Chronic disease and risk factor surveillance using the SA Monitoring and Surveillance System (SAMSS) – history, results and future challenges

Anne Taylor
Eleonora Dal Grande
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Anne Taylor
Manager, Population Research and Outcome Studies
Health Intelligence
SA Health

Eleonora Dal Grande
Senior Epidemiologist, Population Research and Outcome Studies, Health Intelligence
SA Health

Introduction

Chronic disease and risk factor surveillance systems can deliver data-driven evidence to assist in the prevention and slowing of the progression of chronic diseases such as diabetes, asthma, heart disease, arthritis, chronic obstructive pulmonary disease (COPD) and osteoporosis. This is achieved by providing prevalence estimates of the condition and associated risk or protective factors. Epidemiological assessment using representative population health surveillance systems can deliver best available information needed by health policy makers, health planners and health promoters to make appropriate, timely and efficient evidence-based decisions.

What is surveillance?

Surveillance is commonly described as ‘the systematic, ongoing collection, analysis and interpretation of outcome-specific health data, closely integrated with the timely dissemination of these data to those responsible for preventing and controlling disease or injury’. Surveillance is crucial for public health. Descriptions of surveillance include the ‘bedrock of public health’, ‘a core function of public health’, ‘central to the process of disease prevention’, and ‘essential in monitoring and controlling disease’. Surveillance is seen as the ‘centre of an epidemiological approach to public health’—a public health that is dedicated to preventing disease and promoting health.
Public Health Bulletin

History of surveillance

Historically surveillance was initially limited to sanitation, communicable and infectious diseases, and environmental concerns. Communicable disease surveillance systems, now highly developed, serve as early warning systems, gaining information on how to target preventive efforts and provide detailed data on the population at risk. The use of surveillance in public health terms was limited solely to communicable disease until the 1950s and surveillance was notably excluded from the definition of epidemiological research. In 1968 the World Health Assembly officially broadened surveillance from communicable disease to diseases generally, and in 1976 a full issue of the International Journal of Epidemiology was devoted to health surveillance in the broader sense.

Disease registries, still the most common chronic disease surveillance systems, incorporate hospital data, sentinel general practice systems, perinatal morbidity systems, birth defect systems, cancer registries and vital statistics. They are used to estimate the size and distribution of health issues in order to detect epidemics.

Non-registry-based surveillance of chronic disease and associated risk and protective factors is manifestly different from cross-sectional surveys or series of surveys. As argued by McQueen, surveillance systems should not be just the accumulation of cross-sectional surveys but a systematic methodological exercise structured to produce long-term trend data. Continuity, and the use of the same indicators aimed at detecting change, cannot be achieved if different survey methodology or questions are used over time. Fundamental to a surveillance system is a systematic and uniform approach to the data collection components. This includes clear and strict guidelines and standards. Also essential is the use of epidemiological expertise and the link to interventions. Analyses are primarily designed to measure prevalence, determine the population at risk, forecast trends and emphasise priorities.

The most important variable in a surveillance system is time, because it is imperative to know about problems as soon as they develop. McQueen and Choi (pers. comm.) regard surveillance as the seismograph of the health system—detecting change over time that is significant enough to raise concern and perhaps warrant intervention. Surveillance systems must be able to detect trends in health practices and risk factors, using the data to indicate evaluation, prevention and control measures. There is also a need to contribute to understanding the progression of diseases and assist in the planning of health policies and programs. A good surveillance system, as well as collecting the data using a rapid, flexible and cost-effective system, must also prioritise dissemination of the data or information to the decision makers. Surveillance therefore implies action. A crucial feature of a surveillance system is the ability to detect change and to do so early so that control or prevention can be implemented.

Surveillance systems are not designed to be used as research tools or to gain in-depth information on a topic; rather, the focus is on quantity, frequency and variability. Chronic disease and risk factor surveillance systems do not focus on the individual, but aim to identify the extent of the problem, track patterns and trends, measure changes and assess progress in primary prevention.

SA Surveillance and Monitoring System (SAMSS)

In the early 1980s numerous states in the United States joined forces to start what was to become (in 1984) the Behavioural Risk Factor Surveillance System (BRFSS). BRFSS is now a blueprint for best practice chronic disease and risk factor surveillance in the world. The SA Surveillance & Monitoring System (SAMSS) has been operating in South Australia (SA) since 2002 and was modelled on the BRFSS. SAMSS aims to assess health-related behaviours, determinants of behaviour and prevalence estimates for non-registry-based chronic diseases in the SA population. The system provides timely information on the prevalence of conditions and risk and protective factors, and is capable of detecting emerging trends. In addition, the system identifies research opportunities and needs, and highlights changes in health care practices. It is also used to formulate public health policies, identify high-risk populations and evaluate progress in disease prevention. Selected findings of interest from SAMSS are presented in this paper to illustrate the utility of using surveillance as a public health tool.

SAMSS methodology

All households in SA with a telephone number listed in the Electronic White Pages (EWP) are eligible for selection in the SAMSS sample. A letter introducing the surveillance system is sent to the household of
each selected telephone number. The letter informs people of the purpose of the interview and indicates that they can expect a telephone call within a certain time frame. Within each household, the person who had their birthday last, aged zero years and over, is selected for interview. Data are collected every month by a contracted agency and interviews are conducted in English. Proxy interviews are undertaken for respondents aged under 16 years. The response rate for SAMSS from July 2002 until December 2007 has generally been between 65% and 70% each month. The computer-assisted telephone interview (CATI) system is used to conduct the interviews. At least 10 call backs are made to the telephone number selected to interview household members. Replacement interviews for persons who could not be contacted or interviewed are not permitted. The data are weighted by age, sex and area of residence to reflect the structure of the SA population according to the latest Census or Estimated Residential Population. Probability of selection in the household is calculated based on the number of people in the household and the number of listings in the EWP. Weighting is used to correct for disproportionality of the sample with respect to the population of interest.

Demographic variables assessed in this paper were age, gender and employment status (employed full-time or part-time vs home duties, retired, student or unemployed). Risk factors and chronic conditions were short-term risk levels of:

- alcohol consumption (as defined by NHMRC\textsuperscript{12})
- mean number of vegetables consumed per day
- smoking status (smoker vs non-smoker or ex-smoker)
- family financial situation (money left over each week or ability to save vs spending more than they receive or just enough money to get through to next pay day)
- psychological distress as determined by the Kessler Psychological Distress 10-item Scale (K10).\textsuperscript{13}

Data were analysed using the Statistical Package for the Social Sciences (SPSS version 15.0) and Stata Version 10. Trends were analysed using ARIMA models.

What SAMSS can show about population health

SAMSS can provide data for a range of analytical purposes. Highlighted in this paper are a few examples of trend analyses conducted on SAMSS data.

Figure 1 shows the overall higher level of short-term alcohol risk for those aged 40 years or older when compared to respondents aged 16–39 years. Figure 2 shows the mean number of vegetables eaten per day by sex. Females ate more vegetables per day than males, and the trend indicated that the rate is increasing among females. In terms of having just enough money to get through to next pay day or spending more than they are receiving, there is a marked difference between the employed and the not-employed (Figure 3).

A: 16 to 39 years old

B: 40 years and over

Figure 1: Prevalence of short-term alcohol risk by age groups, 16 years old and over
The examples of trend analyses undertaken here demonstrate changes in diseases and risk factors in SA over time and differences between population groups. They highlight the power of a chronic disease and risk factor surveillance system. It is important that decision makers have access to up-to-date and relevant evidence, and SAMSS provides that service in regard to chronic disease and risk factor prevalence estimates, trends and patterns. In conjunction with other important and relevant data sources, SA Health is well serviced to make informed decisions.

Future challenges

Limitations of SAMSS include excluding populations at risk (e.g. the homeless), the use of self-reported data only, the lack of physical measures, and constraints on the number of questions that can be asked. While telephone surveying replaced face-to-face interviews as the mode of choice for many researchers in the 1990s, it is now under threat from steadily declining response rates, increased use of mobile telephones, lack of access to EWP and decreasing landline connections. Internet surveys were seen as an obvious replacement method of collecting data on populations; however, from an epidemiological perspective, unless the sample boundaries and parameters are known, the sample is not based on probability principles. It is therefore unscientific and inferences about the population cannot be made.

An increasing field of research is mixed-mode surveying, which is being used in preparation for the next generation of population surveying methodology and as the panacea for low response rates. Mixed-mode
surveys rely on combining data from at least two modes of data collection (e.g. telephone, postal, internet, face-to-face interviewing). Problems inherent with mixed-mode surveying are the potential for different answers to be given to socially desirable questions and the different levels of acquiescence to questions, both of which are dependent upon mode.  

Surveying populations about their health is now entrenched in the epidemiology, public health and health service universe. Although many challenges exist, this type of data collection and research will prevail. Innovations will be required, including adaptations to the methodology (especially adjustments to sampling). However, because the representative data and subsequent research findings are too important for collection not to be continued, health survey/surveillance programs will continue to provide this important information.

Chronic disease and risk factor epidemiology must place increasing emphasis and importance on the range of economic and sociopolitical dimensions of life (e.g. wealth distribution, work status and housing ownership) in order that prevention, early detection and appropriate management programs are implemented to limit the occurrence and progression of chronic diseases and chronic conditions in our community.

References


