

The process and costs of publishing medical journals in Sri Lanka: an economic evaluation

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To cite: Ranasinghe P, Perera YS, Abeygunasekara AM. The process and costs of publishing medical journals in Sri Lanka: an economic evaluation. *BMJ Open* 2011;**1**:e000057. doi:10.1136/bmjopen-2011-000057

► Prepublication history for this paper is available online. To view these files please visit the journal online (<http://bmjopen.bmj.com>).

Received 8 January 2011
Accepted 20 May 2011

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ABSTRACT

Objectives: Medical journals have contributed to the advancement of medicine by helping to disseminate scientific knowledge and providing a forum for medical communities to debate issues in depth. To the authors' knowledge, there are no studies examining the process of medical journal publication in developing Asian countries. The authors analysed the process and costs of publishing medical journals in Sri Lanka, a developing country in South Asia.

Methods: Data were collected by interviewing the editors and perusing the records at the editorial offices of the respective medical journals. Articles published in 2009 (or 2008 for journals not published in 2009) were analysed by perusing the respective journals.

Results: A total of 44 medical journals were published in Sri Lanka's history, of which only 28 journals remained in publication after 2007. A majority (54%) of the journals published after 2007 were published once per year. Seventeen journals in publication after 2007 were published in paper version only, and 11 journals were also available online. The mean cost of printing one issue was Sri Lankan Rupees (LKR) 97 720 (US\$888) (range LKR 28 000–270 000). The cost of distribution ranged from LKR 2000 to 140 000 (US\$18–1273). The mean cost of publishing one article was LKR 6646 (US\$60). A total of 456 articles were published in 2009 (/2008). The total number of pages published was 1723.

Conclusion: The infrastructure for medical journal publishing in Sri Lanka has many good qualities such as free access, minimum charges for authors and potential for online availability. The journals are solely academic (non-profit), but the costs remain high.

INTRODUCTION

Scientific journals began in the 17th century with the French *Journal des Savants* and the British *Philosophical Transactions of the Royal Society*.¹ General medical journals began at the end of the 18th century and specialist medical journals at the beginning of the 20th century. Medical publications in Sri Lanka began in the late 19th century; the *Journal of the Ceylon Branch of the British Medical Association* (forerunner to *The Ceylon Medical Journal*)

ARTICLE SUMMARY

Article focus

- To analyse the process and costs of publishing medical journals in a developing country.
- To identify a list of medical journals published in the country.
- To analyse the number and types of articles published in recent Sri Lankan medical journals.

Key messages

- Sri Lankan medical journals are freely accessible with minimum charges for authors.
- Sri Lankan medical journals are solely academic (non-commercial) and non-profit in nature.
- The publication costs remain high.

Strengths and limitations of this study

- There is a lack of a comprehensive list of medical journals in the country.
- The limited number of publications from the fields of allied health sciences (nursing, pharmacy and physiotherapy) were not included.

was among the first medical journals published in the country. Medical journals have contributed immensely to the advancement of medicine by helping to disseminate scientific knowledge and providing a forum for medical communities to debate issues in depth. In addition, medical journals have helped medical practitioners to stay up to date on current practices related to their profession.

The cost of producing the first copy for a good- to high-quality journal in the UK has been estimated to be approximately \$2000.² Prices for US science journals rose 11% from 1960 to 1995 in constant dollars.^{3–4} Van Orsdel and Born reported that US journals prices rose 8.8% from 1995 to 1996.⁵ US journal prices increased 9.6% from 2003 to 2007, and non-US journals prices increased 9.2% during the same time in constant dollars.⁶ Reasons given for such prices increases are an increase in the size of the journals (including non-article content), the falling number of subscriptions,

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resource-cost inflation and the move away from author-side charges in the 1980s.⁷ The increased costs have resulted in significant journal price increases, hampering the ability of libraries, institutes and investigators from acquiring publications necessary for research and education.^{8,9}

The situation in relation to the publication of medical journals in developing countries such as Sri Lanka is different, as most medical journals published locally are underfunded, lack high-quality articles and are invisible to the rest of the world.¹⁰ To our knowledge, no studies have examined the process of publishing medical journals in developing countries in Asia. The primary objective of the present study was to analyse the process and costs of publishing medical journals in Sri Lanka, a developing country in South Asia. Secondary objectives included identifying a list of medical journals published in the country and analysing the number and different types of articles published recently in medical journals in Sri Lanka.

METHODS

Journal identification

In the absence of any established method for obtaining an exhaustive list of all medical journals in Sri Lanka, the list of medical journals published in Sri Lanka was compiled using: (1) The Union list of periodical holdings of Health Science libraries in Sri Lanka 2001, published by Health Literature, Library and Information Services (HELLIS) Network Sri Lanka;¹¹ and (2) medical periodicals catalogues available at the following libraries: Faculty of Medicine, Colombo; Postgraduate Institute of Medicine, Colombo; and Sri Lanka Medical Library. Journals published in either year 2008 or 2009 were considered for the cost analysis, and journals that were not published after 2007 were excluded, as the cost of publication may have changed significantly in recent years. In addition, journals from the allied health sciences were also excluded.

Cost analysis

The costs for printed journals were analysed under two basic categories, 'direct costs' and 'indirect costs'.¹² Direct costs were (1) editorial costs (for the selection and review of articles, the manuscript management system and copy-editing); (2) cost of printing; (3) distribution costs (including postage, packing and shipping costs); and (4) overhead costs (maintenance of an office and staff). The indirect costs were costs involved in administration, marketing and financing. For electronically published journals, there was no cost of printing or distribution. The editorial costs, overhead costs and indirect costs were minimal in the Sri Lankan context.

Costs were also be divided as fixed costs and variable costs. Fixed costs were those involved in manuscript processing such as editing, preparing special graphics and proofreading (ie, costs remain fixed for a journal, regardless of the number of subscribers). The variable

costs were those involved in printing and distribution of the journal (ie, costs vary by the number of subscribers). In the Sri Lankan context, the fixed costs were minimal, as editorial services were provided free of charge; hence the total variable costs were the sum of the cost of printing and distribution.

Data collection and analysis

The study was conducted between June and July 2010. Data were collected by an interviewer-administered questionnaire. A member of the study team interviewed editors of the respective journals, and exact figures for monetary data were obtained by perusing records at the respective journal offices. Data on the number of issues per year, copies printed per issues, costs of printing a single issue, other costs and avenues of income were collected, while the types and numbers of articles published in 2009 (or 2008 for journals not printed in 2009) were analysed by perusing the respective journals. The consent for publication of data was obtained from the editors of the respective journals. Data were analysed using SPSS V 14.

RESULTS

A total of 44 medical journals were identified as being ever published in Sri Lanka by the above-mentioned journal identification method, and all journals were published in English. A list of journals identified as being ever published in Sri Lanka is given in [box 1](#). Twenty-eight journals were being published after 2007, on which the following analysis is based. Fifteen (54%) journals were published once per year (annually). Seventeen journals (61%) were published in paper version only, while nine journals were published online in addition to paper publication. Two journals (7%) were published exclusively in the electronic format. All 11 electronically published journals allowed free online access to their articles. The number of copies printed per issue ranged from 100 to 8000 (mean 636). Only two journals published more than 1000 copies per issue (*The Sri Lanka Prescriber* and *The Ceylon Medical Journal*).

The mean cost of printing one issue was Sri Lankan Rupees (LKR) 97 720 (US\$888). The cost range was LKR 28 000–270 000 (US\$254–2454). Most of the journals were distributed free of charge, while seven journals carried a selling price which ranged from LKR 20 to 400 (US\$0.2–4). The main forms of distribution were collection by subscribers from the respective journal office (67.9%), postage (46.4%) and courier (14.3%) respectively. The cost of distribution ranged from LKR 2000 to 140 000 (US\$18–1273). Thirteen (52%) journals did not use any paid modes of distribution. There were no editorial costs involved for all the journals, as editorial services and peer review were provided free of charge. Only one journal was hosted in a dedicated office space (*The Ceylon Medical Journal*), while all other journals were hosted at the premises of the respective college or association. Thus, the total cost of journal publication was a sum of the cost of printing and cost of distribution. [Table 1](#) provides a breakdown of each journal's costs.

Box 1 Medical journals ever published in Sri Lanka

1. *Anuradhapura Medical Journal**
2. *Batticaloa Medical Journal*
3. *Bulletin of the Medical Research Institute of Sri Lanka**
4. *Bulletin of Ceylon academy of Postgraduate Medicine**
5. *Ceylon Journal of Medical Sciences**
6. *Ceylon Medical Journal*
7. *Galle Medical Journal*
8. *Government Medical Officers Association Medical Journal**
9. *Jaffna Medical Journal**
10. *Journal of the Lady Ridgeway Hospital for Children**
11. *Journal of Diagnostic Pathology**
12. *Journal of Ruhunu Clinical Society*
13. *Journal of the Ceylon College of Physicians*
14. *Journal of the Ceylon Public Health Association**
15. *Journal of the Clinical Society, General Hospital, Colombo**
16. *Journal of the College of Ophthalmologist of Sri Lanka*
17. *Journal of the Colombo General Hospital**
18. *Journal of the Medical Research Institute of Sri Lanka**
19. *Kurunegala Medical Journal*
20. *Medical Topics**
21. *Medical Research Institute Sri Lanka—Research Publications**
22. *Respire*
23. *Sri Lankan Family Physicians*
24. *Sri Lanka Journal of Anaesthesiology*
25. *Sri Lanka Journal of Bio-Medical Informatics*
26. *Sri Lanka Journal of Child Health*
27. *Sri Lanka Journal of Community Physicians*
28. *Sri Lanka Journal of Critical Care*
29. *Sri Lanka Journal of Haematology*
30. *Sri Lanka Journal of Medicine*
31. *Sri Lanka Journal of Orthopaedics*
32. *Sri Lanka Journal of Psychiatry*
33. *Sri Lanka Journal of Surgery*
34. *Sri Lanka Journal of Urology*
35. *Sri Lanka Practitioner**
36. *Student Medical Journal*
37. *The Bulletin of the Sri Lanka College of Microbiologists*
38. *The Sri Lanka Journal of Dermatology*
39. *The Sri Lanka Journal of Medical Administration*
40. *The Sri Lanka Journal of Obstetrics and Gynaecology*
41. *The Sri Lanka Journal of Venereology*
42. *The Sri Lanka Prescriber*
43. *Transactions of the Society of Medical Officer of Health, Ceylon**
44. *Uva Medical Journal*

*Journals not published after 2007.

The total annual cost of publishing medical journals in Sri Lanka was LKR 5 522 100 (US\$50 201). The mean cost of printing one copy per journal per issue was LKR 308 (US\$3). The mean cost of publishing one article per issue per journal was LKR 6646 (US\$60). The average cost of printing one page per issue per journal was LKR 1848 (US\$17). The main sources of income were advertisements/donations only (35.7%) and funds from the college/association only (39.3%) or both (25.0%).

The total number of articles (number of pages) published for year 2009 (or 2008 for journals not published in 2009) for the 28 medical journals were as follows: editorial (30 (51)), leading/review articles (49 (260)), research papers (120 (577)), brief reports (23 (44)), case reports (88 (190)) and other articles (146 (600)). A journal on average had 16 articles (range 5–55) and carried 61 (range 26–238) pages. A total of 456 articles were published by the respective journals per year (considering year 2009 or 2008 for journals not published in 2009). The total number of pages published was 1723. Twenty-three articles (5.0%) were contributions from foreign countries (India 9, Australia 6, UK 5, Pakistan 1, Iran 1 and Philippines 1).

DISCUSSION

The current global market of scientific publication is a complex one that has evolved over hundreds of years. Searches of UlrichsWeb in 2008 show a total of 219 774 active journals, of which 64 620 are active and academic/scholarly (Boolean search) and 24 059 active and reference journals.⁴ Working from Ulrich's and the Thompson (SIS) citation index, it is estimated that 23 750 journals published in 2006 yielded a total of 1 350 000 peer-reviewed journals.¹³ Once published, these journals are searched, read and referenced by readers and researchers worldwide. These scientific journals for analytical purposes can be divided into two broad categories commercial publications and non-commercial publications. The commercial publishers seek to maximise profit through publishing, while non-commercial/academic publishers (universities and academic societies) as in the Sri Lankan context are mainly non-profit institutions whose objectives are usually linked to furthering the interests of their research or professional development. For Sri Lankan journals, the main sources of funding are advertisers, donors and societies/institutions. Their involvement can be susceptible to influence by external factors such as the state of the local or global economy. This therefore could place limits on the ability of Sri Lankan medical journals to maintain their operations.

There were 28 medical journals in Sri Lanka which published issues in 2008/2009. In 2005, the whole of Africa had only 59 medical journals published in 33 countries.¹⁰ The average cost of publishing one article in Sri Lanka was LKR 6646 (US\$60), while the cost of printing one page was LKR 1848 (US\$17). In contrast the estimated cost of scientific publications in the UK² and USA¹⁴ is US\$2000 (LKR 220 000) and US\$3000 (LKR 330 000) respectively per article. The comparatively low cost for Sri Lankan journals can be attributed to the lack of expenses related to copy-editing, peer-review and dedicated staff, and office maintenance. However, the savings from these may compromise the quality of peer review, copy-editing and punctuality of publications. Though these are relatively lower than the figures from the developed world, publishing an article in a Sri Lankan medical journal incurs a significant cost to the publisher.

Table 1 Publication costs for individual journals

Name of journal (issues per year)	Copies per issue	Mode of publication	Total costs (Sri Lankan Rupees)	
			Per issue	Annual
<i>Batticaloa Medical Journal</i> (1)	500	Printed	94 000	94 000
<i>Ceylon Medical Journal</i> (4)	2000	Printed and online	205 000	820 000
<i>Galle Medical Journal</i> (1)	225	Printed and online	140 000	140 000
<i>Journal of the Ceylon College of Physicians</i> (1)	600	Printed	340 000	340 000
<i>Journal of the College of Ophthalmologist of Sri Lanka</i> (2)	250	Printed	120 000	240 000
<i>Journal of the Ruhunu Clinical Society</i> (1)	200	Printed	62 000	62 000
<i>Kurunegala Medical Journal</i> (1)	200	Printed	55 000	55 000
<i>Respire</i> (2)	350	Printed	170 000	340 000
<i>Sri Lanka Journal of Anaesthesiology</i> (2)	250	Printed and online	72 500	145 000
<i>Sri Lanka Journal of Child Health</i> (4)	250	Printed and online	100 000	400 000
<i>Sri Lanka Journal of Community Physicians</i> (2)	350	Printed	69 000	138 000
<i>Sri Lanka Journal of Haematology</i> (1)	200	Printed	100 000	100 000
<i>The Sri Lanka Journal of Orthopaedic Surgery</i> (1)	100	Printed	30 000	30 000
<i>Sri Lanka Journal of Psychiatry</i> (2)	200	Printed	28 000	56 000
<i>Sri Lanka Journal of Surgery</i> (2)	450	Printed and online	108 000	216 000
<i>Sri Lanka Journal of Urology</i> (1)	200	Printed and online	50 000	50 000
<i>Sri Lanka Journal of Medicine</i> (2)	300	Printed and online	105 000	210 000
<i>Sri Lankan Family Physician</i> (1)	400	Printed	100 000	100 000
<i>Student Medical Journal</i> (1)	100	Printed	40 100	40 100
<i>The Bulletin of the Sri Lanka College of Microbiology</i> (1)	175	Printed	94 000	94 000
<i>The Sri Lanka Journal of Medical Administration</i> (1)	300	Printed	75 000	75 000
<i>The Sri Lanka Journal of Obstetrics and Gynaecology</i> (4)	300	Printed and online	120 000	480 000
<i>The Sri Lanka Journal of Venereology</i> (1)	250	Printed	50 000	50 000
<i>The Sri Lanka Prescriber</i> (4)	8000	Printed and online	270 000	1 080 000
<i>The Sri Lankan Journal of Dermatology</i> (1)	150	Printed	137 000	137 000
<i>Uva Medical Journal</i> (1)	250	Printed	60 000	60 000
Total			2 764 600	5 552 100

All online journals provided free access. *Sri Lanka Journal of Bio-Medical Informatics* (quarterly) and *Sri Lanka Journal of Critical Care* (quarterly) were published online only.

In addition, in a developing country such as Sri Lanka, where the per capita monthly income is LKR 9100 (US \$83)¹⁵ and where a majority of the research work is self-funded, the cost of publication per article of LKR 6646 (US\$60) is substantially high. Authors, researchers, academic and funding organisations, and the government of Sri Lanka should be aware of this. Despite the availability of international journals, local journals still have a vital role to play in disseminating local knowledge, translating it into policy and practice, and contributing to national development.¹⁶ Therefore, all stake holders, especially the government and funding organisations, should recognise the importance of medical journals' potential as a tool for reduction in health inequity and poverty. Publication of medical journals should be supported financially by the state institutes, too, to improve their quality and sustainability. This would help the journals to be published more frequently and punctually, which in turn would foster local research and increase the publishing capacity of Sri Lanka.

In the Sri Lankan model of journal publication, the total fixed costs of publication are minimal, as editorial services, peer review and proofing services are volunteered. Hence, the costs of publishing are mainly dependent on variable costs. This cost distinction is

important in comparing publishing practices. Fixed costs of both print and electronic journals are recovered in three main ways: through subscriptions, author-side payments or contributions of time by editors and others, as in the Sri Lankan setting. Journal printing costs elsewhere tend to be in the \$30–50 per subscription range, and distribution costs in the \$10–20 range. The variable cost per article in a subscription is about \$0.40, and the per-article page in a subscription is under \$0.04. The variable costs of print journals are recovered as part of subscription prices, or, for society journals, personal subscriptions are recovered through member fees. The high price of some journals is due to a very large fixed cost (when there are many articles) that is recovered by a small number of subscribers.

The Sri Lankan medical journals averaged 16 articles (range 5–55) and 61 pages (range 26–238) per journal or about 3.8 pages per article, which is relatively small in comparison with international life science journals including medicine. In addition, only 5.0% of the contributions were from foreign countries, of which 39% were from neighbouring India. Out of the 28 journals studied in this analysis, only one of the journals (*Ceylon Medical Journal*) was indexed in PubMed and carried an impact factor. Thus, although the Sri Lankan model may

foster research publications and local dissemination of knowledge, international contributions and accessibility to the international audiences remain low. Making journals accessible online is one probable solution this issue. Online publication would also help to reduce the printing and distribution costs.¹² In addition, the availability of appropriate software makes it possible to make the submission of articles, peer review process and copy-editing to be done online conveniently for both authors and reviewers. Online publication on a live website would increase the visibility of the journal and its contents. This may help to alleviate the disadvantages of not being included in the indexing systems run by the developed world. The International Network for the Availability of Scientific Publications, a non-profit-making organisation based in the UK, maintains a website for Sri Lankan scientific journals (Sri Lanka Journals Online). At present, there is no extra cost for the journals to be included in this website. Eleven of the Sri Lankan medical journals are available online through this website. The journal website has gained increasing popularity at both national and international levels. Google Analytics shows that from 23 September to 31 December 2008, there were 1364 visits from 82 different countries. In contrast, from 1 January to 30 June 2010, there were 55 756 visits from 186 different countries: the top four sources for visitors were: Sri Lanka (13 843 from seven cities), India (7740 from 130 cities), USA (6424 from 2264 cities) and UK (3796 from 368 cities). The United Nations' repeated calls to provide universal access to the scientific and medical literature have not been heeded by most journals in the world.¹⁶ However, all Sri Lankan medical journals which are available online allowed free access to all their articles. Although this may not be a genuine form of open-access publication, this is a healthy trend which should be continued and fostered for wider dissemination of knowledge. The editors and publishers of other medical journals in Sri Lanka, too, should work towards making their journals available online using the Sri Lanka Journals Online website. With online publication, it may be possible to reduce the number of copies printed and thereby to reduce the escalating printing expenses. One drawback of the online publishing system would be the reluctance of the traditional researchers and reviewers to accept the computer-based system.

Our study has several limitations. The lack of a comprehensive list of medical journals in the country resulted in authors having to limit their journal search to the aforementioned sources. Thus, there is a possibility of inadvertently non-identifying certain medical journals in print and previously printed. In addition, the limited number of publications from the fields of allied health science (nursing, physiotherapy and pharmacy) were not included in the study.

CONCLUSION

The Sri Lankan model of publishing medical journals has several good qualities such as free access, minimum charges for authors and potential for online availability.

A majority of Sri Lankan medical journals are solely academic and non-profit in nature. However, the cost of publication remains substantially high. The good qualities of Sri Lankan medical journals should be appreciated and further strengthened by financial support from government institutes and funding organisations. Sri Lankan medical journals should shift from the traditional publishing model to online publications with a minimum number of printed copies to curtail the ever-increasing printing and distribution costs. This would increase their visibility in the international arena, too.

Acknowledgements We wish to acknowledge the contribution by DW King, in the revision of the manuscript, and also wish to thank the editors of the respective journals for their support during data collection.

Funding This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Correction notice This article has been corrected since it was published Online First. The received date has been amended.

Competing interests None.

Contributors All authors were involved in study design, data collection and analysis. PR drafted the initial manuscript. The manuscript was critically reviewed by YSP and AMA. All authors read and approved the final manuscript.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement No additional data available.

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	3	State specific objectives, including any prespecified hypotheses	4,5
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	NA
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6
Bias	9	Describe any efforts to address potential sources of bias	NA
Study size	10	Explain how the study size was arrived at	6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	NA
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	6
		(b) Describe any methods used to examine subgroups and interactions	NA
		(c) Explain how missing data were addressed	NA
		(d) If applicable, describe analytical methods taking account of sampling strategy	NA
		(e) Describe any sensitivity analyses	NA
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	NA
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7,8
		(b) Indicate number of participants with missing data for each variable of interest	7
Outcome data	15*	Report numbers of outcome events or summary measures	7,8
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA
		(b) Report category boundaries when continuous variables were categorized	NA
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	9,10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	9-11
Generalisability	21	Discuss the generalisability (external validity) of the study results	NA
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	1

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.