
Uses of routine data sets in the evaluation of health promotion interventions: opportunities and limitations

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Abstract

Practitioners are under constant pressure to evaluate their work. In the current environment, health professionals frequently have limited time and financial resources, and opportunities for using existing data sets must be exploited. Routinely collected data provide a potentially useful resource for use in this context. The aim of this paper is to discuss the potential uses of routinely collected data in the evaluation of health promotion interventions. Opportunities for and limitations of routine data are discussed, drawing on examples primarily from the field of sexual health, to demonstrate principles which are also relevant in other areas of health care.

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Introduction

Evaluation includes both programme monitoring and impact assessment. The key question is whether or not a service meets the objectives set for it, and whether another method might have achieved those objectives more rapidly, more cheaply or to a greater extent.

Evaluation allows time and money to be focused on interventions that are effective. It is an important source of feedback allowing materials and methods employed in an intervention to be modified and improved (Downie *et al.*, 1992). Health professionals are under constant pressure from funding bodies to evaluate their activities and evidence of plans for the evaluation of a proposed intervention has become an essential component of funding applications. Positive outcomes need to be demonstrated for funding to be continued. The dissemination of evaluation findings is necessary for progress in the field of health promotion.

Health promotion interventions seek to enable individuals and communities to increase control over, and to improve their health. Their objectives are usually met in terms of targets for specific outcomes – such as disease incidence or prevalence of certain behaviours. In addition to using such population level data, the working of the intervention needs to be linked with the outcomes in order to give the evaluation explanatory power. Thus three interlinked forms of evaluation are implicated: formative evaluation, which is carried out to inform the design of interventions and involves assessment of the inputs to the service which enable the health care to be provided; process evaluation, which deals with the mechanisms of the programme and helps to guide implementation; and outcome evaluation, which assesses the impact of the programme on outcomes identified as objectives, thereby assessing its efficacy.

Using routine data to evaluate health promotion interventions

A broad range of data is collected routinely by a variety of agencies. Table I shows some of the main routine data sources which can provide indicators in evaluation.

Table I Some useful data sources

Data source	Comments
General population data	A number of data sets with information on the general population are produced by the Office for National Statistics (ONS). They include, for example, the public health data set, birth and death files and mid year population estimates derived from census figures. They provide population statistics for incidence rates of particular diseases, disease specific mortality rates, and birth rates
Community services data	Community services such as family planning clinics are required to record data which is collected and collated quarterly. This is predominantly activity data, such as the number of people using services by age group and gender, the type of service provided
General practice data	All GP surgeries in the UK are required to record data on the services they provide. This includes the number of patients registered by age, sex and postcode; the number of temporary residents receiving care; the provision of contraceptive services as measured by general contraceptive financial claims, coil fitting financial claims and contraception provided to those not registered; data on numbers of cervical smears taken; numbers of immunisations; new patient checks and elderly health screening
Prescribing analysis and cost data	General practice prescribing analysis and cost data (PACT data) is produced by the Prescriptions Pricing Authority and provides data to individual GPs and the health authority regarding the prescriptions dispensed as prescribed by each general practitioner in each surgery. The data include the name of the drug and the number of tablets or units prescribed
Hospital data	A minimum data set is kept regarding all inpatients and outpatients and provides basic demographic data and information pertaining to the specific consultation or hospital admission. Some hospital data is collated and published by the ONS to provide information for epidemiological purposes such as disease specific mortality rates
Laboratory data	The Communicable Disease Surveillance Centre (CDSC) of the Public Health Laboratory Service (PHLS) collects and collates data on communicable diseases, generated from a wide range of sources including laboratory reports and epidemiological studies. Data are published on a regular basis and are available to researchers and health professionals

The appropriateness of the application of this routine data to the evaluation of health promotion interventions depends on the nature of the intervention, the population to which the intervention is directed and the aims and objectives of the intervention, which should be clearly defined. A realistic assessment of the likely impact of the intervention should be made. Critical consideration needs to be given to the potential role of routine data in providing indicators for the specific intervention. The advantages and limitations of the routine data must therefore be considered in the context of the specific project. In particular, the validity and scope of the routine data available should be considered.

Data protection

Researchers and health professionals who use data containing personal information on research subjects must ensure this is covered

by an appropriate registration under the Data Protection Act 1984[1]. Computerised records relating to treatment that health professionals have provided as employees of a National Health Service (NHS) trust will be covered by a registration held by that trust. However, when personal data is held in connection with individual research, health professionals need to register individually as data users.

When health professionals use confidential medical data for purposes other than the immediate health care of the patient concerned, this raises the issue of whether this entails a breach of confidentiality. Data users must therefore be aware of and observe the Data Protection Act, which aims to ensure standards for collecting, holding, and using personal data.

Rationale for using routine data

A number of arguments can be made for drawing on existing data to evaluate health

promotion interventions. This section examines the main advantages and opportunities in using routinely collected data.

Low cost

Existing data is generally available at low cost to health professionals, providing an obvious opportunity for conserving limited financial resources. The collection of primary data, generated specifically for the purposes of the evaluation, is costly and takes time. The utilisation of “off the shelf” data which has previously been collected and collated is clearly an alternative option.

Comprehensiveness

Routinely collected data sources are often more comprehensive than sample-based data sets, since they include information on the whole population. In the case of hospital data, some information on every patient is collected on a routine basis. This data set provides information by age and sex and diagnosis, reason for admission, length of stay and surgical procedure. Some of these hospital data are collated and published by the Office for National Statistics (ONS) and are therefore readily available for research purposes.

Opportunities for comparison

Routinely compiled data sets tend to be based on standard instruments, enabling meaningful comparisons between geographical areas, health care services or national figures. Comparisons can also be made with other sources of data where similar indices have been measured. Data on similar types of behaviour may be obtained from several different surveys. This allows for opportunities for checking validity and reliability of the data collected. Questions on condom use have featured in both the National Survey of Sexual Attitudes and Lifestyles and the British General Household Survey. Typically questions have been asked about attitudes towards condom use, knowledge of their protective effects and recent practice (Goodrich *et al.*, 1998). Combining information elicited from separate and independent studies allows a triangulation of results, adding validity to the measures where the data are similar.

Opportunities for time-series analysis

Some large-scale surveys are repeated at regular intervals. Where design is kept constant, comparison of given indicators over time can be made. For example, changes in the prevalence of a behaviour over time can be measured, where data is taken from subsequent rounds of the same survey. Even better, for purposes of comparison, is the cohort study. Data from such studies can be analysed to produce trend data in a given population group such that changes in attitudes or behaviours over time can be monitored.

Objectivity

Routinely collected data are not dedicated to the evaluation of a specific intervention, a feature that may, at first sight, seem to be a disadvantage. Yet the distance from practice may serve to lend impartiality to the evaluation conclusions drawn, for just this reason.

Certain data sources may provide impartial and objective data, which can be used as a check on the validity of self-reported behaviour. Goodrich *et al.* (1998) cite the example of commercial sales data as a more objective measure of behavioural change. Data on condom sales provide a proxy indicator of condom use. Such data have the advantage in that they are relatively free from individual reporting bias and can be used to verify results from behavioural surveys.

Drawbacks of using routine data

Despite the advantages, a number of questions remain:

- To what extent can available data provide the process and outcome indicators required to evaluate the intervention?
- To what extent do measurement indicators have to be tailored to the data available?
- What are the implications of this for the value of potential indicators?
- How can the data be accessed and by whom?
- What are the problems relating to the quality and the validity of the data?

Lack of specificity

A key question relates to the extent to which the indicators available in the routine data

sources represent the particular outcomes the intervention is seeking to achieve. Describing some of the limitations of using condom sales figures in the context of evaluation of sexual health promotion, Goodrich *et al.*, (1998) point out that the aggregate data tell us nothing of what happens to condoms after they are purchased. For this type of information, dedicated in-depth research would be needed. The factors influencing condom use are complex. Recent research (Coleman, 1998) has shown that young people are often well aware of the need to use condoms, and often do buy them, but a major barrier to use is problems of communication during a sexual encounter. Thus any evaluation of a health promotion intervention which aimed to promote condom use may produce misleading conclusions if relying solely on sales figures.

Inferring causality

The problem of attributing outcome to intervention is a perennial one in health promotion evaluation and the use of data collected at the level of the population tends to exacerbate the difficulties. Ideally, intervention activities should be linked with outcomes in the target population. Otherwise, there is little way of knowing whether desired outcomes came about as a result of the intervention, or as a result of other influences. In order to establish a close link between the intervention and its outcomes, the nature of the study itself will, of course, influence the extent to which causality can be determined. A poorly designed study, for example, may not detect changes in outcomes which have in fact resulted from the intervention.

Identifying the target population

Measuring outcomes in an attempt to evaluate the impact of an intervention on a given population requires information on who was exposed to, or targeted by the intervention, and who was not. Without this data, again the researcher encounters difficulties in assessing that particular outcomes are the direct result of an intervention. Moreover, official sources of data rarely discriminate between subgroups of the population according to variables most useful to the evaluation. In relation to sexual health services for example, Allen (1991) notes the crudity of data on service users, as it cannot indicate whether those using the service are people who had never used

services before, or were dissatisfied customers of different services, or were clients moving between services.

Lack of sensitivity

The effects of specific programmes risk going unobserved if the indicators selected to measure the changes lack sensitivity to specific changes. Routinely collected health service data are often inadequate for localised analysis. For example, returns from sexual health clinics[2] are produced in terms of location of the clinic, yet many people attend outside their area of residence[3]. The mobility of clients between services and across geographical regions provides challenges to both identifying the client population and in attributing changes in behaviour or disease incidence to the service in question.

Data generated at the clinic level may tell us little about the prevalence of disease or behaviours among the local resident population. Where available, sub-national, regional or even ward-level data are likely to produce more sensitive indicators for use in the evaluation of local initiatives.

General population data are of most use when evaluating interventions that are directed to whole administrative regions since the population numbers of residents of the borough are used as the denominator in the calculation of disease rates.

Although ONS population data, for example, is not generally available for each ward, ward-level data can be calculated and are available locally from some health authorities. In London, for example, ward-level population data can be purchased from the London research centre and this allows indicators to be tailored more specifically to the intervention in question.

The Lambeth Southwark and Lewisham Health Action Zone (which includes the reduction of unplanned pregnancy among its aims) uses indicators available from the ONS, which have previously been proposed as measures of unintended pregnancy (Clarke, 1988; Faculty of Public Health Medicine, 1994; McColl and Gulliford, 1993). They include:

- the age specific abortion rate per 1,000 females;
- the abortion rate per 1,000 live births;
- conceptions in those aged less than 16 expressed as a rate per 1,000 girls aged 13 -15.

Clearly, these data will need to be augmented by data from other sources for a meaningful picture to emerge. The determinants of teenage pregnancy, for example, are complex. Levels of education are strongly correlated with the outcomes of sexual activity (Wellings *et al.*, 1994). Teenage conceptions and unplanned pregnancies have been linked to social deprivation (Smith, 1993; Boulton Jones *et al.*, 1995). Many individual factors will influence conception rates and decisions (Effective Health Care, 1997).

Use of indicators of outcome such as unplanned pregnancies to evaluate services needs to be amplified in practice by, for example, rates of failed contraception and late abortion referrals.

Where programmes reach a relatively small section of the population, the size of the effect on the overall population may not be of significant magnitude to affect population based measures of behaviour. The numbers of pregnancies in women under the age of 16 for example, are small and modest changes in this rate may reflect random variation. It has been argued that evaluating local programmes in terms of changes at the population level could be detrimental to continued support of such efforts if those without a full understanding were to conclude that the programmes “don’t produce results” (Bertrand and Tsui, 1995). Interventions with small effects on many people require very large studies to evaluate them (Rose, 1992). For smaller scale programmes other outcomes such as changes in client knowledge, behaviour and satisfaction with services may be more meaningful indicators of achievement (Bruce, 1990).

Furthermore, population data cannot indicate which aspects of a multifaceted programme are effective. For this, the in-depth evaluation of the component parts of programmes and their processes is essential.

Time frame and scale of evaluation

The time frame over which outcomes are measured has to be carefully considered. It needs to be long enough to allow individuals to implement change, or move through a period of developing readiness to change, and short enough not to allow relapse into pre-change behaviours (Aral and Peterman, 1996). In relation to sexual health services, Allen (1991) highlights the following problems in using birth, conception and

abortion rates as outcome measures, in the short term:

- Services are likely to build up a clientele over time, so that the impact would probably be gradual rather than immediate.
- There is a time lag in the case of both births and abortions, so that even if there were immediate widespread take-up of services or increase in the efficient use of contraception which affected birth or abortion rates, it would not show up in the figures for some months.
- There are fluctuations in the birth rate and abortion rate at local and national level from year to year and the figures for one or two years are insufficient to show any reliable trend.
- There is a time lag in the collation and publication of data on births and abortions, which makes any regional or national comparisons in the short-term very difficult (Allen, 1991, p. 8).

Similar problems with using incidence of infection as outcome indicators have been discussed (Bertrand and Tsui, 1995). Because several sexually transmitted infections (STIs) are generally found in varying proportions in populations, measurement of a single STI may be inappropriate; in order to track a single STI over time for evaluative purposes, evaluators would first need to establish the prevalence of the STI concerned in a given population. Furthermore, some STIs are chronic and so treatment, or changes in behaviour, may not necessarily lead to an immediate change in prevalence.

The use of measures relating to morbidity and mortality are even less favourable in the case of HIV infection because of the time lag between infection and the appearance of HIV-related symptoms. Similarly, in some other diseases which have long latency periods before the development of symptoms, the use of such measures can be problematic.

Thus, an intervention may have long term effects which may require expensive prospective trials unless intermediate effects of the intervention can be measured. The potential danger in only measuring immediate effects is that the effect of the intervention may only be short term, when a long-term effect is the ultimate goal.

Choice of indicators is dictated by the data available

The information available from routine data sets may pose serious restrictions on what can actually be measured. For example, government returns from sexual health services in the UK only record age in a limited number of pre-determined age groups. So any measurement of service use by age is limited.

Furthermore, the unit of measurement is the diagnosis, not the patient. An individual may be recorded more than once for different courses of treatment. Since the figures only allow calculation of the numbers of infections they do not provide a true count of persons. A similar problem arises in the analysis of data from out patient clinics[4], which record attendances or "threshold" crossings (not patients) so that the same patient may be included more than once.

Generalisability

With regard to their generalisability to the population as whole, conclusions from routine data sets need to be cautiously drawn. For example, in the returns from sexual health services, the statistics may not show the true incidence of sexually transmitted infections as around 10 per cent of patients are thought to receive treatment elsewhere than in NHS genitourinary medicine (GUM) clinics. Furthermore, many people never present for treatment, because they do not have any symptoms, or because they disregard symptoms, or because the conditions resolve themselves spontaneously.

Where data from family planning clinics[5] are used to monitor service use, caveats need to be included, relating to incompleteness of the data. They do not cover private clinics, general practitioners' surgeries, consultants' outpatient clinics, or the use of contraceptive methods available without prescription (predominantly condoms, natural methods and sterilisation).

So far as routinely collected data are concerned, men are a neglected group. As there are no financial payments for contraceptive services provided to men there is no routinely available data regarding the use of general practitioners' contraceptive services by men or regarding the provision of condoms from general practices.

The time period between the collection of data and its subsequent publication and availability to researchers is important in the

context of generalisability. Where this time lag is substantial, the conclusions cannot be generalised to the current study population among whom the incidence of a given disease or the prevalence of a given behaviour may have changed significantly. Routinely collected data, because of the long lead-time between the generation of the data and its production in usable form, may be of less value in assessing the outcome of short-term interventions.

Data quality

The standards of routine data collection are not always as high as those expected in research or for more rigorous evaluation. Data may be inaccurate, incomplete or out of date. Furthermore there may be little consistency among service providers in the way data are recorded. For example, inconsistencies both between and within services have been found in the definition of sessions and attendances in the completion of clinic activity statistics (Allen and Hogg, 1993). There is also evidence that, given the (perceived) pressure on services to bring in more patients, staff are under pressure to exaggerate the figures, by for example, including telephone calls as attendances (Beardsell *et al.*, 1997).

Errors may be made in the recording and transfer of data. Much of the data are still recorded and stored on manual records. Data may also be transferred manually between incompatible computer systems, resulting in a higher likelihood of human errors.

Discrepancies in the data held by health authorities and clinics regarding list sizes or opening times illustrate inaccuracies. The accuracy of general practice data is influenced by the efficiency with which claims are made. Less financially efficient general practices may provide services without making claims. In the past, women signed a form stating that they were receiving contraceptive services from a GP in order for a claim to be made. There is currently no routine way in which claims made are checked against either records or prescriptions.

Practice list data cannot be relied on to give an accurate indication of the local population size. List sizes in some inner city areas may be inflated by as much as 20 per cent across some age bands in comparison with the ONS mid year estimates (Challenger, 1999). They may be particularly inaccurate for younger

age groups in areas of high population mobility when the person who moves does not re-register with a new practice.

When routine data sources are incomplete or are lacking in sensitivity and specificity, as discussed above, their use as indicators may be limited. For example, STI incidence is one of the ten indicators of progress, and one of the outcomes of programme impact and prevention activities, developed by the World Health Organization's erstwhile Global Programme on AIDS. Data on risk behaviour and protective strategies comprise important intermediate and surrogate indicators (Stroobant, 1994) and may need to be collected using specially designed surveys.

Data have limited scope

Overall, there is a limited range of existing data available and it is unlikely that these data cover all the aspects of evaluation required. The data are often collected for reasons other than monitoring and do not necessarily provide the appropriate information required. Routine data measures often represent a compromise between the readily available quantitative data and the essential features of good indicators.

Routine data may be particularly weak at assessing important processes. In sexual health promotion, the attitude of those involved is key to the success of many interventions, and confidentiality is an essential feature of counselling and sexual health services. Neither of these can be evaluated from routine data sources.

Summary

This paper has illustrated many arguments for using existing data sets for the purposes of evaluation. Routinely collected data sets are inexpensive to use, convenient and often comprehensive – containing information on all members of a given population.

A major advantage of using routinely collected data is the opportunity it provides for making comparisons, through time, across different services and with national figures. This is maximised with good communication and co-operation between health professionals at both the design level of an evaluation, and between different regions. Use of routine data is particularly beneficial where surveys are repeated over time as this

allows trend data to be collated. Data are generally available over an extended period of time, and methodological flaws are at least constant over time, making it of considerable value in charting trends.

Because these data sets are not generated with any particular agenda in mind, they often provide impartial information which may be used as a check for self reported behaviour which may be less objective and more prone to reporting bias.

There is, then, a strong case to be made for the use of routinely collected data sets in the evaluation of health promotion interventions. However, this paper has also considered some potential drawbacks of using routinely collected data sets in evaluation. Some of the indicators obtained from these data sources may be lacking in specificity. Because the prime purpose of these data is usually not the provision of indicators for evaluation, they may have less power in inferring causality than other indicators designed at the outset of a specific study. There is a further danger that the data may not actually refer specifically to the study population in question – an issue that would not arise were data collected on that population from the outset.

An additional limitation is that data sets may not be sensitive enough to local conditions and therefore may be inadequate for the evaluation of local health promotion initiatives. Population level data will not be sensitive enough to detect specifically which aspects of a multi-faceted programme have been effective. However, regional and even ward level data are often available and can be used in this context.

Data may also be inadequate for detecting changes in behaviours which occur over a short period of time. There is often a significant time lag between data collection, analysis and publication when data sets become available to researchers. If the time lag is too long, the data will not detect changes which may have occurred immediately after the intervention. If too short it will not detect long term outcomes of specific programmes.

Because they are not designed specifically for evaluation purposes, the data sets may not contain the necessary information required and thus may limit exactly what can be measured in the process of the evaluation. Furthermore, conclusions need to be generalised to the general population with

caution as data sources from specific groups (such as users of a particular service) may not be representative of the wider population.

Caution needs to be exercised when relying on data sources which may have been compiled by a number of different people, each of whom may be inconsistent in their methods, accuracy or thoroughness.

Sole reliance on these data sources may allow only an evaluation of outcomes at the expense of missing some important processes. The use of more than one data source is recommended in order that each might to some extent correct and compensate for the deficiencies of the other. Triangulation of data from several sources is an accepted approach to problems of validity and reliability in social science research and routinely collected data sets provide important opportunities in this context. Where necessary, it can be enriched by additional research using qualitative methods to give more in-depth understanding.

Thus, while there are problems with using all these data on their own, some of these are remedied by using them in unison, especially where they point to similar results. Conclusions drawn from multiple data sources are likely to be firmer than those drawn from a single source, thus adding value to the evaluation results.

Notes

- 1 Further information can be found on the following Web site: www.hmsa.gov.uk/acts/acts
- 2 Sexual health services in the UK are required to make statistical returns to the Department of Health. This is the main source of data that purchasers use to assess need and monitor both clinic activity and the incidence of sexually transmitted infections in the districts.
- 3 For convenience; people may wish to access services during their working day and so are more likely to access services closer to their work than to their home. This is probably more so in London and in other urban centres where large numbers commute to work from surrounding towns or rural areas. Furthermore, it is likely that people travel to a centre rather than use their local clinic to enhance their anonymity. This is probably particularly likely of young people.
- 4 The KH09 is returned on a monthly basis and provides workloads for NHS genitourinary medicine clinics. It provides information on the number of clinic sessions held; the number of clinic sessions cancelled; referral attendances seen; referral attendances which did not arrive; GP written referral requests; private patient attendances and contractual arrangement attendances.

5 KT31 is the annual return made to the Department of Health by family planning clinics in England and FP 1001/2/3 and EC 102/3/4 are the financial claims forms for contraceptive services provided by general practice. They provide data for the calculation of certain indices which may be used in the evaluation of the services. For example, the proportion of women registered with a general practice who currently use contraceptives may be determined. The proportion of women living in an area receiving contraceptive services may be calculated, if family planning community clinic data records postcodes and if ward level population data can be obtained.

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