

What makes a good prevalence survey?

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In addition to providing an estimate of the burden of skin disease in a given community, prevalence surveys permit an estimation of the potential demand for medical facilities and the economic impact of a disorder. Comparison of data from prevalence surveys conducted in different populations with varying dietary and lifestyle habits may allow inferences to be drawn about the association between a certain disease and its possible triggering factors¹.

These significant inferences should be drawn from high-quality prevalence surveys. Thus, it is important to critically appraise the quality of the source of information for prevalence data. This chapter discusses criteria that can be used to assess the quality and relevance of publications that report on the prevalence of a disease. The proposed criteria have been derived from a general medical literature search, supplemented by our own experience in assessing the quality of prevalence surveys of psoriasis in Europe.

Quality criteria

Our literature search suggested that the most comprehensive guideline for evaluating the quality of prevalence surveys was that published by Loney et al². They proposed eight main quality criteria. Based on this publication, we developed seven quality criteria, which are in part identical to the criteria suggested by Loney et al. They are shown in Box 1.

We discuss each criterion in more detail below with reference to prevalence surveys of psoriasis in order to illustrate how these principles can be applied to a common skin disease:

Specification of the target population

Published prevalence surveys should give a definition of the target population, which is the population to whom the researchers wish to generalise their results. Information about the geographical area covered as well as age and gender should be included. If certain population subgroups are excluded, e.g. certain ethnic groups, this should be mentioned.

Employment of adequate sampling methods

In most cases it is impossible to survey the whole population of interest. Therefore it is necessary to draw a sample that is representative of the population of interest. The best sampling technique is random sampling, whereby a group of people are selected at random for study from a larger group (population). Each person is chosen entirely by chance, thereby reducing the likelihood of a selection bias favouring one group of people over another.

Cluster sampling ie sampling clusters of people such as a random sample of villages within a region, is acceptable providing the methods are clearly described and that the precision of the final prevalence estimate incorporates the clustering effect. Convenience samples eg a street survey or interviewing lots of people at a public gathering, are not considered to provide a representative sample of the base population.

Adequate sample size

The larger the sample, the narrower will be the confidence interval around the prevalence estimate, making the results more precise¹. As no observed sample value exactly equals the population value, the confidence interval is a necessary parameter that describes the range of

plausible values for the population parameter². Often, a “ 95% confidence interval ” is quoted. The figure of 95% reflects the strength of belief that the computed interval actually contains the unknown parameter value³.

The sample size required to estimate the prevalence of a disease with a certain degree of precision can be calculated. For example, following a review of surveys concerning the prevalence of psoriasis, we calculated that if the prevalence of psoriasis is assumed to be 2%, a sample size of 753 would be needed in order to obtain an error rate of +/- 1% at the 95% confidence level. So with this sample size, and a real psoriasis prevalence of 2%, the prevalence value resulting from a survey could vary between 1% and 3%.

The accepted error rate could vary depending on the assumed absolute prevalence of a disease. If a disease has a prevalence of around 10%, an error rate of 2% could be acceptable, resulting in a prevalence estimate with 95% confidence intervals varying between 8% and 12%. As the prevalence of psoriasis is not assumed to be that high, though, an error rate higher than 1% could result in imprecise outcomes.

In order to guarantee the defined confidence level and error rate, and therefore ensure a specified degree of precision, it is necessary to define the actual final sample size by subtracting the non-responders from the initially determined sample size. In our review of European prevalence surveys for psoriasis (Box 2), we considered the sample size adequate if the total number accounted for at least 753 participants after subtracting the non-responders.

Adequate response rate

If only a proportion of invited people participate in a survey, selection bias may occur, thus affecting the validity of the findings⁴. Individuals affected by a certain disease could either respond more often than healthy people, or rather tend towards non-participation. For population surveys, a response rate of 66% to 75% has been recommended as generalisable in literature⁵. In our rating of prevalence surveys for psoriasis, we considered a response rate of 70% or higher as adequate.

Information on non-responders

It is necessary to obtain information about non-responders to make sure that they do not differ from survey responders in terms of factors such as sociodemographic characteristics or the presence of disease. Researchers should try to follow up individuals who do not consent to participate in a survey and ascertain their reasons for non-response. In our review of prevalence surveys for psoriasis, any attempt of the researchers to obtain information about the reasons for non-participation and the characteristics of the group of non-responders was regarded as a quality asset.

Valid and repeatable disease definition

An important quality criterion for prevalence surveys is the presence of a standardised definition of the disease under investigation. A good disease definition is valid and repeatable. The term “validity” refers to the sensitivity (discerning as many cases of disease as possible) and specificity (excluding as many noncases as possible) of the definition⁶. A disease definition’s validity has to be tested on an independent sample before it can be used on the study population.

Ideally, a repeatable disease definition leads to similar results between several observers or within replicate measurements taken by in the same observer. Testing of this criterion is also necessary before adopting a disease definition.

In the field of dermatology, valid and repeatable disease definitions are rarely to be found in prevalence surveys. As our rating of prevalence surveys for psoriasis shows in Box 2, not one of the 18 assessed surveys contained a valid disease definition.

Reduction of observer bias

Observer bias may occur when a prevalence survey is based on clinical examination or on interviews. If there are several observers, their assessment concerning the presence or absence of a disease or of its severity could vary considerably. But even if only one examiner is responsible for the whole survey, observer bias may occur, e.g. if the examiner is prejudiced or has a personal interest in a certain outcome.

Thus, an attempt to minimise observer bias is mandatory for every prevalence survey. This task may be accomplished by adequate training of the examiners, by teaching them to rate the presence or absence of a disorder in the same standardised way. A comparison of the results of all observers may also show if there is an interobserver-variability. If there is only one observer, it should be made clear before the onset of the survey that he or she has no personal interest in a particular outcome.

Additional criteria

Specification of inclusion criteria

To allow for comparability between different prevalence surveys, it is important to specify inclusion criteria. These should comprise information about the age range and, if appropriate, gender and ethnic group of the targeted individuals.

Information on studied individuals

In addition to specifying inclusion criteria to denote who is eligible for study, a good prevalence survey should give information about the individuals actually studied. Given that non-response is common, data on the population that is actually studied might differ from the specified inclusion criteria. For example, if a survey of psoriasis sets out to include all adults between 20 and 80 years of age, but individuals older than 75 years do not participate, the age range of the actually studied persons runs from 20 to 75 years. Valuable information about the studied individuals comprises at least the age range and the proportion of men and women.

Measurement with valid instruments

A good prevalence survey describes the examination methods which led to its results. Furthermore, the instruments employed should be valid, displaying a high sensitivity and specificity. If an agreed standard measurement of a disease exists, with tested validity and reliability, it should either be employed, or any other used instruments should have been tested previously in relation to the standard instrument.

In prevalence surveys, one way of measurement is clinical examination of the study population, especially when dealing with surveys of visible dermatological diseases. If this examination is performed by one or more trained specialists, a valid measurement may be assumed. Other common methods are questionnaires and interviews. Ideally, employed questionnaires should have been tested for validity before being used on the study population.

Correct application of epidemiological terms

It cannot be assumed that published prevalence surveys always apply the correct epidemiological terms for their findings. Sometimes, the terms “prevalence” and “incidence” are misused, the one being applied when in fact the other has been determined. Therefore a careful evaluation of the results with regard to their correct epidemiological relevance is necessary.

In our review of prevalence surveys, one out of 18 surveys applied the term “incidence” to its findings, when in fact the prevalence had been determined.

Confidence intervals or standard errors

The results for the prevalence of a disease derived from a prevalence survey provide only an estimate of the true prevalence in the larger population. Confidence intervals provide a range that contains the true population prevalence estimate with a certain degree of assurance, thus indicating the level of confidence one can have in the estimates. The degree of assurance commonly used is 95%.

Confidence intervals are influenced by the sample size: The larger the sample, the narrower the confidence interval and the more precise the estimate³. By calculating and mentioning confidence intervals for their prevalence estimates, quality prevalence surveys indicate their precision.

The standard error as a measure of the amount of sampling variability is also influenced by the sampling size³. It reflects how much the estimate for prevalence fluctuates from sample to sample. A small standard error shows that different samples do not highly affect the estimate for prevalence derived from the survey.

Thus, both confidence intervals and standard error are important to describe the reliability of the outcome of prevalence surveys. One of them should be computed and always reported in the results of a prevalence survey.

Box 1. Criteria to consider when assessing the quality of prevalence surveys in dermatology

A. Seven criteria which should always be assessed:

1. Was the target population specified?
2. Which sampling method was employed? Is the survey based on a random sample or a whole population?
3. Was the sample size adequate?
4. Was the response rate adequate?
5. Was information given on non-responders?
6. Was a valid and repeatable disease definition given?
7. Have reasonable efforts been made to reduce observer bias?

B. Other factors worth looking for:

1. Were inclusion criteria specified?
2. Was information on persons actually studied reported in detail?
3. Were known and validated instruments used for measurement of the health outcome?
4. Were the terms “incidence” and “prevalence” correctly applied?
5. Were confidence intervals or standard errors presented for the estimates of prevalence?

Box 2. Critical appraisal of studies of the prevalence of psoriasis in Europe 1975-2002

Study and setting	Sample size (n)	Sample design	Measures	Prevalence rates	Present quality criteria	Limitations
Basirc-Drusko (1989) ⁷ Yugoslavia – Croatia	8416	Urban and rural communities, factory employees	Clinical examination	Point prevalence: 1.6%	Target population specified Random sample Sample size adequate	No information on response rate and non-responders No valid disease definition No information with reference to reduction of observer bias
Braathen (1993) ⁸ Norway	13438	Random sample of the Norwegian population	Questionnaire	Point prevalence: 1.4%	Target population specified Random sample Sample size and response rate adequate Observer bias reduced	No information on non-responders No valid disease definition
Brandrup (1981) ⁹ Denmark	4977	Random sample of the Danish population	Interviews	Lifetime prevalence: 2.8	Target population specified Random sample Sample size and response rate adequate Observer bias reduced	No information on non-responders No valid disease definition
Broadley (2000) ¹⁰ U.K. – Cambridge	753	First-degree relatives of patients with multiple sclerosis	Questionnaire, confirmation from general practitioner	Lifetime prevalence: 2.8%	Target population specified Response rate adequate Information on non-responders Observer bias reduced	Convenience sample Sample size too small No valid disease definition No population-based survey
Cellini (1994) ¹¹ Italy – Recanati	426	Agricultural workers authorised to use pesticides	Clinical examination	Point prevalence: 1.2%	Target population specified Response rate adequate Observer bias reduced	Convenience sample Sample size too small No valid disease definition No population-based survey
Cribier (1998) ¹² France – Strasbourg	100	Hepatitis C-infected patients	Clinical examination by dermatologists	Point prevalence: 4.0%	Target population specified Response rate adequate Observer bias reduced	Convenience sample Sample size too small No valid disease definition No population-based survey
Ferrandiz (2001) ¹³ Spain	12938	Stratified random sample of the Spanish population; persons responding to telephone calls	Telephone interview	Lifetime prevalence : 1.4%	Target population specified Random sample Sample size and response rate adequate Observer bias reduced	No information on non-responders No valid disease definition
Jensen (1995) ¹⁴ Norway – Oslo	140	Heart transplant recipients still alive 1 year after surgery	Clinical examination by a dermatologis	Point prevalence: 7.0%	Target population specified Response rate adequate Information on non-responders Observer bias reduced	Convenience sample Sample size too small No valid disease definition No population-based survey
Larsson (1980) ¹⁵ Sweden – AC County	9615	Adolescents 12 – 16 years of age, attending grades 7 – 9 of the compulsory school in AC County	Clinical dermatological examination	Point prevalence: 0.3%	Target population specified Whole population Sample size and response rate adequate Information on non-responders Observer bias reduced	No valid disease definition
Lee (1990) ¹⁶ U.K. – Blackpool	136	Patients with Crohn's disease attending a colitis clinic	Clinical examination, confirmation by a dermatologist in case of doubt	Point prevalence : 9.6%	Target population specified Response rate adequate	Convenience sample Sample size too small No valid disease definition No information about reduction of observer bias No population-based

						survey
Popescu (1999) ¹⁷ Romania — Bucharest	1265	Schoolchildren in Bucharest, classes 1 – 4	Clinical dermatological examination; Questionnaire for additional data	Point prevalence: 0.3%	Target population specified Random sample Sample size and response rate adequate Information on non- responders Observer bias reduced	No valid disease definition
Rea (1976) ¹⁸ U.K. — Lambeth	1200	Stratified random sample of population of Lambeth 15 to 74 years of age	1. Screening with a questionnaire 2. Clinical examination by dermatologists, other doctors, or trained nurses of ¼ of individuals responding positive and 1/5 of individuals responding negative to questionnaire	Point prevalence: 1.6%	Target population specified Random sample Sample size and response rate adequate Information on non- responders	No valid disease definition No information with reference to reduction of observer bias
Romano (1998) ¹⁹ Italy — Messina	457	Patients with diabetes mellitus attending an outpatient clinic	Clinical dermatological examination	Point prevalence: 5.3%	Target population specified Response rate adequate Observer bias reduced	Convenience sample Sample size too small No valid disease definition No population-based survey
Schafer (2001) ²⁰ Germany — Augsburg	2539	Stratified random sample of all registered residents of Augsburg aged 25 – 74 years	Clinical dermatological examination	Point prevalence: 3.8%	Target population specified Random sample Sample size adequate	Response rate too low No information on non- responders No valid disease definition No information with reference to reduction of observer bias
Siragusa (1999) ²¹ Italy — Troina	1500	All individuals admitted to the Department of Geriatrics at the Oasi Institute	Clinical dermatological examination	Point prevalence: 1.9%	Target population specified Sample size and response rate adequate	Convenience sample No valid disease definition No information with reference to reduction of observer bias
Susitaival (1995) ²² Finland — Pielavesi	1052	All registered farmers between 18 and 64 years of age in two municipalities	Validated questionnaire	Point prevalence: 1.8%	Target population specified Sample size and response rate adequate	Cluster sample No information on non- responders No valid disease definition No information with reference to reduction of observer bias
Van Romunde (1984) ²³ Netherlands — Zoetermeer	4691	Inhabitants of two residential areas in Zoetermeer	Questionnaire, clinical dermatological examination	Point prevalence : 1.1%	Target population specified Whole population Sample size adequate Observer bias reduced	Response rate too low No information on non- responders No valid disease definition
Weismann (1980) ²⁴ Denmark — Copenhagen	584	Individuals living at a municipality old people's home in Copenhagen	Clinical examination	Point prevalence: 2.9%	Target population specified Response rate adequate	Convenience sample Sample size too small No valid disease definition No information with reference to reduction of observer bias

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