Epidemiologic and public health initiatives in telecommunication*

*Iniciativas epidemiológicas e de saúde pública nas telecomunicações**

Abstract

Epidemiologic knowledge must be available widely in order to insure public health for all worldwide. The objective of this paper is to account for what has been done in epidemiologic telecommunication during the previous four years at the University of Montreal, and to discuss the future of telecommunication for public-health enhancement. The first step taken has been to set up a mailing list in methodological epidemiology. The second step has been the launching of a virtual seminar in theoretical epidemiology. It is advocated that virtuality is mandatory to disseminate public health information, but that several crucial issues must be solved before the objective can be reached, among them the cultural, political and ethical issues of the endeavor. This paper includes a critical appraisal of the consequences for under-developed countries of the worldwide telecommunication expansion in the field of public health.

Keywords: Epidemiology. Public health. Telecommunications.

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Resumo

O conhecimento epidemiológico deve ser amplamente disponível para assegurar saúde pública para todos. O objetivo deste estudo é descrever o que tem sido realizado na área de telecomunicação epidemiológica na Universidade de Montreal, nos últimos quatro anos, e discutir as perspectivas do uso da telecomunicação no aprimoramento da saúde pública. Inicialmente foi criada uma mala direta de metodologia epidemiológica. A seguir, organizamos um seminário virtual de epidemiologia teórica. Tem se defendido que os recursos virtuais são indispensáveis para a disseminação da informação na área da saúde pública, entretanto, diversos pontos cruciais devem ser resolvidos antes que esse objetivo seja alcançado, entre eles aspectos culturais, políticos e éticos relacionados ao projeto. Este estudo apresenta uma análise crítica das conseqüências, para os países em desenvolvimento, da expansão da telecomunicação global na área da saúde pública.

Palavras-chave: Epidemiologia. Saúde Pública. Telecomunicações.

Introduction

Epidemiology is the basic discipline of public health. One of the tasks of epidemiology is to unravel disease risk factors at the population scale. There currently is worldwide need for the development of epidemiology training programs and the dissemination of epidemiologic information. Developing countries deal with large disease burdens and epidemics regularly decimate populations, but the technical knowledge insuring disease eradication is still at a loss. Easily accessible and updated scientific information remains scarce and information-sharing technology is lacking even though technical epidemiologic knowledge has started to spread largely to developing countries.

It is in this perspective that virtuality has been used to disseminate epidemiologic and public health knowledge around the world. The instruments described herein are: an epidemiology mailing list that aims at disseminating the modern techniques and methods of disease measurement, analysis, and eradication; a virtual seminar list that can accelerate epidemiologic paradigm shifts to deal more efficiently with complex disease states; and a web page that acts as supporting device to the lists. It was hoped by creating the lists that they would help support health-training programs in the least provided countries. More specifically, the above virtual devices were worked out to allow students to broaden the pool of potential human resources accessible to them. The virtual devices were also thought to be of value to experts who indulge in the sharing of viewpoints about critical epidemiological issues. Virtuality would also be useful to bring together scientists in a new and stimulating collaboration scheme. Another important asset of the worked-out devices would be to share advanced seminars among universities. It was thought that virtuality would enhance and broaden students' access, choice, and participation to scientific debates, thus allowing for dissemination of updated information and

paradigm shift acceleration. Finally, telecommunication would facilitate the sharing of "hot" information such as new publications, data sets, scientific meeting announcements, new scientific politics, etc., as soon as they are known.

The objective of this paper is to account for what has been done in this framework during the last four years at the University of Montreal, and to discuss the future of telecommunication for public-health enhancement in underdeveloped countries.

The epidemiology mailing list

A mailing list is an electronic medium that acts as a journal one would subscribe to, except that the mailing list is free of charge. Mail sent to the list gets into each subscriber's mailbox, thereby allowing anyone to participate, comment, and discuss issues of interest. The list allows subscribers to get in touch with one another and share all kinds of information. As an example of the fruitfulness of the collaboration elicited by the epidemiology list, some members have put ideas in common and published a position letter with respect to a public-health matter[1]. This would have not been possible without the Net.

The epidemiology mailing list, EPIDEMIO-L, serves the purpose of networking scientists interested in public-health development [2,3]. EPIDEMIO-L is the first and sole Internet epidemiology list dedicated to methodology. The list was launched on August 15, 1994. The evolution of the number of subscribers since the start is shown in Figure 1. Exactly one year after launching the list had 1167 members. The number of subscribers on the list has now (1998) topped off at about 1600; things go as though the list has reached all connected epidemiologists and public-health experts. Unfortunately no data are available as to the order of magnitude of drop-out subscribers. Hypotheses about dropping out of the list are that the list now reaches scientists from many other disciplines who only subscribe to get viewpoints on specific issues; these people leave the list once satisfied with the responses. Another hypothesis is that regular receiving of mail on topics one is not concerned with may detract some people from remaining subscribed, although it is possible to get mail in only one daily batch (digest format). The epidemiology list is large in comparison with scientific associations and other lists. Thus, the (American) Society for Epidemiologic Research has about 1600 members, and the statistics list, STAT-L, concerned with a subject matter with a potentially wider application range, has around 1200 members.

When the list reached more than 500 subscribers, members started to post and interact regularly among themselves (self-organizing state). This size was attained less than two months after launching. An in-depth study of the subscribing process undertaken a few months after launching disclosed an interesting dynamical pattern[4]. Periodically, the subscribers file is subjected to reports[5]. The number of subscribers continues to grow though the growth rate dampened since the first launching weeks. The list keeps on increasing in number mostly because of new internet users. The list growth rate computed while the list was still thriving was around 4% per month; in

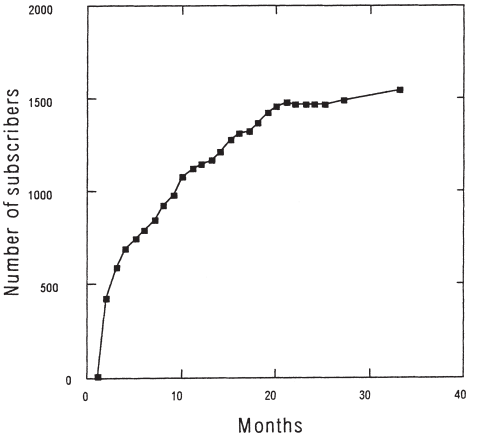

Figure 1 - The number of subscribers to the EPIDEMIO-L list according to the number of months since list launching.

other words, about 50 new members used to join the list each month. This rate applied to Canada and the United States. Other countries' growth rate was less than 2%.

Table 1 displays the number of subscribers according to participating countries (5). Fifty countries are represented. Most subscribers come from the United States, and Canada takes the second rank. Other important features are that French-speaking countries (like France) are poorly represented, and that Brazil, with 28 subscribers, holds the first place out of South American countries. The list is essentially subscribed to by university faculties and students, followed by U.S. governmental agencies. Unfortunately, the proportion of subscribing faculties and students cannot be determined at this time. A few other features of the list point to the important role of certain countries as, for example, South Africa and Spain. Table 1 content is regularly updated and can easily be accessed on a Web page (http://alize.ere.umontreal.ca/~philippp).

Posting to the list is not moderated, i.e., all posts go to the list without being reviewed by the list manager. Never during the list existence has moderating proved mandatory because of irrelevant messages. It is worthy of note that members have always been courteous. Subscribers can receive messages as soon as they are issued or, if wished, in 24-hour digest mode. Active participation by list subscribers requires the dynamic mode (rather than the digest mode). List discussions are archived and available to anyone who is subscribed. This entitles the archives to be used for teaching purposes. With their diversity of viewpoints, archives constitute an excellent asset for students' judgment training. This is at variance with classical teaching too often characterized by a sheer lack of contrasting viewpoints.

Epidemiologists and public-health experts around the world have a common objective, i.e., reducing the burden of disease in populations. This objective translates to three facets of training require-

Table 1 - EPIDEMIO-L subscribers by countries (May 1997)

USA	822
Canada	246
UK	85
Australia	62
Spain	30
Brazil	**28**
Germany	25
Netherlands	23
Sweden	19
Japan	18
New Zealand	15
France	14
South Africa	13
Italy	10
Lebanon	9
Finland	9
Thailand	9
Czech Republic	7
Argentina	6
Switzerland	6
Norway	6
Malaysia	6
Columbia	5
Denmark	5
Ireland	5
Hong Kong	4
Portugal	4
Austria	4
Ecuador	3
Greece	3
Mexico	3
Chile	3
India	3
Taiwan	3
Indonésia	2
Korea	2
Israel	2
Namibia	2
China	2
Slovenia	2
Latvia	1
Cuba	1
Romania	1
Costa Rica	1
Turkey	1
Mauritus	1
Venezuela	1
Bahrain	1
Sri Lanka	1

ments. They are pointed out in Table 2, along with an outline of issues discussed on EPIDEMIO-L. First, there is the epistemological knowledge that helps understand the tenets of the scientific process in which public-health and epidemiology are embedded. Second, there is the methodological knowledge that helps health professionals undertake the appropriate steps of risk factor identification and disease eradication. Finally, there is the statistical knowledge, i.e., the mathematical tools necessary to recognize when and where intervention is deserved. These three facets of the training process are featured by the epidemiology list that offers a high level of scholarship in these areas. Be that as it may, it must also be noted that third-world public-health problems, because of their tight cultural embedding, are often dealt with from vantage points different from those cited above; unfortunately, these viewpoints are only rarely considered on the list. One of the objectives of worldwide lists like EPIDEMIO-L should be to elicit more participation from third-world scientists who can bring unique points of view (economic, political, ethical) in their approach of public health issues.

The number of messages sent to the list since launching has been 2700. Six hundred and sixty-seven authors wrote these messages. This makes for about 6 posts per day and 4 posts per author, which testifies to the health of the list. By way of comparison, the statistics list has generated 23562 posts since launching for an average of 9 posts per day. The comparison is not entirely fair, however, since the statistics list is older. Current subscribers to the statistics list receive between 15 and 20 posts per day. To sum up, the epidemiology-list traffic is least and more manageable despite the larger number of subscribers.

Figure 2 shows the percentage of messages according to the percentage of subscribers. The relationship is a Pareto law with about 5% of authors writing 95% of the messages. The Pareto law is a measure of efficiency. The Pareto law is widespread in nature and fits phenomena wherein in-

Table 2 - Examples of issues discussed on EPIDEMIO-L

Epistemological issues
are you plodders or insighters?
complexity as buffer to disease emergence
causality
epidemiology under attack
modeling the "black-box"?
paradigm shift
philosophy of science
publication of "negative" results
reductionism in science
theory in epidemiology
Methodological issues
clinical epidemiology
clinical trials
choice of controls in case-control studies
epidemiologic surveillance
infections & nonlinearity of processes
prevalence at birth
prevention & disease dynamics
questionnaire writing
the self-selection bias
Statistical issues
qualitative methods
the ecological fallacy
validation of data
spatial analysis
standardization

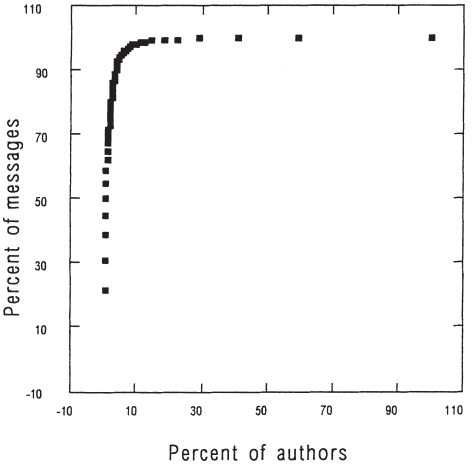

Figure 2 - Percent distribution of messages and authors of messages.

equality of participation is the rule. Hence, applied to computer sciences, the Pareto law says that learning 5% of commands allows 95% of the work to be done. We doubt one could completely democratize participation to list discussions, were it only because students likely make for a sizable fraction of the subscribers and that students are mainly knowledge consumers rather than providers. Improving students' participation to list discussions should however be stressed.

Positive factors of the list success are the high quality discussions allowing members to learn from the ideas of others, the consistent politeness of all collaborators, and the personalized character of the list. The list has two managers (P. Philippe and H. Soubhi), regularly present on line, recognized, and accepted by the subscribing community.

The virtual seminar list

In September 1995, a virtual seminar list was launched. A traditional seminar class is devoted to in-depth discussions over several topics tightly related around one or more learning objectives. Seminar members, each in turn, present the seminar topics in class, thereby eliciting discussions with participants and allowing for a variety of viewpoints. Typically, traditional seminar classes involve very few students so that the range of available viewpoints remains limited. A virtual seminar rather dilates the space of viewpoints by enlarging the pool of participants; it does so by including electronically-wired participants in the discussions.

The virtual seminar launched at the University of Montreal was concerned with theoretical epidemiology, a neglected facet of epidemiology training programs. Theoretical epidemiology is concerned with the epistemology of disease causation, an issue that has been lingering in epidemiology.

One year before launching the virtual seminar list, a traditional seminar class on theoretical epidemiology was set up; electronic mail was nevertheless added to the seminar and tested on a private basis. The seminar was a success and the idea of sharing its content across the Net then rose. The virtual seminar list was announced on the epidemiology mailing list a few months before launching the seminar class, and about 100 would-be participants worldwide proved to be interested in the content and with its format. Subscription to the virtual seminar list has been moderated; this allowed the whole bandwidth to be devoted to the seminar topics since subscribers had accepted the objectives of the seminar list beforehand.

Table 3 shows the features of the seminar list. One hundred and nine participants from 18 countries were enrolled in the seminar. The United States had about half of the total number of members, followed by Canada with 31. Another feature of interest is that half of seminar members were university faculties; further, authors of some papers to be taken up during the seminar were personally invited to subscribe to the seminar. Another matter worth mentioning is that the seminar list was supported by a web page. On the latter, subscribers could find unpublished seminar papers as well as other information such as the seminar syllabus and reading list, a file of other mailing lists devoted to methodology, etc. Subscribers could either consult the information by connecting to the web page at their convenience or download the articles along

Table 3 - Virtual seminar list subscribers

USA	53
Canada	31
Spain	4
UK	3
India	2
Germany	2
Auatralia	2
South Africa, Belgium, Switzerland Finland, Norway, Japan, Greece Czech Rep., Mozambique, New Zeland, Argentina, Brazil	1
	109

with their graphics onto their local server/computer. Files of the seminar discussions are available online to anyone willing to connect to the web page. The web page has about 10 visitors per day but this number also includes people coming from all over the Net.

The virtual seminar has been highly praised by subscribers. Many subscribers felt that a paradigm shift is wanting in epidemiology, and wished to get acquainted with alternative paradigms from other sciences. Notwithstanding, discussions on the seminar list were somewhat mitigated. Too many seminar subscribers used to simply peruse the messages. On one hand, this is understandable since theoretical epidemiology is new in curricula. A second reason might be that the seminar list has not attained a critical threshold number of participants to support dynamical discussions. On the other hand, one can barely expect from virtual seminar participants what is rarely found in real seminar classes. Though quantity of participation does not always go with quality, it must nevertheless be remembered that to reach and sustain an interesting discussion dynamic a minimum number of list posts is required; below that number, the system (seminar-class list, here) does not self-organize and may, therefore, head toward extinction. The list objective is to insure sustainability (to head beyond a threshold) much in the same way that below a certain reproductve rate a disease vanishes from the population. Lack of interest in topics discussed is not an issue here as people decided by themselves to subscribe to the seminar class. Other reasons for less than optimal participation to the discussions might be that the seminar required time to familiarize with the complex issues debated, a detractor for people already involved in other professional activities.

Among solutions to low participation, one would be to hook up other universities. Some universities have manifested interest in developing the seminar locally, but before this can happen faculties must familiarize with the seminar content. Should the seminar finally open up on worldwide active involvement, this would constitute an important breakthrough in universal epidemiology training. Another possibility is videoconferencing; one university faculty expressed desire for seminar sharing while adding videoconferencing technology to students' virtual participation. For example, CU-SeeMe is a program (under copyright of Cornell University and its collaborators) capable of videoconferencing several sites around the world from desktop computers.

Challenges

Though the two electronic lists set up at the University of Montreal already constitute major steps for extending the epidemiology learning/training process, some problems were faced that ought to be discussed. The first problem is technical and concerns the limited extent of networking. The generally low subscribing frequency of developing countries is an upsetting feature at variance with the intents of telemedicine. Virtuality is a powerful mean of disseminating public-health and technical information[6,7], but one is off the target if developing countries lag behind. From a conservative vantage point, virtuality is sometimes considered complementary to classical training in developed countries. To the contrary, we think that virtuality is mandatory for developing countries if they are to keep up with the development of the new technical information production and advances of health-related program requirements. It is no less true that a north-south symmetrical interchange of information would help bring complementary points of view to the issues considered.

The second concern is that of language. Networking would be of little use without helping foreign countries to actively partake in the universal endeavor of information sharing. To facilitate the transfer of information, similar electronic lists should be set up in foreign-language countries while insuring gateways to English-speaking elec-

tronic lists. The presence on the lists of subscribers fluent in both English and the foreign language would help share the information more efficiently. Telecommunication must not be viewed by foreign countries as a threat; consideration must therefore be given to the preservation of foreign-country languages. It appears that current resistance to telecommunication use is not alien to this preoccupation in certain cases.

A third issue to underline is psychological in origin; it concerns subscribers' participation to list discussions. Though face-value analysis shows the epidemiology list to be on the democratic side, a genuine effort to boost participation beyond its current state should be made. Increasing effective participation would not only broaden the diversity of viewpoints but, more important, favor training in critical appraisal. If the subtle advantages of telecommunication are to be shared by the vast majority of subscribers, one must attempt to get rid of the main impediment to communication, i.e., the psychological barrier.

Last, one should underline a sociological issue, i.e., the sub-optimal information sharing trend on electronic lists. Subscribers to virtual media should understand that lists are there for symmetrical information sharing. Information pathways must be invertible if information spreading is to be insured in ubiquitous directions and not always from usual posters to permanent readers.

Aside from purely technical problems, one should not forget that accessibilty to knowledge does not by itself allow for public health improvement. Public health is not just a matter of knowledge[8]. This mistake commonly follows from a simple linear viewpoint. The specifics of history and culture of populations are context variables that ought to be taken into account when one speculates about possible health changes[9]. Traditional societies have more involved patterns of culture that can entail departure from simple linear reasoning[10]. It is not because North-American societies have developed in a more or less logical fashion that all world countries face change in a similar way. Therefore, one must be careful when inferring that population health patterns will improve because of knowledge accessibility. Undesirable side effects are always possible that may jeopardize the objectives of intervention.

Conclusion

Worldwide public health is a crucial issue today. Much money is continuously invested by developed countries into the training of developing-country health professionals. These people go to foreign universities, are trained at high costs during several years, and go back to their country of origin. They then attempt to better the health of their population, but in contexts discrepant with that of the learning settings. A daunting gap therefore remains: That of a lack of continuity between the training received in the more affluent countries and the practicing conditions of the countries of origin. Hence, there is no insurance that the costly training translates to effective public health enhancement. The more so that the more straightforward pattern of health care of the more affluent countries is at variance with the culture- and history-driven health patterns of developping countries.

The telecommunication initiatives described here do not have the extent and diversity that the virtual training programs of the future will have but they trace the way to virtuality (see, for example:

http://www.pitt.edu/~super1) . Two dimensions of effective public-health enhancement, i.e., modern training and continued learning in the country of origin of health professionals, can now be embodied in only one process and are supported by the telecommunication technology. This should also permit the new training programs to be tailored to the specific needs of developing countries.

We now master powerful tools to improve the health of populations worldwide. Virtual technology, because it allows easy

information spread, rapidly, and at low cost, should help better the health of populations. All the means are now available, including cultural adjustments, to induce a quantum leap in the health of populations. This is not solely a technical issue, however. A more healthy world will emerge if developed countries are also willing to help some developing countries lessen the ban they maintain on virtuality for cultural, political, and economic reasons. The latter reason should be the former to consider as virtuality is out of reach without the budgets to buy hardwares, softwares, and to insure technical support. Health information therefore is predicated on these more daunting issues.

Anyone interested in discussing epidemiology and public health issues can join the epidemiology list. An internet address suffices. To subscribe, send email to: LISTPROC@CC.UMONTREAL.CA with the following message: SUBSCRIBE EPIDEMIO-L first_name last_name

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