

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC2  
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## Comment on nhess-2020-402

Anonymous Referee #2

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Referee comment on "A simulation-optimization framework for post-disaster allocation of mental health resources" by Stephen Cunningham et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2020-402-RC2>, 2021

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This study presents a framework for allocation of mental health resources by using a simulation-optimization approach. The manuscript is well-written and topically appropriate for NHESS as a research article. Overall, the findings are of interest to both the research community and the management area (e.g., decision-makers), and this paper made a good contribution by demonstrating a proof-of-concept of the proposed approach. I, therefore, recommend publication after addressing the, mostly minor, concerns and comments outlined below.

### Key comments / concerns

1. Although the authors review literature well in Section 2, it is difficult to know the current methods and protocols for treating disaster-related mental health problems. For example, what are the current standards and guidelines for allocating mental health clinicians and other resources following a disaster event? I expected to see this in Section 2.3, but this section describes methods for analyzing treatment measures rather than treatment options.
2. The SVI is a composite index that combines multiple social and economic indicators to represent overall vulnerability. However, as the authors explain in Section 2.1, a tailored vulnerability based on a set of specific indicators would be more reasonable to model a specific type of mental health illness, patient, and hazard. This could also provide new options for decision-makers. Please elaborate on this point in the proper section.
3. Lines 473-474: I think the baseline model needs to include clinicians to reflect the real world rather than the do-nothing approach. Could you include a baseline model that allocates clinicians according to the number of populations, and then compare it to the

optimized results (i.e., Figure 5)? I believe this can better quantify the benefits of this approach.

4. I recommend explaining additional input parameters, objectives, and constraints in the Limitations section. The current variables are sufficient for a proof-of-concept, but future research must address realistic factors. This could be related to the current standards and guidelines mentioned in my comment #1.

Minor comments:

Lines 66-67: "before constructing a model" is repeated.

Lines 379-381: Could you include population and SVI maps in the manuscript or supplement file? This will assist readers in identifying the optimal allocations spatially across socio-economic statuses.

Lines 230-245: Please provide references to support these sentences.

Equations (2-3) and (6-7): Please specify the subscripts "NT" and "T".

Equations (5 and 8): Please specify the subscript "j" and use "N" or "J" for all census tracts.

Please explain a potential application of agent-based modeling for clinician allocation, as a recent study does (Lines 205-206).

Given the frequency of natural disasters (e.g., hurricanes), the proposed approach can be applied to serial multi-hazard events. I recommend expanding on this benefit as well.