

The Art and Science of Evidence-Based Decision-Making

... *Epidemiology
Can Help!*



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The Art and Science of Evidence-Based Decision-Making

... *Epidemiology Can Help!*

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The Canadian Public Health Association (CPHA) is a national, independent, voluntary association representing public health in Canada with links to the international public health community.

CPHA is pleased to be working in partnership with the Centre for Surveillance Coordination, Health Canada, to help increase the capacity of public health practitioners and decision-makers across Canada to better protect the health of Canadians.

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Epidemiology is a basic tool for public health. Yet to a large extent, it has remained in the domain of specially trained epidemiologists. Today, there is a clear need for all public health practitioners to incorporate epidemiology into their day-to-day practices. However, many lack the training or confidence to do so.

This article explores how epidemiological skills and approaches can improve decision-making in public health. It emphasizes the need to enhance capacity at the local level and describes how the Health Canada Skills Enhancement for Health Surveillance Program can help public health organizations and practitioners improve their skills in epidemiology, surveillance and information management.

An Evolving Science Supports Decision-Making in Public Health

To some extent, public health decision-making is an art. Experience, knowledge of the community, timing, values and leadership style are inevitably part of the decision-making experience. Increasingly, however, public health practitioners and Boards of Health are charged with making “evidence-based” decisions that are based on a careful analysis of accurate data and proven research findings.

But how do we know that we have the right information? How do we know which research results are reliable and applicable? How do we know if our analysis of the data is sound? How do we convert what the research tells us into effective community action?

The science of epidemiology helps answer these questions. It gives us the tools we need to be better health detectives, better planners and better service providers. An epidemiological approach helps us make improved decisions about the types of public health programs, policies, planning and surveillance initiatives we need in our communities.

A helpful definition describes epidemiology as: *the study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to control of health problems.*¹

Modern epidemiology uses tested scientific methods to help us understand the patterns of disease and health and the root causes or determinants of health problems. These are the “who”, “what”, “where” and “why” questions that always surround a public health concern. Epidemiology helps us apply this information to prevent illness and injury, to protect people from harm and to control health problems.

Historically, epidemiology has been associated with the investigation of communicable diseases. As a consequence, it is often considered the domain of specialists with graduate training. Today, we still use epidemiology to explore the causes and patterns of communicable disease, but over the past 40 years, epidemiological concepts have been increasingly used to help us understand a wide range of health issues. These include injuries, health behaviours 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. Thus, core competencies in epidemiology are useful to all public health practitioners who are making decisions and recommendations about programs and spending in public health.

The use of epidemiology has been central to the development of public health practice. Epidemiology is important in the prevention and control of infectious diseases, immunization, and understanding the impact of therapeutic interventions. Today, there is an emphasis on the broader socioeconomic and environmental determinants of health.² The need to better understand this complex web of factors contributing to health and disease has increased recognition of the need to use an epidemiological approach in public health practice. This understanding is required if effective prevention, protection and control programs are to be implemented.^{3,4}

Epidemiological concepts are used in public health to:

- monitor trends in health and health determinants
- provide information for evidence-based decision-making
- identify outbreaks, threats to health and emerging issues
- develop policies and programs to manage health risks
- improve operations and plan health services
- improve our understanding of the determinants of health
- facilitate research
- evaluate health policies, programs and services, and help demonstrate accountability for efforts to protect health
- empower people (individuals, health providers, governments and communities) with the information they need to take action to protect and improve health.⁵

Making Good Decisions

The following case studies provide two real-life examples of how training in epidemiological concepts and skills can help communities make better decisions.

1. A Case Study in Adolescent Suicide Prevention

The people in your community are mourning the loss of three adolescents who committed suicide over the last three months. You are asked to join a committee looking at implementing a suicide prevention program in the school.

Scenario 1A

You know from reviewing *Toward A Healthy Future: Second Report on the Health of Canadians* that Canada has a consistently higher rate of youth suicides than other countries and that the greatest increase in suicide rates has been among the 15 to 19 age group.⁶ For Canadians aged 15 to 29, suicide is the second leading cause of death.⁷

The committee is considering the use of a specific high school curriculum suicide prevention program found by one of the teachers. You see that the curriculum is designed to change knowledge, awareness and attitudes about suicide.

Decision: You agree that the use of this curriculum is a good initial strategy. The school prepares to start the program in six weeks.

But is this the best decision? Let's apply some epidemiological analysis techniques to take a closer look...

Scenario 1B

In this variation of the same scenario, you use your training in epidemiology to gather information about other programs and their effectiveness, and to review additional data about suicide rates.

A closer look shows that there are limitations to the use of these data due to under-reporting and changes in reporting between years and between countries.⁹ From a national perspective, the steady but slow increase in suicide rates in recent years has been almost entirely among men, although women attempt suicide (unsuccessfully) more often. Suicide rates in Aboriginal communities are estimated to be two to seven times higher than in the population at large. People who have substance abuse problems are more at risk, as are people who are depressed.⁹ Depression is highest in the 15 to 24 year old age group.¹⁰

You locate a systematic review of a variety of curriculum school-based suicide prevention programs that used epidemiological criteria to evaluate each program (www.eagle.ca/PHB/phred/index.htm). You find that the program under consideration may increase suicide-related knowledge, but it may also have harmful effects. In fact, the evaluation showed that the program appears to increase the proportion of young men who feel that suicide is a reasonable solution to problems.

Other concerns are expressed about curriculum programs in general. The review stresses the need to make programs culturally sensitive and to consider tailoring programs differently for young men and young women. It suggests the use of a comprehensive multi-strategy for suicide prevention.

Decision: After you present this detailed analysis, the committee recommends the development of a comprehensive, multi-strategy suicide prevention program. A curriculum component that is sensitive to culture and gender may be one part.

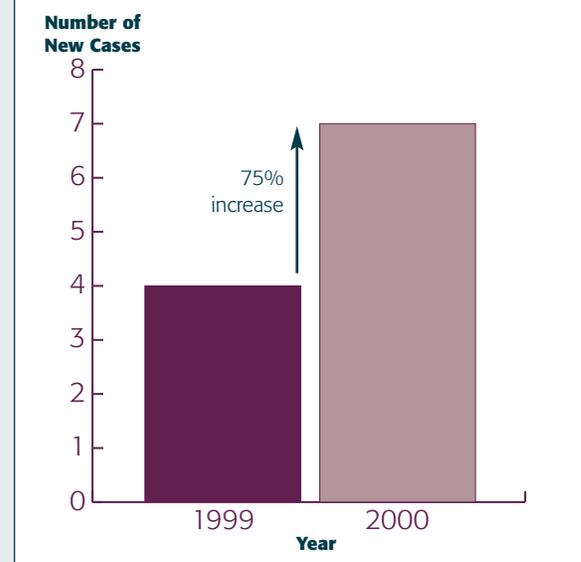
2. Getting the Denominator Right: A Case Study in Local HIV Infection Trends

A large municipality in your province reports a significant increase in the rate of new HIV-positive cases in the last year. You are responsible for HIV/AIDS prevention in your community and must make recommendations for next year's programs.

Scenario 2A

The increase in rates of HIV cases prompts you to look at the rates in your town. Data show that there were four new HIV-positive cases in 1999 and seven in 2000. You calculate this as a 75 percent increase in the number of cases per year (see figure 1).

Figure 1. New HIV-Positive Cases, Your Community 1999 and 2000



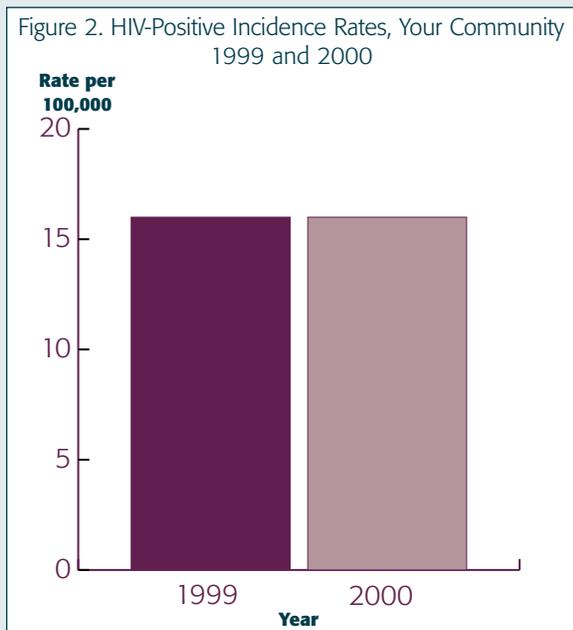
Decision: You recommend an expansion of HIV/AIDS prevention and control activities. The Board of Health approves the recommendation and moves funds from the tobacco bylaw program.

But is this the best decision? Let's apply some epidemiological principles to take a closer look...

Scenario 2B

In this version of the same scenario, you take a closer look at why the number of new cases of HIV increased in your community from four in 1999 to seven in 2000. Epidemiological concepts state that we need to look at the denominator, or number of people in the population as well as the number of new cases, and that actual numbers are not the same as rates. Furthermore, you remember that it is important to be cautious when calculating rates and making comparisons with small numbers. In other words, calculating percentage changes or comparing rates with small numbers can indicate dramatic differences which, although accurate, still require closer investigation and analysis of the data within your locality.

You note that the population size of your town increased dramatically between 1999 and 2000 due to changes in municipal boundaries. You conclude that when comparing rates per 100,000 population, there was *no* increase in HIV-positive cases because you are now accounting for the increase in population size (see figure 2).



Decision: You therefore recommend that the current level of HIV/AIDS activities be maintained and that the department continue to monitor the situation, especially among high-risk groups. The Tobacco Bylaw team sends you flowers the next day!

Recommended Core Competencies in Epidemiology

Local needs for capacity in epidemiology and surveillance will vary according to the size and distribution of the population, and available community supports such as universities, colleges and other health agencies and specialists. However, public health practice improves most when all professional staff have training in the core competencies in epidemiology.

Core competencies required by all public health practitioners include the ability to:

- understand basic research methods
- understand the way surveillance improves community health
- identify, access and interpret appropriate data and scientific evidence
- critically appraise health science literature
- carry out program evaluations
- assess population health status and the determinants of health and illness
- organize and present health information
- partner with the community to attach meaning to data.

In addition, public health agencies need access to people with specialized skills and knowledge in epidemiology. Beyond the competencies outlined above, specialists in epidemiology need to be able to apply survey methods and advanced statistics and to provide leadership and advice to other public health practitioners.

Support for an Epidemiological Approach

Management support to upgrade and strengthen the epidemiological skills and knowledge of public health practitioners is essential. Here are some of the ways management can support the increased use of an epidemiological approach:

- Provide formal agency support for the increased use of epidemiology to assess, plan and evaluate programs.
- Upgrade and strengthen staff and management skills.
- Include epidemiological capacity in accreditation standards and job descriptions.
- Collaborate with universities, colleges and others to provide public health practitioners with opportunities to improve their skills and knowledge through project work and courses.
- Support professional networking and the development of public health epidemiologists through provincial and national organizations.
- Develop and implement strategies to recruit and retain specialists and staff with epidemiological expertise.

Information technology supports that are required to enhance the use of epidemiology include:

- computer and internet access for all staff who make program decisions
- easy access to appropriate software for basic questionnaire design and data analysis
- commitment to high quality data collection and timely reporting to those who collect and collate data
- access to local, regional and national data.

The Skills Enhancement for Health Surveillance Program

The Skills Enhancement for Health Surveillance Program is an Internet-based training initiative for front-line health professionals across Canada. It is designed to increase their skills in epidemiology, surveillance and information management. The program will provide continuing education opportunities that may otherwise be inaccessible or unaffordable. The core component will be a series of distance-learning modules in both official languages.

In 2000-2001, the program piloted and evaluated the first training module, "Introduction to Epidemiology." Participants in the pilot cited the flexibility of a self-paced learning tool and relevant, practical content as the strengths of the course. One person said, "it is continuing education at its best." Another participant said that the course "builds a foundation of solid public health practice."

In March 2002, an orientation to online learning and three revised and expanded instructional modules will be available, including "Basic Epidemiological Concepts", "Measurement of Health Status" and "Descriptive Epidemiological Methods."

Public health managers and practitioners who want more information about this continuing education opportunity should contact health_surveillance@hc-sc.gc.ca.

Two other useful resources are available from the Skills Enhancement for Health Surveillance Program. Contact health_surveillance@hc-sc.gc.ca to obtain these resources.

1. *Toward Effective Community-Based Action: Using Epidemiological Skills in Public Health Surveillance for Local Public Health Practice* is a 25-page paper (including references) on the importance and use of epidemiology and health surveillance in public health practice and decision-making in the community.

The paper was written by Larry W. Chambers, Anne Ehrlich and Louise Picard for Health Canada on behalf of the Ontario Public Health Research, Education and Development Program and the Association of Public Health Epidemiologists in Ontario.

The paper begins with four case studies demonstrating how the use of epidemiology can change and improve decision-making in public health. It describes the core competencies in epidemiology and the management and technical supports that are required to use an epidemiological approach. Then, it briefly discusses different types of data sources. The paper concludes by emphasizing the need to enhance local capacity by strengthening the epidemiological skills of all public health practitioners. A one-page summary of the above paper is available on request.

2. *The Art and Science of Evidence-Based Decision-Making... Epidemiology Can Help!* is a PowerPoint presentation based on the original paper. It is designed to be used with public health staff and decision-makers, such as Boards of Health. The purpose of the flexible 20 to 40 minute presentation is to build support for improving epidemiological skills and capacity at the local level.

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Centre for Surveillance Coordination

The Skills Enhancement for Health Surveillance initiative is part of Health Canada's Centre for Surveillance Coordination. The mandate of the Centre for Surveillance Coordination is to collaborate with public health stakeholders on the development, maintenance and use of health surveillance information, tools and skills that strengthen Canada's capacity for timely and informed decision-making.

One of the Centre's activities is the Network for Health Surveillance in Canada. The Network is a partnership involving local, provincial, territorial and national governments, nongovernmental organizations and universities. The Network is building the relationships, standards and system tools so that public health decision-makers can access, via the Internet, the information they need to better meet public health needs.

For more information about the Centre, the Network and the Skills Enhancement Program, please visit <http://www.healthsurv.net>