Author's response to reviews

**Title:** Prevalence of hallux valgus in the general population: a systematic review and meta-analysis

**Authors:**

- Sheree Nix (s.nix@uq.edu.au)
- Michelle Smith (m.smith5@uq.edu.au)
- Bill Vicenzino (b.vicenzino@uq.edu.au)

**Version:** 2 **Date:** 1 September 2010

**Author's response to reviews:** see over
1 September 2010

Dear Professor Menz,

RE: Revised manuscript MS: 1805719667401551 and response to reviewer comments

Prevalence of hallux valgus in the general population: a systematic review and meta-analysis

We would like to thank the reviewers for their thoughtful attention to this manuscript and also to the editors for an opportunity to address their comments. We appreciate the feedback provided and the consensus that the topic of this manuscript will be of interest to the readership of JFAR.

A point-by-point response to each concern, including changes made to the manuscript, is outlined in the attached table. Modified text in the manuscript has been highlighted, and deleted text has been noted with track changes.

We look forward to hearing from you in due course.

Yours Sincerely,

Sheree Nix
(On behalf of M. Smith and B. Vicenzino)
**Reviewer 1 (ER)**

1. **Methods para 2 Study Selection: How did the authors deal with imprecise use of the terms HAV and bunion?** In the literature, the two terms are often used interchangeably but, strictly speaking, a bunion is the soft tissue reactive change which occurs subsequent to HAV as a consequence of the prominence of the 1st metatarsal head. In this manuscript, both were included as search terms, rightly so, to ensure identification of all studies which might pertain to HAV. The authors should describe whether bunion was considered to be distinct from HAV when answering their initial screening question “Does the article appear to discuss prevalence of HAV?” The issue of imprecise use of the terms HAV and bunion should also be raised in the discussion of concerns regarding HAV definition (Discussion para 3).

   **Authors’ response**
   This is an important issue. As the terms “hallux valgus”, “hallux abducto valgus” and “bunions” are used interchangeably in the literature, no distinction was made between these terms when answering the initial screening question, thus we included all articles that discussed hallux valgus or bunions.

   To clarify this point, the following revisions have been made in Methods para 2 (page 5):
   - Wording of the initial screening question has been changed and now states: “Does the article appear to discuss prevalence of hallux valgus or bunions?”
   - An addition has been made in brackets: “including both clinically diagnosed HV and self-reported bunions”

   Furthermore, an addition has been made to Discussion para 4 (pages 11-12) to clarify the true definition of the term “bunion” and to highlight possible data inaccuracies that may occur due to use of inappropriate terminology (see highlighted text).

2. **Methods para 4 Data Extraction: Who extracted data? Were data checked by a second reviewer?**

   **Reviewer comment**
   Due to the large number of included papers and the time and resources available, data were extracted by the first author only, though queries were addressed by all authors in regular meetings.

   **Authors’ response**
   The following detail has been added to Methods para 4 (page 6):
   “Data extraction was performed by the first author, and queries discussed and resolved by all authors in regular meetings.”

3. **Methods para 4 Data Extraction: I am aware that authors of individual studies were contacted to provide additional data yet this is not mentioned anywhere in either the methods or results sections.** The authors should state that this was undertaken in the methods and add detail in the results of how many study authors were contacted and how many provided additional data.

   **Reviewer comment**
   We did not contact all authors from individual studies for additional data. However, it was deemed necessary to contact one author for clarification regarding the study population reported in more than one paper. Another author was contacted to provide raw data for age and gender subgroups, which were provided only in figure form in the original paper.

   **Authors’ response**
   This detail has been added to Methods para 4 (page 6):
   “Authors were contacted where additional information was required.”

   The following detail was also added to Results para 1 (page 8):
   “One author was contacted to provide clarification that multiple papers reported data from the same sample. Another author who only provided graphical data for age and gender subgroups was also contacted during data collection.”
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<td>4.</td>
<td><strong>Additional file 2: Under the Study Methodology column, more detail of how HAV was defined would be helpful.</strong> For each of the described methods eg interview, clinical examination, questionnaire, a number of options are available to define HAV. For example, for a questionnaire survey, options include the Manchester scale, line drawings, or self-report of suffering from bunions. Similarly, for clinical examination, observers could crudely judge HAV to be present, compare to the Manchester scale, or objectively measure the HAV angle. The authors discuss the issue of HAV definition in the discussion section but this detail would be helpful in Additional File 2.</td>
<td>As requested, details regarding measurement tool used and criteria for diagnosis of HV have been added to the “Study Methodology” column of Additional File 2. The following explanation in brackets has also been added to Discussion para 1 (page 10): “(i.e. self-report or clinical examination)”</td>
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<td>5.</td>
<td><strong>Results para 4 Meta-analysis: Highly statistically significant heterogeneity between studies was found. Yet the authors seem to ignore this in reporting and interpreting their findings. The degree of heterogeneity seen suggests that it may not be valid to pool prevalence estimates from different studies. The issue of heterogeneity is not addressed in the discussion section and should feature in the discussion of study limitations (discussion para 5). Accordingly, the authors should add the caveat of heterogeneity to both the abstract and main text conclusions.</strong></td>
<td>Despite significant heterogeneity between studies, pooling of estimates within age and gender subgroups was considered to be an important synopsis of the available literature. Care has been taken not to pool results across studies with vastly different age and gender sample characteristics. In order to acknowledge and discuss the issue of heterogeneity, an additional paragraph has been added to the discussion. See highlighted text Discussion para 5 (page 12). The following caveat has been added to the abstract conclusions (page 3) and main text conclusions (page 13) respectively: “Notwithstanding the wide variation in estimates...” “…and highlights the wide variation in prevalence estimates across studies.” Also see Reviewer 3 Comment #15.</td>
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<td>6.</td>
<td><strong>Abstract results: “CI” is missing in the parentheses following the percentages for prevalence in males and females.</strong></td>
<td>This formatting change has been made (page 3).</td>
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<td>7.</td>
<td><strong>Figure 1: The text does not lie completely within the boxes and is not aligned in one box</strong></td>
<td>This formatting error was also noted under editorial/formatting requests. This was an error in file conversion to PDF, and an attempt has been made to reformat Figure 1.</td>
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<td>8.</td>
<td><strong>Figure 2 concerning prevalence in females and males is very informative. I appreciate that a large number of studies provided age-stratified data (listed in Additional File 4) but this data might be easier to interpret in a similar Forrest Plot rather than a table</strong></td>
<td>We feel that the number of data points included in Figure 2 (stratified by gender) is only just manageable for the reader, and to provide an age-stratified forest plot would require an even more complex figure. Table 1 was designed to provide an easier way of interpreting the data in Additional File 4 as it shows the pooled estimates of prevalence for each age subgroup and also the interaction with gender. Notwithstanding this, if the editor(s) feel that a forest plot is required, we will be able to supply one.</td>
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9. At present, studies providing prevalence estimates for adults are grouped together as 18-65 in Additional File 4 and Table 1. This is obviously a very wide age-band. Within the 15 studies with the 18-65 age-band, is it possible to sub-group further to present data for younger and middle-aged adults which would contrast nicely with the juvenile and elderly groups?

We originally attempted to further sub-group the 18-65 year age category. However, due to the great variability in the way different studies divided age sub-groups, it was deemed not possible to present data by further age sub-groups.

The following text has been added to Discussion para 5 (page 12) to explain this limitation:

“Our subgroup meta-analysis was limited by the fact that not all studies reported HV prevalence by gender or age. Those studies that did report prevalence by age used a range of different age groupings, which rendered impossible further sub grouping the 18-65 years age bracket.”

### Reviewer 2 (TK)

10. An important consideration is that the term hallux abducto valgus is only really used in the podiatric literature. This study describes a literature search which would have produced very little if that search term alone was used. On this basis the authors may consider using the term hallux valgus which is more universally recognised.

As also requested by the editorial team (editorial/formatting requests), the term “hallux abducto valgus” and its abbreviation “HAV” have been changed to “hallux valgus” and abbreviated “HV” throughout the manuscript.

11. Background: Sentence 2 paragraph 1 is stating the obvious. This study is now 19 years out of date and as it is a costing exercise the authors must consider is it really relevant?

As the significance of hallux valgus will be clear to the readership of JFAR this reference has been removed from Background para 1 (page 4).

12. Para 1 sentence 3, reference 2 this paper describes the condition hallux valgus not hallux abducto valgus. Again the choice of term used by the author is problematic. Similar issues dog almost every reference in this paper.

Refer to Comment #10 above.

13. “Clinically it is often cited that HAV is more common in female and elderly individuals;[2] however, no synthesis of the current literature or synoptic statement has been made to justify this.” I don’t really understand this as surely most of the references show this to be the case. Certainly one reference (though not of the greatest quality) not used in this paper is quite helpful on this issue: Gould N Schneider W. Epidemiological survey of foot problems in the continental united states 1978-79. Foot Ankle 1980. 1. 8-12

The reference cited by this reviewer was excluded from our review on the basis that their data were only reported as figures/estimates extrapolated to the overall population of the USA and not on directly derived quantitative prevalence data; thus, it did not satisfy the inclusion criteria outlined in our methods.

The wording of the sentence quoted by the reviewer has been changed to clarify our intent and more appropriate references have been added (Background para 2, page 4):

> Individual studies have reported that HV is more common in female and elderly individuals [9,12]; however, there has been no synthesis of the literature to date or synopsis derived.

To acknowledge the fact that individual studies commonly report HV prevalence to be higher in elderly and female individuals, small changes to the wording of the Discussion para 2 (page 10) have been made:

> “This supports the observation of several individual reports that HV is more prevalent in
### Methods. Data analysis Page 9
Pooled prevalence estimate - this term will mean little to most readers and must be clarified.

As suggested, the following detail has been added to Methods para 5 (page 7) to clarify this term:

> “...which gives an average estimate across studies weighted by sample size.”

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### Reviewer 3 (UN)

15. **The pooling of the data using a meta-analysis despite “the lack of a clearly stated definition of HAV in the majority of studies reviewed” is not justifiable. Pooling the overall prevalence among the 24 studies “…that reported HAV prevalence for the overall population...” could be misleading given possible differences in population, time reference, and definition of HAV. If such large differences occur (in study design, time, populations, and definitions of HAV) across the studies, then the appropriate goal for the study may not be to provide a pooled estimate but to describe systematic variation in study results (1).


Heterogeneity is an important issue also raised above in Comment #5.

The authors agree that the reported overall pooled prevalence estimate may be misleading, and have therefore removed it from Table 1 (page 24), abstract results (page 2), and main text results (Results para 4, page 9). The overall pooled estimate has been left in the manuscript as a dotted reference line in Figure 3 which is explained in the Figure legend text (page 24):

> “…dotted line represents an overall pooled estimate, although there was significant heterogeneity across the 24 studies”

As recommended by the reviewer, one of the goals of the analysis was to describe the systematic variation in study results by study quality, sampling method and definition of hallux valgus. This is reported in Figure 3.

The following text has also been added to Discussion para 1 (page 10) to clarify this:

> “This review revealed a wide variation in HV prevalence estimates, and meta-analysis showed that systematic differences in these estimates were related to a number of factors, including method of HV diagnosis, gender, age, study quality, and sampling method.”

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16. **The fact that 21 of the 78 papers included in the meta-analysis were based on hand-searching of the reference lists despite an initial 8456 electronic hits, raises some questions regarding the appropriateness of the initial search criteria.**

The majority of studies sourced from reference list searches were either too old to be indexed on electronic databases, were grey literature (i.e. books or government surveys) or did not have abstracts available on electronic databases, and as such were unlikely to be retrieved by keyword search.

This was discussed in Methods para 1 (page 5). The authors are confident that the search strategy was highly sensitive and thorough.

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17. **It is not enough to determine the frequency of HAV over a denominator; a well-defined population and the period of time in which HAV were counted are both essential:**

- a) Including studies conducted over 40-50 years ago or from cultures vastly different in...
terms of shoe-wearing may not be relevant, and not accounting for cultural differences or adjusting for cohort effect may not be valid.
b) Age range of 18-65 is too broadly defined.
c) The relevance of including school children or younger is unclear.

prevalence relied on data that was present across the majority of studies, and unfortunately details of sampling frame (including the period of time in which HV was counted) were not consistently reported. Finally, this review did not attempt to examine factors associated with HV such as footwear or cultural differences, as there is insufficient data to do so.

These limitations have been discussed, and the following addition made to Discussion para 6 (page 12):
“Details of sampling frame and sample characteristics were also often poorly reported, as revealed by our quality assessment (Additional File 3.xls).”

b) See comment #9 above.
c) We included juvenile data because our purpose was to examine the prevalence of hallux valgus in the overall population.

18. The authors implied that studies with high estimates of HAV were probably biased or of low quality. However, the authors have also pointed out that recent studies did show that women or older people had higher prevalence of HAV as compared respectively with men or younger people. In fact, our recent findings from a population-based study of older adults enrolled between 2005 and 2008 in Boston, Massachusetts, USA, indicate that older women had a HAV prevalence of 58% while older men had a prevalence of 25% (Osteoarthritis & Cartilage 2010:18;41-46). With the aging of the population, one may expect to see even higher sex-specific estimates of HAV prevalence.

The authors did not intend to imply that studies with high estimates of HAV were biased or low quality, and the wording of the manuscript has been altered to reflect this. The following minor changes have been made:

A sentence has been removed from Discussion para 3 (page 11):
A few studies in our analysis reported quite high estimates of nearly 50% HAV in the overall population.

A caveat has been added at the end of Discussion para 3 (page 11):
“…however, as discussed previously, this trend may also be related to the fact that these “low” quality studies were mostly clinical studies that diagnosed HV rather than relying on self-report data.”.

In order to highlight the systematic differences according to gender and age, minor changes have been made to Discussion para 2 (page 10) (see highlighted text).

An addition has also been made to abstract results (pages 2-3) to highlight the increased prevalence with age:
“…and 35.7% in elderly people aged over 65 years (CI: 29.5 to 42.0)”

19. Need to clearly label and number tables and figures

We have carefully checked all labels and numbering of figures and tables and believe that they are in accordance with JFAR requirements.

Editorial/ formatting requests

1. Change ‘hallux abducto-valgus’ to ‘hallux valgus’ throughout the manuscript.

The wording ‘hallux abducto-valgus’ has been changed to ‘hallux valgus’ throughout the manuscript.
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