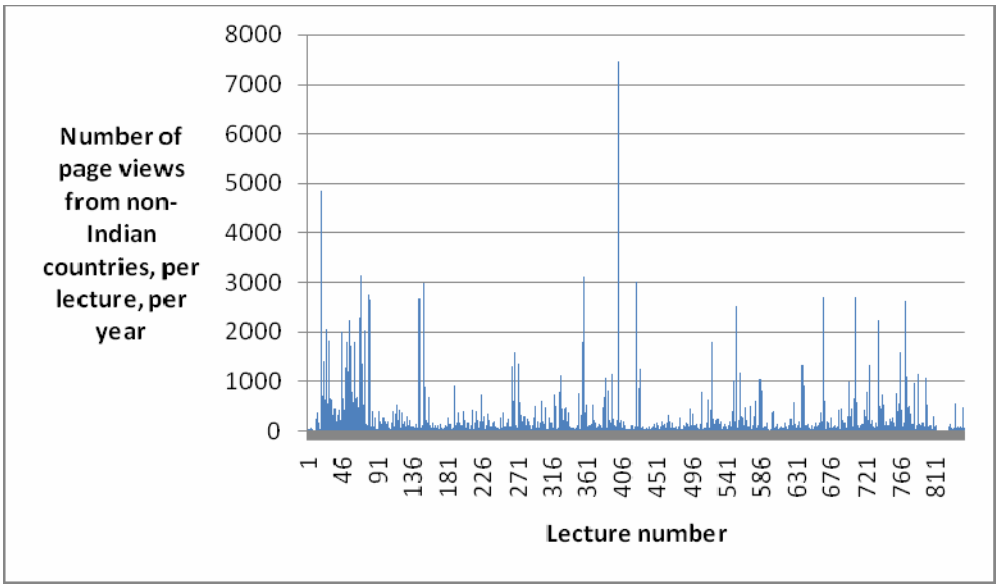

Figure 13. Main Network – Number of page views from non-Indian countries, per lecture, per year (N = 848)

Figure 13 is a column chart showing the distribution of page views from non-Indian countries to lectures in the Main Supercourse.

Interestingly, the one lecture which stands out in figure 12, figure 13 and figure 14 is the lecture Public Health Consequences of Disasters (lec20351). It was ranked number 1 in the Main Supercourse in terms of page views from non-Indian countries (7,466.4 page views from non-Indian countries) as well as the total page views (7,743.6 total page views). It was ranked number 2 in terms of page views from India to the Main Supercourse. Is is a very well written lecture contributed by a national expert in public health in the United States, which probably explains its high popularity in India as well as other countries. The second highest ranking lecture in the Main Supercourse in terms of the page views from non-Indian countries as well as the total page views was the lecture on epidemiologic transition.

Figure 14 is a distribution of total page views to lectures in the Main Supercourse.

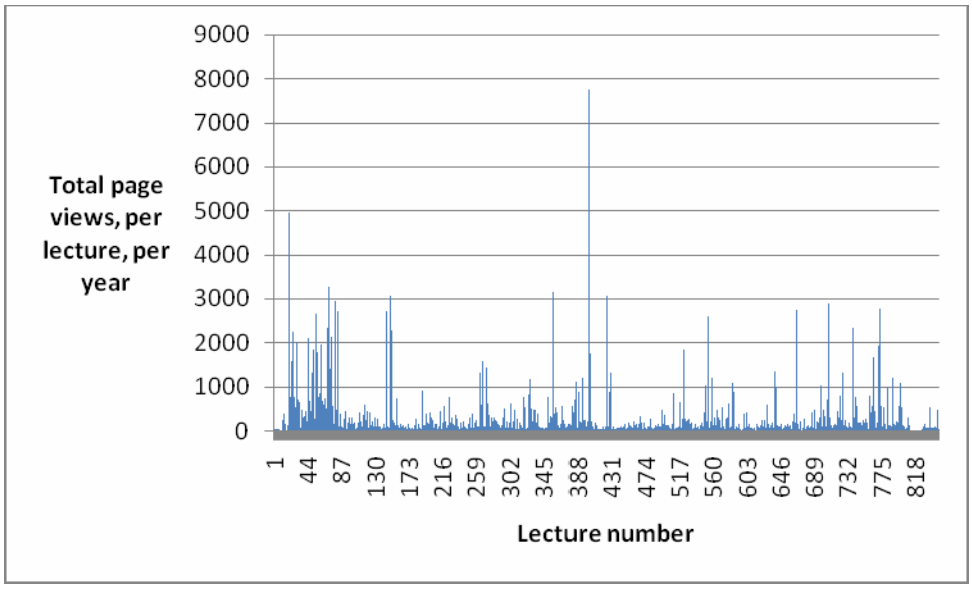

Figure 14. Main Network - Total page views, per lecture, per year (N = 848)

The column charts above also show that there is a lot of variability in the number of page views between lectures.

4.3.1.6 Means, Standard Deviations, Confidence Intervals, Medians, and Inter-Quartile ranges

The software SAS® (SAS Institute Inc., Cary, NC, USA) was used for all statistical tests. PROC UNIVARIATE and PROC MEAN were used to obtain the descriptive statistics in table 11.

Table 11. Mean, standard deviation, confidence intervals, median, inter-quartile range for page views, for the Indian Supercourse (N = 120) and the Main Supercourse (N = 848)

		Mean	Standard deviation	95% Confidence Interval	Median	Inter-quartile range (Q1 – Q3)
Page views from India	**Indian Supercourse**	48.2	132.0	24.4 to 72.1	14.4	24.9
	Main Supercourse	13.6	29.6	11.6 to 15.6	4.8	9.6
Page views from non-Indian countries	**Indian Supercourse**	266.9	1651.9	31.7 to 565.5	64.0	85.9
	Main Supercourse	264.3	533.5	228.4 to 300.3	96.4	182.5
Total page views	**Indian Supercourse**	15.2	1699.5	8 to 622.4	77.9	111.4
	Main Supercourse	277.9	556.0	240.5 to 315.4	101.0	194.1

As can be seen in the table 11, looking at the page views from India, the median for the Indian Supercourse (14.4), was much higher than the median for the Main Supercourse (4.8).

What this means is that, not unexpectedly, lectures from the Indian Supercourse were receiving many more page views from India, per year, than the lectures from the Main Supercourse. The Indian Supercourse was being used more by people in India, than the Main Supercourse. Statistical tests were also done to prove this, as will be described in the later part of this section.

Statistical tests were also done to compare the page views from non-Indian countries and total page views, between the Indian Supercourse and the Main Supercourse.

All page views were page views, per lecture, per year, unless mentioned otherwise.

4.3.1.7 Frequency distribution of page views

The frequency distribution of the page views from India, page views from non-Indian countries and the total page views were graphed for the Indian and the Main Supercourse (figures 15 - 20). The frequency distributions gave a graphical representation of the distribution of page views.

Figure 15 shows the frequency distribution of the number of page views from India, per lecture, per year, to the Indian Supercourse.

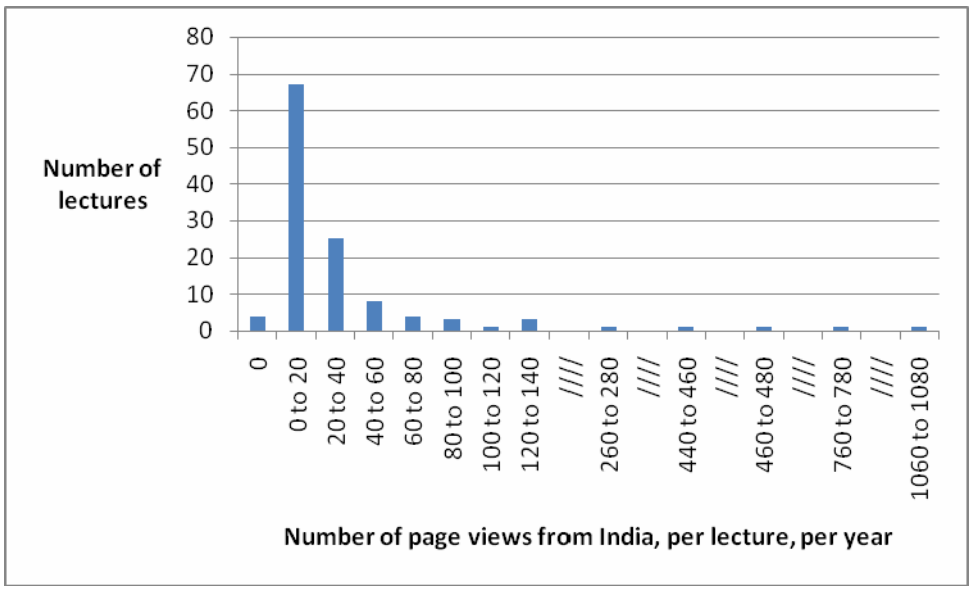

Figure 15. Frequency distribution – Indian Supercourse - Number of page views from India, per lecture, per year (N = 120) (each interval includes its upper limit)

Figure 15 shows that the page views from India to the Indian Supercourse were not normally distributed. A majority of lectures had between 0 to 20 page views, per year. The median was 14.4 pageviews. There were a few lectures with very high page views and the distribution was clearly skewed. More formal tests were done, as will be described later, and the tests confirmed that the data were not normally distributed.

Figure 16 is a frequency distribution of the number of page views from non-Indian countries, per lecture, per year, to lectures on the Indian Supercourse. This distribution also appeared to be skewed. The majority of Indian Supercourse lectures had between 20 to 40 page views from non-Indian countries. The median was 64.0.

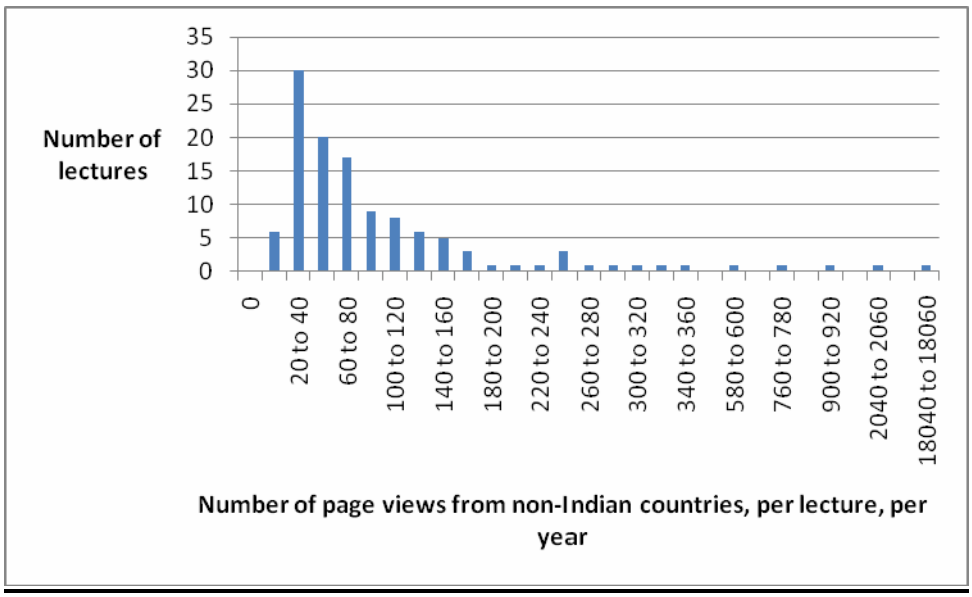

Figure 16. Frequency distribution – Indian Supercourse - Number of page views from non-Indian countries, per lecture, per year (N = 120) (each interval includes its upper limit)

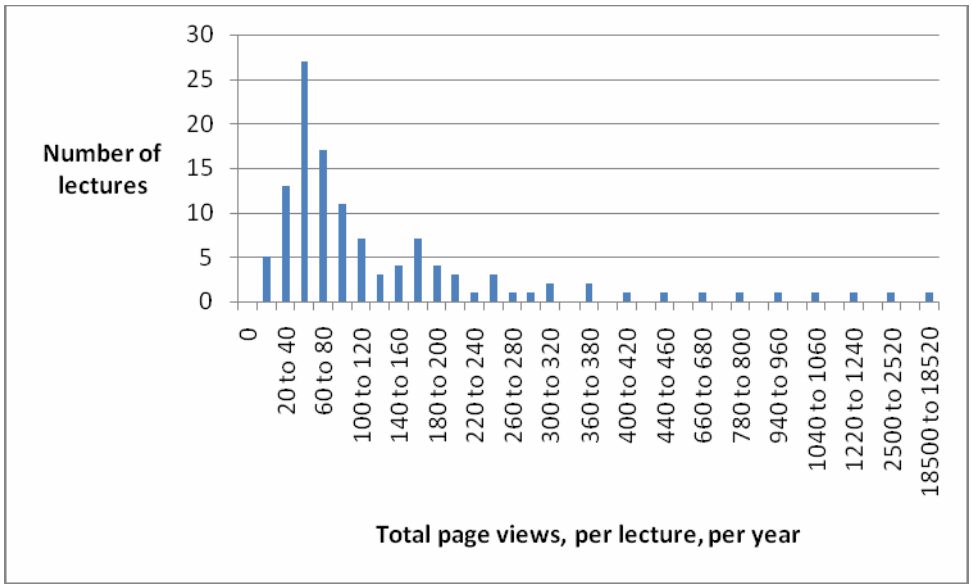

Figure 17. Frequency distribution – Indian Supercourse – Total page views, per lecture, per year (N = 120) (each interval includes its upper limit)

Figure 17 is the frequency distribution of total page views, per lecture, per year, to the Indian Supercourse. These data were not normally distributed. The majority of Indian Supercourse lectures had between 40 to 60 total page views. The median was 77.9.

Figure 18, figure 19 and figure 20 show the frequency distributions of page views from India, page views from non-Indian countries and total page views to lectures on the Main Supercourse. All data are per lecture, per year.

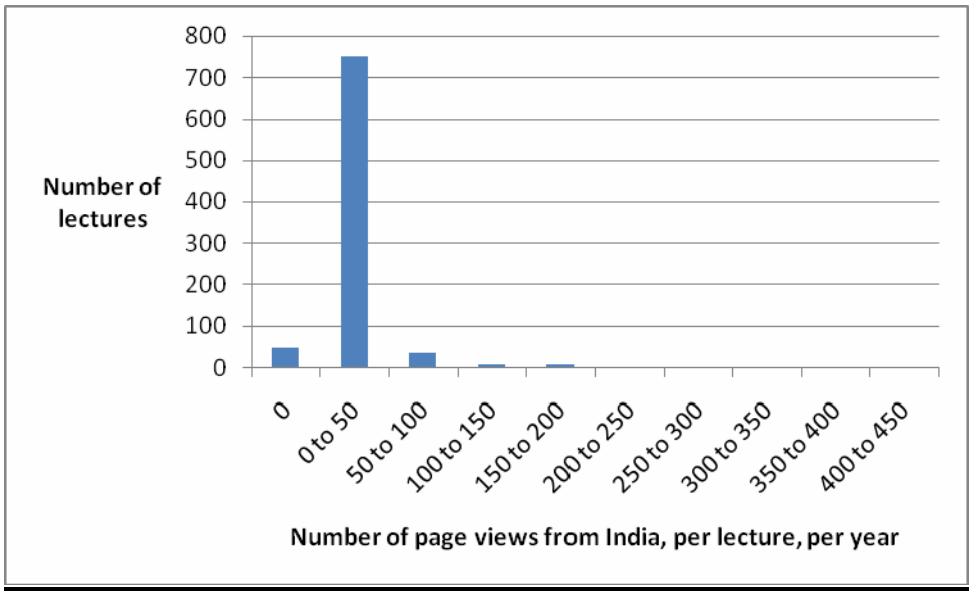

Figure 18. Frequency distribution – Main Supercourse - Number of page views from India, per lecture, per year (N = 848) (each interval includes its upper limit)

As seen in figure 18 the majority (88.3 %) of Main Supercourse lectures had between 0 to 50 page views from India. The median was 4.8. This was much smaller than the median of the page views from India to the Indian Supercourse lectures (14.4). The distribution of these page views was skewed.

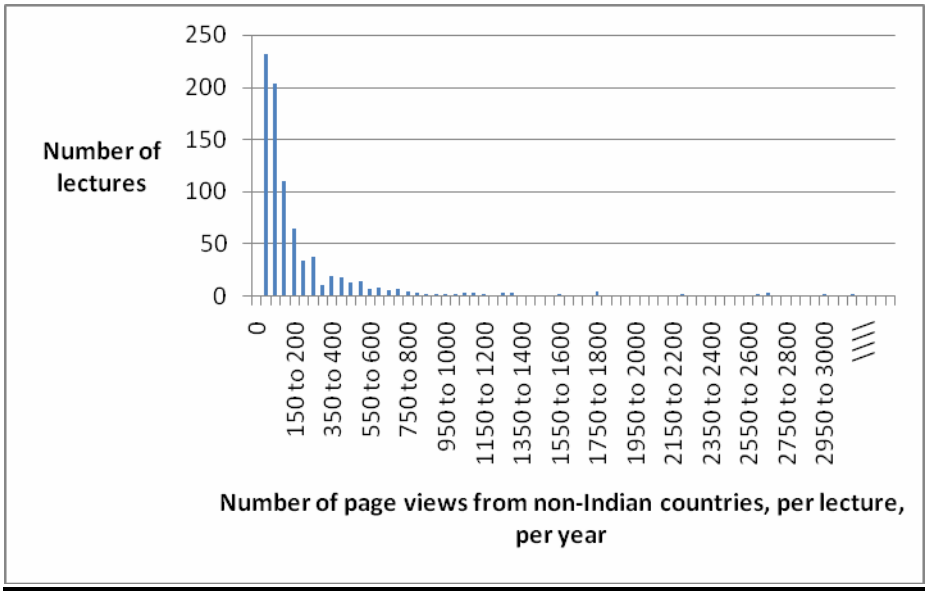

Figure 19. Frequency distribution – Main Supercourse - Number of page views from non-Indian countries, per lecture, per year (N = 848) (each interval includes its upper limit)

The majority of Main Supercourse lectures had between 0 to 50 page views from non-Indian countries. The median was 96.4, which was much higher than the median of the page views from non-Indian countries to the Indian Supercourse lectures (64.0). These data were not normally distributed.

The distribution of total page views to the Main Supercourse lectures was also skewed (figure 20). A majority of the Main Supercourse lectures had betweem 50 to 100 total page views. The median was 101.0.

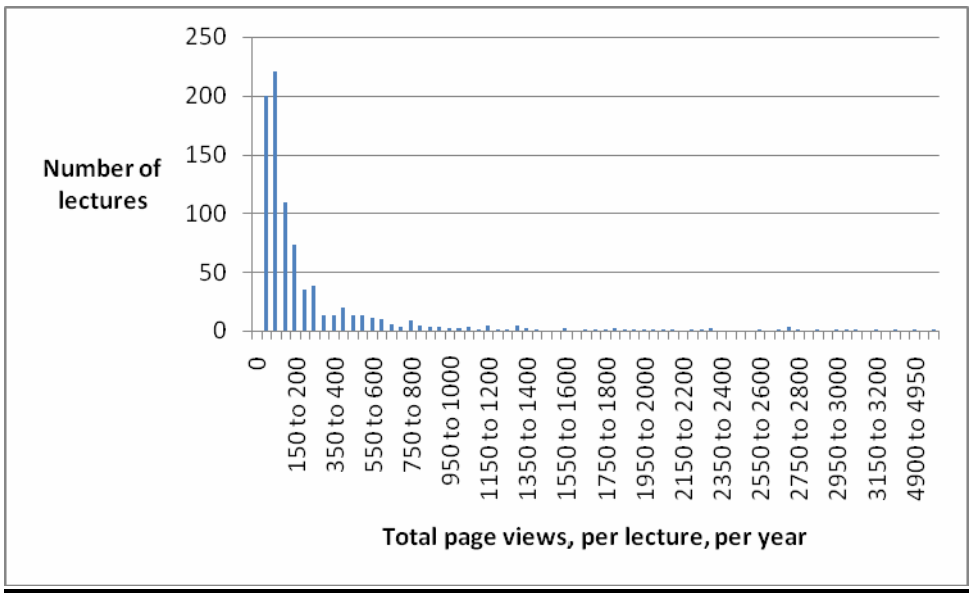

Figure 20. Frequency distribution – Main Supercourse – Total page views, per lecture, per year (N = 848) (each interval includes its upper limit)

The above frequency distributions for the number of page views from India, the number of page views from non-Indian countries and the total page views, for lectures on both the Indian and the Main Supercourse show that the distribution of these page views was highly skewed. There were some lectures in the very high page view ranges. The results of the tests for normality, which are described later, confirmed that the data in all the above 6 frequency distributions were not normally distributed. What is also interesting is that there were clearly some factors influencing the number of page views to some lectures.

4.3.1.8 Relative frequency distribution

In addition to the frequency distribution of page views, charts were also constructed showing the relative frequency distributions of page views. These are displayed in figures 21 to 26. These relative frequency distributions give a graphic representation of the pattern of distribution of

page views to the lectures. These graphs were plotted to summarize the relative frequency, or proportion of the total, of page views in each of the ranges.

Figure 21 shows the relative frequency distribution of the number of page views from India, per lecture, per year, to the Indian Supercourse. A majority (55.8 %)of lectures had between 0 to 20 page views. The distribution was skewed.

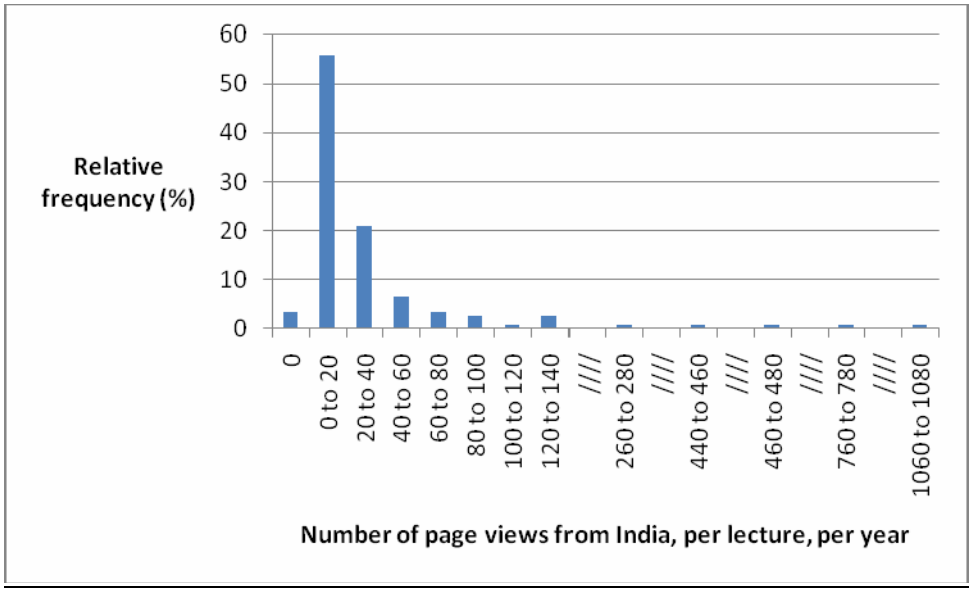

Figure 21. Relative frequency distribution – Indian Supercourse - Number of page views from India, per lecture, per year (N = 120) (each interval includes its upper limit)

Figure 21 shows that for a majority (55.8 %) of lectures from the Indian Supercourse, there were between 0 to 20 page views from India.

Figure 22 is a relative frequency distribution of the number of page views from non-Indian countries, per lecture, per year, to the Indian Supercourse. The majority (25 %)of Indian Supercourse lectures had between 20 to 40 page views from non-Indian countries. The data were not normally distributed.

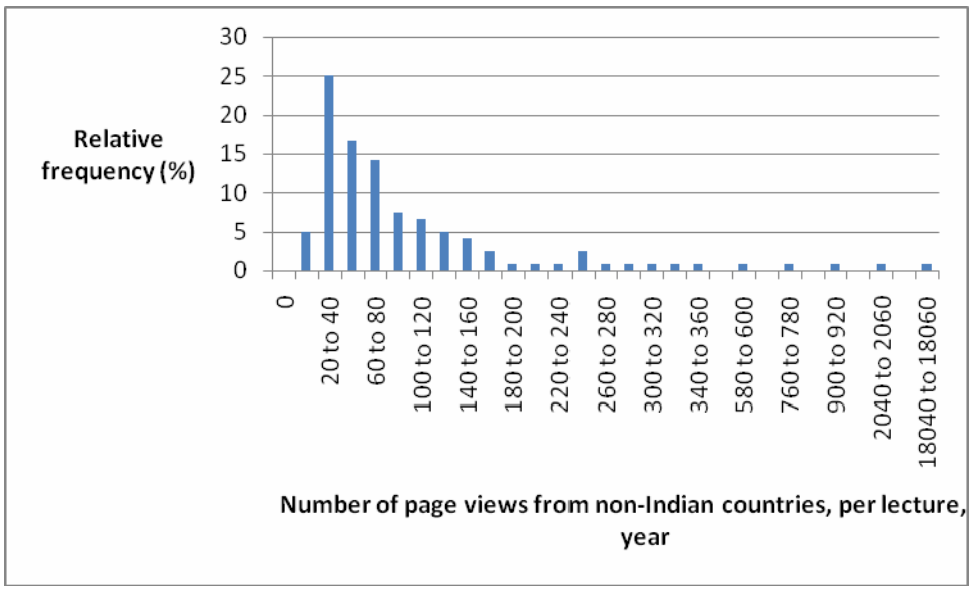

Figure 22. Relative frequency distribution – Indian Supercourse - Number of page views from non-Indian countries, per lecture, per year (N = 120) (each interval includes its upper limit)

Figure 23 is a relative frequency distribution of the total page views, per lecture, per year, to the Indian Supercourse. The majority (22.5 %) of Indian Supercourse lectures had between 40 to 60 total page views. The distribution of total page views to the Indian Supercourse lectures was also skewed.

The majority of lectures on the Indian Supercourse (22.5 %) had between 40 and 60 total page views, per lecture, per year.

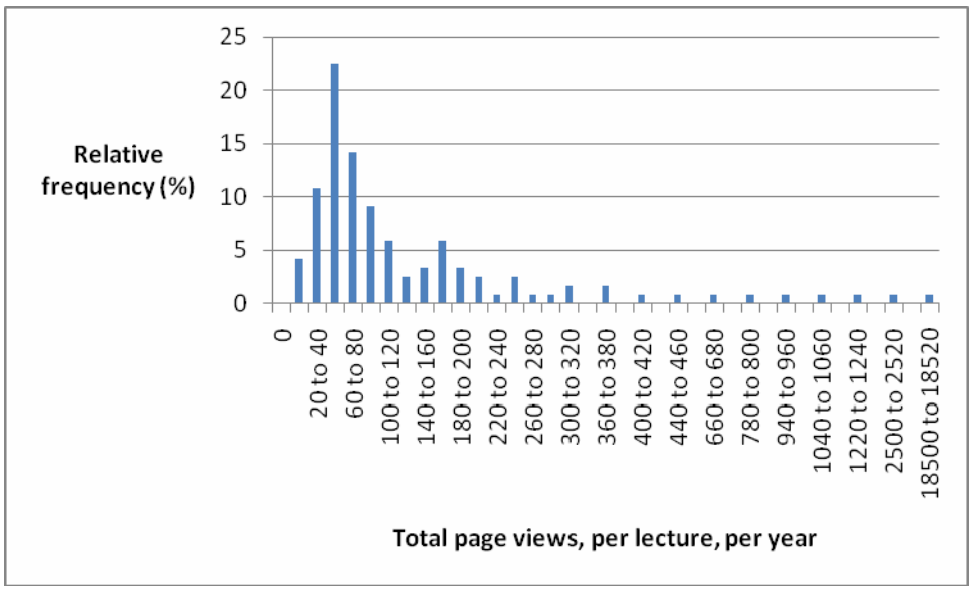

Figure 23. Relative frequency distribution – Indian Supercourse – Total page views, per lecture, per year (N = 120) (each interval includes its upper limit)

Figure 24 is a relative frequency distribution of the page views from India, per lecture, per year, to the Main Supercourse.

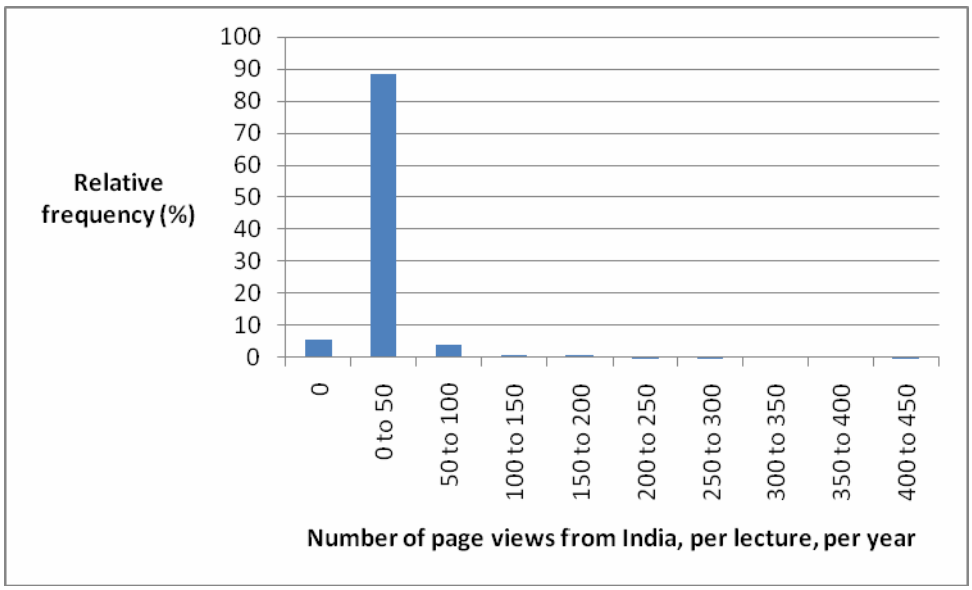

Figure 24. Relative frequency distribution – Main Supercourse – Page views from India, per lecture, per year (N = 848) (each interval includes its upper limit)

The majority of lectures on the Main Supercourse (88.3 %) had between 0 to 50 page views from India, per lecture, per year. This distribution too was skewed.

Figure 25 shows the relative frequency distribution of the page views from non-Indian countries, per lecture, per year, to the Main Supercourse.

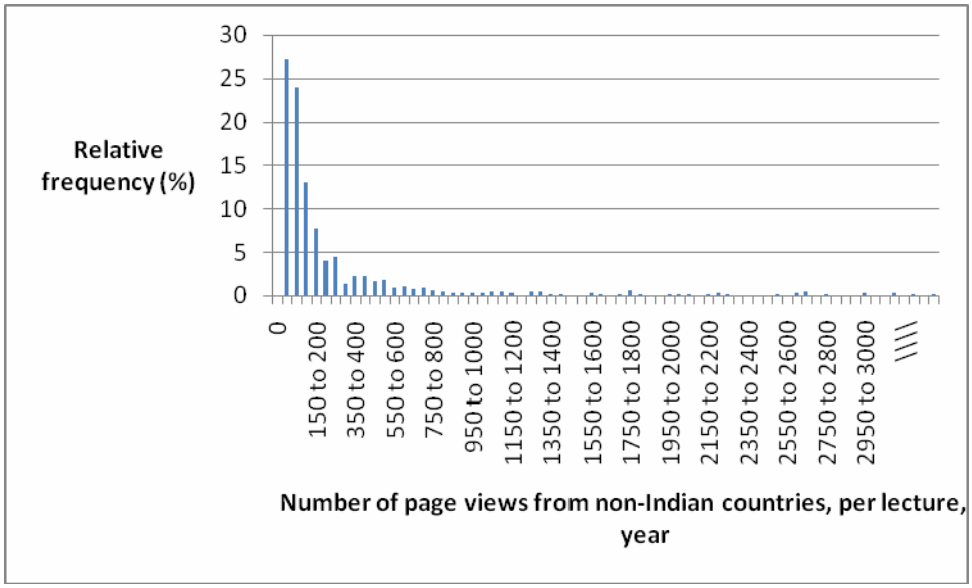

Figure 25. Relative frequency distribution – Main Supercourse – Page views from non-Indian countries, per lecture, per year (N = 848) (each interval includes its upper limit)

The majority of lectures on the Main Supercourse (27.2 %) had between 0 to 50 page views from non-Indian countries, per lecture, per year. The distribution was not normal.

Figure 26 is the relative frequency distribution of the total page views, per lecture, per year, to the Main Supercourse.

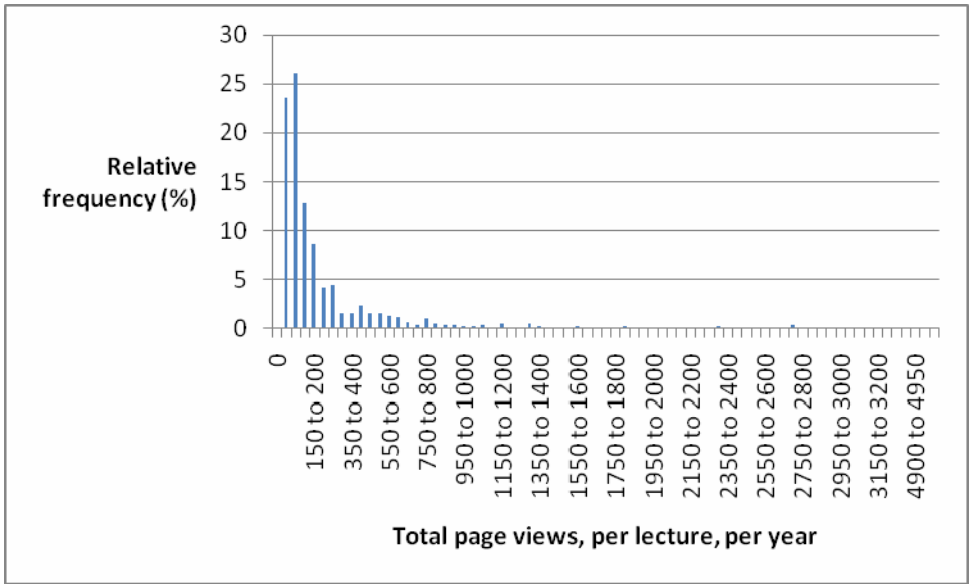

Figure 26. Relative frequency distribution – Main Supercourse – Total page views, per lecture, per year (N = 848) (each interval includes its upper limit)

The majority of lectures on the Main Supercourse (26.1 %) had 50 to 100 total page views, per lecture, per year, and their distribution was not normal.

4.3.1.9 Cumulative relative frequency distribution

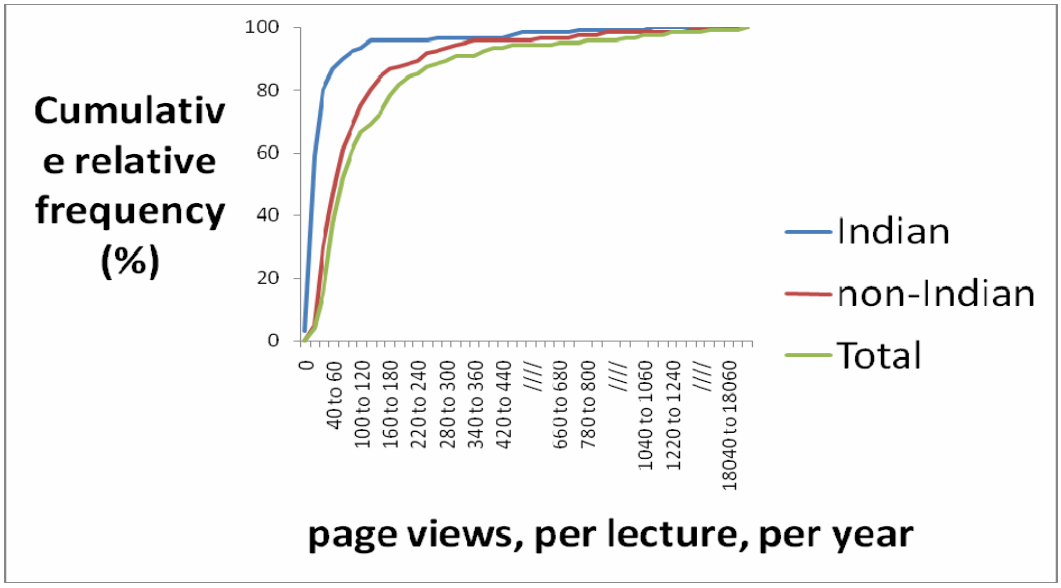

Figure 27. Cumulative relative frequency of page views - Indian Supercourse

Figure 27 shows the cumulative relative frequency distribution of page views from India, page views from non-Indian countries and total page views for the Indian Supercourse. For the Indian Supercourse, the cumulative relative frequency distribution was distinct for the 3 types of page views. All three lines were concave downwards, indicating positively skewed data (with a tail to the right). The distribution of all three lines rose fast initially and then slowly towards the end. The page views from India appear to be more positively skewed then the other two lines. There were a few lectures with very high number of page views. For the Indian Supercourse, the medians for the page views from India, page views from non-Indian countries, and the total page views were 14.4, 64.0 and 77.9 respectively.

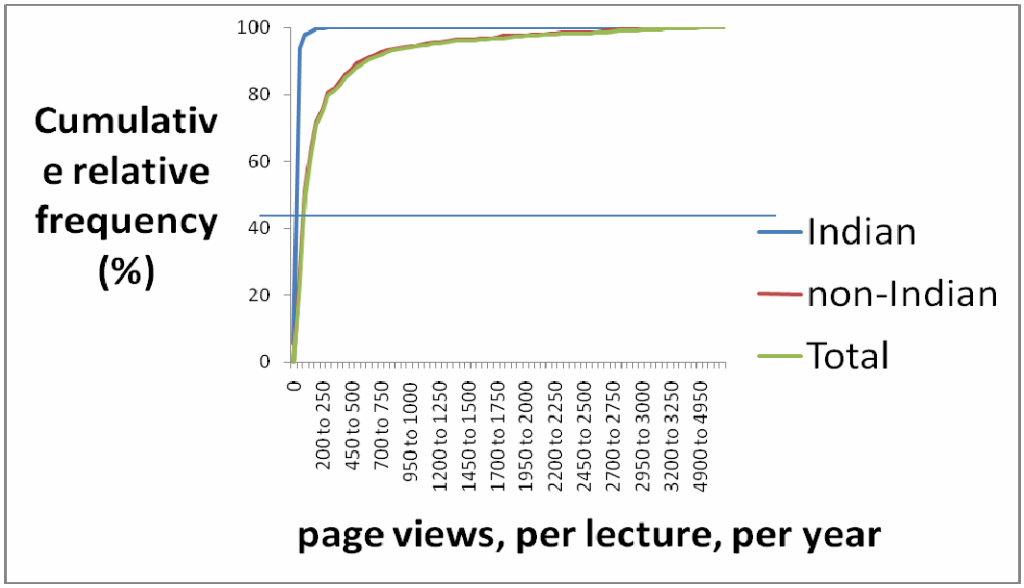

Figure 28. Cumulative relative frequency of page views - Main Supercourse

Figure 28 shows the cumulative relative frequency distribution of medians for page views to the Main Supercourse, for 3 types of page views – page views from India, page views from non-Indian countries and total page views. The distribution of page views to the Main Supercourse was also positively skewed. The medians of the page views from India, page views from non-Indian countries and total page views to the Main Supercourse were 4.8, 96.4 and 101.0. Interestingly, the lines for non-Indian and total page views almost overlapped. This is because the page views from India to the Main Supercourse were extremely skewed, so that the line rose almost straight initially to approximately the 90th percentile. There were some lectures in the Main Supercourse that had 0 or very low page views from India, which is responsible for the extremely skewed distribution of the page views from India to the Main Supercourse. Total page views are a sum of page views from India and page views from non-Indian countries. Because the page views from India are extremely skewed, the cumulative frequency distributions

of the page views from non-Indian countries and the total page views were almost identical, and the two lines overlapped.

4.3.1.10 Most viewed lectures

Tables 12, 13 and 14 list the top ten lectures from the Supercourse in terms of the page views from India, page views from non-Indian countries and the total page views.

Table 12. 10 most popular lectures among users from India

Rank	Indian or Main Supercourse	Lecture name	Page views from India, per lecture, per year
1	Indian	Pulse Polio Immunization	1060.9
2	Indian	Reproductive and Child Health in India	761.1
3	Indian	Malaria	461.2
4	Indian	How to Conduct a Meta-Analysis	455.3
5	Main	Pharmacoepidemiology	423.6
6	Indian	Polio Eradication Program in India	277.4
7	Main	Public Health Disaster Consequences of Disasters	277.2
8	Main	Cancer Epidemiology	206.5
9	Main	Questionnaire Design: An Introduction	200.0
10	Main	Principles of Epidemiology	188.2

As seen in table 12, for page views from India, lectures from the Indian Supercourse were ranked number 1, 2, 3, 4, and 6. These lectures were on infectious diseases and maternal and child health epidemiology, except for the lecture “How to Conduct a Meta-Analysis” which will be described later. Infectious diseases are still of great public health significance in India. Also in

India, there is a great interest in maternal and child health epidemiology, since mothers and their children in India make up a large proportion of the Indian population, they are a very susceptible group and public health programs directed toward this group often lead to dramatic improvements in their health status.

The above table also showed that many of the Indian lectures have high utilization rates in India.

Table 13. 10 most popular lectures among users from non-Indian countries

Rank	Indian or Main Supercourse	Lecture name	Page views from non-Indian countries, per lecture, per year
1	Indian	How to Conduct a Meta-Analysis	18052.9
2	Main	Public Health Disaster Consequences of Disasters	7466.4
3	Main	Epidemiologic Transition	4833.5
4	Main	A Brief Introduction to Epidemiology - Part I -	3144.2
5	Main	Web of Causation; Exposure and Disease Outcomes	3114.5
6	Main	The Impact of Pandemic Influenza on Public Health. Part I	2998.3
7	Main	Herd Immunity and Vaccination	2970.7
8	Main	Questionnaire Design: An Introduction	2753.2
9	Main	Principles of Epidemiology	2693.7
10	Main	Validity and Reliability	2690.9

Table 14. 10 most popular lectures among all users

Rank	Indian or Main Supercourse	Lecture name	Total page views, per lecture, per year
1	Indian	How to Conduct a Meta-Analysis	18508.2
2	Main	Public Health Disaster Consequences of Disasters	7743.6
3	Main	Epidemiologic Transition	4937.7
4	Main	A Brief Introduction to Epidemiology - Part I -	3264.2
5	Main	Web of Causation; Exposure and Disease Outcomes	3159.9
6	Main	Herd Immunity and Vaccination	3051.7
7	Main	The Impact of Pandemic Influenza on Public Health. Part I	3049.4
8	Main	Questionnaire Design: An Introduction	2953.2
9	Main	Principles of Epidemiology	2881.9
10	Main	Case-Control Studies	2770.6

As seen in table 13 and table 14, the lecture "How to Conduct a Meta-Analysis" was ranked highest in terms of page views from non-Indian countries and total page views. Among the lectures that had been included in this analysis, this lecture was the most popular lecture in the Supercourse, with 18,508.2 total page views per year. In contrast, for page views from India, this lecture was ranked number 4.This is a high page ranking, but it was not the most popular lecture for users in India. This lecture was probably being used to teach a class, which explained its consistently high page views. The top 5 user countries for this lecture were the United States, United Kingdom, Canada, China and then India.

The top 5 lectures in terms of total page views from each of the 4 strata are shown in table 15.

Table 15. Five most popular lectures from each strata in terms of total page views

Strata	Name of lecture	Indian or Main Supercourse	Total page views, per lecture, per year
Basic Epidemiology lectures	How to Conduct a Meta-Analysis	Indian	18,508.2
	Epidemiologic Transition	Main	4,937.7
	A Brief Introduction to Epidemiology - Part I	Main	3,264.2
	Web of Causation; Exposure and Disease Outcomes	Main	3,159.9
	Herd Immunity and Vaccination	Main	3,051.7
Chronic Disease Epidemiology lectures	Intima Media Thickness and Atherosclerosis	Main	2,589.6
	Etilogy and Determinants of Type 2 Diabetes	Main	2,093.4
	Cancer Epidemiology	Main	2,014.0
	Epidemiology of Iron Deficiency and Iron Deficiency Anemia	Main	1,779.9
	Rheumatic Fever / Rheumatic Heart Disease	Main	1,578.2
Infectious Disease Epidemiology lectures	The Impact of Pandemic Influenza on Public Health. Part I	Main	3,049.3
	Cholera-History	Main	2,712.3
	Infectious Disease Epidemiology	Main	2,260.2
	Epidemiology of Tuberculosis	Main	1,956.9
	Nosocomial Infection. Surveillance Methods	Main	1,735.2
Other Epidemiology Lectures	Public Health Disaster Consequences of Disasters	Main	7,743.6
	Pharmacoepidemiology	Main	2,657.9
	Introduction to Molecular Epidemiology	Main	2,236.5
	Overview of Public Health Surveillance. Part I.	Main	1,836.0
	Evidence Based Medicine The Hierarchy of Evidence. Part I	Main	1,580.1

As seen in table 15, in each of the 4 strata, the 5 most popular lectures were from the Main Supercourse. The only exception was the Basic Epidemiology Lectures stratum, in which

case, the most popular lecture was from the Indian Supercourse. This was the lecture "How to Conduct a Meta-Analysis".

4.3.1.11 Page views to the front page of the Indian Supercourse

The front page of the Indian Supercourse received 766.4 page views per year from India, and India was ranked number 1 among countries, is terms of page views. The front page of the Indian Supercourse also received 261.8 page views per year from the United States. The United States was ranked number 2 in terms of page views. The 10 countries with the most numbers of page views to the Indian Supercourse front page in descending order of page views were India, USA, UK, Australia, Canada, Egypt, Singapore, China, Malaysia and Peru.

In contrast, the front page of the Supercourse received 2384.3 page views per year from India, which was ranked number 6. The United States was ranked number 1 and there were 32767.7 page views per year from the United States. The 10 countries with the most number of page views to the Supercourse front page in descending order of page views were the United States, USA, Canada, UK, Egypt, China, India, Australia, Italy, Japan and Brazil.

4.3.2 Statistical analysis

4.3.2.1 Test for normality of data (Shapiro-Wilk test)

The descriptive statistics, frequency distributions and column charts all suggested that the page view data were not normally distributed. The first step in the statistical analysis of the data was testing the normality of the data. This was done to decide if non-parametric tests were needed to further analyze the data. The PROC UNIVARIATE in SAS was used to test for normality of the page view data. The number of page views from India, the number of page views from non-

Indian countries, and the total page views for the Indian Supercourse as well as the Main Supercourse, were tested for normality. The test for normality used was the Shapiro-Wilk test since for these data, the number of observations was less than 2,000. The results of the test for normality are displayed in table 16.

Table 16. Results of the Shapiro-Wilk test for normality

		Shapiro-Wilk statistic (W)	Pr < W	Result
Indian Supercourse	**Page views from India**	0.3	< 0.01	Significant
	Page views from non-Indian countries	0.1	< 0.01	Significant
	Total page views	0.1	< 0.01	Significant
Main Supercourse	**Page views from India**	0.4	< 0.01	Significant
	Page views from non-Indian countries	0.4	< 0.01	Significant
	Total page views	0.4	< 0.01	Significant

The results of the Shapiro-Wilk test were highly significant, as can be seen in table 16. This confirmed the findings of the data description. The p-values for all 6 groups of data were highly significant. Due to the significance of the test for normality, no assumption of normality was made. It was decided that non-parametric tests would be used to test these data.

4.3.2.2 Comparison of page views from India between the Indian Supercourse and the Main Supercourse

The main objective of this study was to assess if the culturally appropriate and locally produced lectures in the Indian Supercourse lectures were being used by people in India. The first test was to compare utilization of the Indian Supercourse and the Main Supercourse lectures by people in India. The parameter used to test utilization for this comparison was the number of page views from India. Page views from India were compared between the Indian Supercourse and the Main Supercourse. Since the data were not normally distributed, non-parametric tests were used for the comparison. The PROC NPAR1WAY in SAS was used to do this comparison.

Null hypothesis - For lectures on the Indian and the Main Supercourse, the number of page views from India, per lecture per year, are equal

Alternate hypothesis - For lectures on the Indian and the Main Supercourse, the number of page views from India, per lecture per year, are not equal

The Wilcoxon Rank-Sum (Mann-Whitney U) test - Since the minimum sample size in the two samples (120) was greater than 10, the normal approximation was used. Table 17 gives the result of the Wilcoxon Rank-Sum test.

Table 17. Wilcoxon Rank-Sum test. Comparison of page views from India between the Indian and Main Supercourse

Category		Median of page views from India	(Q1, Q3)	Statistic	Normal approximation Z	Two – sided PR > |Z|	Result
Indian Supercourse	848	14.4	(8.0, 32.9)	83,212.5	8.7	< 0.01	Significant
Main Supercourse	120	4.8	(2.0, 11.6)				

As can be seen in table 17, the results of the Wilcoxon Rank-Sum test were highly significant ($p < 0.0001$). Also, the median of the page views from India to the Indian Supercourse was more than the median of the page views from India to the Main Supercourse. For this group of lectures, the Indian Supercourse lectures have significantly more page views from India than the Main Supercourse lectures.

4.3.2.3 Comparison of page views from non-Indian countries between the Indian Supercourse and the Main Supercourse

The next step involved comparing the Indian Supercourse and the Main Supercourse, for page views from non-Indian countries. Again, the PROC NPAR1WAY in SAS was used. For this analysis, the hypothesis that was tested was:

Null hypothesis - For lectures on the Indian and the Main Supercourse, the number of page views from non-Indian countries, per lecture per year, are equal

Alternate hypothesis - For lectures on the Indian and the Main Supercourse, the number of page views from non-Indian countries, per lecture per year, are not equal

Table 18. Wilcoxon Rank-Sum test. Comparison of page views from non-Indian countries between the Indian and Main Supercourse

Category	N	Median of page views from non-Indian countries	(Q1, Q3)	Statistic	Normal approximation Z	Two – sided PR > |Z|	Result
Indian Supercourse	848	64.0	(34.8, 120.7)	46,235.5	- 4.2	< 0.01	Significant
Main Supercourse	120	96.4	(48.1, 230.6)				

Interestingly, when the comparison was made between the Indian Supercourse and Main Supercourse for page views from non-Indian countries, the test was again significant ($p < 0.0001$). The numbers of page views from non-Indian countries were significantly different between the Indian and the Main Supercourse. However, as can be seen in table 18, the median was greater for the Main Supercourse (96.4) as compared to the Indian Supercourse (64.0). What this means is that the Main Supercourse received more page views from non-Indian countries than the Indian Supercourse.

4.3.2.4 Comparison of total page views between the Indian Supercourse and the Main Supercourse

The last comparison in this group was the comparison of total page views between the Indian Supercourse and the Main Supercourse. The PROC PAR1WAY in SAS was used again. The hypothesis tested was:

Null hypothesis - For lectures on the Indian and the Main Supercourse, the number of total page views, per lecture per year, are equal

Alternate hypothesis - For lectures on the Indian and the Main Supercourse, the number of total page views, per lecture per year, are not equal

Table 19. Wilcoxon Rank-Sum test. Total page views between the Indian and Main Supercourse

Category	N	Median of page views from non-Indian countries	(Q1, Q3)	Statistic	Normal approximation Z	Two – sided PR > |Z|	Result
Indian Supercourse	848	77.9	(51.8, 163.2)	52,834.5	- 1.9	0.06	Not significant
Main Supercourse	120	101.0	(51.1, 245.2)				

When total page views were considered, the median for the Indian Supercourse was 77.9 and the median for the Main Supercourse was 101.0. The results of the Wilcoxon Rank-Sum test were not significant ($p = 0.0642$). Table 19 shows the result of this test for comparison of total page views between the Indian Supercourse and the Main Supercourse.

4.3.2.5 Summary of Wilcoxon rank-sum tests

Table 20 is a summary of the findings of the tests for equality of page views between the Indian Supercourse and the Main Supercourse.

Table 20. Summary of tests for equality of page views between the Indian Supercourse (N= 120) and the Main Supercourse (N= 848)

	Category	Median (Q1, Q3)	Two – sided PR > |Z|	Result
Page views from India	Indian Supercourse	14.4 (8.0, 32.9)	< 0.01	Significant
	Main Supercourse	4.8 (2.0, 11.6)		
Page views from non-Indian countries	Indian Supercourse	64.0 (34.8, 120.7)	< 0.01	Significant
	Main Supercourse	96.4 (48.1, 230.6)		
Total page views	Indian Supercourse	77.9 (51.8, 163.2)	0.06	Not significant
	Main Supercourse	101.0 (51.1, 245.2)		

There was a statistically significant difference between the Indian Supercourse and the Main Supercourse as regards page views from India and page views from non-Indian countries. The Indian Supercourse received significantly more page views from India. The Main Supercourse received significantly more page views from non-Indian countries. The total page views between the Indian Supercourse and the Main Supercourse are not significantly different.

4.3.2.6 Correlation

The Spearman Rho correlation coefficient was calculated for the Indian Supercourse, for page views from India and page views from non-Indian countries. The results suggest that there was a statistically significant correlation between the two types of page views (rho = 0.5, $p < 0.01$). There was a positive correlation between page views from India and page views from non-Indian countries. This suggests that lectures that had more page views from India also had more page views from non-Indian countries, so they were popular lectures in general.

4.3.2.7 Comparisons after stratification

The above tests and comparisons were done grouping all lectures from the Indian Supercourse together and all lectures in the Main Supercourse together. As was mentioned before, the lectures that were included in the analysis were stratified into 4 strata - Basic Epidemiology, Chronic Disease Epidemiology, Infectious Disease Epidemiology and Other Epidemiology Lectures.

All lectures included in the analysis were stratified into 4 strata, so that the equality of page views could be tested between similar lectures, from the Indian Supercourse and the Main Supercourse. This is described in detail below.

4.3.2.8 Comparison of page views from India, per lecture per year, between the Indian Supercourse and the Main Supercourse after stratification

After stratification, page views from India were compared in each stratum between the Indian Supercourse and the Main Supercourse. PROC NPAR1WAY in SAS was used to do the analysis. Since the number of observations in each category were more than 10, the normal approximation Z statistic was used.

Table 21. Page views from India, per lecture, per year (Wilcoxon Rank-Sum test after stratification)

		Median (Q1, Q3)	Normal approximation Z	Two – sided PrR > |Z|	Result
Basic epidemiology lectures (N = 171)	**Indian Supercourse (N = 12)**	23.8 (13.4, 39.8)	1.5	0.12	Not significant
	Main Supercourse (N = 159)	13.7 (6.8, 26.0)			

Table 21 continued

Chronic disease epidemiology lectures (N = 190)	**Indian Supercourse (N = 13)**	14.4 (11.0, 35.6)	3.6	< 0.01	Significant
	Main Supercourse (N = 177)	4.7 (2.7, 10.0)			
Infectious disease epidemiology lectures (N = 211)	**Indian Supercourse (N = 52)**	14.0 (6.2, 30.1)	5.6	< 0.01	Significant
	Main Supercourse (N = 159)	4.6 (2.8, 8.5)			
Other epidemiology lectures (N = 396)	**Indian Supercourse (N = 43)**	13.4 (6.2, 32.9)	6.7	< 0.01	Significant
	Main Supercourse (N = 353)	2.9 (1.8, 5.9)			

In all the four strata, the page views from India to the Indian Supercourse were more than those for the Main Supercourse. This difference was statistically significant for the Chronic Disease Epidemiology ($p < 0.01$), Infectious Disease Epidemiology ($p < 0.01$) and Other Epidemiology Lectures (< 0.01). Even for the Basic Epidemiology lectures, the median number of page views from India to the Indian Supercourse (23.8) was much higher than the median of the page views from India to the Main Supercourse (13.7). But the result of the Wilcoxon rank-sum test was not statistically significant ($p = 0.12$), probably due to the small sample size.

To compare, when the lectures had been pooled together, results of the Wilcoxon Rank-Sum test showed that the numbers of page views from India were significantly higher for the Indian Supercourse as compared to the Main Supercourse (< 0.01). These results were consistent with the previous analysis, which showed that the page views from India are consistently more for the Indian Supercourse as compared to the Main Supercourse.

4.3.2.9 Comparison of page views from non-Indian countries, per lecture per year, between the Indian Supercourse and the Main Supercourse after stratification

The page views from non-Indian countries were also compared within the 4 strata, between the Indian Supercourse and the Main Supercourse. Table 22 shows the result of this analysis.

Table 22. Page views from non-Indian countries, per lecture, per year (Wilcoxon Rank-Sum test after stratification)

		Median (Q1, Q3)	Normal approximation Z	Two – sided Pr > |Z|	Result
Basic epidemiology lectures (N = 171)	**Indian Supercourse (N = 12)**	239.7 (74.2, 557.8)	- 0.7	0.46	Not significant
	Main Supercourse (N = 159)	262.5 (144.8, 549.1)			
Chronic disease epidemiology lectures (N = 190)	**Indian Supercourse (N = 13)**	55.5 (36.9, 83.0)	- 2.5	0.01	Significant
	Main Supercourse (N = 177)	97.2 (56.0, 211.9)			
Infectious disease epidemiology lectures (N = 211)	**Indian Supercourse (N = 52)**	66.8 (37.8, 106.5)	- 2.0	0.04	Significant
	Main Supercourse (N = 159)	76.9 (47.5, 177.3)			
Other epidemiology lectures (N = 396)	**Indian Supercourse (N = 43)**	49.4 (33.0, 126.2)	- 1.0	0.33	Not significant
	Main Supercourse (N = 353)	63.1 (34.2, 140.0)			

The numbers of page views from non-Indian countries were significantly different between the Indian and Main Supercourse for 2 strata – Chronic Disease Epidemiology ($p = 0.01$) and Infectious Disease Epidemiology lectures ($p = 0.04$). In both these strata, the Main Supercourse received significantly more page views from non-Indian countries, as compared to the Indian Supercourse. Even for the other 2 strata – Basic Epidemiology and Other Epidemiology lectures, the Main Supercourse did receive more page views from non-Indian countries, but this difference was not statistically significant. This may be due to the small sample size. The results of this analysis are summarized in table 22.

To compare, when the lectures were pooled together, the Main Supercourse received significantly more page views from non-Indian countries as compared to the Indian Supercourse ($p < 0.01$).

4.3.2.10 Comparison of total page views, per lecture per year, between the Indian Supercourse and the Main Supercourse after stratification

When the total page views were compared within each of the 4 strata, none of the test results were statistically significant. This finding was similar to the finding of the test when the lectures were pooled together. The p values however, were much higher for this comparison, than for the pooled data, where the p value was 0.06. This was probably because of the small sample sizes after stratification.

Table 23. Total page views, per lecture, per year (Wilcoxon Rank-Sum test after stratification)

		Median (Q1, Q3)	Normal approximation Z	Two – sided Pr > |Z|	Result
Basic epidemiology lectures (N = 171)	**Indian Supercourse (N = 12)**	277.3 (95.8, 574.4)	- 0.5	0.60	Not significant
	Main Supercourse (N = 159)	278.0 (155.9, 571.7)			
Chronic disease epidemiology lectures (N = 190)	**Indian Supercourse (N = 13)**	83.0 (53.5, 112.7)	- 1.4	0.17	Not significant
	Main Supercourse (N = 177)	101.0 (59.5, 219.2)			
Infectious disease epidemiology lectures (N = 211)	**Indian Supercourse (N = 52)**	78.4 (51.6, 158.8)	- 0.6	0.52	Not significant
	Main Supercourse (N = 159)	81.7 (52.2, 194.1)			
Other epidemiology lectures (N = 396)	**Indian Supercourse (N = 43)**	71.3 (50.9, 160.5)	0.8	0.45	Not significant
	Main Supercourse (N = 353)	67.9 (37.8, 145.5)			

4.3.2.11 Summary of comparisons after stratification

Table 24. Summary of the results of comparison between the Indian and the Main Supercourse after stratification

	Page views from India	Page views from non-Indian countries	Total page views
Basic epidemiology lectures	Not significant (p = 0.12)	Not significant (P = 0.46)	Not significant (p = 0.60)
Chronic disease epidemiology lectures	Significant (p < 0.01) Indian > Main	Significant (p = 0.01) Main > Indian	Not significant (p = 0.17)
Infectious disease epidemiology lectures	Significant (p < 0.01) Indian > Main	Significant (p = 0.04) Main > Indian	Not significant (p = 0.52)
Other epidemiology lectures	Significant (p < 0.01) Indian > Main	Not significant (p = 0.33)	Not significant (p = 0.45)

4.3.3 Comparison of utilization of similar lectures

Table 25 shows page views from India for 8 randomly selected Indian Supercourse lectures and similar comparable lectures from the Main Supercourse.

Table 25. Comparison of utilization of similar lectures

Stratum	Indian Supercourse lecture	Page views from India to the Indian Supercourse lecture, per year	Comparable Main Supercourse lecture	Page views from India to the Main Supercourse lecture, per year
Basic epidemiology	Descriptive studies	46.7	Descriptive Epidemiology	107.1

Table 25 continued

Basic epidemiology	Cohort Studies	23.8	Cohort Studies	124.8
Chronic disease epidemiology	Diabetic Nephropathy in Type 2 Diabetes: The Indian Experience	29.6	Epidemiology of Diabetes Complications - I	35.6
Infectious disease epidemiology	Malaria Control in India. Part I	89.8	Malaria	44.5
Infectious disease epidemiology	Pulse polio immunization	1060.9	Poliomyelitis	54.8
Infectious disease epidemiology	Malaria	2511.1	Malaria	44.5
Other epidemiology	Reproductive and Child Health in India	761.1	Early Childhood and Population Health. Part I	3.9
Other epidemiology	Situation of Children and Women in India	115.2	Women's Health Data in National Survey of Family Growth (NSFG)	0

It was difficult to find lectures that were similar in the Indian and Main Supercourse. There were some lectures such as Epidemiology of Endemic Fluorosis and lectures on some lectures on infectious diseases specific to India. These lectures had no matching lectures in the Main Supercourse. In the stratum of other epidemiology lectures, the Main Supercourse had many lectures on injury and molecular epidemiology. In contrast, the Indian Supercourse had more lectures on maternal and child health epidemiology.

Two lectures each were selected for this analysis from the stratum Basic Epidemiology lectures, from the Indian Supercourse and from the Main Supercourse (descriptive studies and

cohort studies). For both these matching pairs of lectures, the lectures from the Main Supercourse had more page views from India as compared to the corresponding lecture from the Indian Supercourse. One lecture on diabetes was selected from the Indian Supercourse and from the Main Supercourse. In case of the diabetes lectures, which were from the Chronic Disease Epidemiology lectures stratum, the lecture from the Main Supercourse had more page views from India, as compared to the lecture from the Indian Supercourse.

When a similar comparison was done using 3 pairs of Infectious Disease Epidemiology lectures from the Indian and Main Supercourse, the Indian Supercourse lectures in each case had more page views from India than the Main Supercourse lectures. A similar result was seen for 2 pairs of Other Epidemiology lectures selected for this analysis. This means that among the lectures that were included in this analysis, users from India preferred infectious disease lectures and other epidemiology lectures from the Indian Supercourse. In contrast, for lectures that were analyzed in this table, users from India preferred basic epidemiology and chronic disease epidemiology lectures from the Main Supercourse.

4.3.4 Dissemination analysis

Four lectures from the Indian Supercourse were selected at random to analyze the effectiveness of the Indian Supercourse Newsletter. 2 of these were mentioned in the Indian Supercourse newsletter, which was sent only to participants in India. The other 2 were not mentioned in the newsletter. Page views from India to these 4 lectures were counted for a period of 15 day prior and 15 days after the Indian Newsletter was sent.

The difference in the number of page views from India before and after the newsletter served as a means of assessing the effectiveness of the newsletter in disseminating information about the Indian Supercourse.

The results of this test for dissemination shows that there was a significant increase in page views to the lectures that were mentioned in the newsletter (from 1 page view per 15 days to 13 page views per 15 days, and from 2 page views per 15 days to 33 page views per 15 days). In contrast there was only a slight increase in the numbers of page views to one of the lectures that was not mentioned in the newsletter (from 47 page views per 15 days to 60 page views per 15 days). The second lecture did not receive any page views either before, or after the newsletter, and did not contribute to the dissemination analysis. The results of this dissemination analysis are shown in table 26.

Table 26. Dissemination analysis

Category		**Page views from India**	
		Before newsletter	**After newsletter**
Mentioned in newsletter	Lecture 1	1	13
	Lecture 2	2	33
Not mentioned in newsletter	Lecture 3	47	60
	Lecture 4	0	0

Figure 29 shows an almost 15 fold increase in page views from India to lectures that were mentioned in the Indian Supercourse newsletter, immediately following the newsletter, and then a rapid decline.

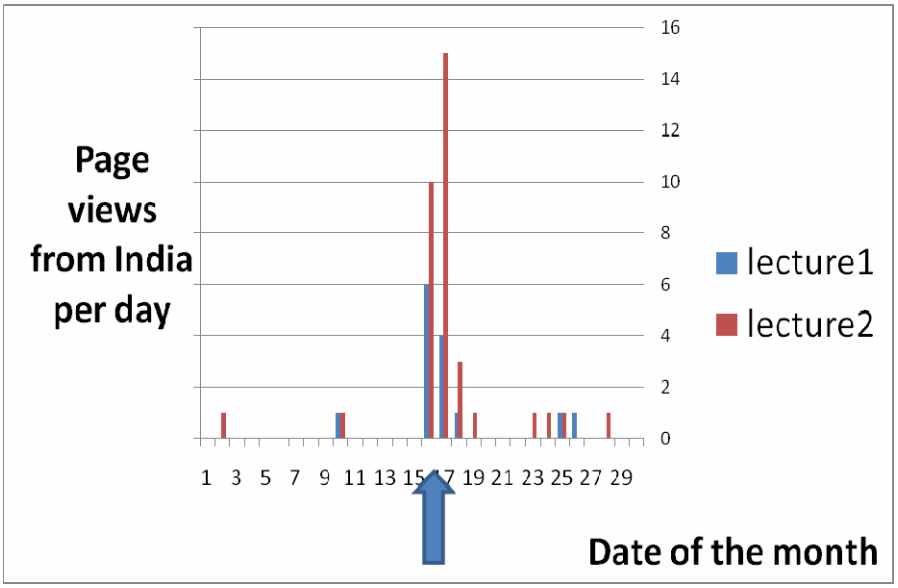

Figure 29. Lectures mentioned in the newsletter – page views from India before and after the Indian Supercourse newsletter

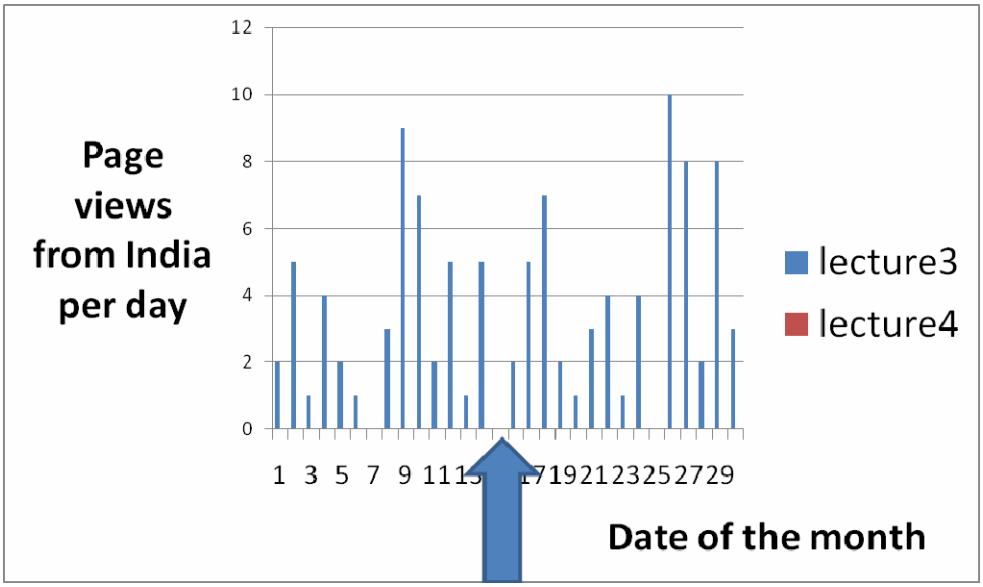

Figure 30. Lectures not mentioned in the newsletter – page views from India before and after the Indian Supercourse newsletter

Figure 30 shows page views from India for the lecture that was not mentioned in the Indian Supercourse newsletter. The increase in the number of page views from India was not as large as that seen in figure 29.

These graphs revealed that following a newsletter, there was an initial spike, followed by a rapid decline in the number of page views. The newsletter was very effective in getting visitors to come to the Website. The increase in page views after a newsletter was seen mainly in those lectures that had been directly mentioned in the newsletter. This means that there is a need for continuous reinforcement and better advertising of information on the Indian Supercourse Website.

5.0 DISCUSSION

The central theme of the dissertation was the development and evaluation of an educational epidemiology network, the Indian Supercourse. Evaluation of the Indian Supercourse included an assessment of its use among people in India. The main assessment parameter was the number of page views from India. The null hypothesis tested the equality of page views from India between the Indian Supercourse and the Main Supercourse. As the results show, page views from India were significantly higher to the Indian Supercourse as compared to the Main Supercourse. This shows that users from India prefer to use the locally produced and culturally appropriate information contained in the Indian Supercourse, as compared to the more generalized epidemiology information contained in the Main Supercourse.

During the second half of the twentieth century, there have been some commendable advances in public health in India. During the years 2001-2006, the life expectancy at birth in India was 63.9 years for males and 67 years for females[62]. This is in sharp contrast to the very low life expectancy in the middle of the twentieth century in India. When India gained independence in 1947, the life expectancy was only 28 years[61]. Since the last 6 decades, there has been a rapid increase in life expectancy in India. This has been in part due to the effort of the public health programs run by the Government of India, as well as the work of many local and international NGOs. The rise in socio-economic status has brought about prevention though improved hygiene, access to water and improved nutrition, all of which contributed to improved

health, but India still lags behind in life expectancy as compared to developed nations like the United States, where life expectancy at birth in the year 2005 was 77.8 years[105]. Thus there is a gap of more than 10 years in life expectancy between India and the United States. In order to catch up and overcome this gap to reach its maximum potential, more attention needs to be given to education in epidemiology and public health, and public health work force development in India.

In India, there are deep-rooted cultural beliefs and customs, such as the belief in the concept of hot and cold foods. These beliefs are so ingrained that even some physicians trained in the allopathic system of medicine believe in them. Some of these beliefs are harmful. On the other hand, some customs such as using turmeric for a sore throat may be useful. More research about these beliefs is needed, and this research can only be done in India. So, it is essential to have public health practitioners trained to do this research in India. Some public health professionals in India have received a Master's or doctoral degree in public health from a school in a developed country, such as the United States, and they have returned to India. This number is very low. If the number of trained public health professionals in India has to be increased, training in epidemiology and public health has to be conducted in India, so that it is accessible to more people.

There is a need for innovative and inexpensive methods to deliver epidemiology education in India. One such method is training people over the Internet. In recent years, there has been a rapid growth in the number of Internet users in India. India is ranked number 4 in the world in terms of the rate in growth of Internet users[31]. In developed countries such as the United States, there is a long and rich history of distance learning on the Internet. There are many advantages to the traditional method of distance learning on the Internet. It improves access to

education, because the student is not restricted by time or place, and can learn at his/her own convenience. Learning can be customized for each student. When distance learning is on the Internet, it allows the instructor to easily update learning materials. Also students can easily search for more information in online databases and online libraries.

A country such as India with a population over 1 billion, and a high prevalence of public health issues, needs its own system of formal public health education. Such a system needs to be able to produce information that is pertinent to the public health needs of the people of India. There also needs to be a system of dissemination of this information to teachers at medical schools in India, as well as to the "unreached" population in rural areas. The most cost-effective and fast way to distribute this information is over the Internet.

In recent years, there has been an explosive growth in the number of users of the Internet. India is now ranked number 4 in the world in terms of rate of growth of Internet users[5]. In December 2007, it was estimated that about 60 million people in India or 5.3% of the population of India use the Internet[80]. The commonest barriers to the use of the Internet are illiteracy, lack of English language literacy, and inability to pay for a computer and Internet connection. Even so, a recent survey indicated that about 10% of urban dwellers in India are regular users of the Internet. Even though only 5.3% of the people of India have access to the Internet, it is expected that virtually all of the target population of the Indian Supercourse (faculty in Medical schools in India) has access to the Internet. What is important is that these teachers are able to use the prevention materials in the Indian Supercourse to teach their students.

The results of this evaluation of utilization are important because they provide evidence of the need to produce more Indian Supercourse lectures and similar educational materials on epidemiology customized to the needs of teachers and students in India. Also, there was no

statistically significant difference in total page views between the Indian Supercourse and the Main Supercourse. This means that in general, users of the Supercourse did not prefer one over the other. Even though lectures in the Indian Supercourse were produced in a developing country, they were used all over the world, attesting to their good usability and quality.

This dissertation was one of the few studies that evaluated utilization of an educational epidemiology website, using statistical analysis. Information about utilization from Web server log files was collected and analyzed using Web Statistics Analysis software. Most similar studies of website utilization evaluation are done in the field of e-commerce[51–54]. As far as educational websites are concerned, this is a largely unexplored field, and the unique aspect of this study was that it created a framework for similar website evaluations in the field of epidemiology education. An extensive literature review showed that there is a paucity of literature in this field. In spite of a great interest in distance learning on the Internet, the evaluation of utilization of educational websites is a very underdeveloped field, and most studies are descriptive rather than analytical.

The results of this study, which shows that Indian users prefer to use the Indian Supercourse more as compared to the Main Supercourse, are very important because this provides justification for development of the specialized Indian Supercourse for users from India, as a sub-part of the Supercourse. The Main Supercourse contains lectures in epidemiology, but a need was felt for developing a customized Indian Supercourse for users from India, because in India, there is a great shortage of trained epidemiologists in the public health workforce. There are no schools of public health that grant MPH or PhD degrees. Some physicians in India can obtain a postgraduate degree in preventive and social medicine (PSM). About 200 physicians in India get a degree in PSM each year[1]. It can be estimated that since the last 30 years, only 6000

physicians obtained a degree in PSM. When we examine the population of India (more than 1 billion), only one such professional in epidemiology is trained every year for 5 million people. In contrast in a developed country such as the United States, about 6000 students get a degree in public health every year at the ASPH accredited schools of public health[2]. The population of the United States is about 300 million[3]. This means that about 100 public health professionals are being trained for every 5 million people in the United States every year. Thus, the rate of training in the US is about 100 times that in India.

This lack of formal training in epidemiology (education gap) leads to a significant knowledge gap at all levels in the public health workforce. This sets up a vicious circle (figure 31).

Figure 31. Vicious cycle

The lack of access to information about epidemiology and disease prevention leads to an increased disease burden, which in turn leads to poverty. Poverty prevents access to information, and the vicious cycle is perpetuated. There is a need to break this cycle and the best way to do so is to improve access to information.

There are well developed systems of traditional distance education at the ASPH accredited schools of public health[2]. The 2 major disadvantages of traditional Internet-based

distance learning are its high cost and lack of equitable access in some regions due to presence of the digital divide. The digital divide is a great impediment to progress, because people who need information the most are denied access to it.

There needs to be a better system for teaching epidemiology over the Internet, particularly for a developing country such as India. One such system is the Global Health Network Supercourse. The Supercourse differs from a traditional distance learning system because it makes epidemiology education available for everyone free of cost. Unlike traditional schools of public health that offer traditional distance learning courses in epidemiology, the Supercourse is not a degree granting institution.

Interestingly, an analysis of lecture use by month revealed that lectures on both the Indian as well as the Main Supercourse were used more 2 times a year, which may correspond to the time just before examinations. In general there is a lack of literature on utilization of educational websites, but the spike in use is similar to what was observed by McKnight and Demers[41], who observed spikes in activity at certain times, such as students using the assignment Webpage when the assignment was due, and students using the Website most, just prior and just following the face-to-face classes. The clear spikes in utilization of the Supercourse website 2 times a year may point to increased utilization just before examinations.

The analysis revealed that there was a great variability in the utilization rates for lectures on both the Indian as well as the Main Supercourse. This result is similar to the findings of the study by McKnight and Demers[41], who found that certain pages on their course Website were used most. The assignment page was accessed often, second only to the home page. The utilization statistics for page views from India, page views from non-Indian countries as well as total page views are all skewed to the right for the Indian as well as the Main Supercourse. More

exploration of the reason as to why some lectures are popular while others are not is needed. Distribution of page views to individual lectures revealed that the topic of a lecture plays a role in determining the number of page views, so that Indian users are interested in certain topics. A Spearman correlation coefficient revealed that there is a significant correlation between the page views from India and the page views from non-Indian countries to the Indian Supercourse lectures. This means that in addition to the topic of the lecture, the quality of the lecture could also be determining the number of page views.

There are no previous studies that analyze utilization of different online lectures by topic and geographic pattern of utilization. But, it would be expected that Indian people would be most interested in lectures on diseases that are of great public health importance to India, and this was the whole premise on which the decision to create a specialized Supercourse for India was based. This premise was shown to be true, looking at popular lectures among users from India, which were different from the lectures that are popular in non-Indian countries. This justified the creation of a specialized Supercourse for teachers and users in India.

Dissemination analysis showed that the Indian Supercourse newsletter was able to increase page views to lectures in the Indian Supercourse. The effect was seen most for the lectures that were mentioned in the newsletter. There was a rapid decrease in the number of page views following the initial spike after the newsletter. These results are similar to those of a Master's of Science thesis[45] which analyzed the utilization of a family life education Website. The researchers were disappointed that visitors viewed only 4 pages on average, and only 24 percent of the visitors were returning to the Website for more information.

Locally produced information does not receive much attention in international literature[70]. The Indian Supercourse was created to fill this void in availability of locally

produced epidemiology knowledge in India, and to make epidemiology knowledge available to everyone in India. The results of this analysis have shown that Indian users prefer the information in the Indian Supercourse which addresses their education needs more as compared to the Main Supercourse.

There are some constraints to the use of IT in India. As mentioned in the paper by Chandrashekhar and Ghosh[76], there are limitations to the use of information technology to improve epidemiology and public health education in India. These limitations are three pronged. The factors that can potentially reduce the positive impact of information technology on public health in India are the three "divides" – digital divide, economic divide and educational divide.

The digital divide is the lack of access to new information technology in a developing country such as India. There is also the presence of a digital divide within India. The urban educated elite have better access to information technology as compared to larger populations of people in rural regions of the country. Even if access were to improve initially in rural areas, the rapid changes that are inherent in the field of information technology will assure that those who had access initially will fail to receive updated technology. The commonest barriers to the use of the Internet are illiteracy, lack of English language literacy, and inability to pay for a computer and Internet connection. Even so, a recent survey indicated that about 10% of urban dwellers in India are regular users of the Internet. The target audience for the Indian Supercourse is the medical school teacher in India. The medium for medical education in India is English. Most medical schools in India are in urban areas, with good access to the Internet, and most of the medical school teachers and even students are from the higher socio-economic strata and are able to pay for Internet access in their homes. So it is expected that the target users of the Indian Supercourse, do have access to the Internet. Also, the Indian Supercourse is a teacher support

system. The teachers in turn teach the students. Most of the dissemination of the lectures is not through the Internet; it is through a very effective system of knowledge exchange, the classroom.

The economic divide is the divide between the "haves" and the "have-nots" between developed countries and developing countries such as India, as well as within the country. It is due to the high cost of acquiring, maintaining and updating information technology equipment. The educational divide happens due to inadequate education, causing a lack of competence and confidence to adequately use and benefit from information technology. Again because of the reason explained above, these divides would not affect the main target audience for the Indian Supercourse, making it an effective means to impart epidemiology knowledge in India.

To do beyond the digital, educational and economic divide, and exploit the benefits of information technology, India will need to invest more in schooling for children and in developing literacy and skills among adults. Access to information technology and the Internet is rapidly improving in India. India is one of the fastest growing Internet markets in the Asia-Pacific region[106,107]. India, and China, each are expected to have more Internet users than the U.S. by 2010[107]. In order to fully benefit from information and communication technology, the people in Indian need to be able to overcome the digital divide, economic divide and educational divide.

5.1 LIMITATIONS AND POTENTIAL BIASES IN ANALYSIS OF UTILIZATION

The page views from India were compared between the Indian Supercourse and the Main Supercourse. There is a separate front page for the Indian Supercourse (http://www.pitt.edu/~super1/India/India.htm). Only Indian Supercourse lectures are listed in this

Indian Supercourse front page. Indian Supercourse lectures are also listed in the Main Supercourse web pages – all lectures page (http://www.pitt.edu/~super1/main/index.htm), lecture by topic page (http://www.pitt.edu/~super1/assist/topicsearch.htm), lecture by author page (http://www.pitt.edu/~super1/faculty/lecturers.htm) and lecture by key words page (http://www.pitt.edu/~super1/assist/keysearch.htm).

When a visitor from India goes to the Indian Supercourse front page, they can view only Indian Supercourse lectures. This might have created a potential bias, so that such a visitor from India will view more Indian Supercourse lectures. In contrast, the Main Supercourse has both Indian and Main Supercourse lectures listed. When a visitor visits the Main Supercourse front page, they have a choice of viewing either Indian or Main Supercourse lectures. This does not introduce a bias. A way of adjusting for this bias is to use Web statistics analysis software that can ascertain the browsing path of a visitor on the Website, so that the proportion of visitors that come to each lecture via different paths can be ascertained. This might be from the Indian Supercourse front page, from the Main Supercourse front page or via a search engine.

A potential limitation of this study is that this study compares page views from India, between the Indian Supercourse and the Main Supercourse. The study does not measure the effect of viewing a Supercourse lecture on knowledge about the topic. Such a change can be measured only by using a pre- and post-test (assessing knowledge before and after viewing a Supercourse lectures, and comparing the two).

Concern is often expressed about using data from log files in an educational setting. Teachers may feel threatened by the fact that university authorities can easily track how well they interact with students. Students may be apprehensive because Web-based learning environments permit teachers to monitor study habits, creating a concern that they may be

judged on "how they study" rather than the traditional measures of knowledge such as exams and papers[42]. Since, the Supercourse is not a traditional degree granting institution and does not have registered students there is no cause for concern in this regard. There are limitations on the type of information that can be obtained using log files. Data such as computer literacy and levels of satisfaction can only be obtained using a questionnaire.

5.2 FUTURE DIRECTIONS FOR THE INDIAN SUPERCOURSE

This study measured and compared users visiting the Indian Supercourse and the Main Supercourse Websites. The results of this study showed that the Indian Supercourse was used more by people in India as compared to the Main Supercourse. But this dissertation measured only the people coming to the website of the Indian Supercourse. Even though the Internet reaches the target audience of the Indian Supercourse, only a small proportion of the total population of India have access. In order to obtain the maximum impact of epidemiology education, it is essential that the information in the Indian Supercourse reaches many more people in India, even those who cannot view the Indian Supercourse Website regularly. There is a need to go beyond the digital, language and economic divides and reach people who do not currently have access to the Indian Supercourse.

In order to make the Internet accessible to people in India who do not understand English, the government of India is promoting Indian language technology in digitalized information[79].The government is also making efforts to bring cost-effective Internet, including wireless broadband Internet technology, to remote villages in India[78,79]. This will go a long way in overcoming the language and economic divide in India. There is still the need to distribute

health information using these newly created channels. The problem with the digital divide is lack of access to the Internet, combined with the issue of not being able to benefit from access.

The Indian Supercourse is the ideal content to be distributed into villages in India. Even though this research showed that the Indian Supercourse lectures on epidemiology are used in India, it is one step towards improving access to epidemiology and public health information in India. There is a need to expand the number as well as the types of lectures available in the Indian Supercourse. The model of the Supercourse can be applied to other fields such as education in agriculture, since this field is closely related to health. This model which has proven to be successful in India can be used in other developing countries particularly in South-East Asia and Africa, which have the same public health issues as India.

There are many ways to bring about more rapid and wide spread dissemination of the information in the Indian Supercourse network. The Indian postal system reaches almost everyone in India. A new program of the Indian postal system allows customers to send email to a person in a remote village without a computer. This email is printed out and carried by the postman. So a person can get email even if he/she has never even seen a computer. This system of "email by snail mail" can be used to send information from the Supercourse to remote corners of India[108].

India is prone to many natural disasters such as floods, tsunamis and earthquakes. The Supercourse model can be used to deliver just-in-time lectures to reduce the epidemiology of fear[109,110]. As a natural disaster unfolds, a lecture is can be created rapidly by Indian Supercourse experts in disaster epidemiology. This lecture can then be disseminated in India to reduce the "epidemiology of fear".

This research assessed the utilization of lectures in the Indian Supercourse. As more sophisticated Web statistics analysis software becomes available, there is a scope for doing more detailed analysis of utilization of the Indian Supercourse. Ideally, this analysis would include an analysis of unique visitors, first-time visitors, and returning visitors. Like analyzing an e-commerce Website, analysis of an educational Website such as the Supercourse could also include path analysis. This analysis was done over a period of 1 year. Since web site traffic is often volatile[40], in future Website logs can be monitored over a long term.

If India is to take full advantage of available knowledge in public health, in order to improve the health situation, it is necessary that education in epidemiology is made available for everyone. Ideally this would involve training everyone in the public health workforce, using a certificate course in epidemiology. In addition, there need to be schools of public health where future researchers, public health project managers, policy makers and leaders in public health in India will be able to obtain a postgraduate degree in epidemiology. Epidemiology training also needs to be incorporated into the training of all medical students, so that at a minimum, physicians will be able to read and interpret research in journals, to that they can update their knowledge. Also, more physicians need to be trained in Preventive and Social Medicine. Public health training needs to be multidisciplinary, so that everyone working in the field of public health can obtain formal training in epidemiology.

6.0 CONCLUSION

It is possible to develop an online epidemiology educational network with locally produced material in a developing country such as India. There is a great enthusiasm for participation in such a network among authors as well as users in India. Tests for evaluation of utilization of the Indian Supercourse show that the numbers of page views from India for the Indian Supercourse are significantly higher than the numbers of page views from India for the Main Supercourse. Users from India prefer to use the locally developed Indian Supercourse lectures more than the Main Supercourse lectures. Overall, both the Indian Supercourse as well as the Main Supercourse had very high utilization rates.

Public Health Significance: The Indian Supercourse is an efficient way to make high quality epidemiology education available without charge for every person interested in epidemiology in India. The Indian Supercourse project has great public health significance. The current situation is that there is a lack of formal epidemiology education in India. Most of the medical textbooks used by medical students are written in developed countries, mostly the United States. Even though they are excellent reference books, they do not contain information about diseases that are most prevalent in India. In India, there is also an overemphasis on costly tertiary care that is often harmful. There needs to be more emphasis on prevention and epidemiology education.

The results of the analysis in the dissertation show that the Indian Supercourse is able to effectively disseminate epidemiology knowledge in India. The Indian Supercourse is free of charge and it can teach users from various disciplines. Since the lectures in the Indian Supercourse are locally produced, they are culturally sensitive and pertinent to the epidemiology education needs of users in India. This makes education in epidemiology available to all interested people in India. It is hoped that this will induce an interest in epidemiology, and even a policy change at the government level. This will lead to schools of public health being built in India, which will ultimately lead to improved health of all the Indian people.

APPENDIX - LIST OF LECTURES INCLUDED IN THE ANALYSIS

A.1 INDIAN SUPERCOURSE (N = 120)

A.1.1 Basic epidemiology methods

(12 lectures)

How to Conduct a Meta-Analysis

Origin, growth & development of epidemiology

Epidemiology - its perspectives & applications

Causal inference

Disease epidemiology

Descriptive studies

Case Control Studies

Cohort Studies

Dynamics of disease and disease transmission

Unicef cooperation in india

Unicef in india. New challenges and changing role. Part i

Cohort study

A.1.2 Chronic disease epidemiology

(13 lectures)

The National Iodine Deficiency Disorders Control Program (NIDDCP). Part I

Long range strategy plan Orbis international – india

K.A.P study on HT & DM. Part I

Nutritional Anemias

Iron and Brain

Obesity in Adolescents – Indian scenario

Probiotics and Allergy

Diabetic Nephropathy in Type 2 Diabetes: The Indian Experience

Obesity, Nutrition & Environment

Asthma in Indian children

Management & Prophylaxis of Cardio-respiratory illnesses

Clinical Implications of TNF Family in Blood Disorders

Epidemiology of Endemic Fluorosis

A.1.3 Infectious disease epidemiology

(52 lectures)

Leprosy

Pulse polio immunization

Urban Leprosy Elimination

Evolution of the Mad Cow Disease in the United States

AIDS/ HIV – Current Senario

HIV / AIDS epidemic in India

Polio eradication program in india

Malaria control programme

Malaria Control in India. Part I

Revised national tuberculosis control programme

Soil and shower of hiv/aids in india

K.A.P study on frontline health workers

Meningococcal meningitis (MCM) at Delhi & India. Part I

HIV/AIDS scenario in Nagaland

HIV: the Gloabal and Indian scenario

HIV Prevention in Mothers and Infants

Situation assessment for HIV programming

HIV Counselling and Testing

Stigma and Discrimination Related to HIV/AIDS

Infant feeding and HIV

HIV/AIDS Prevention Through Schools

Kala Azar

Nosocomial infections. Part I

Epidemiology of polio myelitis and polio eradication programme in india

Epidemiology of Japanese encephalitis and control measures

HIV AIDS Counseling

Yellow Fever

The danger Numero Uno

Polio Eradication Program in India: Actions in Post-Eradication Phase

Epidemiology of leptospirosis & control measures

Tetanus

HIV/AIDS prevention programme. Programme plan of cooperation

Immunization Services

Prevention of HIV in Health Care Facilities

Technical and Operational issues in Pediatric HIV/AIDS

PMTCT programme monitoring

Guidelines for the Use of Antiretroviral Agents in Pediatric HIV Infection. Part I

Malaria

Poliomyelitis. Epidemiology and Current Status. Part I

Dengue and Dengue Hemorrhagic Fever

Chikungunya

Mosquito laughs at man

Epidemiology of HIV/ AIDS in India

Management of Severe Falciparum Malaria

The strange, beautiful and powerful world of microbes

Antiviral Properties of Milk Proteins and Peptides

Nutraceuticals: An emerging field for metabolic engineering of Lactic Acid Bacteria

Prescribing Antibiotics in Pediatric Office Practice

Disease Informatics: Phytates driving from the back-end to Influenza, Encephalitis, Hepatitis, Anemia at the front-end

Prions the infectious proteins

Elimination of Leprosy

The Principles of Outbreak Epidemiology

A.1.4 Other epidemiology lectures

(43 lectures)

Policy Reform in Family Welfare Program of India

Needs assessment: reproductive & child health [RCH] care

Quality Of Reproductive & Child Health Care In India: Assessing The Status. Part I

Violence against Women and Reproductive Health

Adolescents and Reproductive Health

Knowledge, Attitudes And Socio-Demographic Factors Differentiating Blood Donors From Non-Donors In An Urban Slum Of Delhi

Artichoke of Population Studies & Clinical Practice. Part I.

Gender and Health

Genetic research designs in the real world

Adaptation of the Integrated Management of Newborn and Childhood Illness (IMNCI) Strategy for India

Child survival – how many deaths can we prevent?

Vulnerability of Women & Children to HIV/AIDS

Reproductive Health of Young Adults. Part I

Situation of Children and Women in India

Millennium Development Goals. Linkages with Early Child Development and Nutrition

Clinical Trials

RCH Programme in India. Part I

Pre-birth elimination of females in India: issues and challenges

Prevention of mother to child transmissionof HIV in India: issues and challenges

HIV/AIDS and children with special reference to India's response for Prevention of Mother to Child Transmission of HIV/AIDS, Treatment & Care

The Millennium Development Goals Linkages with Child Health.The Challenge in India

Global trends of neonatal, infant and child mortality: implications for child survival

Radioimmunoassay & Enzyme Linked Immunosorbent Assay

Clinical Trials

Bioassays

Antiretroviral Drugs for Treating Pregnant Women and Preventing HIV Infection in Infants in Resource-Limited Settings

Growth & Development in Adolescence

Study on the Customs of South Indian Mothers during pregnancy

Adolescent Health

RCH PHASE-II

Adolescent vaccines

Disease Informatics: Host factors simplified

Introduction of Stem Cell Technology

RNA Switches Genetic Research Tools

Screening for Retinopathy & Nephropathy

Antimicrobial Drug Discovery Through Bacteriophage Genomics

Planning & Organisation of RCH Services for 1 Lakh Population in a Rural Area. Part I

Nitric Oxide as a Unique Bioactive Signaling Messenger in Physiology and Pathophysiology

Molecular Markers and its Applications in Livestock Improvement

Post-transcriptional gene silencing

Gene Trapping

Effect of Nutrients on the Gene Expression: Nutri-genomics

Reproductive and Child Health in India

A.2 MAIN SUPERCOURSE (N = 848)

A.2.1 Basic epidemiology methods

(159 lectures)

Analysis, Reporting, and Feedback of Surveillance Data. Part I.

Epidemiologic Transition

Monitoring Disease in the Population

Why should medical students be interested in EPIDEMIOLOGY?

Epidemiology of Medical Devices

How to Read an Article on a New Diagnostic Test

A Primer on Sample Survey

Capture-recapture techniques for determining incidence and prevalence of diabetes

Epidemiologic Design I Focus on descriptive study

Epidemiologic Design II Focus on analytic study

Different Kinds of Epidemiologic Studies

Screening and Disease Prevention

Screening

Case Crossover Design

Annual Report 101

A Brief Introduction to Epidemiology - Part I -

A Brief Introduction to Epidemiology - II (History of Infectious Disease Epidemics & Epidemiology)

Attributable Fraction: Fundamental Differences in Interpretations of Probability of the Causation

A Brief Introduction to Epidemiology - III (Basic Statistics & Common Epidemiologic Measures)

Questionnaire Design: An Introduction

Introduction to Program Evaluation

A Brief Introduction to Epidemiology - VIII (Epidemiologic Research Designs: Cross-Sectional/Prevalence Studies)

A Brief Introduction to Epidemiology - IX (Epidemiologic Research Designs: Case-Control Studies)

A Brief Introduction to Epidemiology - X (Epidemiologic Research Designs: Cohort Studies)

A Brief Introduction to Epidemiology - XI (Epidemiologic Research Designs: Experimental/Interventional Studies)

A Brief Introduction to Epidemiology - XII (Critiquing the Research: Methodological Issues)

A Brief Introduction to Epidemiology - XIII (Critiquing the Research: Statistical Considerations)

A Brief Introduction to Epidemiology - IV "Overview of Vital Statistics & Demographic Methods"

Uses of demography

Primordial prevention

Surveillance

The Use of Epidemiologic Methods in Disasters

Herd Immunity and Vaccination

Epidemiology, Demography and Biometry Program

Migrant Studies

Publication bias in clinical trials

A Brief Introduction to Epidemiology - V (Principles of Organizing & Presenting Epidemiologic Data)

Low Fitness as a Predictor of Morbidity and Mortality

Physical Activity Epidemiology

Introduction to Epidemiology. Part I

Measures of Disease Occurrence. Part I

Descriptive Epidemiology. Part I

Analytic Epidemiology. Part I

Evaluating Associations. Part I

Standardization and Methods to Control Confounding. Part I

Effect Measure Modification And Intervention Studies. Part I

Cohort Studies. Part I

Genetic Epidemiology. Part I

Case-Control, Case-Crossover, and Cross-Sectional Studies. Part I

Evaluating Epidemiologic Literature

Infectious Disease Epidemiology. Part I

Measures of Public Health Impact

Screening. Part I

Use of Race and Ethnicity In Epidemiological Research

Introduction to Epidemiology

What is Epidemiology?

The epidemiological concept of population

Variation in disease by time, place and person: A framework for analysis

Variation: role of error, bias and confounding

Cause and effect: the epidemiological approach

Natural history, spectrum, iceberg, population patterns and screening: interrelated concepts in the epidemiology of disease

Risk and frequency: incidence and prevalence

Sampling Frames and Study Types: Studies on Life Events.

Presentation and interpretation of epidemiological data: objectives

Study design

Theoretical, ethical, contextual, practical and critical foundations for future epidemiology

Bias and Confounding. Part I

Statistical association and causality

Susser’s causal criteria

Introduction to the Fundamentals of Epidemiology

Web of Causation; Exposure and Disease Outcomes

Assessing Disease Frequency

Measures of Association

Screening and its Useful Tools

Epidemiologic Transition: Changes of fertility and mortality with modernization. Part I

Descriptive epidemiology for Public Health Professionals. Part 1

Evidence based medicine for beginners. Part I

Disaster epidemiology

Design and Analysis of Cluster Randomization Trials in Health Research

A Brief Introduction to Epidemiology - VI (Basics of Research & Epidemiological Research Methodologies)

Brief Introduction to Epidemiology XIV: Critiquing Internet Information

The Effectiveness of Mass Media Campaigns: Youth Substance Abuse

How to Write and Publish a Scientific Paper

Finding Research Support. Part I

Students' Guide to Health Research Methodology

Management of a Disease Outbreak. Meningococcal Infection at a High School.

Mortality of Twins and Singletons

The Five Main Rubrics of Epidemiology, As Applied to Drug Dependence Syndromes

Absolute, Relative and Attributable Risks. Part I

Epidemiologic design from a sampling perspective

Self-Rated Health in Epidemiological Surveys as a Predictor of Disability and Mortality

Screening and Early Detection. Part I.

A Brief Introduction to Epidemiology - VII (Epidemiologic Research Designs: Demographic, Mortality and Morbidity Studies).

A smoking gun? Detecting causes of disease

Is It Worth the Risk?: Risk Perception

Screening

Epidemiology Key Terms and Measures

Epidemiology Applications

Epidemiological Researches in Egypt

Ophthalmic Epidemiology: A Clouded Vision

Terrorism: the Epidemiology of Fear. Part I

Intelligent Data Analysis (IDA)

Study Management. Part I

Variables

Potential Errors in Epidemiologic Studies. Introduction

Potential Errors in Epidemiologic Studies. Random Error

Potential Errors in Epidemiologic Studies. Bias

Potential Errors in Epidemiologic Studies. Confounding

Study Designs for Clinical and Epidemiological Research

Validity and Reliability

Mental Health and Illness. An Epidemiological Perspective

Study Planning and Design to Enhance Translation of Health Behavior Research

The Modeling of Science. Factors that Influence Science. Part I

Epidemiologic Study Designs

Validation of Predictive Regression Models

Confounding

Data Quality Control

Introduction to Cancer Epidemiology. Part I

Principles of Epidemiology

Data Sets and Outcome Measures. Part I

SMRs, PMRs and Survival Measures

Critical Appraisal

Causation

A Source of Error in Self-Reports of Pap Test Utilization

Nature and uses of epidemiology

Disease Transmission and Context

Categorization and classification of health states

Population sampling

Measures of Disease Frequency

Measures of disease association

Standardized rates and ratios

Other measures of mortality age-cohort analysis

Reliability of disease classification

Screening for disease

Survival and life tables

Vital data

Morbidity data: registries and surveillance

Concepts underlying study design

Overview of study design. Community surveys

Randomized trials

Cohort studies

Case-control studies

Social Aspects of Diseases

Showing Cause, Introduction to Study Design

Bias, Confounding and the Role of Chance. Part I

Descriptive Epidemiology

Infectious Disease Epidemiology

Investigating an Outbreak. Part I

Deriving Biological Inferences From Epidemiologic Studies

The "Brain Drain" Phenomenon

Cohort Studies

Case-Control Studies

Intervention Studies

Screening

Randomised controlled trials in primary care: case study

Epidemiologic Measures of Association

Pakistan: Epidemiological Transition Country Statistics

Principles of Research Synthesis. Part I

Evaluation and evaluative research in healthcare: analysis of an example

A.2.2 Chronic disease epidemiology

(177 lectures)

Epidemiology of Insulin Dependent Diabetes Mellitus

Rheumatic Fever / Rheumatic Heart Disease

Epidemiology of Hodgkin

Descriptive Epidemiology of Multiple Sclerosis

Cancer Epidemiology

Viral Hepatitis Hepatocellular Carcinoma

The Impact of Diabetes in the Americas

Various Aspects of Lipid Problems in Asia

Type 2 Diabetes in Japanese Americans

Etilogy and Determinants of Type 2 Diabetes

Natural History and Determinants of Type 2 Diabetes

Epidemiology of Iron Deficiency and Iron Deficiency Anemia

Epidemiology of Type 2 Diabetes Mellitus in the Arab World

Types of Studies in Diabetes Epidemiology

Epidemiology in Gestational Diabetes Mellitus

How to Control Cancer

Epidemiology of Diabetes Complications - I

Epidemiology of Hypothyroidism

Gastric Cancer Epidemiology

Cardiovascular Disease in Black Women

Cardiology Practice in Grenada, West Indies

Problem based learning in Europe (in Cancer Education)

International health: noncomunicable diseases as global health problem

Mr. Os (osteoporosis), Hong Kong

The Role of Poverty in Prostate Cancer in African-Americans

WHO Statistics, 2000

Geriatric education for Primary Health Care physicians

Active Ageing

Interactive Cancer Mortality Mapping on the Internet Part I: The Atlas On-Line

Systemic stiffness: a determinant of blood pressure?

Prevention of Ovarian Cancer

Interactive Cancer Mortality Mapping on the Internet Part II: Customizable Maps

Strategies for the Education of Diabetic Patients on the World Wide Web. Part I

The Role of Phytoestrogens in Cancer Etiology

Health transition and emerging cardiovascular disease in developing countries: situation and strategies for prevention. Part I

Informing Medicaid Policy With Cancer-related Health Services Research

The Duke Stroke Policy Model (SPM). Part I

Gastric Cancer Prevention

EPIDEMIOLOGY OF DIABETES – ITS HISTORY IN THE LAST 50 YEARS

D-Chiro-Inositol and its Role in Diabetes and Insulin Resistance

Critical evaluation of the diagnosis of Gestational Diabetes Mellitus (GDM)

Colorectal Cancer: Proposal of a Screening Program for Developing Countries with Emphasis on Costs

Physical activity and longevity

Yeast and cancer

Lung Cancer: a preventable disease

Design and conduct of evaluations of CVD control programs (part I)

Cancer Survivorship Research: Challenge and Opportunity. Part I

Mody: maturity-onset diabetes of the young. Part i

Prevalence of Diabetic Complications in Relation to Demographics in Europe Part 2: microvascular diseases, neuropathy, and costs of diabetes

Prevention Diabetes

Prevention Cardiovascular disease

Overdiagnosis in mammography screening for breast cancer in Sweden and Norway

Epidemiological Reasoning Using Cancer Statistics. Part I

Prevalence of diabetic complications in relation to demographics in Europe Part 1: acute complications and macrovascular diseases

Situation analysis and cost-effectiveness analysis of cervical cancer screening in Russia

Cancer Trends in England and Wales

Insulin for Life

Low carbohydrate, low insulin, moderate protein, healthy fats as the basis for blood glucose normalization in diabetes

Prevention of Cardiovascular Diseases: Begin in Childhood!

Lipids Metabolism

Toenail arsenic and bladder cancer: findings from a cohort study of male smokers

Epidemiology and Diagnostic Tests for Venous Thromboembolism

Cervical Cancer Screening Among Chinese Women

IMPROVING DIABETES CARE FOR ADULTS: A Population-Based Approach

Outcome of Diabetic Pregnancy. Comparison of North East England with Norway.

Cancer Prevention, Ethics, and Managed Care

EPIDEMIOLOGY OF CARDIOVASCULAR DISEASE (CVD)

Study Designs in Epidemiologic Research

Low Adherence of Hypertension Patients to Treatment – What Is To Be Done? Clinical Problem for Public Health

A systematic review of the incidence of schizophrenia

Developing International Science

Aging And Diabetes Mellitus: A Dental Public Health Problem Along The US-Mexico Border

HDL Cholesterol No Longer Is Good Cholesterol: Emerging Genetic Theories

Health Transition And Emerging Cardiovascular Diseases In Developing Countries

CVD Control Programs: Preventive Strategies

Prediction of Type 1 diabetes and related Autoimmune Diseases

The Type 1 Diabetes Sardinia (Hot and Cold Spot) Project: what did we learn so far?

Smoking and Type-2 Diabetes Mellitus

Epidemiology of colorectal cancer

Tumoral calcinosis

Twin Research & Sri Lankan Twin Registry. Part I

Update on childhood diabetes mellitus

The Metabolic Syndrome: International Diabetes Federation (IDF) consensus definition

Global burden of Cardiovascular Diseases

Diabetic atherothrombosis and accelerated aging: intervention strategies. Part I

Changing trends in epidemiology of type 1 diabetes mellitus throughout the world: How far have we come and where do we go from here

Diabetes and Risk Factors How to conduct prevalence studies

A Global Approach of World Epidemiology in Chronic Venous Disorders

Ramadan Fasting and Muslim Patients

Epidemiology of Diabetes Mellitus (DM) in Siberia

Energy Balance and Cancer Survival

Dietary intakes of calcium and vitamin D and risk of colorectal cancer in women

The Beneficial Effects of Long-Chain, Polyunsaturated n-3 Fish Oil Fatty Acids on the Cardiovascular System. Part I

Research Highlights from the National Institute of Diabetes and Digestive and Kidney Diseases

Diabetes Mellitus and Hypertension as Major Risk Factors for the Development of Cardiac and Renal Disease. Part I.

Skin Cancer in Western Saudi Arabia

Diabetes and Obesity

Role of Inflammation in the Macroangiopathy of Diabetes

Primary Prevention of Cardiovascular Disease in Diabetes: Treat as Secondary Prevention or Assess Individual Risks? Part I.

Insulin for the World's Poorest Countries

Radiation Epidemiology and Leukemia. Part I.

ISCHEMIC HYPOXIC ENCEPHALOPATHY Toward a new focus in complete Neurorehabilitation of their sequels (A Physiopathological Model) (Part I)

Cardiovascular diseases and Soils

Metabolic Syndrome, Diabetes, and Cardiovascular Disease: Implications for Preventive Cardiology. Part I

Subclinical Atherosclerosis: Implications for Cardiac Risk Assessment. Part I

Dietary Intervention and Recommendations in the Prevention of Obesity and Heart Disease

Whole grain, fiber, and health

Obesity, Energy Balance and Cancer Prevention

Cancer Prevention Clinical Trials in America

Basic Considerations for Prevention of Blindness in Diabetes Care and Education

Why is asthma prevalence increasing?

National Diabetes Education Program. Changing the way diabetes is treated.

Mortality from Familial Hypercholesterolemia (FH)

Intima Media Thickness and Atherosclerosis

Isoflavonoids and Breast Cancer Risk

Pancreatitis and Pancreatic Cancer

Stroke Epidemiology - 2001

Coronary Heart Disease Risk Profile of Women with PCOS: Collision of Evidence and Assumptions. Part I.

Recent Trends in Diet and Serum Lipids Level in Japan

Very Low CHD Mortality Among Men Aged 35-44 in Several States in the United States

Prostate Cancer and Smoking

Anger and Coronary Heart Disease: Epidemiologic Evidence from the Atherosclerosis Risk in Communities (ARIC) Study

Ethnic Differences in the Association Between Body Mass Index and Hypertension

Cardiovascular Epidemiology

Cardiovascular Epidemiology. Part I

Pathogenesis of Acute Coronary Syndromes

Age Dependent Type I Diabetes Pathogenesis

Cardiovascular Risk Factor Overview and Management. Part I

Research Study Design and Analysis for Cardiologists

American Heart Association

Primary and Secondary Prevention of Cardiovascular Disease

National Cholesterol Education Program. Part I

The National and Global Cancer Burden (Part I)

Lipids and Cardiovascular Disease Prevention. Part I

Diabetes and Cardiovascular Disease. Part I

Obesity and CHD

Physical Activity and Cardiovascular Disease

Inflammation and CHD. Part I

Strategies for Prevention of Type 2 Diabetes

Beta Thalassemia: an Overview

Surrogate Measures of Atherosclerosis and Implications for Evaluating Cardiovascular Risk. Part I

Establishing Preventive Cardiology Programs

CVD Epidemiology Case Studies

Survival Estimates in Prevalent Cohorts: an Application in Sickle Cell Anemia

Clinically Meaningful Change and Clinical Relevance of the Functional Assessment of Cancer Therapy-Lung: Analysis of ECOG 5592 Data

Modelling Time Dependent Hazard Ratios in Relative Survival: Application to Colon Cancer

Arsenic and Nonmelanoma Skin Cancer in Slovakia

Audit of Cancer Registrations Notified by National Health Service Central Register in England and Wales

Body Mass Index, Weight Change and Death in an Older Hypertensive Population: The SHEP Study

Therapeutic Interventions

L-Arginine, Nitric Oxide and Atherosclerosis

Incidence of Cutaneous Malignant Melanoma in Granada (Spain) 1985-1992

Ethical Issues and Cancer Screening

Vitamin D and Risk of Type 1 Diabetes

WHO's Cervical Cancer Screening Programmes: Managerial Guidelines

Patterns of Contraception in IDDM in the UK

MSc in Diabetes A Population Approach

MSc in Diabetes. A Population Approach. Impaired Glucose Tolerance and Undiagnosed Diabetes

Occupational Cancer. Part I

Myocardial Protection

Magnesium Discussion pro and con

A Lateral View of Diabetes from the Caribbean. Part I

Genetic Screening for Sporadic Cancers and Other Diseases of Complex Etiology

Epidemiology of Alzheimer's Disease

Hypertension Update. Which Guideline to Follow?

A ‘pandemic’ of adenocarcinomas in the new millennium: a common causal pathway?

The discovery of the pulmonary circulation - who should get the credit: ibn Al-Nafis or William Harvey?

Risk factors for coronary Artery diseases in Pakistanis: A cross–sectional Study

Changing Strategies Of Treatment Of Hypertension

NMR Spectroscopy of Lipoproteins as a New Measure of CVD Risk and Preventive Therapies

Use of Electron Beam Computed Tomography (EBCT) for Identification of High Risk CHD. Part I.

New Nutritional Approaches for the Treatment of Hyperlipidemia. Part I

Preventing CAD in Diabetes. Part I.

Early Defibrillation “Jewels”. Part I

Organizing Colorectal Cancer Screening. Part I

Type 2 Diabetes in the Elderly: Options for Treatment. Part I

CHD Prevention in the Elderly: Should All Older Adults Be Treated?

A.2.3 Infectious disease epidemiology

(159 lectures)

Economic Impact of Pandemic Influenza In the U.S.: Implications for Setting Priorities

Typhoid Fever (Part I)

Injection Safety

Dengue Viruses

Testing for Trichomonas Vaginalis in Male STD Clinic Attenders: An Elusive Infection

How to Investigate an Outbreak

Experience with HIV/STD Prevention Counseling with a Rapid HIV Test and Counseling Quality Assurance (RESPECT-2)

Investigation and Control of Outbreaks of Foodborne Illness

Malaria

Epidemiology of Andean Cutaneous Leishmaniasis

AIDS and STDs in Africa I The Problem

Influenza: Epidemiology, Prevention, and Control

Epidemiology of Tuberculosis

Epidemiology of Transfusion Transmitted Disease

Cryptosporidium: The Milwaukee Case

Epidemiology and Management of Diarrheal Diseases

Toxoplasma: a Fetal and Sometimes Fatal Parasite

HIV Clinical Trials

Dengue

Caseous Lymphadenitis in Goats & Sheep

An Overview of TB in SAARC Countries and Role of SAARC TB Centre in TB Control

Severe Acute Respiratory Syndrome (SARS):Basics Part I: Background

Identification of Bioterrorism Agents. Part I

Malaria basics

Principles of HIV Therapy Simple is Better!

Severe Acute Respiratory Syndrome (SARS):Basics Part III: The Virus

Severe Acute Respiratory Syndrome (SARS):Basics Part IV: The Disease

Severe Acute Respiratory Syndrome (SARS):Basics Part V: Infection Control

Severe Acute Respiratory Syndrome (SARS):Basics Part VI: Discussion

Diphtheria

Monkeypox: Outbreak in the US

Development of Outbreak Investigation Database for hospital Infections

Sickle cell anemia and thalassemias

Hepatitis C Primer for HIV Care Providers. Part I

Community Acquired Pneumonia Challenges in the New Millenium

Poliomyelitis

Rabies

Amebiasis

Filariasis

Chagas disease

The mosquito vectors: Aedes aegypti and A. albopictus

Hepatitis in a Surgeon- Problem Oriented Learning: Part I

Cysticercosis and Echinococcosis

Schistosomiasis

Leishmaniasis

Diarrhea, caused by waterborne Entamoeba, Giardia, Cryptosporidium and Cyclospora

Invasive and Non-invasive Monitoring of Hepatitis C Virus-induced Liver Fibrosis, Alternatives or Complements?

Cholera-History

MMR vaccine for measles, mumps and rubella

'I Think I Have Anthrax…': Responding to Bioterror in the National Capital Region

Ascaris, Trichuris, Enterobius, Ancylostoma, Strongyloides and Trichinella (Nematoda), and the diseases that these roundworms cause in humans

Infectious Disease Epidemiology

African sleeping sickness caused by Trypanosoma brucei

Epidemiology and Control of Methicillin-Resistant Staphylococcus Aureus in Hospitals

Tuberculosis: Previous and Present Millennium

Anthrax

Analysis of Malaria Incidence, Altitude, and Rainfall a Study in the Timor Tengah Selatan (TTS) District, West Timor, Indonesia

Situation analisys on HIV vertical transmission

HIV/STD Risk Behaviors in Methamphetamine User Networks. Part I

HIV/AIDS Prevention, Diagnosis, and Treatment in Older Patients

The Evolving of HIV Epidemic in South Africa

Mad Cow Disease Outbreak in the United States. Following the Story in USA Today. Just in Time Lecture.

Syphilis Epidemiology. Part I

Syphilis – Clinical Aspects of Primary Syphilis

BIRD FLU

Syphilis – Clinical Aspects of Secondary Syphilis

Avian Influenza: Zoonosis

Geographic orientation for African countries with Human Immunodeficiency Virus

Prevention of AIDS in South Africa

Domestic environment and socio-economic factors of tuberculosis in bandung and west timor. Part I

Syphilis – Clinical Aspects of Late Syphilis

Congenital Syphilis

Australia Antigen and the Biology of Hepatitis B

Food Safety Challenges from Farm to Table. Part I

The geographic orientation of Southeast Asia regarding the spread of HIV/AIDS

Epidemiology of Emerging Infectious Diseases: An Examination of Global Threats From a Public Health Education Perspective

Acute P. aeruginosa Infections-From Genes to the Bedside. The relationship between research and clinical care. Part I

Syphilis is still with us

Cholera and Global Health. Part I

Venezuelan Equine Encephalitis Virus in Mexico

Function of Aminoglycoside–Arginine Conjugates (AACs) as inhibitors of HIV-1 replication

West Nile Virus Encephalitis

HIV INFECTION AND INJECTION DRUG USE: The Importance of Gender

Anaplasmosis and taxonomic issues

Ticks

Malaria in pregnancy in sub-Saharan Africa: Relationships with mothers' anemia and their infants' birth weight

Clinical and Epidemiological Aspects of Escherichia coli O157:H7 in Latin America

Factors associated with the pattern of dengue haemorrhagic fever (DHF) incidence in Indonesia

Dengue and Aedes Aegypti: a public health problem along the United States-Mexico border (Lecture number 1 - a series of Dengue lectures)

Hepatitis C in Pakistan

Opportunities and Challenges in reducing heterosexual HIV transmission

An update on HIV/AIDS and STDs in Pakistan: epidemiological trends over the last decade

Pharmaceutical companies & HIV/AIDS in developing settings

"Just a few days . . . Ebola, Zaire, 1976". Part I

All-cause Mortality and Malaria in African children: Trends and Controversies

Conquering Malaria Through Actions Linking Control to Research

HIV/AIDS

Infectious Diseases Programs and Perspectives of the Fogarty International Center, National Institutes of Health

Tropical Diseases Research in Panama: Historical Perspectives and Current Opportunities

Scourges Old and New: The Burden of Infectious Diseases in the 21st Century. Part I

Communicable Diseases Following Natural Disasters:A Public Health Response

Pathogenesis of AIDS

Towards an HIV Vaccine

TB and the Mexican Border: BCG, Practices & Complications. Part I

Epidemiology of cholera

Shigella infection

Salmonella infection

AIDS: Basic Themes During Epidemics

The Role of International Agencies in Conquering Malaria. Part I

Nosocomial Infection. Surveillance Methods

The Impact of Pandemic Influenza on Public Health. Part I

Incidence of Influenza in Ontario Following the Universal Influenza Immunization Campaign

Avian Influenza in Vietnam "Cum ga"

Typhoid fever & control measures

Sexually Transmitted Diseases: Viral (Part I)

Global Polio Eradication: history, achievements & challenges

Control of Communicable Diseases in Emergencies

Sexually Transmitted Diseases: Bacterial (Part I)

Antimicrobial Resistance and Public Health

Biodefense and Pandemic Influenza: The Research and Public Health Interface

The Scientific Response

Emerging and Re-Emerging Infectious Diseases: The Perpetual Challenge to Global Health

Cutaneous Leishmaniasis in Saudi Arabia

Combating Infectious Diseases and the Disease Control Priorities Project: A Convergence of Epidemiology, Economics and Research

Challenges of Influenza Control

Herd Protection against Influenza

Epidemiologic Update: Hepatitis C

Evolutionary Origin and World Expansion of Malaria

Outbreak of Botulism Associated with Fermented Beaver - Alaska, 2001

Epidemiology of Amebiasis

Rift Valley Fever

Emerging Infectious Diseases

Caring for the Worker Potentially Exposed to Bloodborne Pathogens. Part I.

Sexual Behavior and the Prevalence of Chlamydia trachomatis Infection in Asymptomatic Students in Germany and Spain

AIDS Care, Why and How Should Industry Respond?

HIV/AIDS - Issues for the Workplace principles, planning, policy, programmes and project participation

Expanding Safer Sex Options: Introducing the Female Condom

Opportunistic Fungal Infections

Anthrax - The Sequel. Part I

Cost-performance Analysis of Malaria control in Henan Province, China

Device Related Nosocomial Infection in ICU. Part I

Hospital Epidemiology

Basic Investigation of Outbreaks. Part I

Management Issues in Outbreak Investigations. Part I

The Economic and Demographic Impact of HIV/AIDS in South Africa

Infection Control: Attitudes and Behaviors

Organization and Sustainability

Prevention and Control of Infections

Prevention and Control Activities

Dengue, Aedes aegypti, and Hurricane Reconstruction in the Caribbean and Central America: Prevention and Control Following a Natural Disaster (Text-2002)

Microbial Threats to Health in the United States: Natural and Manmade

Population Dynamics of Infectious Diseases

Administrative Issues in Outbreak Investigations: Working with the Media. Part A

Human Bartonellosis Caused by Bartonella Bacilliformis

Chickenpox in Children, Adults and Pregnancy: What to Do?

A Foodbome Outbreak of Gastroenteritis in a Teaching Hospital

A Review of Foodborne Illness & an Outbreak Investigation that Lead to a Product Recall

The Big Ten Tropical Diseases. Categorization and research strategic emphases

Adult immunization “What Family Physicians Need to Know”

A.2.4 Other epidemiology lectures

(353 lectures)

What kills us?: Yesterday, today and tomorrow

National Hospital Discharge Survey (NHDS), National Survey of Ambulatory Survey (NSAS) National Survey of Ambulatory Survey (NSAS)

Using National Ambulatory Medical Care Survey and National Hospital Ambulatory Medical Care Survey Data (Part I)

National Electronic Disease Surveillance System

Molecular Epidemiology and Food Outbreaks

National Ambulatory Medical Care Survey / National Hospital Ambulatory Medical Care Survey Workshop (Part I)

Women's Health Data in National Survey of Family Growth (NSFG)

NCHS Data on Women's Health NHANES Series

The National Health and Nutrition Examination Survey (NHANES): An Overview

Mortality Associated with Down Syndrome in the United States, 1983-1997

The Epidemiology of Physical Activity-related Musculoskeletal Injuries. Part I

Introduction to Molecular Epidemiology

Primary Prevention of Birth Defect

Clinical Trial Concepts

Introduction to Injury Epidemiology

Injuly Epidemiology Analytic Approaches

The Epidemiology of Human-Animal Interactions: Part I Zoonotic Diseases

The Epidemiology of Human-Animal Interactions: Part II Health Benefits to Humans

Q repeat 9 interval amino acid forms in man and pathogen

Disaster and Hospital Functions

Pharmacoepidemiology

Epidemiology of Disasters - part I -

An Overview of Military Epidemiology

Child & Family Health Infant Mortality Module 1 of 2

The Epidemiology of Human-Animal Interactions: Part III Animals as Sentinels of Environmental Hazards

Child & Family Health Infant Mortality Module 2 of 2

The Health and Wellbeing of Womankind

Developmental (Congenital) Dysplasia of the Hip. Natural History and Prevention Levels.

C-Sections and VBACs – Past, Present, and Future

Nepal: Health Status Country Profile in Brief

Sick Building Syndrome in Relation to Environmental Tobacco Smoke and Overtime

Violence against Women in Kazakhstan. Part I

1000 Drug Interactions That You Didn't Know You Knew

Injury Epidemiology- Participatory Action Research and Quantitative Approaches in Small Populations

Mutant Prevention Concentration and the Selection Window Hypothesis. Part I

Epidemiology of Childhood Fractures in Affluent and Deprived Areas

Health inequalities in adolescence

Air Pollution and Health: An introduction

Methods and problems of developing and using instruments for measuring quality of life of the mentally ill

Occupational exposure to aerosols from waterproofing agents

Challenges in exposure assessment to Diesel soot

Too Many Germs, Too Few Monkeys. The Need for Artificial Organisms for Testing and Validating Pharmaceuticals.

Women and Smoking. A Report of the Surgeon General - 2001.

The Outer Limits of Drug Survey Monitoring Systems: Ethnographic sense making contributions to "hard data"

Risk Assessment: A Conceptual Introduction

Does the Pharmacotherapy of ADHD Beget Later Substance Abuse? A Meta-Analytic Review of the Literature

Contextual risks for maladjustment: the high costs of affluence

Chronic Fatigue Syndrome Epidemiology and Treatment Considerations. Part I

Parkinson’s Disease and the Environment: the Potential Contribution of Metal-Gene Interactions

Programme on reduction of perinatal mortality in the Republic of Kazakhstan

Overview: disparities in the diagnosis and treatment of mental disorders

Access to and Need for Counseling Among Children after the September 11th Attacks on the World Trade Center

Using verbal autopsy to assess to pass to death Infant Mortality in Talas oblast, Kyrgyzstan, years 1997-2001

Access and Quality of Primary Health Care with focus on Mother and Child Care

Risk Factors for Female Infertility in an Agricultural Region

Correlates of wife abuse among married men

Importance of Race, Ethnicity and Genetics in Biomedical Research and Clinical Practice

Opportunities to Reduce Oral Health Disparities: Basic Sciences to Clinical Practice. Part I

Genetics of Osteoporosis. Part I

Fear of Falling Among Seniors: Needs Assessment and Intervention Strategies

Some problems of air pollution in armenia within post-soviet period

Malt Liquor Use A Community College Study

Pediatric Micronutrient Deficiencies, Epidemiology and Prevention I. Introduction, Principles and Iron Deficiency

Pediatric Micronutrient Deficiencies, Epidemiology and Prevention II. Vitamin A and Iodine

The Fertility Transition in Historical Perspective

Maternal Health Measurements

Semen quality in relation to exposure to currently used pesticides

Cognitive approaches to suicide. Part I

Teenage Driver Crashes -- Carrying Passengers as a Risk Factor

Vitamin K and Hemorrhagic Disease of the Newborn

Prevention of Birth Defects

The decline of mortality in the second half of the 20th century

Molecular Biology of Memory: A Dialogue Between Genes and Synapses

Toxicology and Epidemiology (1st of 10 Lectures on Toxicologic Epidemiology)

The Utilization of Geographic Information Systems (GIS) in Health Planning and Epidemiology

Research Phobia in Family Medicine

Genes, Cognition and Emotion. Part I

Evidence-Based Medicine Can we practice effectively without it?

Disaster Epidemiology Lessons From Bam Earthquake Dec 26, 2003 Iran. Part I

Depression During Pregnancy

The National Children's Study

Environmental Endocrine Disruptors Part I: Toxicity

Environmental Endocrine Disruptors Part II: Bioaccumulation

Environmental Endocrine Disruptors Part III: Persistence and Prevention

Exercise and Health

Competencies Required of Public Health Professionals and Leaders

Public Health and Risk Assessment (2nd of 10 Lectures on Toxicologic Epidemiology)

An Introductory Lecture to Environmental Epidemiology Part 1. Introductory Examples

An Introductory Lecture to Environmental Epidemiology. Part 2. Time Series Studies

Can Physical Activity Attenuate Aging-related Weight Loss in Older People?

Evidence Based Medicine The Hierarchy of Evidence. Part I

An Introductory Lecture to Environmental Epidemiology. Part 3. Issues in Design.

An Introductory Lecture to Environmental Epidemiology. Part 4. Some Issues in Exposure Assessment

Prenatal and Postnatal Growth and Endocrine Diseases. Part I

An Introductory Lecture to Environmental Epidemiology. Part 5. Ecological Studies.

Epidemiology of Aging

Hispanic ethnicity, rural residence, and regular source of care

Toxic Oil Syndrome: A new disease. A perspective of interaction between host and environment.

Bacterial Vaginosis and Pregnancy: Clinical Overview and Public Health Implications

Male Involvement in Reproductive Health

Health Disparities in Physical Activity: Patterns and Implications

Social Epidemiologic Methods in International Population Health and Health Services Research

Prevalence of chronic constipation in general population

Heights and Weights of Mexican Children

Reproductive Health Trends and Issues

Introductory lecture on environment and health

Oxidant Mechanisms in Response to Ambient Air Particles

Consaguinity and apnea of prematurity

Perinatal Epidemiology

Anaphylaxis & Acute Allergic Reactions in the Emergency Department

Update on Acute Asthma

Medical Aspects of Blast Injuries

Neurolathyrism

Program: Safe School

Safety Road Program

Factors Associated with Breast Self Examination (BSE) Practice Among Female Patients in an Out Patient Clinic in the Philippines

Toxicology and Risk Assessment. (3rd of 10 Lectures on Toxicological Epidemiology)

Islamic teachings on reproductive health and fertility transition in Muslim-majority countries

Public Health Genetics: An Emerging Interdisciplinary Field For The Post-Genomic Era

Integrating Genomics into Clinical Practice

What is Clinical research? And what do we do it?

Genetic Information for Testing Type 1 Diabetes

Risk assessment in travel medicine

Scientific Basis of Genetics. Part I

Human Genome Project. Part I

US Childhood Asthma Prevalence Estimates: The Impact of the 1997 National Health Interview Survey Redesign

Epidemiology and Risk Assessment (4th of 10 Lectures on Toxicologic Epidemiology)

Russian Health profiles in Transition

How to Interpret Your Lab Results

Birth Control and Abortion in American History

Public Health Disaster Consequences of Disasters

Smoking and Health

Treatment Effectiveness: Finding Value in Clinical Data. Part 1.

Examination of narcotic drugs and ethyl alcohol among soldiers in Lithuania

Theories in Environmental Risk Assessment

Road traffic accidents in Tunisia: a man made disaster

Indications of zinc deficiency for lithuanian population and its geomedical control

Chernobyl disaster and experience of population protection from nuclear accident

The National Advisory Committee on Children and Terrorism and Current U.S. Changes in How Preparedness is Evaluated

Respiratory Symptoms Reported by Adults Living in an Air Polluted Area in Jordan

From injury epidemiology to injury prevention: Lithuanian experience

CRESP Amchitka Expedition: A Model for Multi- and interdisciplinary Research into Radionuclide Contamination of the Marine Environment

Natural disaster risks in ukraine

Travel medicine and pregnancy

A Review of Risk Factors for Schizophrenia

Ethical Principles for Biomedical Research Involving Human Subjects: Overview of International Guidelines

Toxicologic Side of Epidemiology (5th of 10 Lectures on Toxicologic Epidemiology)

Birth control and breastfeeding

Environmental Epidemiology on Small Areas

The past, present and future of childhood lead poisoning

Experience of implementation of standardized trauma treatment methodology Advanced Trauma Life Support® courses (ATLS®) in Lithuania. Part I

Impact of environmental factors on psychic disorders and somatic diseases in lithuania

Data for Decision Making in Disasters: Advances and Controversies. Part I

An Educational Intervention to Promote Proper Seat Belt Use During Pregnancy

Predictors of Retention in Care Among HIV+ and At-Risk Youth

What fathers need: A countywide assessment of the needs of fathers of young children

Family Planning Effort Scores

Integrated perinatal infections surveillance: the labor and delivery record to the rescue

Adapting Smoking Relapse Prevention Materials for Pregnant and Postpartum Women

Substitution of Dietary Protein for Carbohydrate: Associations of Disease and Mortality in a Prospective Study of Postmenopausal Women

Magnetic Resonance Imaging (MRI) Screening for High Risk Patients

Negative self-schemas and the onset of depression in women

Health Disparities Among American Indian/Alaska Native Populations. Part I

Health Situation in Mongolia

Carpal Tunnel Syndrome

A systematic review of the prevalence of schizophrenia

Gender Sensitive Factors in Girls' Delinquency

Impact of the Informatics on Epidemiology and Health Care Management

Cell Division. Part I

Genetics is a study of how proteins interact, fold, and function. Part I

The Great Ideas Of Biology

Cell Cycle Control

Epidemiologic Side of Toxicology (6th of 10 Lectures on Toxicologic Epidemiology)

Epilepsy in childhood

Analyzing the increase in sporadic Creutzfeldt-Jakob disease (CJD) observed since 1970 in the United Kingdom (U.K.), by using age-period-cohort models

Monitoring the Health and Well-Being of a Disadvantaged Minority Group: Australia's Aboriginal and Torres Strait Islander Peoples

The WISE Study: The NHLBI-Sponsored Women's Ischemia Syndrome Evaluation Methods and Findings

Molecular Basis of Mechanotransduction in Endothelial Cells. Part I

Treatment During Pregnancy: Gaps in our Knowledge. Part I

Internet& epidemiological Surveillance

Collaborative approach for the treatment of postpartum haemorrhage

Anthropometrics of Mexican schoolchildren

Evolution by Gene Duplication. Part I

VIGI+A Project

Measuring Immunization Coverage among Pre-School Children: Past, Present and Future Opportunities. Part I

Human Exposure Assessment I (7th of 10 Lectures on Toxicologic Epidemiology)

Alcohol Use, Abuse, and Dependence

Fouling and Cleansing our Nest; Human-induced Ecological Determinants of Disease

Perspectives in Global Fertility and Infertility

Understanding Gene Testing

Human Exposure Assessment II (8th of 10 Lectures on Toxicologic Epidemiology)

PTSD in Refugee Populations

Obstetric Fistula An Overview

Can the Concept of Environmental Public Health Tracking Work in a Real Life Setting?

Disability Adjusted Life Years Possibilities and Problems

Epidemiological Evidence for MDMA/Ecstasy Dependence. Part I

Depression in Southern Africa: Lessons from Zimbabwe

Effectively Breaking the Cycle of Drugs and Crime

Characterization of Health Risk (9th of 10 Lectures on Toxicologic Epidemiology)

Inequalities in Children's Educational Outcomes: Using Administrative Data to Gain a Population-Based Perspective on Health

Evidence based health care (EBHC)

Assessing and Managing Environmental Risks: Putting Each Problem Into Public Health Context and Engaging Stakeholders from the Start (part I)

Molecular Profiling of Prostate Cancer

Overview of Public Health Surveillance. Part I.

Gene-Environment Interactions

Patterns of Health and Illness in Indigenous Australian Communities

Global Diseases biological challenges of the 21st Century

Perspectives on Clinical Outcomes of Studies of Products for Use in Cartilage Repair

IOM recommendations on drug safety: relevance for vaccines?

Validation of the OMERACT-OARSI Responder Index: Responders Have Better Overall Health Status than Non-responders

Fraud in Medical Research:Emphasis on Statistical Aspects

Toxicologic Epidemiology (10th of 10 Lectures on Toxicologic Epidemiology)

Ethics in research involving human subjects

American Bioethics after Nuremberg: Pragmatism, Politics, and Human Rights. Part I

The Burden of Reproductive Disease in Rural Women in The Gambia, West Africa. Part I.

Environmental Approaches to Injury Prevention

Genomics, toxicology, & public health (Part I)

Gene-Environment Interactions in Cancer

The Newcastle Critical Appraisal Worksheet. A format for examining journal articles.

Genetics: Past, Present, and Future. Part I.

Priority Setting for Health Research

Trends in Mortality by Income in Urban Canada from 1971 to 1996. Part I.

Genetic Testing and the Prevention of Type 1 Diabetes. Part I.

Falls in the Elderly

Routine Molecular Epidemiology for Enhanced Detection and Control of Foodborne Outbreaks. Part I.

Maternal Smoking and Infant Birth Weight

Molecular Epidemiology and Susceptibility to Malaria Infection. Part I.

Fetal Origins of Disease Hypothesis

The Impact of the Human Genome Project on Public Health Practice

Prevention of Complications of Endocrine Disorders

Geograpfic Variation of GI Diseases

Living and dying: Health, Illness and Disease

Maternal and Child Health in Republic of Kazakhstan (Community Health Assessment).

Inequity and Inequality in a Healthy City Profile of Moscow. Part I.

The Relationship between Breast-feeding and the Prevalence of Asthma

The Global Health Crisis. Part I.

Genetics of Diabetes and Its Complications: Layers of Complexity. Part I.

Social Desirability and Social Approval Biases in Dietary Self-Report: Examples of Epidemiologic Effect Modification. Part I.

Hereditary Colorectal Cancer: From Genetic Testing to Prevention. Part I.

Exposure Assessment to Trihalomethanes in Swimming Pools

Mapping Genes for SLE: A Paradigm for Human Disease?

Is the CT Scan important at the 24 Hours in Children with Mild Traumatic Brain Injury? International Multicentre Study

Socioeconomic Differences in Swedish Children and Adolescents Injured in Road Traffic Injuries: cross sectional study

Socioeconomic Differences in Road Traffic Injuries During Childhood and Youth: a closer look at different kinds of road user

Perchlorate The State of the Science Human Studies

Predictors of Asthma in Young Children. Does Reporting Source Affect Our Conclusions?

Prevalence of permanent childhood hearing impairment

Zoonotic Pathogens: An Introduction

Effectiveness of a State Law Mandating Use of Bicycle Helmets among Children: An Observational Evaluation

Air Safety and Terrorism

The epidemiology of smoking in Ukraine: a cross sectional survey undertaken in 2000

New Approaches to Epidemiological Risk Assessment Management

Epidemiologic Challenges in Malignant Hyperthermia (MH)

Self perceived health in Ukraine: results of a cross sectional survey

A Case-Control Study of Biomechanical and Psychosocial Risk Factors for Occupational Low-Back Pain

Validity and Reproducibility of Exposure Measurements: The Method of Triads

Comments on APPENDIX A "Dissent on Safety Issues"

Post-combat disorders from the Boer War to the Gulf Conflict: their nature and attribution

Enhancing Health Policy Through Epidemiology

Health Outcomes in Populations Living Close to Landfill Sites

Death as Data: Autopsy and the Death Certificate

Undernutrition in the old age - costs and treatment implications

Neural Tube Defects Among Mexican Americans Living on the Texas-Mexico Border: Effects of Folic Acid and Dietary Folate

New Problems of Environmental Health in Armenia

Impact of Preeclampsia on Birth Outcomes

A Multilevel City Health Profile of Moscow

Validity and Reproducibility of Physical Activity Questionnaires

Physical Activity and Bone Health during Childhood and Adolescence: Critical Periods for the Prevention of Osteoporosis

Idiopathic Sudden Deafness: risk factors from a case-control study using pooled controls

Environmental Exposure Assessment and Biomarkers

Safety Education of Pedestrian a Systematic Review

Corticosteroid Randomisation After Significant Head Injury

Disabilities due to Injury in the U.S. Armed Forces

Air Travel Pleasure or Peril?

Motor Vehicle Crashes in Older Drivers

Plasma Concentrations of Carotenoids, Retinol and Tocopherols in Preeclamptic and Normotensive Pregnant Women

GnRH antagonists in Assisted Conception. Cochrane Systematic Review. Part I

Diagnosis I

An Overview of Risk Assessment

Chinese Herbal Medicines: The Good, the Bad, and the Ugly

Care of Woman with HIV Living in Limited-Resource Settings: Prevention Part I

Epidemiological Issues in Determining Whether Benzene Causes Lymphatic Cancer or A Toxicologist's Defense Against the Pump Handle. Part I

The Problems of Malnutrition in Armenia

Improving Child Health in Developing Countries: the Critical Role of Research

HIV in Mothers and Children. Part I

Evidence Based Medicine. Part I

Drug Interactions Pharm 560 2 October 2002 . Part I

Evidence Based Medicine. Prognosis

Evidence Based Medicine. Effectiveness of Therapy. Part I

Evidence Based Medicine. Meta-analysis and systematic reviews. Part I

Evidence Based Medicine. Diagnostic Tests

Nutritional Guidelines for Osteoporosis

Risk Assessment

Antioxidant Vitamin Therapy: To 'E' or not to 'E'

Social and Leisure Activities in Relation to Dementia

Injury Biomechanics

Injury Prevention and Control

Risky Behaviors in Adolescence

Adolescent Health. Creative Approaches

Introduction to Injury Scoring Systems. Physiologic Scores

Hand Hygiene: A Look at the New Guideline. Part I

Fibrinogen in South Asians

Medical Surveillance

Congenital Malformations and Birth Weight: a Family Perspective

Adolescent Health Risk Behavior

Preschool and School Age Activities: Comparison of Urban and Suburban Populations

Early Childhood and Population Health. Part I

Epidemiology and Sex(ually Transmitted Diseases): The Basics

Forecasting Epidemic: Time Series Modelling

Modeling Factors Influencing Malaria Incidence In Myanmar

Insurance, the Presence of a Medical Home, and the Benefits of Primary Care for Children. Part I

A Threshold Effect in the Relation of Stressful Life Events and Preterm Delivery

Malnutrition in Pakistani Children

Women's Health in Gyor

Reproductive Health

Domestic Violence

Urban/Rural- and Income-Related Variations in Correlates of Physical Activity in U.S. Adults

Concepts of Demography

Childhood Asthma with an emphasis on disease misclassification and synthetic bedding

Healthy Worker Effect (HWE). Part I

The origin of Bimaristans (hospitals) in Islamic medical history

Toxicity of new generation pharmaceutical agents

One for You and One for Me: Drug Seeking Patients and Professionals. Part I

Effect of Sport Nutrition Education in High School Students from Low-Income Communities. Part I

Health in Russia Russian Health Profile

"Ukraine" Health Profile

Kazakhstan Health Profile

"Armenian" Health Profile

Latvian Health Profile

"Turkmenistan" Health Profile

Kyrgyzstan Health Profile

Lithuanian Health Profile

Azerbaijan Health Profile

Georgian Health Profile

Tajikistan Health Profile

Moldova Health Profile

Estonian Health Profile

Uzbekistan Health Profile

Belarus Health Profile

Early Detection and Prevention of Renal Failure. Part I

The Identification of Genetic Hyperlipidemias

Prevention of Preeclampsia. Part I

Smoking Cessation and Pregnancy. Part I

Interventions in Smoking Cessations. Part I

Prevention of Complications of PID. Part I

Fetal Alcohol Syndrome: Alcohol and Pregnancy

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Exercise Programs In The Elderly: Risks and Benefits

USE IT OR LOSE IT: Preventing Cognitive Decline in Aging

Nicotine Dependence and Quitting Smoking. Part I

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