

Special Article

# Global Networking of Cancer and NCD Professionals Using Internet Technologies: The Supercourse and mHealth Applications

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Cancer is a leading cause of death around the world. Education is at the core of cancer prevention activities, especially programs targeting empowering existing public health workforce. In the past 10 years, researchers at the University of Pittsburgh have been building the Global Health Network Supercourse project, a library of over 4500 online lectures and a network of nearly 50000 public health professionals in 174 countries. As of November 2010, the overall number of Supercourse participants from Asia exceeds 7000 participants. The Supercourse network has been investigating methods for Internet based recruitment of cancer prevention professionals in order to network cancer experts locally and globally, including the use of mHealth technologies for cancer research education and for NCD registries. Supercourse is a tool that can offer a solution to the challenges of information sharing, especially in the field of NCDs and cancer. In this paper, we highlight the need for the development of Cancer Supercourse with Satellite in Asia and encourage faculty members from Asia to join the network.

**Key words:** Cancer, Internet-based education, Prevention, eHealth, mHealth, Supercourse, Chronic disease  
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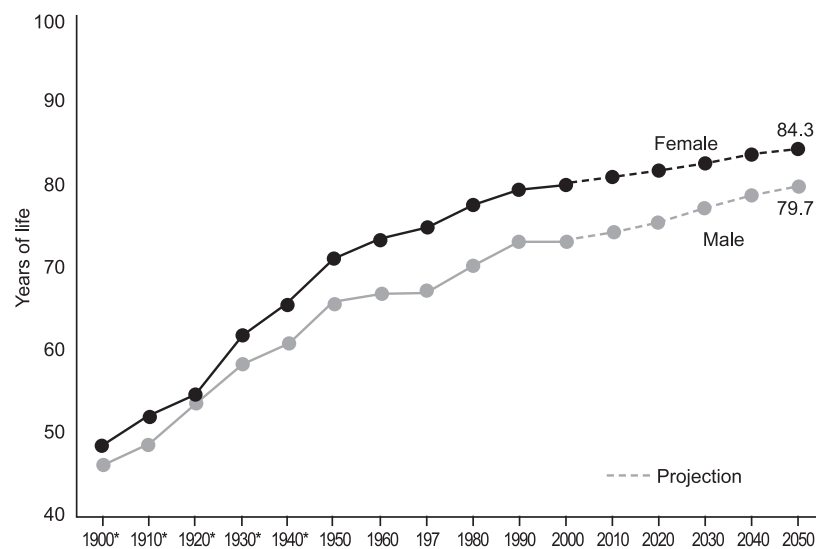
## INTRODUCTION

*“Education is the Most Powerful Weapon Which You Can Use to Change the World.”*

**N. Mandela**

Cancer is a leading cause of death around the world. According to WHO, more than 70% of all cancer deaths occur in low- and middle-income countries. Deaths from cancer worldwide are projected to continue rising, with an estimated 12 million deaths in 2030. Despite increasing burden of cancer around the world, there is very little research on cancer prevention and cancer prevention education. Education is at the core of cancer prevention activities, especially programs targeting empowering existing public health workforce. Cancer surveillance programs monitoring incidence, prevalence and survival are also a critically important component of cancer prevention. In the past 10 years, researchers at the University of Pittsburgh have been building the Global Health Network Supercourse project, a library of over 4500 online lectures and a network of nearly 50 000

public health professionals in 174 countries Supercourse has approximately 40 participants from Korea and 2 lectures in Korean, while the overall number of Supercourse participants from Asia exceeds 7000 participants. Growing number of lectures in the Supercourse collection are targeting cancer prevention, research methods, and cancer surveillance. The Supercourse network has been investigating methods for Internet based recruitment of cancer prevention professionals in order to network cancer experts locally and globally, including the use of mHealth technologies for cancer research education. Supercourse education modules are aiming to improve cancer awareness and empower cancer educators around the world through the development of low bandwidth lectures, opening mirrored servers in the developing countries, distribution of Supercourse CDs/DVDs, and networking public health and especially non communicable diseases (NCD) professionals from across the world. Quality control mechanisms of the lectures are developed based on an open peer-review system, similar to that utilized in amazon.com. Global, low cost, low bandwidth, and high impact projects like the Supercourse are needed to



**Figure 1.** Life expectancy in the US from Healthy People 2010 [1].

improve sharing of cancer prevention and cancer surveillance information locally and globally. Supercourse is a tool that can offer a solution to the challenges of information sharing, especially in the field of NCDs and cancer. In this paper, we highlight the need for the development of Cancer Supercourse with Satellite in Asia and encourage faculty members from Asia to join the network.

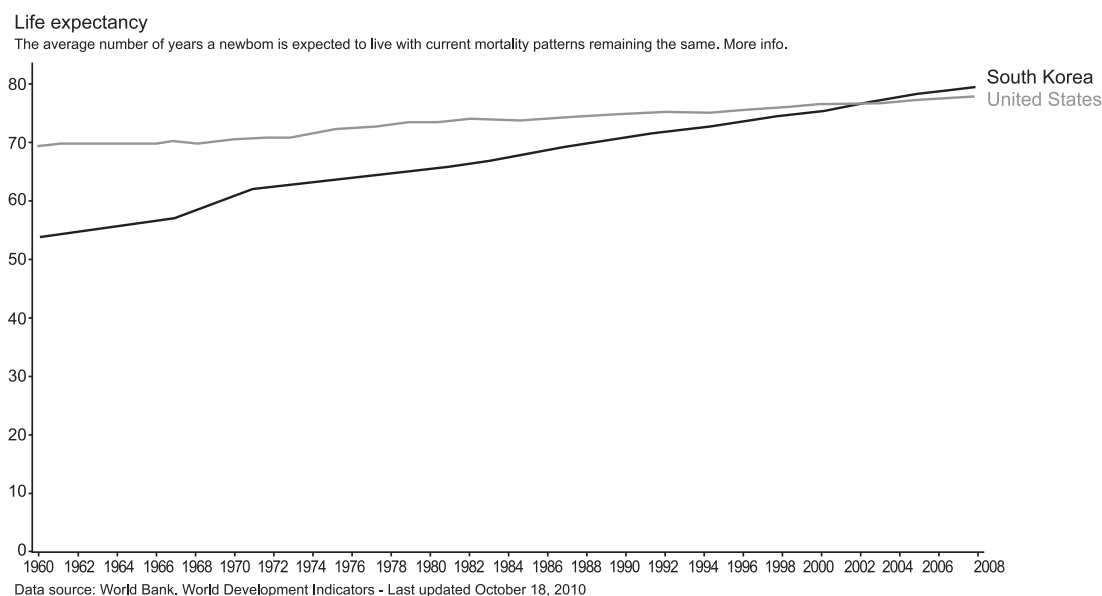
### Increasing Life Expectancy: Implications for NCDs and Cancer

According to Healthy People 2010 [1], at the beginning of the 20th century, life expectancy at birth was 47.3 years, increasing dramatically over the past 100 years (Figure 1). Today, World Bank estimates that life expectancy in both, USA and South Korea (hereafter Korea) is approximately 78.5 years of age, with the world's overall life expectancy being over 70 years of age. Koreans had an average life expectancy at birth of 52.4 years in 1960, 16 years below the average among member countries of the Organization for Economic Cooperation and Development; it increased to 62.2 years in 1970. With an average life expectancy of 78.5 in 2010, Korea experienced the greatest life expectancy gain of any country in the coalition and a rise of more than 6 months per year from 1960 to 2005 [2]. With increasing life expectancy, NCD are becoming leading cause of death in both developing and developed world. This is particularly true for cancer, which is currently one of the world's leading causes of death.

Institutionalization of public hygiene in Korea in the

late 19th and early 20th centuries may have led to reductions in infectious and parasitic diseases [3], leading to the initial rise in life expectancy in Korea over the course of the 20th century. Success in the reduction of infectious and parasitic diseases, have been followed by reduction of infant mortality, improved access to clean water, and improved housing conditions, all leading to great increases in life expectancy. Preventive activities have been implicated in increasing life expectancy and achieving longer life expectancy in various countries around the world, including US and Korea. Despite the fact that these two countries had very different life expectancy in 1960, through the process of accelerated epidemiologic transition, Korea now has higher life expectancy than the US. Prevention of childhood mortality and communicable diseases have been at the core of life expectancy increases (Figure 2). Disease prevention has been emphasized in the work of Chang Sei Kim, the first Korean to receive PhD in public health, who argued that Korean people should receive education on public health in order to improve the primitive conditions of sanitation [4].

In the past three decades, prevention of chronic disease became important, as scientists explore ways to even further increase our life expectancy gains. The 3.6-year increase in male life expectancy in Korea between 1983 and 2005 attributable to CVD largely reflected lowered mortality from hypertensive disease, stroke, and other heart diseases. While most of this positive contribution occurred in men aged 45 to 74 years [2], similar trends have been observed in women. Sadly, success in the prevention on cardiovascular disease in



**Figure 2.** Life expectancy in South Korea vs US. Data source: Public Data from World Bank, World Development Indicators.

Korea, US, and other countries of the world has not been replicated for the field of cancer prevention.

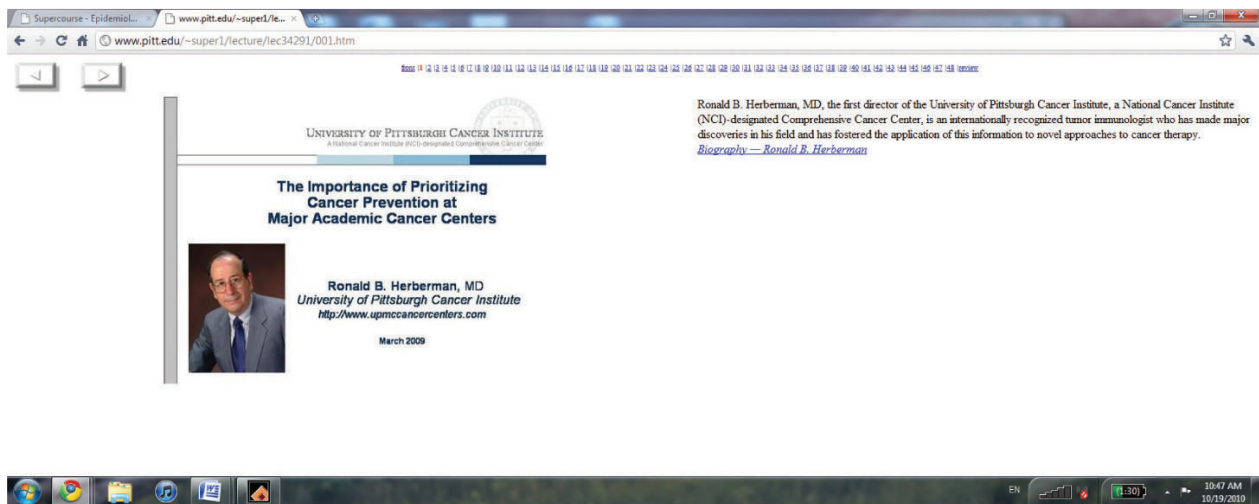
Cancer is a complex chronic disease that is very difficult to manage effectively. The complex biological processes that contribute to the formation of malignancies make finding a cure a difficult challenge. Existing therapies, including chemotherapy and radiation, have limited degree of success and result in toxic side effects. One of the biggest challenges in curing cancer, and especially metastatic disease, is developing a treatment regimen capable of killing rapidly dividing cancer cells without destroying healthy cells.

Given the challenges of curing malignancies, cancer prevention offers to be a good and cost effective alternative approach to reducing the burden of cancer morbidity and mortality. Far and away the most important cause of lung cancer is exposure to tobacco smoke through active or passive smoking [5]. Despite the fact that smoking can be prevented, smoking continues to be a problem in both developing and developed countries. In the United States, lung cancer remains the leading cause of cancer death in both men and women even though an extensive list of risk factors has been well-characterized. Smoking harms nearly every organ of the body, and is implicated in the development of many malignancies [6]. Smoking has been implicated in cancers of the lung, esophagus, larynx (voice box), mouth, throat, kidney, bladder, pancreas, stomach, and cervix, as well as acute myeloid leukemia.

Similarly, morbid obesity has been implicated in cancer development, especially in females. Cancer prevention cannot be implemented without having a well trained workforce in cancer and NCD prevention.

WHO Collaborating Centre, University of Pittsburgh and the Global Health Network Supercourse Project

The WHO NCD Action Plan [http://apps.who.int/gb/ebwha/pdf\\_files/A61/A61\\_8-en.pdf](http://apps.who.int/gb/ebwha/pdf_files/A61/A61_8-en.pdf) is one of the most important concepts in the area of Non-communicable diseases prevention, focusing on leading and catalyzing an intersectoral, multilevel response to chronic disease, with a particular focus on low and middle-income countries and vulnerable populations. To accomplish effective NCD prevention, there needs to be a well trained NCD work force in all countries (<http://www.who.int/nmh/about/en/>). Sadly, there are very few people trained in NCD epidemiology and Prevention. While many public health professionals are aware of dangers of smoking and the risk for lung cancer, other risk factors for cancer, such as obesity and certain preventable infections, are less known. This problem is especially evident in the developing world, where the number of high quality schools of public health is limited and where mortality from NCDs is on the rise. The UN Resolution calling for the Summit on NCDs was unanimously passed by UN member states on 13th May, 2010. For the first time ever, the United Nations General Assembly will hold an NCD Summit involving Heads of State, in September 2011, to address the threat posed by NCDs to low- and middle-income countries



**Figure 3.** Front slide of the Supercourse lecture on prioritizing cancer prevention at major academic cancer centers by Ronald Herberman, MD.

(LMICs).

Global Health Network Supercourse Project [7-12] [www.pitt.edu/~super1](http://www.pitt.edu/~super1), that came out of the WHO Collaborating Centre for Disease Monitoring and Telecommunications at the University of Pittsburgh, targets the need for multilevel response to NCDs, by fueling the distribution of preventive lectures on NCDs and cancer through the global network of scientists, consisting of nearly 50000 health leaders in 174 countries. We have collected 4500 PowerPoint lectures on Global Health and Prevention from 20 Nobel prize winners, the former head of the NIH and CDC, and the former US Surgeon General in a lecture library. The theme of prevention shines through most of the Supercourse lectures, especially in the field of cancer (Figure 3).

Supercourse network has approximately 40 faculty members from Korea and over 7000 members from Western Pacific Region (WPRO) region, mostly based in India. Considering the fact that Supercourse is still not very popular among scientists in Korea, we would like to highlight the need for the development of Cancer Supercourse with Satellite in Asia and encourage faculty members from Asia to join the network.

One of the things that can be done to improve awareness of the NCDs locally and globally is to empower and educate public health taskforce. This can be done by sharing high quality educational curricula in the field of cancer and other NCDs. This can be accomplished by sharing materials through the Internet, DVDs, mobile devices, and other media. This can also be achieved by sharing educational materials in the area of research methods methodology and biostatistics. The

Supercourse has several hundred lectures in this area, including six full courses on basic epidemiology and biostatistics, ready for use for the local and global faculty members (<http://www.pitt.edu/~super1/index1.htm>).

In the past, core Supercourse developers have also been implementing short training programs targeting early stage public health professionals and physicians. This model for training physicians in public health by providing in-house research training can be used to strengthen local capacity and reduce increasing problems of ‘brain drain’ [13]. These 1-2 week training courses helped to facilitate global networking of faculty and students.

### **Building Blocks of NCD and Cancer Prevention.**

Slides to Lectures to Courses to Curricula: In the Supercourse, our plan is to take several approaches to build a flexible shared curricula program in the area of NCDs. We collect the “building blocks” of curricula: slides and lectures. Curricula are composed of courses, courses are composed of lectures, and lectures are composed of slides. By rearranging lectures one can create different courses and curricula. We can help to train junior scientists in the area of NCDs by establishing a system of slides and lectures that can be rearranged by teachers to establish different curricula. While we provide the “raw materials,” it is the university instructor that converts the lectures into courses and curricula. Providing slides and lectures are the “seeds” of interdisciplinary courses and curricula, as they make it much easier for local instructors to teach in other areas.

We provide the building blocks for lectures, for courses, and curricula in the Supercourse. Library of Alexandria in Egypt is building Science Supercourse, where the feature of using slides as building blocks for new lectures is already available.

Overall, the Supercourse has an excellent start on building NCD program. Supercourse has over 300 NCD epidemiologic lectures. These lectures are from some of the leading NCD experts in the world including Walter Holland, Sir Richard Doll, Steve Blair, Peter Bennett, numerous lectures from NCI, etc. These lectures are used quite extensively. In the past 12 months, they were seen by over 1 million individuals, as determined by web statistics. Approximately 20-40 percent of the usage of lectures is from developing countries. The ranking of our lectures overall is 4.5 / 5 based upon 10000 reviews. It is clear that our chronic disease lectures from developed and developed countries alike are highly rated, with very high Web impact measures, and thousands of students in both developed and developing countries have already learned from them. The importance of the network and Supercourse lectures is that we already have built a large, robust global faculty network engaged in NCDs. Many more students are already being taught about NCDs due to the Supercourse, as the course preparation time is markedly reduced.

### **Distribution of Lectures to Colleges and Universities**

We use many different approaches to distribution. Materials are not copyrighted, so we encourage people to share the lectures with their friends. Thousands of faculty worldwide come to the main Supercourse site and to the mirror servers. In addition to our Supercourse site in Pittsburgh, we have 42 mirrored servers at universities in Nepal, Egypt, Sudan, Thailand, China Mongolia, Mexico, China, Egypt, etc. A mirrored server aids distribution as accessing a lecture by someone living in Nepal from a server in Nepal is much faster than if the server is in Pittsburgh.

Our Chinese network of 700 medical students is translating the lectures into Chinese. We share the best materials with teachers, and then they can present it without access to the Internet to their students through DVDs. We share these with the educators around the world. We do not "give" the DVDs away, rather we request that the DVDs are gifts meant to be given away, and we ask people to make at least five copies for their students and library. In addition, a governor in Nigeria

has made 1000 copies and distributed the lectures to every college and university in Nigeria. In China the power of our distribution network was demonstrated where our H1N1 lecture was put onto CCTV, the highest ranking TV in China and over 50 million students learned from it. WHO helped to distribute Supercourse DVDs to all medical schools of the world in 2010.

### **Mobile Health, NCD Prevention and the Supercourse**

Mobile health or mHealth is a term most commonly used in reference to using mobile communication devices for health services information sharing. Advances in mobile communications and medical technologies facilitate the development of emerging mobile systems and applications for healthcare [14]. When most people think of Mobile Health, they think in the context of high tech, and clinical medicine, e.g. using cell phone images for distance diagnosis, real time patient monitoring, real time provision of care, etc. In this context, mHealth applications are limited to the health professionals in the developed world, where access to high end devices is easier. While mHealth certainly has application for industrialized nations, the field is also rapidly growing in the developing world, stemming from the rapid rise of mobile phone penetration in low-income nations.

To our knowledge, mHealth has not been thought about in the context of Mobile-Global Health and the use of low end simple mobile communication devices. Worldwide, there are 6.2 billion people and 4.5 billion cell phones. In Mumbai, India, there are 1.5 cell phones for every person. According to Korea Times, Mobile phone population stood at 50.05 million as of Sept. 8, 2010, exceeding the country's estimated population of 48.8 million. The mobile-phone ownership rate, which gauges the rate of a nation's population to its wireless users, reached 102.4 percent, meaning there are 12 mobile handsets for every 10 people in Korea ([http://www.koreatimes.co.kr/www/news/biz/2010/09/123\\_73089.html](http://www.koreatimes.co.kr/www/news/biz/2010/09/123_73089.html)). This compares to only 91% phone ownership rate in the US.

There never has been a technology that could reach so many people in an instant, for such a low cost. While the cost of iPhones and Blackberries still remains high, we need to think about Mobile-Global Health in terms of reaching large numbers of people using simpler devices. Mobile Global Health has a great potential to revolutionize global health. Considering that we can potentially reach 80% of the world's population using



**Figure 4.** Supercourse on iPhone 4.

mHealth applications, we have to think about what we should do to harness this technology for improving health around the world. For example, we can send simple messages about good hygiene practices, we can share our lectures, we can warn people about impending health dangers, or we can collect information about disease patterns around the world.

The Supercourse group in Pittsburgh is currently considering the development of a Mobile-Global Supercourse that will bring Mobile Technology into Global health by various means including:

- a) Development of a Mobile-Global Chronic Disease Surveillance technology, especially in WPRO region;
- b) Development of a Supercourse Applications for iPhones, which can bring the lectures into high end mobile devices
- c) Development of a system where Supercourse modules could be distributed via simple mobile devices as text messages;
- d) Linking I-Phones and other mobile devices with pico projectors for use in rural areas for teaching using Powerpoint lectures (Figure 4 demonstrates Supercourse lecture on iPhone 4).
- e) Using Mobiles for risk factor reduction education, e.g., obesity, smoking, HPV infection, etc.
- f) Linking Supercourse experts with the Media so that

high quality NCD information is effectively shared among chronic disease professionals around the world.

- g) Use mobile devices to conduct national health and NCD surveys, as well as for entering data into cancer and NCD registries.

Harnessing mHealth technologies is especially important in the field of cancer registries, where there timely collection of high quality information is a concern. To our knowledge, as of October 2010, the literature on the use of mHealth for cancer registries, was really scarce.

## Conclusions and Future Directions

The Supercourse network has been investigating methods for Internet based recruitment of cancer prevention professionals in order to network cancer experts locally and globally. Supercourse education modules are aiming to improve cancer awareness and empower cancer educators around the world through the development of low bandwidth lectures, opening mirrored servers in the developing countries, distribution of Supercourse CDs, and networking public health and especially NCD professionals from across the world. Quality control mechanisms of the lectures are developed based on an open peer-review system, similar

to that utilized in amazon.com. Global, low cost, low bandwidth, and high impact projects like the Supercourse are needed to improve sharing of cancer prevention and cancer surveillance information locally and globally. Supercourse is a tool that can offer a solution to the challenges of information sharing, especially in the field of NCDs and cancer. Mobile health applications have a great future in the field of NCD prevention. mHealth, based on the most ubiquitous and widely accepted technology, offers an unprecedented opportunity to serve the unserved reaching out to huge population groups. There is growing evidence that mHealth has already transformed healthcare delivery in many resource poor settings through its low cost, high reach and versatile applications [14]. The recent introduction of mobile phones that utilise the open source Android operating system, and which include (among other features) both GPS and Google Maps, provide new opportunities for developing mobile phone applications, which in conjunction with web applications, allow two-way communication between public health field workers and their project databases [16].

mHealth may have dramatic implications for cancer registries. The use of cancer registry mortality and follow-up data in epidemiologic studies is common, however, it is unclear to what extent bias may be introduced because of incomplete or inaccurate cause-of-death data in the registries [17]. Considering high level of connectivity in Korea, we can envision the start of mHealth cancer registries in this region, while involving partners from WHO, WHO Collaborating Centers, and partners from WPRO countries in general .

If you are interested in joining the Supercourse network or donate lectures, please email the Supercourse developers at [super1@pitt.edu](mailto:super1@pitt.edu).

## REFERENCES

1. Health People 2010. [cited 2010 Oct 20]. Available from: [http://www.healthypeople.gov/document/html/uih/uih\\_2.htm](http://www.healthypeople.gov/document/html/uih/uih_2.htm).
2. Yang S, Khang YH, Harper S, Davey Smith G, Leon DA, Lynch J. Understanding the rapid increase in life expectancy in South Korea. *Am J Public Health* 2010; 100(5): 896-903.
3. Lee JC, Kee CD. The institutionalization of public hygiene in Korea, 1876-1910. *Korean J Med Hist* 1995; 4(1): 23-35.
4. Park Y. Chang Sei Kim's activities on public health in colonial Korea. *Korean J Med Hist* 2006; 15(2): 211-225. (Korean)
5. Page GP, Green JL, Lackland D. Epidemiology of lung cancer with special reference to genetics, bioassays, women, and developing countries. *Semin Respir Crit Care Med* 2000; 21(5): 365-373.
6. The 2004 United States Surgeon General's Report: The Health Consequences of Smoking. *N S W Public Health Bull* 2004; 15(5-6): 107.
7. Ledoshchuk B, Shubnikov E, Hennon M, LaPorte R, Linkov F. Nuclear Health Just in Time Lectures and Nuclear Health Supercourse: <http://www.pitt.edu/~super1/lecture/lec37401/index.htm>. *J Environ Radioact* 2010; 101(12): 1070-1071.
8. Linkov F, Omenn GS, Serageldin I, Cerf V, Lovalekar M, Laporte R. Multilayer and Multimetric Quality Control: The Supercourse. *J Cancer Educ* 2010.
9. Linkov F, Hussein IS, Taioli E, Laporte R, Al-Oufi HS. The Supercourse of fisheries: importance of sharing educational materials and implications for cancer and chronic disease research. *Nutr Health* 2009; 20(1): 31-40.
10. Karimova S, Laporte R, Shubnikov E, Linkov F. Maternal and child health supercourse for the former Soviet Union countries. *Matern Child Health J* 2007; 11(6): 628-633.
11. Laporte RE, Omenn GS, Serageldin I, Cerf VG, Linkov F. A scientific supercourse. *Science* 2006; 312(5773): 526.
12. Linkov F, LaPorte R, Lovalekar M, Dodani S. Web quality control for lectures: Supercourse and Amazon.com. *Croat Med J* 2005; 46(6): 875-878.
13. Dodani S, LaPorte RE. Ways to strengthen research capacity in developing countries: effectiveness of a research training workshop in Pakistan. *Public Health* 2008; 122(6): 578-587.
14. Kyriacou EC, Pattichis CS, Pattichis MS. An overview of recent health care support systems for eEmergency and mHealth applications. *Conf Proc IEEE Eng Med Biol Soc* 2009; 2009: 1246-1249.
15. Akter S, Ray P. mHealth - an Ultimate Platform to Serve the Unserved. *Yearb Med Inform* 2010: 94-100.
16. Aanensen DM, Huntley DM, Feil EJ, al-Own F, Spratt BG. EpiCollect: linking smartphones to web applications for epidemiology, ecology and community data collection. *PLoS One* 2009; 4(9): e6968.
17. Brenner DR, Tammemagi MC, Bull SB, Pinnaduwa D, Andrulis IL. Using cancer registry data: agreement in cause-of-death data between the Ontario Cancer Registry and a longitudinal study of breast cancer patients. *Chronic Dis Can* 2009; 30(1): 16-19.