Author's response to reviews

Title: A spatial analysis to study access to emergency obstetric transport services under the public private "Janani Express Yojana" (JE) program in two districts of Madhya Pradesh, India

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Version: 3
Date: 27 June 2014

Author's response to reviews: see over
June 27 2014, Ujjain, India

To
The Editor
BMC Reproductive Health

Sub: Rebuttal Letter and submission of revised original research article entitled ‘A spatial analysis to study access to emergency obstetric transport services under the public private “Janani Express Yojana (JE)” program in two districts of Madhya Pradesh, India. MS No : 4147028611357814

Dear Editor,

Thank you for the comments and feedback on our submitted article. We are also thankful to both the reviewers for their valuable comments that helped us to make the manuscript better piece of information.

We have now responded to Reviewer and Editor’s comments on the above mentioned manuscript. We have revised the manuscript as per comments and actions taken are reported below. For easy reading we repeat the comments by the reviewers and the editor in Bold, then make our comments in Normal and then edits in the manuscript in “Italics”. In addition, we have further edited the manuscript. We are submitting two separate MS word files 1) MS_JEY_with_track_change_270614.docx highlighted all the changes made as per suggestions. Line number mentioned in authors reply corresponds to line number in this file. File 2) MS_JEY_Wihtout_track_change 270614.docx are updated version without track changes.

Reviewer: Allisyn Moran

Minor Essential Revisions


Authors’ Response:
As per suggestion we have added reference no. 7 (line No. 549-552) and updated the data accordingly on line No. 71-72.

“Complications such as hemorrhage, hypertensive disorders, infections and unsafe abortions account for more than 50% of maternal deaths globally.”

Pg 10 – discussion on bypassing non-functional BEmOC facilities – important to also talk about this phenomenon in Bangladesh. This is an important area that needs more study.

Authors’ Response:
We have added discussion on phenomenon of bypassing in other developing countries at line No. 276-278 in results and line No. 464-471 in discussion and references 45 to 47 (line No. 675 - 684)

“The orange lines show that some mothers bypassed Non-BEmOCs on their way and preferred to deliver in district level facilities providing cesarean section services (CEmOCs and Non-CEmOCs).”

“Why mothers bypassed non-BEmOC facilities?
Figure 4 and 5 revealed that some mothers bypassed Non functional BEmOCs (Non-BEmOCs) to seek care in higher (district level) facilities offering cesarean section services (CEmOCs and Non-CEmOCs). Bypassing primary care facilities to seek care in higher level facilities has been reported from other developing countries. This bypassing is costly and inefficient for pregnant mothers and the health system as it delays access to EmOC services, particularly for those residing in distant locations. Perceived poor quality of care is an important determinant for bypassing behaviour [43-45].”


Discretionary Revisions
Interested to know more about how time of decision to seek care was assessed – this was the critical point to calculate delay time – was it only mother’s decision – or family member’s? How were these questions asked? Decision making is complex and may have occurred at various time points.

Authors’ Response:
Decision to seek care was the decision of the person whosoever was the decision maker in the particular family. To explain the methodology details we have added line No. 190 – 195 in data collection section.
“Mothers were requested to narrate the events leading up to delivery beginning from the noticing of labour pains through decisions to seek care and travel to the facility. Interviewers probed to know the time of key events of interest including time when the decision was made to seek medical care, by whosoever was the decision maker in the particular family; time they started the journey to the facility and the time they reached the facility.”

Reviewer: Lisa Hirschhorn
Reviewer’s report:
The authors present an interesting approach to do a quick evaluation of the Janani Express program in 2 districts in Madhya Pradesh. The approach represents a great combination of network analysis and hotspot analysis and the cross sectional approach to sampling women over a short period of time makes this a potential tool for ongoing program evaluation. There were however some major gaps in the information and in the interpretation/discussion.

We are thankful to the reviewer for the appreciation of our research work and identification of the further potentials in it.

Compulsory
1. These results only apply to women who come to the facility—there is a major gap in the results and should be more strongly added to the discussion. Currently this is only 1 line in the limitations paragraph, The major failure may be for the women who never make it to the facility. Adding in the facility delivery rates for the districts would also be important

Authors’ Response:
We agree that this is an important question and in response we have added the paragraph in the discussion line No. 371 - 375.

“The present study was a hospital based study. It could not take account of the mothers delivered at home or on their way to OC facility. Therefore present study, cannot rule out the possibility that there might be a subset of mothers in the community who in spite of their willingness to deliver in a facility had to undergo home delivery owing to non availability or late arrival of transport vehicle.”

However we would like to clarify that the proportion of women delivering at home has fallen sharply since the inception of the ‘Janani Suraksha Yojana’ (JSY). In Madhya Pradesh, official statistics peg institutional delivery at close to 90%. Our own studies (not reported in this paper) in the community in one of these districts, show that home births are low, about 7% of all births. Earlier studies from our group (Sidney et al. Reproductive Health 2012, 9:2 doi:10.1186/1742-4755-9-2) indicate that home births tend to be concentrated among poorer multiparous women, however the proportion now is rather small.
2. The differences between the 2 districts is of interest and should be discussed. Assumptions about the reasons why the women in district 1 hotspot chose the lower level facility are over-stated. In fact a significant % of women do not need a comprehensive EMOC facility an it may be appropriate where they went

Authors’ Response:
Please refer the differences in two districts in the discussion line No 444 - 457. In response to the reviewer’s comments we have added the following text in line No 457 - 462 in the discussion section.

“While we agree that the majority of women will not require to deliver in a Comprehensive EmOC facility, but the alternative to not delivering in a CEMoC facility in this setting is nearly equivalent to delivering in a dysfunctional facility, as none of the other facilities provide Basic EmOC which is life saving. Therefore promotion of BEmOC deliveries must be preceded by improving the quality of care at the peripheral facilities not capable of providing BEmOC services at the time of study.”

3. For the women getting to the CEmOC having less delay, this may be due to the appropriate triage of women in need of more emergent services getting priority. This should be added into the discussion

Authors’ Response:
We have discussed the issue in details in the MS in line No. 392 - 410. Here we have discussed how in the given setting it is unlikely that mothers reached CEmOC facilities quicker because they were prioritised based on triage.

“Mothers who delivered in CEmOC facilities travelled longer distances than those who delivered in the non-BEmOC facilities. The absence of key signal EmOC functions, indicate poor functioning of the peripheral non-BEmOC facilities; this is a possible explanation for this situation in which many mothers travelled significantly longer distances to deliver at CEmOCs located at district headquarters. Paradoxically, mothers who delivered at CEmOCs encountered fewer occurrences of long second delays. Ideally, CEmOC facilities are expected to be utilized by mothers with delivery complication who are referred by BEmOC facilities. But in our setting, there is no formal gatekeeping between different facility levels. Therefore a CEMoC facility can received a large number of uncomplicated parturients who arrive directly from home (the majority), some parturients with complications who come directly from home or are referred from a lower level or private facility. Also there was no difference in between the distances travelled by mothers with delivery complications and referred mothers. Given these observations, it is unlikely that mothers reached CEMoC facilities quicker because they were prioritized based on triage. It is possible that wealthier mothers who had the resources to organize non JE transport (hired or own) for themselves, bypassed dysfunctional lower level facilities (non-BEmOCs) and traveled directly to higher facilities
(CEmOCs) at district headquarter taking lesser time, despite farther distances, than those delivered in non-BEmOCs. It is also likely that road networks are better leading up to CEmOC facilities (usually in the big towns) than lower level facilities which tend to be more remotely located.”

4. Similarly because of the differences between the districts, comparing aggregate times by facility type is not valid and should not be combined

Authors’ Response:
We have compared the proportion of mothers who took more than 2 hours. The 2 hours cut off was decided upon as this is the recommendation given by the WHO (reference no. 14 line No. 571-574) as the critical time to reach a health facility in which the life of a haemorrhaging mother can be saved. Hemorrhage is the major cause of maternal mortality in the setting. Thus, this cut off was used for each individual mother, regardless of district. We did not aggregate values of the two districts. (Please refer details in background, line No. 79-82. methods, line No. 195-197)

5. There is mention of referred women but no data on what % these represented and how the time was calculated (facility to facility? Total from home to final facility?) This needs to be broken out

Authors’ Response:
We have calculated the time from home to first facility. We have added the information on referrals in results line No. 304 - 306 and discussed the same in line No 412 - 425.

“46 (9.83%) mothers were referred in by some other facility of which 18 took more than 2 hours to reach the first facility.”

“What happened to referred cases?
In this study the 46 (9.83%) mothers were referred, of which 18(39.13%) took more than 2 hours to reach the first facility. Another study conducted in same setting reported that the average inter facility transfer time was 1.25 hours for referred cases [38]. The efficiency of emergency obstetric transport system is meaningful only if it can take pregnant mother to a facility where EmOC is available. In the given setting most of obstetric care facilities were not equipped with basic EmOC functions (non-BEmOCs). These facilities can possibly at the best handle completely uncomplicated deliveries but they need to refer any other deliveries to higher centers. In these cases the referral transport consumes vital time and adds to the delay in access to facility with EmOC services. Therefore unless peripheral facilities are made EmOC functional, transportation by itself has little meaning [6, 39]. These findings indicate the need to strengthen non-BEmOC facilities in addition to improvement in referral and transport system in the given settings.”

Minor Essential revisions and questions for clarification which would strengthen understanding of the methodology

Background and Intro
• Were the JE vehicles inspected for quality? Cars with mechanical issues or older models might make the trip longer. If the vehicles are older, then they might have some impact on longer second delay. This should be discussed briefly

Authors’ Response:
The JE vehicles were not inspected for quality as this was not the objective of the study. However as per the government rules the vehicles must be in good condition by the owner of the vehicle and we have added line No 112 -114 in the background

“In this partnership, the service is paid for by the state, while private operators are responsible for vehicle procuring, maintenance and upkeep.”

• Do the drivers use the same route when driving from a village to a health facility? Could some variability be due to drivers rather than response to requested ride?

Authors’ Response:
We have not estimated the time based on travelling route but it was the actual time taken by the mother. The possibility of variation cannot be completely ruled out.

Methodology clarification
• Mapping section of methodology
  o What data did they georeference? What roster data was cross verified with ground truth
  o Did they digitize all the roads from a topography map, or was it obtained from the government? And were they able to use the government classification of road type to be able to estimate anticipated travel time?

Authors’ Response:
For these points, we have modified mapping in methods section, line No. 200 - 208 to explain what data were geo-referenced in this study.

“Mapping
Geographic Information System was developed using following geo-referenced data in ArcMap version 10 (i) The boundary maps of the study districts and their villages (village maps) were obtained from the office of Survey of India. Geo-referencing of the boundary maps was done using Survey of India topological sheets of the scale 1:50,000. The geo-referencing was cross verified on the ground using hand held global positioning system (GPS) at random locations. (ii) The locations of obstetric care facilities and JE vehicle stations were digitized using the recordings obtained from hand held GPS. iii) The locations
of the villages from where mothers travelled were identified from their residential addresses as provided to the research assistants in the survey. The locations of mothers’ villages were mapped onto the GIS.”

What roster data was cross verified with ground truth?

Authors’ Response:
We did not use any raster data in our study. The objective of the study was not to verify raster data with ground truth. We did not consult any rasters for the purpose of this study.

Did they digitize all the roads from a topography map, or was it obtained from the government? And were they able to use the government classification of road type to be able to estimate anticipated travel time?

Authors’ Response:
We used the current situation of road networks based on data provided by government authorities responsible for construction and maintenance of roads. Estimation of travel time was not an objective of study and was not done. To calculate the delay we have used the time reported by the mothers which is explained in data collection. (line No. 190 - 195).

“Mothers were requested to narrate the events leading up to delivery beginning from the noticing of labour pains through decisions to seek care and travel to the first OC facility. Interviewers probed to know the time of key events of interest including time when the decision was made to seek medical care, by whosoever was the decision maker in the particular family; time they started the journey to the facility and the time they reached the first facility. Mothers who took longer than 2 hours to reach a facility after deciding to leave their home were identified as “long second delay” mothers and further interviewed to elicit reasons for their delay.”

Could they estimate “anticipated” travel time to compare with interview response at the health facility?

Authors’ Response:
Estimation of travel time was not an objective of study so we have not done this.

I believe that ArcInfo 10 should be replaced with ArcMap 10. ArcInfo is an older version of ArcMap, and they stopped ArcInfo on version 3.

Authors’ Response:
ArcInfo 10 has been replaced with ArcMap 10 throughout the MS. (line No 222 and 230)

Pattern analysis is not a tool; its made up of different tools used to do location pattern analysis. What tools did they use in Pattern analysis for their study?
Authors’ Response:
The term pattern analysis replaced by term “Average Nearest Neighbor (Spatial Statistics) tool.” We have also added the details how the tool works. (methods, line No 222 - 226 and results line No 280.)

“Average Nearest Neighbor (Spatial Statistics) tool in ArcMap 10 was used to study the distribution of JE vehicles in the districts. The Average Nearest Neighbor tool measures the distance between each JE location and its nearest JE location. If the average distance between two neighbouring JE locations was greater than a hypothetical random distribution, the JE locations were considered dispersed.”

“Average Nearest Neighbor analysis revealed that of JE vehicles were systematically (not clustered or randomly) dispersed across the districts with nearest neighborhood ratios of 1.75 and 1.64 (p value < 0.001) respectively.”

• Grammar
  o ‘Instead of mother were digitized’, it would make sense if they say ‘…of mothers location were digitized’

Authors’ Response:
We have corrected line No. 268 in results section.

“Therefore a total of 468 (92.9%) mothers’ locations were digitized onto a GIS”

• Network analysis result doesn’t show relationship or correlation, rather it produces how long it takes to go to a location. Page 9 paragraph 3 states that the ‘… network analysis revealed correlation’

Authors’ Response:
The term ‘network’ removed from the discussion, line No. 383.

“Our analysis revealed that there was weak correlation between travelled distances and duration of second delay.”

Discussion
Page 9-the statement that distance to the CEmOC were further than the BEmOC is self evident given that the CEmOC is district

Authors’ Response:
We agree with the reviewer in this matter. However we wanted to explain the paradox that inspite of longer distance the mothers are reaching earlier at CEmOC therefore the statement
“Mothers who delivered in CEmOC facilities travelled longer distances than those who delivered in the non-BEmOC facilities” was made in line No. 392-393 in discussion section.

Figures

• Figure 1
  o Legend should be moved to the lower right corner
  o Is the scale for the larger map or the smaller one? There are two resolutions (country and district)
  o Minor:
    o Great combination of network analysis and hotspot analysis
    o Rearrange the map placement
  # Larger scale map should be on the left and the other on the left

Authors’ Response:
We have corrected the figure 1.
Legend moved to lower right corner.
Separate scales provided for larger and smaller maps
Larger map placed on left.

• Figure 4
  o Rename the orange line label, it says ‘mother’
  o Consider adding Data description in the title

Authors’ Response:
We have corrected the figure
Orange line label changed as “mother to used facility”

• Figure 5
  o Stay consistent with your legend, arrow placement and resolution between the two districts

Authors’ Response:
We have corrected the figure 5 with similar legend, arrow and resolution between the two districts.

• Figure 7
  o In the north west corner, there is a village on the water
  o Also in the central region there is a hotspot which is not linked to a health facility
Authors’ Response:
We have corrected the figure 7. We have checked and corrected the water body. The link of the hotspot in central region revealed using separate inset.

- Figure 8
  o Consider placement of map properties consistent in all the maps
  o Easier if the link line between the hotspots and the health facility should be similar in both districts.

Authors’ Response:
We have corrected the figure 8. We have made map properties are made consistent in all figures. The link between hotspot and health facility made similar in figure 7 and 8.
Additional comments by editor
Please try to avoid statements such as ?there has been no study? and ?there have been no report?; like in the following sentences: ?So far there has been no study reported of this large emergency transport program (JE) that critically supports the state?s conditional cash transfer program (JSY)?. ?There have been no reports of utilization, geographic equity in access and effectiveness in transporting pregnant mothers to EmOC facilities.? To make such assumptions you should provide a review of the literature and a detailed description of the method used to do such search.

Authors’ Response:
We have removed the statements form background line No. 121-122 and discussion line No. 338 - 341 and reframed the statements as follows

“However, available literature suggests that there is a need to study the effectiveness of the JE service from a geographic equity perspective i.e. whether women who reside in remote areas equally benefit from the scheme and to look at its efficiency in terms of time to transport program women.”

“The available reports on this large emergency transport program (JE) that critically supports the state’s conditional cash transfer program (JSY), suggest that there is a need to improve coverage and time efficiency of the JE service.”

We hope that now the editor and reviewers will be satisfied with our responses and with the modifications incorporated in the manuscript.

Sincerely,

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(on behalf of other co-authors)