Reviewer's report

**Title:** Male commuters in North and South England: risk factors for the presence of faecal bacteria on hands

**Version:** 1 **Date:** 26 January 2010

**Reviewer:** Erin Rees Clayton

**Reviewer's report:**

In the study presented in the manuscript entitled “Male commuters in North and South England: risk factors for the presence of faecal bacteria on hands,” the authors interview and collect hand swabs from male commuters in four UK cities in July 2009 in order to identify factors associated with the previously observed geographical trend in fecal contamination of the hands. Results from this study again demonstrate an increase in fecal contamination of the hands of male commuters in the northern cities compared to the southern cities included in the study. Although factors such as self-reported personal hygiene and contact with soil are found to be associated with levels of fecal contamination in univariate logistic regression models, these factors only partially explain the observed geographical trend when included in multivariate logistic regression models.

Understanding risk factors for contamination of hands with fecal bacteria is an important public health goal because it will enable the development of successful hand hygiene strategies aimed at preventing the transmission of infectious diseases. The authors are commended for working to address this goal. Their current study builds upon their previous work by examining in more detail how factors such as hand washing behavior and social contact patterns may influence fecal contamination of the hands. However, I have a few questions and comments regarding the analysis of the data presented and the conclusions made by the authors.

**Discretionary Revisions**

**RESULTS:**

1. The authors only discuss the data related to the hand hygiene behavior as a composite score. Were there any interesting trends in the presence of hand contamination and answers to individual questions relating to hand hygiene? If so, it may be an initial indication of specific hand hygiene activities that contribute to reduced fecal bacteria hand contamination, the effects of which get masked by the composite scores.

2. Hand swabs were collected from 9am-5pm. It is conceivable that participants may have had more social contacts later in the day compared to earlier in the day, and if this is true, then the time of sample collection may be reflected in the number of handshakes. Nevertheless, if time of day was recorded for each sample collected, then it may be worth investigating whether time should be
controlled for in the multivariate logistic regression models.

3. The authors state that “Pantoea and Klebsellia were much less common” compared to the other species of bacteria assessed. Is there any data to suggest how well these organisms survive on surfaces such as human hands? Given that the assays are detecting live organisms, it may be possible that Pantoea and Klebsellia are just as common as the other bacteria, but perhaps they do not survive as long and therefore are not detected by the assays.

DISCUSSION:

1. When considering why there are geographical differences in hand contamination, the authors are correct in acknowledging the possible contributions from variations in climate. However, does the lack of geographical trend in the contamination of women’s hands observed in their previous study provide evidence to discount climate effects? Or would climate be expected to affect men and women differently (for example, if men were perhaps more likely to have outdoor occupations than women)?

2. One assumption made by the authors is that fecal bacteria on hands are associated with disease transmission. This is a reasonable assumption, but it would be interesting for the authors to mention in the discussion whether intestinal infectious disease cases are more prevalent in northern England than in southern England, assuming that data on diarrheal diseases by geographical region exist.

Minor Essential Revisions

ABSTRACT:

1. In the results section of the abstract, the authors state that “none of these factors explained the variation in contamination across cities.” Perhaps it would be more accurate to state that none of these factors completely explained the geographical variation. Controlling for these factors does decrease the estimated ORs for the two northern cities and reduces the statistical significance of these estimates.

INTRODUCTION:

1. The end of the third sentence of the introduction should be clarified. It currently reads, “…the cost of this burden to the UK economy at £3-4bn/year by [4].” Is a word missing, or should the “by” be removed?

2. The data in Figure 1 was presented in an almost identical format in the previous publication (reference 13) by this group. It is unnecessary to reprint it here, especially since the current work does not include women or the city of Cardiff. If the authors wish to include a graph showing the observed trend, I would compare the results from the previous study with those of the current study but include only the levels of hand contamination for males across the four cities included in the current study.

METHODS:
1. The authors list the days and times of sample collection in the methods section, but it would be helpful for them to also indicate that it is the year 2009.

2. The methods describing the culturing of organisms should be rewritten as a chronological process of how the culturing was done, instead of beginning with a list of how the results of the assays will be interpreted. References to the development and/or validation of these assays would be informative.

RESULTS:
1. The authors list four methods of transport. They should define what is meant by “none.” Does this mean no motorized transport? Or no transport method except walking?
2. In Table 2, it would be helpful to provide the number of participants as well as the percent for each of the variables that is currently presented solely as a percent.
3. In Table 3, is the row labeled “any fecal bacteria” intended to provide a summation of the number of positive swabs for the six types of bacteria tested by city? If so, the numbers given for Birmingham and Newcastle do not add up.
4. The final paragraph of the Results section should reference Table 5.

DISCUSSION:
1. In the fifth paragraph of the discussion, the authors state that “these factors – age, hygiene, hand-contact, or soil contact – did not, however, explain the between-city trend in hand contamination rates.” As stated above, these factors seem to partially explain the trend, and if they are categorized instead of being left as continuous variables in the multivariate models (see comment below), do the results change at all?
2. Some of the writing in the discussion is very similar to the previous publication by this group. I recommend re-wording the penultimate paragraph of the discussion section.

Compulsory Revisions

METHODS:
1. The authors state that the swabs used to collect bacteria from the hands are moistened with sterile water. Why are they not moistened with nutrient broth? Nutrient broth was stated as being used in the previous study. Do the fecal organisms survive equally well in water and nutrient broth? Would this difference (water vs. broth) contribute to differences in the frequency of hand contamination observed in this study compared to the previous study?

RESULTS:
1. Thirty-one swabs tested positive for fecal coliforms. According to the data in Table 3, it appears that each swab only tested positive for one coliform. Is this correct? Is it expected that participants would not have multiple fecal bacteria
species on their hands?

2. In the univariate models presented in Table 4, the authors categorize age, hygiene score, and number of handshakes. However, if I understand the footnote of Table 5 correctly, these three variables were treated as continuous variables in the multivariate regression. What is the rationale for this? Is treating these variables as continuous variables the best way to conceptualize their potential effect on the outcome – for example, do we expect participants with a hygiene score of 5 to be meaningfully different from those with a hygiene score of 6, controlling for the other factors?

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests.