Author’s response to reviews

Title: The risk of pathogenic intestinal parasite infections in Kisii Municipality, Kenya

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Cover letter for re-reviewed MS: 6858199671693256 : The risk of pathogenic intestinal parasite infections in Kisii Municipality, Kenya

1. Do references 2 and 3 cover the estimates for all parasites – if not modify text accordingly
   • The references 2 and 3 do not cover estimates for all parasites
   • hence they were modified appropriately as: Entamoeba histolytica (50 million) [4] and Giardia lamblia (2.8 million) [5]

2. What are the symptoms – how much of a public health problem is it?
   • In man, intestinal parasites are significantly associated with diarrhoea [6].
   • The risk of intestinal parasites infections is measured using the DALY (disability-adjusted life year) and one DALY being equal to the loss of one health life year [1]. The resulting diseases have socio-economic impact in terms of high treatment costs per DALY and hospitalization costs [2]

3. Among who?
   • Epidemiological surveys done in Kenya’s poor periurban and urban school children revealed a high prevalence of intestinal parasitic infections with Ascaris
lumbricoides (82%), Trichuris trichiura (60%), Entamoeba histolytica (41%) and Giardia lamblia (30%) [15].

4. Where? Do you have a reference for this statement? I suggest deleting this unless you have a reference
   • This section has been deleted due to lack of reference: “There are poor food handling practices, where for instance vegetables are commonly watered using contaminated water at the farms or contaminated by soil during harvesting and sold unwashed. Most of these vegetables are eaten as salads. The meaty foodstuffs are usually poorly stored and handled under unhygienic environmental conditions”

5. None of this is describing the method
   • This section describes the study area and has been corrected by the authors:
     • Study area
     The study was carried out between December 2004 and June 2005 in Kisii Municipality, which is located at the southern end of the western Kenya highlands at an altitude of 1660m above sea level. The area receives average rainfall of over 1500mm per annum distributed almost throughout the year although there are two rainy seasons (March to May and October to November). Temperatures range from 10°C to 30°C with relative humidity of 88%. The area is densely populated with a population of 37,531 people and a density of 1295 people/km2 [17]. Majority of the population depends on open air markets as a source of both meat and vegetable foodstuffs although there is poor drainage and sanitation characterized by presence of refuse dump sites nearby. The parasitological survey of the food handlers and foodstuffs was carried out at the Kisii District Hospital

6. How were they randomly selected?
   • Twenty two butcheries were randomly selected using lottery method from using a list of the total of 125 butcheries in the Municipality.

7. How were they randomly sampled?
   • The asymptomatic adult male and female food handlers from the sampled markets and butcheries were randomly selected by lottery method from a list of attendance at Kisii District Hospital for routine examination

8. Was there an audit checklist? Were the observations recorded?
   • The meat handling practices at the butcheries were observed on every sampling occasion using a checklist and the observations recorded

9. Have you a reference for this? Was it an observation? If it was an observation how was it recorded?
   • This statement has been deleted as it lacks reference: who rarely wash their hands as they sell foods.

10. How did you ensure that you were not double-counting?
    • Double counting of food handlers was avoided by asking the food handlers if
they had previously been examined for intestinal parasite profile.

11. Which parasites?
   • A 250g sample of each vegetable or meat sample was examined for intestinal parasite profile (described by [12])

12. A sterile sieve?
   • through a sterile sieve to remove undesirable materials

13. Did you use a checklist?
   • using a check list the handlers' hygiene standards and the presence of houseflies on meat samples were observed and recorded during each sampling day

14. Out of how many?
   • This were the total sample of the vegetable varieties collected during the study i.e a total of eighty four vegetable samples comprising of 21 samples for each species were collected, kales cabbage, spider flower and black night shade

15. What were in independent and dependant variables in the multiple regression?
   • The risk factors (independent variables) influencing infection with intestinal parasites (dependent variable) were investigated in 22 butcheries (Table 2)

16. Clarify and document within the methods section of your manuscript, the name of the ethics committee which approved your study
   • This study was approved by the research and ethics committee of Kenyatta University as well as the Ministry of Science and Technology, Kenya. Consent of the study participants was obtained before taking the samples for stool examination

17. Include a title page in your manuscript file. The full names, institutional addresses, and e-mail addresses for all authors must be included on the title page. The corresponding author should also be indicated.
   • The risk of pathogenic intestinal parasite infections in Kisii Municipality, Kenya
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Abstract

Background

Intestinal parasitic infections are among the most common infections worldwide. Various epidemiological studies indicate that the prevalence of intestinal parasites is high especially in developing countries, although in many of these, the environmental risk factors have not been clearly elucidated. The objective of this study was to determine the risk of pathogenic intestinal parasites infections in Kisii Municipality.

Methods

Random sampling was used in the selection of the study samples. Stool parasitological profiles of food handlers were done by direct smear and formalin-ethyl acetate sedimentation method. Both vegetable and meat samples were examined for the presence of intestinal parasites. The storage and meat handling practices of the various butcheries were observed.

Results

Types of samples examined for occurrence of intestinal parasites includes, a total of 84 vegetable, 440 meat and 168 stool samples. Fifty five (65.5%) vegetable, 334 (75.9%) meat and 69 (41.1%) of the stool samples were found positive for intestinal parasites indicating a high overall risk (66.18%) for intestinal parasite infections. Of the parasites detected, the most common parasites infesting the foodstuffs and infecting the food handlers were Ascaris lumbricoides and Entamoeba histolytica. Parasites were significantly less likely to be present on meat that was refrigerated during display than meat that was displayed at ambient temperature.

Conclusion

There is a high risk of infection with intestinal parasites in the sampled Municipal markets. About half of the food handlers surveyed (41.1 %) at the Municipal Hospital had one or more parasitic infections. Furthermore, meat (65.5%) and vegetables (75.9%) sold at the Municipal market were found to be contaminated with parasites hence the inhabitants requires a need for education on food safety, good distribution practices and improvement on sanitary conditions.

Approval ethical committee

This study was approved by the research and ethics committee of Kenyatta University as well as the Ministry of Science and Technology, Kenya. Consent of the study participants was obtained before taking the samples for stool
examination

Thank you