

# ENDGAMES

## STATISTICAL QUESTION

# Cross sectional studies: advantages and disadvantages

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A cross sectional study design was used to investigate the extent of chronic fatigue and the associated psychosocial exposures in a developing country. The setting was a primary health centre catchment area in Goa, India. Participants were women aged 18-50 years. The primary outcome was reporting of fatigue for at least six months. Data on the primary outcome and psychosocial exposures were obtained by a structured interview. The psychosocial exposures that were investigated included mental health and gender disadvantage factors. The presence of anaemia was determined from a blood sample.<sup>1</sup>

The sampling frame consisted of 8595 eligible women listed in family health registers. In total, 3000 randomly sampled women were invited to participate and 2494 (83%) consented. Recruitment took place from November 2001 to May 2003. It was reported that 12.1% (95% confidence interval 10.8 to 13.4%) of women experienced chronic fatigue. Those psychosocial exposures most strongly associated with chronic fatigue were poor mental health and sexual violence by the husband.

Which of the following statements, if any, are true?

- The study was longitudinal by design
- It was possible to estimate the prevalence of chronic fatigue in women aged 18-50 years
- It was possible to estimate the incidence of chronic fatigue in women aged 18-50 years
- It can be inferred that chronic fatigue was caused by poor mental health and sexual violence by the husband

## Answers

Statement *b* is true, whereas *a*, *c*, and *d* are false.

The aim of the study was to investigate the extent of chronic fatigue and the associated psychosocial exposures in a developing country. A cross sectional study, which is observational in design, was undertaken in Goa, India. In an observational study the investigators do not intervene in any way but simply record the health, behaviour, attitudes, or lifestyle choices of the study participants. As the name suggests, in a cross sectional study the researchers aim to obtain a representative sample by taking a cross section of the population.

In the study above, the population was women aged 18-50 years who lived in a developing country. The study participants were a random sample of women from the family health registers for the catchment area in Goa. Other types of sampling could have been used to recruit women, including convenience sampling, which has been described in a previous question.<sup>2</sup>

In a cross sectional study, all the measurements for a sample member are obtained at a single point in time, although recruitment may take place across a longer period of time. In the study above, each woman was interviewed once, with recruitment taking place between November 2001 and May 2003.

A cross sectional study is not longitudinal by design (*a* is false). In a longitudinal study, each participant is observed at multiple time points, thereby allowing trends in an outcome to be monitored over time. Longitudinal studies may be prospective or retrospective and observational or experimental in design. The cohort study, described in previous questions,<sup>3 4</sup> is an example of a longitudinal study that is observational in design. Because women in the study above were interviewed only once, it was not possible to describe trends in chronic fatigue.

A cross sectional study is particularly suitable for estimating the prevalence of a behaviour or disease in a population. Prevalence is the proportion of the population that has the behaviour or disease. In the study above 12.1% of women reported chronic fatigue, and this figure is an estimate of the prevalence of chronic fatigue in the population of women aged 18-50 years in a developing country (*b* is true). Incidence is the number of new cases of a particular behaviour or disease in the population that occur within a specified period, expressed as a proportion of the number of people in the population during that time. It was not possible to estimate the incidence of chronic fatigue in the population of women aged 18-50 years in a developing country from the study above (*c* is false). Women were interviewed only once for assessment of chronic fatigue. They were not followed longitudinally to assess whether new cases of chronic fatigue developed. Therefore, the proportion of new cases of chronic fatigue in the sample over a particular time period could not be measured.

Incidence and prevalence can be reported as a proportion, percentage, or as a rate per 1000, per 100 000, or per 1 000 000, depending on the rarity of the behaviour or disease. Such measures of the occurrence of a behaviour or disease are useful when allocating resources and planning healthcare services.

Cross sectional studies are generally quick, easy, and cheap to perform. They are often based on a questionnaire survey. There will be no loss to follow-up because participants are interviewed only once. However, a cross sectional study may be prone to non-response bias if participants who consent to take part in the study differ from those who do not, resulting in a sample that is not representative of the population. It is possible to record exposure to many risk factors and to assess more than one outcome in a cross sectional study. However, because data on each participant are recorded only once it would be difficult to infer the temporal association between a risk factor and an outcome. Therefore, only an association, and not causation, can be inferred from a cross sectional study (*d* is false). For the study above, it is not possible to infer that poor mental health and sexual violence by the husband preceded the onset of chronic fatigue and that they may be risk factors for chronic fatigue. It

can be inferred only that chronic fatigue was associated with poor mental health and sexual violence by the husband. The results from a cross sectional study may inform the hypotheses for a more complex investigation, such as a cohort study.

Cross sectional studies are sometimes repeated at different times to assess trends over time. However, caution is needed if different participants are included at each time point. It may be difficult to assess whether changes in prevalence reflect a trend or simply differences between different groups of participants sampled from the population.

Competing interests: None declared.

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