Reviewer's report

Title: Definition and characterization of localized meningitis epidemics in Burkina Faso: a longitudinal retrospective study

Version: 1 Date: 3 June 2011

Reviewer: Lydiane Agier

Reviewer's report:

General comments:
In this study, authors use a novel dataset, with a thin geographical specification of disease counts, and investigate a definition of an epidemic at a lower level than currently used in public health policies. This is of prime importance in the management of meningitis in the African Belt, and could allow improving vaccination efficiency and saving scarce resources. Yet, how the current vaccination policy could evolve relatively to the results shown here should be better described and enhanced, mostly in the discussion. The manuscript needs reviewing, in terms of language and of re-organising.

Specific:

Globally:
- My concern about the English language expression applies especially to the "Results" section. This section should be re-organised and it should be clarified what some results are expected to show (for instance, ‘The interquartile range of ACI among health centres of the same district year was on median 1.41% (range 0.72-2.29%) in district years with epidemic declaration and 0.03% (0.01-0.09%) in district years without epidemic declaration’, ‘The median population size in individual localised epidemics was 6,702’). In addition, a few sentences should be removed for not being informative, if not confusing (i.e. ‘We used the interquartile range of ACI as a measure of heterogeneity among health centres in the same district and year’, ‘We use two ACI at the health centre level to define a localized epidemic’).

- In order to have a better idea of the potential interest of downscaling from the district to the health-centre level for defining an epidemic, it would be great to describe population size at both levels. Including a map in the figures would help visualising the studied area and mostly the results in terms of localized epidemic.

- Vaccination policy is the problem you are tackling in this study, without detailing it enough in my opinion. You should discuss how your results could impact the current policy. For instance, would epidemic episodes at a health centre level be sufficiently long for efficiently launching vaccination campaigns? It would also be interesting to evaluate the number of vaccine that would have been administered over the study period according to both policies, the current district level policy, and the one you propose. It would also be clearer to readers if you were explaining what is expected from the introduction of the new conjugate A
vaccine. Finally, you should discuss what impact might have had the past vaccination campaigns on the dynamic of the disease and thus on your data: it could partly explain why epidemics are so localised (vaccination might have stop it from spreading in the district), and how it could be related to some districts/health center declaring epidemics in 2 consecutive years. Another issue of vaccination is the susceptibility of the population which could be originating a good part of the local interannual variability of cases (to be linked with the interval epidemics at health district level might occur at).

- You could simplify your incidence rates definitions: weekly incidence rate (WIR) is the weekly number of cases per 100,000 inhabitants, and annual incidence rates (AIR) the annual number of cases per 100 inhabitants (cumulative means your cumulative counts with time, which is not the case here).

- You should better explain the concepts you are using, such as ‘years with epidemic declaration’ (at a district or a health centre level?), ‘epidemiogenic’, ‘separate epidemic wave factors’

- Be careful with acronyms being wrongly spelt. You should be more consistent in writing percentage. I would advice to give them in numbers and use the % symbol.

- Did you not try to have data about viral infections in the studied health centres? It would have been a great opportunity to test a hypothesis that was exposed in a previous publication.

Abstract:
A few words should be replaced to better describe the study: ‘spatiotemporal’ instead of ‘temporo-spatial’, ‘definition of localized epidemics to be used in real time surveillance’ instead of ‘real-time definition of localized epidemics’ (the definition is not time varying) and avoid the term ‘demographic characteristics’ since the only variable analysed is the population size. You should also specify that the threshold LE75 is defined on two consecutive weeks. Finally, when you say ‘where no widespread laboratory surveillance exists’, I imagine you refer to quantifying the reduction of the burden of the disease after the introduction of the conjugate A vaccine, but the message is not clear.

Methods:
- I would rather talk about ‘predominantly NmA or NmX epidemics’ rather than what could sound purely ‘NmA /X epidemics’.

- When you mention the median, specify what it refers to (for ‘median peak WIR and median AIC’ : does it refer to all health districts or only to epidemic ones)

Results:
- Be careful with using percentiles on too small samples

- The paragraph on location of localized outbreaks and relation between epidemics at a districts/health center level is unclear and should be split into two according to the 2 topics. Considering epidemic definition, it needs rephrasing for it is confusingly presented (for instance, ‘In 9 out of the 12 district years which
were declared as epidemic, at least one localized epidemic was identified at a health center level; in the sole district year declared as non epidemic two localized epidemics were recorded’). Considering the distance, you should first inform what you are talking about, and make it clear that you first describe the Hauts bassins region, then the Boulsa district (is that correct?). Finally, the fact that a given health center declares an epidemic over 2 consecutive years deserves more attention, mostly in the discussion, where it should be related to vaccination.

- It is surprising and not very consistent to present results in terms of timing of epidemic declaration for the RT@HC criterion, when you had previously selected the LE75 criterion. You should at least present both.

- It is surprising to mention lab testing in the discussion without mentioning it in the results.

Discussion:

- You should better explain how your proposed definition could help overcome the limitation of routine surveillance data and allow analyses that are specific for meningococcus.

Tables and figures

- Table 1 needs reorganisation and title simplification. I would give first the district level variables then the health centre variables (defined as such in a top row). To help simplifying the names, you should give more explanations in the text (i.e. epidemic (non-epidemic) HC are health centres for which the LE 75 criterion was (wasn’t) met in the given year, weeks are given as calendar weeks, all cases are not laboratory confirmed). I am not sure the information about the week of WIR peak is of primary necessity. Reorder the rows for easier to read. The tests results should better be given in the manuscript than in the table. I would not include in the epidemic duration the first week before definition was met.

- Figure 1: Excel is not the most satisfying software for drawing graphs, and explicit legend.

- Figure 2: This is a ROC curve. You could draw two lines linking the symbols relative to predicting the annual cumulative incidences of >0.4 and >0.8 respectively; a legend on the graph would explain what each symbol represent (you do not need to describe the different definitions RT@HC and LE25-LE250, since those are explained in the manuscript)