

UK Biobank collected data on 502 649 subjects, aged 37 to 73, during 2006 to 2010. Febrile illness history was ascertained during the face-to-face interview, when participants self-reported cancer and non-cancer illnesses, including the date of diagnosis by a doctor. The available illness-response terms included pneumonia, encephalitis, meningitis, rheumatic fever, measles, rubella, mumps, diphtheria, and pertussis.

A total of 91 592 participants with visual acuity data were included in the analysis.

The figures on page 4 report the number of cases of these conditions in this group.

| Illness | Number of cases in 91 592 participants | Proportion reporting illness |
|-----------------|--|------------------------------|
| Pneumonia | 993 | 1.08% |
| Encephalitis | 54 | 0.06% |
| Meningitis | 303 | 0.33% |
| Rheumatic fever | 206 | 0.22% |
| Measles | 657 | 0.72% |
| Rubella | 230 | 0.25% |
| Mumps | 418 | 0.46% |
| Diphtheria | 32 | 0.03% |
| Pertussis | 207 | 0.23% |

During the childhood of most of the Biobank participants, between 150 000 and 800 000 cases of measles were reported each year in England and Wales,² and in 1963, 150 of every 1000 children were reported as having measles. So it seems unlikely that the proportion in Biobank ever reporting measles would be 0.72%.

The main Biobank website³ reports 2737 reporting measles in 378 597 participants, again 0.72%. In addition, 61 147 (16%) with asthma, 5893 (1.6%) with rheumatoid arthritis, and 15 761 (4.2%) people with fractures were reported.

Conflict of interest

The author declares no conflict of interest.

References

- Guggenheim JA, Williams C and the UK Biobank Eye and Vision Consortium. Childhood febrile illness and the risk of myopia in UK Biobank participants. *Eye (Lond)* 2016; **30**: 608–614.
- Biobank UK Data-Field 20002 Non-cancer illness code, self-reported. Available at: <http://biobank.ctsu.ox.ac.uk/crystal/field.cgi?id=20002> (accessed on 18 February 2016).
- Public Health England. Measles notifications and deaths in England and Wales 1940 to 2013. Available at: <https://www.gov.uk/government/publications/measles-deaths-by-age-group-from-1980-to-2013-ons-data/measles-notifications-and-deaths-in-england-and-wales-1940-to-2013> (accessed on 18 February 2016).

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Sir, Response to: 'Data from UK Biobank on febrile illness'

We thank Mrs Stratton for highlighting that the figure of 0.7% for the self-reported history of measles infection in UK Biobank participants¹ is far lower than the likely true prevalence in this cohort.

Most UK Biobank participants were born between 1937–1970, and routine measles vaccination² in the UK began in 1968. Thus, most participants would not have been vaccinated against measles during childhood. Prior to vaccination, ~99% of children were seropositive for measles antibodies, suggesting that exposure to the virus was ubiquitous.²

Self-reported measles infection was calculated from the following two interview questions, firstly, 'Has a doctor ever told you that you have had any other serious medical conditions or disabilities?' (the 'other' referring to cancer, which was discussed separately during the interview), and secondly, 'In the touch screen you selected that you have been told by a doctor that you have other serious illnesses or disabilities, could you now tell me what they are?'. We suspect the phrase 'serious medical conditions' contributed to the low self-reports of measles, since for most participants a measles infection may not have been perceived as serious.

We observed¹ that high myopia was more common in participants who did vs did not report having measles before 17 years of age (OR = 1.48, 95% CI = 1.07–2.07). Since childhood measles infection was nearly ubiquitous, this association likely reflects, in reality, an association between high myopia and an unusually serious or debilitating measles infection. In support of this, we saw similar associations with reports of certain other febrile illnesses.

Self-report is a widespread tool in epidemiology with recognised strengths and limitations.³ Accuracy can range widely, for example, sensitivity: 83% for cataract and 31% for colon polyps in NHANES.⁴ We hypothesize that reports for a severe childhood febrile illness are likely to be highly specific, but relatively insensitive. Such misclassification bias is likely to have reduced the power of our analyses. Methods to detect antibodies to viruses, for example, VirScan,⁵ would provide greater accuracy.

We are grateful to Mrs Stratton for flagging this important point regarding the strengths and weaknesses of analyses using large population studies.

Conflict of interest

The authors declare no conflict of interest.

References

- 1 Guggenheim JA, Williams C. UK Biobank Eye and Vision Consortium. Childhood febrile illness and the risk of myopia in UK Biobank participants. *Eye* 2016; **30**: 608–614.
- 2 Fine PEM, Clarkson JA. Measles in England and Wales—II: the impact of the measles vaccination programme on the distribution of immunity in the population. *Int J Epidemiol* 1982; **11**: 15–25.
- 3 Harlow SD, Linet MS. Agreement between questionnaire data and medical records. The evidence for accuracy of recall. *Am J Epidemiol* 1989; **129**: 233–248.
- 4 Bergmann MM, Byers T, Freedman DS, Mokdad A. Validity of self-reported diagnoses leading to hospitalization: a comparison of self-reports with hospital records in a prospective study of american adults. *Am J Epidemiol* 1998; **147**: 969–977.
- 5 Xu GJ, Kula T, Xu Q, Li MZ, Vernon SD, Ndung'u T *et al.* Comprehensive serological profiling of human populations using a synthetic human virome. *Science* 2015; **348**: aaa0698.

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