#### PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (see an example) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below. Some articles will have been accepted based in part or entirely on reviews undertaken for other BMJ Group journals. These will be reproduced where possible.

### ARTICLE DETAILS

TITLE (PROVISIONAL)	Feasibility study of geospatial mapping of chronic disease risk to inform public health commissioning
AUTHORS	Douglas Noble, Dianna Smith, Rohini Mathur, John Robson and Trisha Greenhalgh

#### **VERSION 1 - REVIEW**

REVIEWER	Danny Dorling Prof. of Human Geography University of Sheffield UK
	No Competing interests
REVIEW RETURNED	16/12/2011

THE STUDY	On main outcome measure I say in my comments to authors: ". I guess the main thing the paper is missing is something along the
	lines of – "In Figure 2 the red blob to the right was expected but the one to the left was a revelation" Hence I tick no on the first two
	boxes. Also reference 39 has no date - others may not have one.
RESULTS & CONCLUSIONS	Again - they need to say why it was all worth it.
	They do not mention previous mapping that did make a difference - I have put a link in for them.
GENERAL COMMENTS	What a interesting paper – I hope it is published. My main worry about it is that in the end it just didn't tell us anything we didn't know. I'm also not sure why you use the word "stakeholder" – I guess it might mean something in America. Can't you just say "people" or "people with an interest"?
	I suspect a GP with any experience of the area might say "tell me something I don't know" on seeing the maps. If they don't please can you say so – if they did you need to explain why all that expertise in Adode and Arcgis is as valuable as you imply. You can interview one person (with public health knowledge) in the area, show them the maps and see what they say. I may be wrong but I suspect they say: "Yes, and"
	"Ring Maps" is not a well known term – at least not in cartography, public health, geography, epidemiology or planning. Maybe you could say "A new kind of map we call a Ring Map" – or give a reference. Your reference to it (39) is missing a date so I can't work out how new it is. To be honest it looks confusing. A graph might be more useful (% fast food in area verses risk).
	Key messages: You say "Maps complement a traditional epidemiological approach to public health data". I thought maps

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were the traditional epi approach?
Page 5: "this burden of disease is projected to increase exponentially" is a little too Malthusian. Just say "greatly" – we are not all going to see all our grandchildren die of it. Everyone tends to hype up the thing they study.
Page 6: The best known use of maps is not by CDC. It was all that mapping of cholera in Europe, including very near where you are writing about now (although most the most famous map was centred on Soho). In the USA it was the work of Peter Gould on Aids that was and is best known.
Page 7: We have learnt a lot since we mapped cholera in Soho. What we learnt then was to not be so obsessed by "individual risk factors" (drinking water from the pump), but to ask why the water in the pump carried disease. Similarly you could mention that it is not so much crime, or even the stress caused by crime and the link to diabetes, but what it is that means crime rates are higher in the UK than almost anywhere else in Western Europe. Similarly with obesity: we ain't fat just 'cos we eat chips more. There are underlying reasons why we eat chips more in the UK. You need to climb out of the biomedical microscope a little – less "atomistic facility" please – read the Spirit Level book (Wilkinson and Pickett) which makes this step out and add a reference here, even if you don't agree and think getting postcodes of Macdonalds is the answer.
Page 9: The term "ethnic restaurants" is odd given the we all have an ethnicity. Pie and Mash shops are an ethnic restaurant. You don't want to be cited as an example of how medics / gis folk just don't get it about ethnicity (I suspect).
Page 9: How "long established" do you think the "white British working class population" of Tower Hamlets are? Not very is the answer so not worth propagating this myth. The BNP use it – don't help them. Look up the birthplaces of people living in tower hamlets in the 1971 census to see all the Irish
I hope these comments are useful – sorry they emphasise the negative. I guess the main thing the paper is missing is something along the lines of – "In Figure 2 the red blob to the right was expected but the one to the left was a revelation – it was worth all the cash of employing us all along". Or something like that.
On the history of this mapping this might be of use: Dorling, D. (1999) A review of chapter 2, book review article of Tufte E.R. Visual Explanations Progress in Human Geography, 23, 1, 127-131 It is on-line here: http://www.dannydorling.org/?page_id=766
Your paper really is very well put together – It is publishable as it is, although I recommend revisions. Why make do with just being good? I hope this comments are interesting and that you can use some of them.
All best wishes,
Danny Dorling

REVIEWER	Jacqueline W. Mills, Ph.D.
	Assistant Professor
	Department of Geography
	California State University
	Long Beach, California, USA
	I do not have a conflict of interest with this study.
REVIEW RETURNED	20/01/2012

THE STUDY	The authors do a fine job detailing the approach and its feasibility. However, despite feasibility, is this approach useful in its current form? For example, I question how physicians or other public health practitioners would respond to the ring map presented in this manuscript.
	The authors state that "Impact studies are needed of how maps of chronic disease risk might be used in public health and planning." However, short of a full impact study, this manuscript does need some feedback on the usefulness of the maps that have been created. The manuscript is incomplete without this component.
	Surveying the targeted users (the practices that provided data for the study or other public health groups mentioned) about how they would use the maps and if there are other data sources or methods of visualization that would more appropriately assist them in planning, management, and intervention is a straightforward way to add this necessary insight to the paper.
GENERAL COMMENTS	I applaud this project and hope to see it published with my one major recommendation of addressing the utility of the approach to public health professionals. This is easily done and provides a great deal of value-added to the study.

## VERSION 1 – AUTHOR RESPONSE

Response to Reviewer: Danny Dorling

What a interesting paper – I hope it is published. My main worry about it is that in the end it just didn't tell us anything we didn't know. I'm also not sure why you use the word "stakeholder" – I guess it might mean something in America. Can't you just say "people" or "people with an interest"?

\*\*\*\*We think that as amount of and access to electronic health records are increasing there are unexplored possibilities for using geospatial mapping for local health needs assessment. We hope this paper may be of most help to the likes of new Clinical Commissioning Groups in England, who will perhaps not have used mapping before and this may give them a starting point.

\*\*\*\*We have replaced the word stakeholder.

I suspect a GP with any experience of the area might say "tell me something I don't know" on seeing the maps. If they don't please can you say so – if they did you need to explain why all that expertise in Adode and Arcgis is as valuable as you imply. You can interview one person (with public health knowledge) in the area, show them the maps and see what they say. I may be wrong but I suspect they say: "Yes, and...."

\*\*\*\*We think that with the advent of Clinical Commissioning Groups, GPs may have to think more about the kind of data these maps show, rather than it just confirming what they already knew. For

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example, if the ring mapping technique quantifies the specific high risk groups and risk factors of their own practice population, that would presumably affect their commissioning decisions. For example, they might choose to commission a health promotion intervention amongst a specific local at risk group. As the financial power and commissioning decisions looks as if they will come to lie with GPs for the next stage of the NHS's development, we're not sure they will say: "tell me something I don't know", they might be more likely to say: "here's evidence clearly quantifying the causes we know about, now it's my responsibility to plan, commission, and monitor public health interventions to change it".

\*\*\*\*We primarily intended this paper to be a methodology paper, showing that it is feasible to map this type of health information with large numbers of electronic records, but expertise is required. We did talk to local GPs and public health specialists and they did help shape our thinking and the form of the maps, but we have not formally researched their response to these maps, or how it would affect their commissioning decisions. However, we recognise the next stage of this research is to do a detailed qualitative study with these maps, and explore their impact on commissioning decisions.

"Ring Maps" is not a well known term – at least not in cartography, public health, geography, epidemiology or planning. Maybe you could say "A new kind of map we call a Ring Map" – or give a reference. Your reference to it (39) is missing a date so I can't work out how new it is. To be honest it looks confusing. A graph might be more useful (% fast food in area verses risk).

\*\*\*\*Ring maps as far as we can determine were first published in a health context in academic peer reviewed literature by Stewart and colleagues in 2011. There are a few other examples that Stewart references, in places like ArcUser. We've amended the text to indicate that it is 'relatively new', and updated the reference.

\*\*\*\*At first we also thought it looked a bit confusing. But, in the context of commissioners dealing with dashboards of indicators it took on a new relevance. This combines the somewhat tedious looking pages of traffic light indicators one might find in any commissioning organisation with a relevant local geospatial map. We think the combination is striking. However, we recognise that this impression needs to be confirmed with further qualitative research.

Key messages: You say "Maps complement a traditional epidemiological approach to public health data". I thought maps were the traditional epi approach?

\*\*\*\*We have been confusing in our phrasing and have used the phrase 'statistical approach' instead. We do still think that epidemiologists and cartographers come from different paradigms of operation, and that more sharing of ideas and techniques is needed.

Page 5: "this burden of disease is projected to increase exponentially" is a little too Malthusian. Just say "greatly" – we are not all going to see all our grandchildren die of it. Everyone tends to hype up the thing they study.

\*\*\*\*We have amended this as suggested.

Page 6: The best known use of maps is not by CDC. It was all that mapping of cholera in Europe, including very near where you are writing about now (although most the most famous map was centred on Soho). In the USA it was the work of Peter Gould on Aids that was and is best known.

\*\*\*\*We did have the cholera maps reference in an earlier version and we have re-included this. We've amended the text to indicate the CDC maps are not the best known, but we've kept them referenced as they make a very powerful visual impact on policy-makers.

Page 7: We have learnt a lot since we mapped cholera in Soho. What we learnt then was to not be so obsessed by "individual risk factors" (drinking water from the pump), but to ask why the water in the pump carried disease. Similarly you could mention that it is not so much crime, or even the stress caused by crime and the link to diabetes, but what it is that means crime rates are higher in the UK than almost anywhere else in Western Europe. Similarly with obesity: we ain't fat just 'cos we eat chips more. There are underlying reasons why we eat chips more in the UK. You need to climb out of the biomedical microscope a little – less "atomistic facility" please – read the Spirit Level book (Wilkinson and Pickett) which makes this step out and add a reference here, even if you don't agree and think getting postcodes of Macdonalds is the answer.

\*\*\*\*We have added an extra paragraph in the discussion on page 18 to reflect this point.

Page 9: The term "ethnic restaurants" is odd given the we all have an ethnicity. Pie and Mash shops are an ethnic restaurant. You don't want to be cited as an example of how medics / gis folk just don't get it about ethnicity (I suspect).

\*\*\*\*We agree and have changed to just "restaurants".

Page 9: How "long established" do you think the "white British working class population" of Tower Hamlets are? Not very is the answer so not worth propagating this myth. The BNP use it – don't help them. Look up the birthplaces of people living in tower hamlets in the 1971 census to see all the Irish...

\*\*\*\*We have removed the term "long established".

I hope these comments are useful – sorry they emphasise the negative. I guess the main thing the paper is missing is something along the lines of – "In Figure 2 the red blob to the right was expected but the one to the left was a revelation – it was worth all the cash of employing us all along". Or something like that.

\*\*\*\*I think overall this was not really the case, e.g. from the team of authors some of us have worked and lived in Tower Hamlets for a while, and the maps immediately resonated with our personal knowledge of the area. We hope the real value in this research is the action that that this will engender, especially given current health service reforms in England, and showing health needs in an engaging way that will lead to urgent public health action.

On the history of this mapping this might be of use: Dorling, D. (1999) A review of chapter 2, book review article of Tufte E.R. Visual Explanations Progress in Human Geography, 23, 1, 127-131 It is on-line here:

http://www.dannydorling.org/?page\_id=766

\*\*\*\*We have referenced this in the new sentence on cholera mentioned above.

Your paper really is very well put together – It is publishable as it is, although I recommend revisions. Why make do with just being good? I hope this comments are interesting and that you can use some of them.

\*\*\*\*We'd all like to thank you for the time you gave up to review this paper and the helpful comments.

Response to Reviewer: Jacqueline W. Mills

The authors do a fine job detailing the approach and its feasibility. However, despite feasibility, is this approach useful in its current form? For example, I question how physicians or other public health practitioners would respond to the ring map presented in this manuscript.

The authors state that "Impact studies are needed of how maps of chronic disease risk might be used in public health and planning." However, short of a full impact study, this manuscript does need some feedback on the usefulness of the maps that have been created. The manuscript is incomplete without this component.

\*\*\*\*Please also see the comments to the other reviewer. We are also keen to find an answer to this question. However, the primary purpose of this research was to assess whether it was feasible to take a large sample of electronic patient records, add a geographical locator, map the risk of disease, and relate to socio-economic indicators. It's feasible, but there are hurdles. The next stage is to do a full qualitative study of how these maps influence commissioners and commissioning decisions. We thought about doing a 'straw poll' to add to the manuscript, but in the end felt that we would rather do this formally with a carefully planned qualitative methodology. In reality as we start to use these maps locally, and eight others we have created, this will play into the background information needed for a formal impact assessment, and as you suggest start to explore whether this is really useful.

\*\*\*\*On the ring map, this needs to be seen within the UK context of indicators of performance that are so commonly used by commissioners of care. By combining geospatial mapping with a rim of indicators we hope to be able to bring together the benefits of visualising health needs with the commonly used dashboard approach.

Surveying the targeted users (the practices that provided data for the study or other public health groups mentioned) about how they would use the maps and if there are other data sources or methods of visualization that would more appropriately assist them in planning, management, and intervention is a straightforward way to add this necessary insight to the paper.

I applaud this project and hope to see it published with my one major recommendation of addressing the utility of the approach to public health professionals. This is easily done and provides a great deal of value-added to the study.

\*\*\*\*We explored the possibility of doing this, and in our local context we don't think this would be straightforward, although we do agree that this needs to be done, and is the next stage of this research. However, we would rather publish this paper now, use the maps, and as we receive feedback develop a qualitative protocol for a detailed impact study.

# Correction

Noble D, Smith D, Mathur R *et al.* Feasibility study of geospatial mapping of chronic disease risk to inform public health commissioning. *BMJ Open* 2012;**2**:e000711. In the section 'Strengths of this study' it was reported that only one data field (family history of diabetes) contained a significant proportion of missing data. In fact, this variable is only recorded if positive and therefore it cannot be said whether or not it has a significant proportion of missing data.

BMJ Open 2012;2:e000711corr1. doi:10.1136/bmjopen-2011-000711corr1