A better understanding of health issues through population-based surveillance

Why surveys?

Dr. Sorenson is a professor of Public Health Nutrition at Utah State University

Surveillance systems are the best way to monitor health and establish norms in free-living populations[1,2]. They provide estimates of the health of a population by collecting data on a wide range of variables known to be associated with public health issues of people from the target population[3,6–7]. Epidemiological studies (case-control studies, clinical trials, etc.) cannot provide the same information because they are designed to study specific health problems and must select participants accordingly. Other large cohort studies provide valuable data but they use volunteer participants, like the Baltimore Longitudinal Study of Aging, or non-representative samples of the general population, like the Harvard Nurses Study. A survey may be a single cross-sectional collection of data assessing a single point in time but in order to detect trends and changes in response to intentional or inadvertent interventions, a longitudinal surveillance system is required[8,9]. Using data from the National Health and Nutrition Examination Survey (NHANES I) and the NHANES I follow-up survey, Ford, 2001, found an inverse association between dietary supplement use and adult onset diabetes (hazard rate = 0.76, CI 0.63–0.93). 21% of the diabetics (people diagnosed with diabetes over the 20 years from baseline) took supplements compared to 33% use by the non-diabetics[10].

The utility of surveillance systems

Of great importance to local, regional and national service providers is the use of survey data to identify major health problems and the sub-groups at greatest risk[8,11,12]. From this information, remedial interventions and educational programs can be implemented in a timely fashion[13]. In the late 1980s, public CVD interventions were based on the results of comparisons of risk factors found in NHANES II, the 1977–1978 USDA Food Consumption Survey and the Framingham Offspring-Spouse survey. The major prevention strategies were to reduce the rates of obesity, decrease the intake of total fat, increase the intake of complex carbohydrate, and lower sodium intakes, particularly in men[10]. The National Women and Infants Feeding Program (WIC) is a remedial a program where cut-off points for participation was derived from population norms.

The large pool of data collected in Surveys also provide a wealth of information for public health research. Longitudinal data is badly needed to distinguish between age related and age specific events in aging cohorts. Surveys also provide readily available data sets to examine emerging new health issues and pilot data for more specific studies. If the sample is large enough, surveys can support nested case-control studies[14] on a myriad number of topics.

Methodological issues

Sampling *is key to the value and usefulness of a surveillance system. A simple random sample of a population decreases the ability of the survey to allow examination of smaller groups of people or groups living in sparsely populated regions that are unlikely to be selected in sampling frames that favour large metropolitan areas[5,15,16]. To be truly representative, sampling must be based on local areas and when sub-groups, including the oldest old, minorities and low socio-economic groups, are small, they must be oversampled[5,8,15]. In recent years it has become apparent that health care delivery, attitudes towards public health initiatives, and disease rates are different between rural and urban*

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areas. In rural areas, distances to medical providers and emergency services are on average double those found in urban areas. Rural residents rely to a greater extent on non-physician health care delivery mainly by physician's assistants and nurse practitioners. Inclusion of rural populations, especially from sparsely populated areas, would provide indicators for more equitable provider services and distribution of Medicaid funds[17].

Questionnaires

Questionnaires, the backbone of surveillance systems, must be carefully designed to reflect the true estimates of the survey variables and standardised to allow direct comparisons among the survey groups[18,19]. *They must be updated as the populations and variables change*[9]. *Developing a validated core set of questions is mandatory, with some additional questions to address issues specific to each sub-population*[5,20–22]. *The core questions should include health outcomes found in the population and variables related to them including demographics, occupation, lifestyle, diet and supplement use*[23], *drug history, social support systems, environmental factors, gender issues (menopause, osteoporosis, breast cancer, reproduction, etc.) access to health providers, satisfaction with services*[5], *self estimates of health status, and markers of mental health*[17,24–26]. *Obesity is a major public health problem but measuring or asking height and weight is not enough to understand the determinants of the problem*[5]. *Physical activity, diet history, health problems, attitudes towards exercise, occupation, social support systems, marital status, and income are all important variables to be assessed. Questionnaires must also be modified for ethnic groups to ensure that their questions are relevant to the participants and that the answers address the true intent of the question*[27,28]. *The Activities of Daily Living (ADLs) and the Indicators of Activities of Daily Living (IADLs) are commonly used as estimates of functional status in older people*[29]. *In developing a health and nutrition questionnaire for use with elderly Navajos living in remote areas of the Navajo Nation, we found that many of the ADL/IADL items had no meaning in this population. The question on the ability to climb stairs is inappropriate in an environment where people live in Hogans or trailer homes. Obviously questions about the ability to use public transportation are also irrelevant. This shows the importance of developing and validating questionnaires in the target population.*

The future of surveys?

Despite the great utility of surveys and the information they provide, which is obtained in no other way, it is very difficult to obtain sustained funding for population-based health surveillance. The National Institutes of Health (NIH) are reluctant to fund projects that are not hypothesis driven and do not address specific health outcomes even though state or regional surveys, using standardised methodology, could increase the scope of the large National surveys. Even NHANES and the USDA Continuing Survey of Food Intakes by Individuals (CSFII) have difficulty in getting sufficient congressional funding for each subsequent round of data collection[5]. *This lack of support is ironic since the National Nutrition Monitoring System, the DHHS Healthy People series; the Food and Drug Administration and others depend heavily on these surveys to document progress toward their goals*[5,30]. *The NHANES and the CSFII are being combined this year and they will become a continuous longitudinal National surveillance system*[29]. *This is good news but more surveillance of neglected sub-populations is sorely needed*[30].

Ann W. Sorenson

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