Natural Hazards and Earth System Sciences Discussions

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Comment on nhess-2022-218

Anonymous Referee #1

Referee comment on "Spatial accessibility of emergency medical services under inclement weather: A case study in Beijing, China" by Yuting Zhang et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2022-218-RC1, 2022

The study looks at the spatial accessibility of emergency medical service facilities in Beijing resolved according to weather situations, days and time-of-the-day. The authors demonstrate an empirical approach for linking spatially resolved accessibility decreases to weather situations, and manage to point out spatial inequalities on a sub-urban level. The approach, despite the reviewer having some reservations regarding certain over-simplifications along the way, shows a way forward to combine empirical data to yield insights into an under-studied topic (EMS accessibility) while shedding light on a dimension of social inequity.

General

L 28 not clear at that stage what is meant with « coverage rate ». Is it the total area covered within a 15 mins response time ? i.e. 13 % reduction refers to a km2 number ? why then « rate » (I do know that it is explained later on in the text, however the abstract should be understandable before this)?

L 45-55 : It is good that the authors give detailed insight into what parts make up EMS, especially tailored to the case study context. However, there seems to be - strictly speaking - some inconsistency in the use of the term *services :* One case includes the transport to the EMS facilities within the service definition (aka, the transportation service), the other case not (only treatment service

Further, please elaborate how this goes together with the definition in L 72-74 : It seems that this definition covers only the case of responders starting out from an EMS facility, getting to the scene, and transferring back to a respective facility (e.g. via ambulance). From the initial description above, the reader might think the authors will cover, however, also the case where patients transfer directly from the scene to an EMS facility (e.g. via

private transportation). Hence, it might be good to explicitly mention again that this latter case will not be covered, even though described above for reasons of completeness.

L 58 : To the non-local reader, it is unclear whether 1.5 to 2 hours response time is significantly longer than normally. One would assume this, but it would be helpful to provide average response times during normal conditions for comparison.

L 78 : Reference to the 2SFCA method ?

L 74-L104 : it is good that you provide some literature revolving around the topic of study. However, this very brief listing-style does not make it very clear how those papers are related to the concrete problem statement, or not summarized into coherent areas of challenges, seeming a bit randomly aggregated.

Section 3.1:

Could you please elaborate the reason for averaging to daily speeds for the baseline constructions, since you later also look at rush-hours and non-rush-hours specifically?

In a similar line of argumentation, averaging hence-obtained speed reduction rates across all road sections within the city (L220f), seems to conceal congestion hotspots? Please elaborate why this was done and the potential limitations of this.

Also, it is not clear to me from this description, if days are simply divided in a binary manner into inclement and non-inclement weather days, irrespective of the precipitation magnitude? Please elaborate in more detail if this is the case, and what was the reasoning for and potential shortcoming of this.

Section 3.3:

How does aggregation of the population grids to 1000m in a city distort potential travel patterns? Given that the topology of the road network within Beijing is at a much higher resolution, does this aggregation not lead to a very coarse estimation of what roads are taken, and which ones not?

Section 4. Results:

L275-280: It is hard to understand to which scenarios / analysis areas the percentages belong. Do 38 and 40%, resp., refer to the city including suburban areas? And 77 and 83% refer to only the inner city (is that meant by Six Road Ring)? Please phrase it in a way that describes the area analysed better to a non-local.

L 283-288: The definition and selection of a precipitation event belongs to the methodology section.

4.1.1. When I first read that you average out the total precipitation, across the grid cells, I was sceptical whether this conceals local effects, as one might assume that certain parts of the city could hence flood more, and cause over-proportional traffic delays. Also, I do not see an analysis of total precipitation on traffic speed, which I could imagine has quite an impact (while it is certainly important how strongly it rains in a given hour, it surely also matters how long it rains for causing pluvial flooding). Please elaborate more on both those aspects. Please also use figure 3 in justifying your assumptions / method, as indeed, it seems that without the (explained) outliers, there seems to be not much of an impact on how much it rains for causing travel reductions? This may be an argument in favour of your decision; however, it is somewhat unintuitive why there is so little effect.

In general, please comment more on the relationship between precipitation and urban pluvial flooding, and limitations of looking only at precipitation data without any hydrological modelling associated with it, that would link precipitation with the actual amount of water on the streets.

Figure 4 is basically not commented and further analysed. Please elaborate more, what one can see.

Grammar / Style

In-line citations are ill-formatted (brackets around them), e.g. L 83, L 90, etc. Please format correctly. Also, some citations are CAPITALIZED.

L31: towns new sentence : Furthermore, …

L 106: Could you briefly explain the term “waterlogging” (e.g. the saturation of ground with water), as it may not be clear to every single reader what is meant by this phenomenon.

L145: Rather: “hit” by a rainstorm? They do not malevolently “attack”.

L 145-150: You already gave quite a few examples of hazardous events in the introduction; also, this example does not fit the section “Study area”. Please consider to delete it.

Section labels are wrong. For instance, after 2.1 and 2.2. on p7, we see another section 2.1 and 2.2. on p8

L261: The term “population medical accessibility index” is a little bit cumbersome to read and understand. Could you perhaps think of a simpler, more descriptive term?