Author's response to reviews

Title: Methodological Aspects of a GIS-based Environmental Health Inspection Program used in the Athens 2004 Olympic and Para Olympic Games

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Author's response to reviews: see over
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To: The BioMed Central Editorial Team

Re: 'Methodological Aspects of a GIS-based Environmental Health Inspection Program used in the Athens 2004 Olympic and Para Olympic Games'

Dear Editor

We are pleased to submit a revised manuscript for your consideration. We have made every effort to modify our manuscript according to the editors’ and reviewers’ comments.

Below please find a point-by-point response to the comments provided. In addition, we tried to format our paper in order to conform to the manuscript formatting checklist as requested.

Although your letter was addressed to Dr. Falagas, I would kindly request that you forward all future correspondence to me, since I am the corresponding author of the manuscript. If you have any further questions please feel free to contact me at (+30-6932264685) or via e-mail. I would like to thank you for your consideration.

Sincerely,

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Response to Reviewers’ Comments

Reviewer 1:

General

It is obvious that quite a bit of work went into the exercise described in this paper, which is a real one executed in preparation for the Athens 2004 Olympic and Para Olympic games. The topic is interesting, but quite traditional, nothing really novel here. However, it is worth publishing (after substantial revision) because of the importance of the exercise settings such as Olympic games and similar mass gatherings. The current manuscript draft needs to be more clearly written so that it is informative to the reader. This is especially important since this is a methods paper (the authors are focusing on the "methodological aspects" of their exercise). Some key citations on related work (about a system used in the 2002 Olympic Winter Games in Salt Lake City, USA) are missing and should be included in the revised manuscript. Also, better maps (figures) should be submitted, as the current ones have many problems and are not suitable for publication.

Specific Comments/ Major Compulsory Revisions

1. In several places throughout the manuscript, in the abstract (under Methods and Results) and on pages 6, 8 and 10, we are told about "a needs assessment survey using several questionnaires", "Nineteen standardized questionnaires", "standardized questionnaires used during on-site visits", "standardized checklists and sampling forms", "Nineteen checklists", and "several reporting forms". The terminology used (questionnaires, standardized questionnaires, checklists, standardized checklists, sampling forms, reporting forms) and the figure of 19 (used for standardized questionnaires and checklists) leave the reader confused about the nature and purpose of these data collection instruments and whether they are all the same or different. It would be helpful if the authors could revise their terminology and provide more details about their data collection instruments. Also, any questionnaires/checklists/forms used could be submitted as additional information to be published with the paper (BMC submission system allows additional information files to be uploaded using the 'Additional Material files' button in the manuscript submission process check 'Instructions for Authors').

This is a very helpful comment made by Dr. Boulos. In revising our manuscript we realized that the information about the needs assessment process (questionnaires) included in our manuscript was somewhat confusing and perhaps unrelated to the main topic of our paper. Therefore, we decided to remove the information on the questionnaires used in the assessment process and retain only a more detailed description of the standardized inspection forms used in the Environmental Health Inspection program. We had used specific registry and inspection forms for the registration and inspection of various premises such as restaurants, swimming pools, water supply systems, cooling towers etc. Unfortunately, these standardized inspection forms were written in Greek language and it is quite a labor-intensive task to translate them in order to include them as additional information files as suggested by the reviewer. If you are interested, we may consider translating the most important standardized inspection forms used for restaurants and swimming pools (page 5).

2. Standard GIS terminology should be used for the GIS functions described in this paper. For example, "a circular range of 1,000, 500 and 300 meters" (page 9 and also Figure 2) should be described as "buffers". The GIS process of buffering (building zones “buffers or corridors” around features) is a very useful and standard GIS function. The user enters the desired
buffering distance, and then the GIS builds the buffer outward from the selected feature or features.

The terminology regarding buffers has been used in the manuscript as recommended by the reviewer including figure legends (pages 9, 12, 19).

3. Methods: The authors mention "algorithms" used to estimate the workload of each county and to partition counties into sections with equal workloads. The actual "algorithms/software functions used remain very vague to this reviewer. Some parameters have been estimated, e.g., inspectors driving at about 10 Km/h, but no calculation details/justifications have been given for those estimates, and there is no mentioning of how exactly they have been incorporated into the "algorithms". How distances were measured? Were factors like traffic congestion/bottlenecks, one-way streets, and no-parking zones taken into account, and how? Page 14 mentions "unpredictable factors" and no attempt has been made to even qualify those factors/provide some possible examples (although the authors are rightly acknowledging these "unpredictable factors" as one of the limitations of their study).

This reviewer was expecting to read about some standard GIS network analysis/routing functions when those "algorithms" were mentioned. Such functions can consider many of the above mentioned attributes in the search for optimized inspection routes/equal workload partitions, such as one-way streets, rate of travel (speed limit/traffic condition), road type and condition, or other barriers that prevent continued movement. A related GIS feature, the isochrone function, allows us, departing from some starting location, to identify all geographically reachable areas and routes in all directions based on some user-defined criteria, e.g., after traveling less than 10 km, or less than 10 min. There are numerous health/healthcare applications for this type of topological operations, such as emergency response routing. ESRI ArcView/ArcGIS Network Analyst extension allows such functions, provided suitable base street network data are available (for MapInfo, the tool is known as Drivetime).

This is a very detailed comment on the methodology used. We have added information in the manuscript regarding the algorithms used as requested by the reviewer. During the Olympic Games the government implemented special traffic measures around the City of Athens including designated lanes for Olympic vehicles, particular restrictions in certain blocks and greater areas therefore limiting our ability to employ related GIS features such as the isochrone function to estimate the required time for the traveling of inspectors. Pedestrian streets, and one-way roads were taken into consideration when calculating the transporation time to different inspection sites (page 7).

4. Abstract (page 2): "several applications have already been reported in the literature"
Consider revising this sentence. There are many GIS applications reported in the literature rather than several. The following two reviews can be used as a proxy to the large number of GIS applications that have been described in the biomedical/public health literature: Boulos MN. Towards evidence-based, GIS-driven national spatial health information infrastructure and surveillance services in the United Kingdom. Int J Health Geogr. 2004 Jan 28;3(1):1.
http://www.soi.city.ac.uk/~dk708/JBI1015a.pdf

The above sentence has been revised according to the reviewer’s suggestion. We have also included the recommended citations (page 5, references 12 and 13).

5. Abstract (page 2) and Discussion section (pages 12 onward): "there are no reports for the use of GIS in previous Olympic Games" This is not an accurate statement. In fact, GIS formed a very important component of RODS, the Realtime Outbreak and Disease


We would like to thank the reviewer for the references provided to us. We had actually meant to say that there were no previous reports on the use of GIS for the Environmental Health Surveillance of Olympic Games. We have modified our statement accordingly and included the recommended reference (page 5, reference 14).

6. Page 10: "Using databases from Epi Info 2002". Please provide more details about the nature/origin/content of those databases. Also, please mention the publisher/URL of Epi Info (CDC - http://www.cdc.gov/epiinfo/).

The Epi Info databases used, included the registration information of all environmental health items and the corresponding electronic files of the 17 standardized inspection forms. We have clarified this information in the text as well (page 7, reference 16).

7. Page 10: "Using databases from Epi info 2002 and its GIS component we were able to display the inspection results in color codes according to the categorical score received by each premise. This could have also been done in ArcView 3.2 (which you have also used in your exercise page 7). Please explain/provide details of why you have used Epi Map instead.

We used Epi Map because Epi Info 2002 was used for the development and maintenance of the above databases (see comment 6). In addition, the same software (Epi Info 2002) was used of the statistical analysis of the data collected and the presentation of the results in electronic reports. All these functions were easily performed using the menu features of Epi Info.

8. Discussion page 13: 'This is not really a discussion of the authors' results. It is an incomplete literature review of the potential benefits and applications of GIS (references 7-15). This part of the discussion should be moved to the Background/Introduction sections of the manuscript. The authors should instead discuss the other potential uses of GIS during such large events like the Olympic games, e.g., in emergency preparedness and for managing, dispatching and routing ambulance vehicles. The GIS component of the RODS system that was used in the 2002 Olympic Winter Games in Salt Lake City, USA (see references above) should also be discussed here as another example of GIS applications that could be helpful in Olympic games and similar mass gathering events.

We thank the reviewer for his comment. We have followed his recommendation and moved some of the literature review in the introduction section. Despite using the GIS application for Environmental Health Inspection, we have included a paragraph commenting on the other applications of GIS as suggested by the reviewer (pages 4 and 5).

9. Figures are of a very low resolution and the font size used for map legends is too small/looks unprofessional. Figure 1 shows an unexplained red circle near the centre. The maps also offer too much detail (resulting in confluent map features), and since they are not interactive/zoomable maps (as they were in their native GIS application from which the static figures have been generated), it is recommended that the authors zoom in to some
representative areas on these maps and use those areas as their paper figures to clearly demonstrate what they have done (they can also use those 'zoom in' areas as map insets). Colour-blind-friendly schemes are also recommended (especially for Figure 3 the light green colour). Please revise the map colours so that they are consistent with Cynthia Brewer's recommendations (see: http://www.colorbrewer.org/). Vischeck (http://www.vischeck.com/) can be used to test the new figures prior to resubmission (see screen shot on next page). [IMG] Current Figure 3 in Vischeck. Note how the corresponding "light green" dots in the deuteranope version cannot be easily distinguished from the street network background.

These were quite instructive comments regarding our figures. We have followed Dr. Boulos’ recommendations and improved our figures to the extend possible as suggested. We have added figure 4a and extensively modified figures 4b and 5 in order to illustrate the different capabilities of the GIS maps used.

10. There are also some typos/language errors, though overall, the writing of the manuscript is acceptable. For example, page 8: "the best premises with respect to public health risks" (rephrase to something like "premises posing the lowest public health risks"), page 10: "using a several reporting forms", page 12: "aautomatically" (double 'a' at the beginning of 'automatically'), page 14: "has proven its value whenever was tested", etc.

We have made every effort to eliminate typos and other errors from the revised manuscript.

**Minor Comment**

1. Introduction (page 5 last para) and literature review: It is always desirable to use/relate to the traditional classification of GIS services, which comprises two broad types of GIS applications that also reflect the two traditions in health geography (geography of disease and geography of healthcare systems). These two application types are health outcomes and epidemiology applications, and healthcare delivery applications. The latter type includes the health service and resource allocation/management applications of GIS. There are also studies at the interface (overlap) between epidemiological and healthcare delivery applications, for example in relation to healthcare commissioning and needs assessment. See: Boulos MN, Roudsari AV, Carson ER. Health geomatics: an enabling suite of technologies in health and healthcare. J Biomed Inform. 2001 Jun;34(3):195-219. [http://www.soi.city.ac.uk/~dk708/JBI1015a.pdf](http://www.soi.city.ac.uk/~dk708/JBI1015a.pdf)

We would like to thank the reviewer for providing us with valuable information. We have revised the introduction accordingly.
Reviewer 2

General

This paper reports the use of GIS methods to plan the environmental health inspection program for the Athens 2004 Olympic Games. It will be of great interest to those charged with similar tasks for other mass events.

Major Compulsory Revisions

1) Methods, Designing the environmental health inspection program: More detail needs to be provided (perhaps in a table) regarding what the environmental health inspections entailed. The assessments undertaken would by necessity vary greatly according to the types of premises (eg. food outlet versus airconditioning cooling tower), as would the time taken. Was this variation factored into planning?

It is true as the reviewer indicates that there was significant variability of the inspections performed thereby necessitating the development of 17 different standardized inspection forms, each one used to inspect a specific environmental health item (restaurant, swimming pool, cooling tower etc). We have carefully reviewed our manuscript in order to clarify this issue and provide detailed description of the work undertaken.

2) Did teams of inspectors "specialise" in inspecting certain types of premises, or were their workloads assigned strictly on a geographic basis? If the latter, were potential efficiencies associated with specialisation considered when designing the scenarios for inspection programs?

All the inspectors were trained to use all standardized inspection forms and therefore there was no specialization of inspectors on specific premises since there was a shortage of available inspectors. However, as mentioned in the manuscript, the inspectors always performed their duties in pairs. Therefore, in the assignment of inspectors into pairs, their experience in inspecting particular food premises or water sites was taken into consideration in order to have complementary expertise in the inspection teams. This information was added into the manuscript (page 8).

3) Methods, Designing the environmental health inspection program: Six scenarios for the selection of premises for inspection are described. The chosen scenario involved inspection of a random selection of 2% of all food premises outside of a 200 metre radius of Olympic venues. A rationale needs to be given for choosing this scenario - as it stands it appears that it was chosen pragmatically based on a desire to inspect at least some of these more far-flung food outlets, rather than using more formal methods to assess the risks associated with various types of premises and therefore their priority for inspection.

The reviewer is right to point out that the reason for choosing scenario 6 was based on the availability of human and other resources. It is true that we had inspected all food premises within a buffer of 200 meters around tourist, archaeological and Olympic venues. We included the inspection of 2% of all other premises outside the 200 meter buffer based on a random sample of those environmental health items. It should be noted that prior to Olympic games the food premises were neither registered nor routinely inspected. Moreover, there was no categorization of food premises according to public health risk (low, medium and high). Therefore, it was impossible to undertake such a task in a relatively short period of time and under the pressure to prepare for the Olympic Games. We thought that using a random sample of all other premises would
provide us with a representative picture of the quality of food offered in the Olympic Cities.

4) Inspection of only 2% of food premises is unlikely to have any direct impact on public health, but might have a "deterrent" effect if the inspection program was publicised. Was it? It is not clear whether these random inspections were carried out only in the pre-Olympic period or whether they continued throughout the Games. It could be argued that a deterrent purpose would best be served by conducting such inspections in the pre-Olympic period only, allowing inspections during the Games themselves to focus on high-risk premises.

We would like to thank the reviewer for giving us the opportunity to clarify this issue. The results of the random inspections around the Olympic Cities, during the pre-Olympic period, were publicized by the National Food Authority, Ministry of Development. As correctly assumed by the reviewer, during the Games, all inspections were focused on food premises within the Olympic Village, the Olympic venues and hotels.

Minor Essential Revisions

1) Methods, Workload assessment: Archaeological sites are not mentioned among the list of targeted premises. From information provided later in the paper, it appears that these were indeed targeted.

It is true that archaeological sites were used to target food premises around them. We have further clarified this issue (page 7).

2) Methods, Workload assessment (plus several other instances throughout the paper):
Replace "touristy area" with "tourist area".

Done.

3) Methods, Workload assessment: A (numbered) full reference needs to be included for ArcView 3.2 software.

Done.

4) Methods, Workload assessment: Replace "total miles" with "total kilometres"
Methods, Other GIS applications of the program: More information needs to be provided regarding exactly which databases from EpiInfo 2002 were used to develop additional applications, and what these applications were. Also a (numbered) full reference needs to be included for EpiInfo 2002.

We have replaced miles with kilometers. Please see our response to comments 6 and 7 from the first reviewer regarding the databases of Epi Info.

5) Results, Olympic counties’ workload, second sentence: Should read "...and developed into appropriate working maps."

Done, thank you.

6) Discussion, first sentence: mentions "statistical analysis" but this is not described in the Methods.

We have eliminated the word “statistical” since we have not performed any statistical analyses with respect to the work described in this paper.
7) Results, Other GIS applications, third paragraph: Describes how GIS might be used to investigate a case of Legionnaires' disease, rather than something that actually happened. Was GIS used to assist in investigating any real public health issues or cases of disease during the Games?

The GIS was not used to investigate any real cases since there were no human cases reported.

8) Table 1: The "Other premises" column should be broken down further, at least to individually identify food premises. Or a table which just gives the total numbers across all counties, but a more detailed breakdown by type of premises, could be provided.

We have added another column in Table 1 describing the food premises as requested by the reviewer.

Discretionary Revisions

1) Methods, other GIS applications of the program: Could the inspection results be linked to information regarding the surveillance of human cases of any diseases other than Legionnaires' disease (eg. food or water-borne disease)? Perhaps the potential to use GIS to link premises with cases of a wide range of diseases, where appropriate surveillance data are available, could be mentioned in the discussion?

This is a very interesting comment made by the reviewer. It would be valuable to link inspection results with information about human cases for different diseases. We were not able to do such analyses because the human surveillance data collected by another organization were not geocoded or displayed on a GIS map. A comment has been added in the limitation section of the discussion regarding this issue.