Reviewer’s report

Title: Human health implications of organic food and organic agriculture: A comprehensive review

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Reviewer: Kathryn Bradbury

Reviewer's report:

This review is broad in scope and looks at health implications of organic food and organic agricultural systems. Specific topics, e.g. nutrient composition of organic vs conventional food crops have been reviewed before, but this review includes a wide range of implications of organic farming and organic food consumption. From the author contributions it appears that this was a very collaborative piece of work, however I think the structure and ordering could be improved. I think what would help is if the authors stated very clearly in the background section, what topics they were going to cover, and in the order that they cover them in the main body of the review. At the moment in the third paragraph the authors state they will review 1) plant protection strategies and human pesticide exposure... Human pesticide exposure is the 4th section of the review. I think rather than making broad statements here, if you could very specifically state what you will cover and in the order that you will cover it, it will help make to make the manuscript easier to follow. At the moment the background doesn't seem to closely align with what is covered in the body of the review.

I see that for this journal there is no methods section for a review, however I wondered if there were anywhere that you could briefly describe your search strategy. I don't know of any articles that you have missed but I would like to know how you searched for studies.

Specific comments for various sections are as follows:

1. Organic food consumption and health - human studies, page 4, lines 29-31. Compliance assessment in intervention studies may be difficult, but this is unlikely to be the limiting factor in conducting an intervention study. Such a study would be very expensive, as it would need to recruit thousands of participants, and follow them over many years. In fact, assessing compliance is really similar to measuring the exposure (organic food consumption) in cohort studies, which is also challenging.

2. Page 5, lines 4-7. I think it is worth mentioning here that this is most likely to be due to residual confounding (or possibly multiple comparisons/testing). Is there any biological mechanism whereby organic vegetables would reduce risk of pre-eclampsia?
3. page 5, lines 32-26. Should specify the lower risk of NHL was observed in those that reported usually or always consuming organic food compared to those who reported never consuming organic food.

4. Organic food consumption and sustainable diets. A lot of the discussion in this section doesn't seem to be relevant to the question of organic food vs conventional food. I think the first sentence is relevant, and could be expanded upon, what are the areas where organic agriculture is better than conventional, where is it the same, or worse? The discussion about how organic food consumers eat more vegetables and less meat, and these diet patterns are associated with reduction in disease....I don't find this relevant. The review is about organic food vs conventional food, this is veering into the correlates of organic food, and is not about the direct effect of the production system. I also can't see the relevance of stating that Mediterranean Diets/Nordic Diets are similar to the diets of people who eat organic food, and these diets are associated with reduced risk of disease, and lower carbon footprint. This is really straying from the aim of the review to directly compare organic food and conventional food/food production systems. The second paragraph is a very important point, and I think this point should be moved up in the order because it applies to the section on organic food consumption and human health.

5. Page 13, line 40-47. The concluding sentence that there is uncertainty with the IQ cost implications calculation but that it is probably an underestimate because it is one group of pesticides...I get your point that it is not all pesticides, but the main problem is that the model assumes causality and certainty that organophosphate exposure does reduce IQ, which is not entirely convincing given that it is not supported by the PELAGIE cohort in France (albeit with a relatively lower organophosphate exposure in that cohort).

Page 15, line 15. A reference is needed for the statement about the detrimental effects of cadmium.

Page 16, lines 47-49, and page 17, lines 23-40. The reference #195 describes in detail an important point which should be mentioned in this section, which is that diet composition has less impact on the fatty acid composition of meat in ruminants because the microorganisms in the rumen metabolize the unsaturated fatty acids and the major fatty acid leaving the rumen is C18:0. For the paragraph on page 17 describing the nutritional content of organic vs conventional meat, when summarising the data it would be useful to distinguish between ruminants and non-ruminants, because of this major difference in net absorption of types of fatty acids. I would expect differences in omega-3 content between organic and conventionally-farmed ruminants to be less than for non-ruminants.

Page 19, line 51. A reference is needed for this statement.

Page 20. I think this section could benefit from some restructuring. The organisation of ideas into paragraphs is not always logical. The first three paragraphs on page 19 seem to all be making the
point that there is probably less antibiotic resistance on organic farms. One suggestion for re-ordering that I think would make more sense an order is to start page 19 with the paragraph "Previously...in has been postulated...", then 'Resistant bacteria may be transferred with the production chain.." and then "In pig production, particular attention has been paid...'.

Page 20, lines 4-6. The estimates of MRSA being found in 30%-55% of pigs tested - is that on conventional farms?

Discussion, page 20-21. This is well written and does a good job of tying all the components of the review together. There are no references in the first three paragraphs, and some of these statements need to be supported by references. Again, I don't think it is relevant to this review that people who eat organic food are likely to have a lower risk of disease because eating organic food is correlated with other beneficial behavioural and lifestyle factors. The review should be focussed on whether organic food or organic agricultural productions confers direct effects on health.

Page 23, line 35. Would be helpful to specify 'Nutrient composition differs only minimally...."..

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