

Capture-recapture techniques

Quick and cheap

EDITOR,—Capture-recapture techniques can be used as a quick and cheap alternative to population surveys for estimating the prevalence of physical disability.¹ We used the technique as part of a needs assessment for a new rehabilitation service. We sent a letter to every general practitioner and district nurse in West Berkshire, requesting the name, age, address, and diagnosis of every patient aged 16 to 65 who had severe disability of neurological, musculoskeletal, or peripheral vascular origin and required daily help from carers or other professional or non-professional helpers. People whose primary disability was mental illness or handicap, blindness, or deafness were excluded.

Altogether 177 (71%) of 249 general practitioners, and district nurses from 42 (76%) of 55 practices, replied. A total of 356 patients were identified (243 by general practitioners alone, 56 by nurses alone, and 57 by both general practitioners and nurses).

A capture-recapture technique^{2,3} gave the estimated unidentified population as 230. The total population was therefore 594 (95% confidence intervals 494 to 694) and the prevalence 1.9/1000 adults aged 16 to 65.

The main problem with this estimation was that general practitioners and district nurses may have interpreted the definition of severe physical disability inconsistently. Comparison of prevalences estimated in published population surveys is also difficult because of differences in the definition of disability and its severity and in the categorisation of age and underlying disease. But Harris's population survey of 1971 (which excluded people in institutions) contains enough detail to estimate a prevalence of severe physical disability (severity categories 1 to 4)—broadly similar to the definition used in West Berkshire—of 1.2/1000 adults aged 16 to 64.⁴ A population survey by the Office of Population Censuses and Surveys in 1988 suggested that inclusion of people in communal establishments would increase the prevalence to 1.4/1000⁵ and give a figure of 433 for adults aged 16 to 64 with severe physical disability in West Berkshire, compared with the 594 estimated in our study.

The process of collecting information from general practitioners and district nurses followed by capture-recapture analysis took only 10 weeks, and the only costs were the costs of the time spent on the study by a registrar in public health and clerical staff from Berkshire Family Health Services Authority and West Berkshire Community Unit.

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1 LaPorte RE. Assessing the human condition: capture-recapture techniques. *BMJ* 1994;308:5-6. (1 January.)

2 Hook EB, Regal RR. The value of capture-recapture methods even for apparent exhaustive surveys. *Am J Epidemiol* 1992;135:1060-7.

3 Regal RR, Hook EB. Goodness of fit confidence intervals for estimates of the size of a closed population. *Stat Med* 1984;3:287-91.

4 Harris AL. *Handicapped and impaired in Great Britain*. London: HMSO, 1971.

Priority will be given to letters that are less than 400 words long and are typed with double spacing. All authors should sign the letter. Please enclose a stamped addressed envelope for acknowledgment.

5 Martin J, Meltzer H, Elliot D. *OPCS Surveys of disability in Great Britain*. Report 1. *The prevalence of disability among adults*. London: HMSO, 1988.

More unreliable in humans than birds

EDITOR,—Ronald E LaPorte's editorial on the capture-recapture technique does not accurately reflect the use of this method in wildlife populations, at least in Britain.¹ Complete counts are not always impossible. For birds, when numbers are small or the species occurs in colonies, fairly complete national counts can be made, as has been the case with species as diverse as great crested grebes, marsh harriers, peregrines, gannets, and Dartford warblers.² Indeed, for some of these species, long term trends in population are known for most of this century. In the case of the peregrine, fluctuating trends were linked with contamination with organochlorine pesticides, which caused a dramatic fall in the number of peregrines and then, as remedial measures were taken, a steady recovery.³

In fact, "ornithologists have not made much use of mark-recapture methods for estimating population size."² Ornithological surveys for most species have used sampling techniques, and recent methods have increasingly used random selection of census sites.⁴ Many epidemiological studies in humans have used statistical sampling of representative populations, with a considerable increase in our knowledge of the incidence and prevalence of disease over the past 40-50 years. The use of capture-recapture methods is based on many assumptions,² which may be more difficult to overcome in human than wildlife populations, especially if they concern homeless and mentally ill people.

Nigel Fisher and colleagues' study of homeless people in Westminster used a log-linear modelling method.⁵ The authors admit that questions of validity and reliability of their unobserved population cannot be answered conclusively but conclude that their estimate is valuable for planning health services. It seems desirable to validate this method further for epidemiological studies on homelessness and ill health. Until this is done the most appropriate and reliable methods should continue to be used—both the work of wildlife scientists and traditional epidemiological methods. We need more evidence before we use capture-recapture techniques to bring about a "paradigm shift in how counting is done in all the disciplines that assess human populations."²

4 Marchant JH. The new breeding bird survey. *British Birds* 1994;87:26-8.

5 Fisher N, Turner SW, Pugh R, Taylor C. Estimating numbers of homeless and homeless mentally ill people in north east Westminster by using capture-recapture analysis. *BMJ* 1994; 308:27-30. (1 January.)

Difficult to use in developing countries

EDITOR,—We are engaged in a long term study of the causes and rates of death in three areas of Tanzania. A network of informants in the community reports all deaths, and a team of interviewers perform "oral necropsy" interviews with the families of all the people who have died. Regular censuses provide data for the denominators and a second source of information about deaths. The independent nature of these sources should make them ideal for use in capture-recapture analysis.¹ We have attempted to use these techniques but have found some practical impediments.

The difficulty lies in the choice of tags to identify people found in both "catches." We have attempted to use names as identifiers but have encountered two problems. The first arose because of variations in the spelling of names, so that the same person may be recorded as, for example, Huseni Ali in one database but Hussein Ally in the other. This problem was resolved by standardising spelling at the time the data were entered and by using a name matching program, which matches the first three letters of the first and last names as well as approximate age when searching the databases. Even with these adjustments, however, we found that estimates of ascertainment were as low as 30%, which would have given unrealistically high corrected estimates of mortality. We subsequently discovered that people in the study areas may use completely different names at different times and for different purposes. There are social, religious, and cultural reasons for this. A person may be known to family members by different names—for example, children of mixed religious or tribal marriages. Names may be changed at baptism or when a Muslim child reaches 5 or 6. A person may then choose to use a different name in different circumstances. Some may even use false names if it seems advantageous to do so. Thus the name given to the census enumerator may not be known to the relative who is later interviewed during the oral necropsy.

Our only solution so far has been to print out lists of the names of all people whose deaths are recorded in the census but that cannot be matched with names from the oral necropsy database and to ask the interviewers to visit the homes of these people and find out if an oral necropsy has been done. Although this is a useful way of improving ascertainment, the need to do so has dampened our initial enthusiasm for using capture-recapture techniques in Tanzania. Similar limitations may apply to the use of these techniques in other developing countries.

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1 LaPorte RE. Assessing the human condition: capture-recapture techniques. *BMJ* 1994;308:5-6. (1 January.)