PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	HEALTHCARE UNDER SIEGE: A QUALITATIVE STUDY OF HEALTH-WORKER RESPONSES TO TARGETING AND BESIEGEMENT IN SYRIA
AUTHORS	Fardousi, Nasser; Douedari, Yazan; Howard, Natasha

VERSION 1 – REVIEW

REVIEWER	Shawn C. NEssen Brooke Army Medical Center Fort Sam Houston, TX USA
REVIEW RETURNED	19-Feb-2019

GENERAL COMMENTS	This is an important paper addressing the delivery of healthcare under siege conditions and in an environment where healthcare workers and hospitals where attacked. While qualitative analysis is not generally used for scientific journals, it is a valid research technique and the paper and results add important information to the body of medical research. The researchers are to be congratulated for their efforts.

REVIEWER	Sharif Ismail Imperial College London UK Steering committee member for the Syria Public Health Network until 2018.
REVIEW RETURNED	25-Feb-2019

GENERAL COMMENTS	Thank you for the opportunity to review this paper - a strong piece of work on a difficult but important topic and based on data gathering from an exceptionally hard to access study population. Particular thanks to the authors for the clarity of their account on acquisition of consent - a major challenge with study populations like this and one that is frequently glossed over in accounts elsewhere. My main recommendation is to encourage the authors to draw out more clearly the implications of their work, and consider contextual differences across their study settings (if there are notable features to highlight here). By section: Methods section: 1. Development of the topic guide: on page 5 the authors state that this was developed based on the literature and expert consultation among other sources. What literature was consulted?

	2. Confidentiality: on page 5 the authors state that participants were sent transcripts for further comment/feedback. Ensuring confidentiality in electronic communication is difficult - what, if any, steps were the authors able to take to address this? 3. Coding: were interviews analysed thematically by BOTH of the interviewers, or just one? How did you ensure consistency of approach in coding between the two interviewers? Results: 1. Disaggregation by location: it would be interesting to know - insofar as it is possible to disclose this kind of information - how observations between participants differed across the two study locations. Were there distinctive aspects of the dynamics of siege in Aleppo and other locations that meant the reported experiences of participants were different? If so, in what ways? This matters for the recommendations. Discussion/implications: 1. Protective measures: the authors identify this as a gap in the literature identified by their study but do not expand on where they think the key gaps that they have identified are (International legal instruments? Economic measures? Other approaches?). This goes to the heart of what has made some recent conflict environments - including Syria but also Yemen among others - such incredibly difficult ones for health workers to operate in, but meaningful solutions are in short supply. Is there anything further the authors can add here? 2. Broader recommendations: I was not wholly clear what the authors' recommendations for improving preparedness were. There is discussion of online training for example - but what would this cover, and what evidence of effectiveness for these interventions can the authors cite (there is literature on remote training support, a lot of this from the Syria crisis although less focused on siege and the practicalities of trauma care delivery admittedly)?

REVIEWER	Rohini J Haar University of California, Berkeley. School of Public Health. United States of America.
REVIEW RETURNED	04-Mar-2019

GENERAL COMMENTS	Dear Authors, Thank you for looking at this excellent and understudied research topic. I think it is desperately needed and wonderful to see it being done locally. Overall, I think this paper does an excellent job of reviewing the literature, outlining the methodology and results and presenting solid conclusions. The following comments are an attempt to clarify and improve the manuscript but should be taken in the light that overall, this is good work. Broad comments: - consider reframing the paper and the conclusions as 'advice for future beseigements and how to deal with reconstruction in syria'--that might make it more relevant for a broad readership. What did the syrian doctors learn that might be useful in another war? in a different place? I think many others can put that learning into use if framed that way, rather than a "this is what happened here" framework. In that context, need to realy think about, can you plan for beseigment? - might be useful to compare and contrast Ghouta and Aleppo to see if different reactions to the same problems yeilded different

	results? you said aleppo was more prepared-- did that pay off? is that just comparing apples to oranges? - I would try to keep the organization really clear from the start. You say interviews fcused on targeting of health and beseigment, and mass casualties. I would restructure that as: (1) general responses to conflict events (mass casualties, etc), (2) responses to beseigment and (3) responses to targeted attacks on health. then I would go through the entire paper and make sure every single section has the same organization, in the same order, with the same titles. You generally do this but tightening it up more would make it easier to read. - strongly reconsider the 'weaponization' framework. I see that you describe healthcare attacks but I'm not sure in this case, that you are proving that healthcare is being weaponized. moreover, that is not an accepted framework beyond a single paper, if I remember correctly, that defined it. Stick to the standard IHL framework and definitions. - even though this is a qualitative work, we still need at least one table showing the basic demographics of the health wrokers you interviewed. Age, gender, years working, speciality or training, etc. That will help us understand who exactly you interviewed which is completely missing now. Specific feedback: - abstract is sort of disorganized. I'd use the above structure and rewrite it under the three headings in both the results and the conclusions sections. I'd avoid the weaponization term in the keywords-- but perhaps I'm biased that I don't think that term is well accepted or understood. - you do a good job in the background definiing health attacks, IHL and beseigement-- nice work - the 522K people dead is a total estimate-- please highlight that these numbers are not verfiied or confirmed anywhere-- they are just a huge guess and could be much much higher. I might even stick with "unknown estimated dead" and avoid sticking a wrong number on it. - for 542 attacks on health-- please qualify that as "at least 542" and that is just PHR data. other groups have different numbers, but I don't know the totals for those. again, this is not fully verified data. ITs still the fog of war.... - page 3, line 32-- "refrain from violence against those (PEOPLE?) - page 3, line 29 and 51-- why are these quotes in italics? - page 4, line 4-5: standardize n=XX, (percentage) for all the same way - Methods: nice work! I'm impressed you could get written consent inside beseiged Syria! - page 6, line 34: :Underground working" is awkward. rephrase that. .. moving underground? underground facilities? - page 6, line 48-49-- please elaborate on this idea. ITs really interesting and needs to be thought out more-- perhaps another quote? page 7, line 1-7-- not sure what happened to the translation but I don't understand this quote. might need ot replace it with something more understandable or retranslate it. page 7, line 42: dispersal is awkward. maybe "decentralization?" - generally, can you put [age, gender, speciality] for each of teh quotes? - pge 8, line 26: how is this triage issue different from other mass casulty events like natural disasters? It sounds pretty similar to hurricaines etc, no? maybe consider rewriting this section to focus

	on HOW and WHERE this conflict mass casualty is interesting and different from natural disasters or other triage events. maybe one big thing here that you mention is the ETHICS around treating people in this way-- the desperation vs. the lack of sufficient skills.... and how that can be improved? page 10, line 50-52: this is interestign that NGOs did some decent trainings. Highlight this in the conclusions about mitigation measures. page 11, line 43-50: this quote is fantastic. really inteesting-- maybe continue to elaborate on this for future planning... Discussion: again, I think this needs to be slightly reorganized to fit the headings more tightly, making it easier to read. I'd also reframe this to focus on lessons learned for the future-- both in Syria and in other conflicts. In Syria-- how can there be reparations for what happened? can the docs get some therapy? can the medical school in ghouta get accreditation? funding? what mitigation measures are possible now? How are things now? where are teh doctors now and what do they need? and internationally, can beseigments be planned for? since attacks on health are frequent, perhaps they can be planned for-- what does your study say about how? Limtations: page 16, line 43: not "potential" as these were real limitations of a previously conducted study. why were women not sampled enough? may need to elaborate more on where these doctors are now and if that changes their perspectives? references-- just check them. some are repeated.

VERSION 1 – AUTHOR RESPONSE

Reviewer 1.1: This is an important paper addressing the delivery of healthcare under siege conditions and in an environment where healthcare workers and hospitals where attacked. While qualitative analysis is not generally used for scientific journals, it is a valid research technique and the paper and results add important information to the body of medical research. The researchers are to be congratulated for their efforts.

Response 1.1. Thank you very much.

Reviewer 2.1: Thank you for the opportunity to review this paper - a strong piece of work on a difficult but important topic and based on data gathering from an exceptionally hard to access study population. Particular thanks to the authors for the clarity of their account on acquisition of consent - a major challenge with study populations like this and one that is frequently glossed over in accounts elsewhere. My main recommendation is to encourage the authors to draw out more clearly the implications of their work, and consider contextual differences across their study settings (if there are notable features to highlight here).

Response 2.1. Thank you. We agree that this strengthens the manuscript, so have reorganised Results and Discussion to highlight any differences between settings and further draw out implications. Please also see Response 3.7 below.

Reviewer 3.1: Dear Authors, Thank you for looking at this excellent and understudied research topic. I think it is desperately needed and wonderful to see it being done locally. Overall, I think this paper does an excellent job of reviewing the literature, outlining the methodology and results and presenting

solid conclusions. The following comments are an attempt to clarify and improve the manuscript but should be taken in the light that overall, this is good work.

Response 3.1. Thank you very much.

Reviewer 3.2: consider reframing the paper and the conclusions as 'advice for future beseigements and how to deal with reconstruction in syria'-- that might make it more relevant for a broad readership. What did the syrian doctors learn that might be useful in another war? in a different place? I think many others can put that learning into use if framed that way, rather than a "this is what happened here" framework. In that context, need to realy think about, can you plan for beseigment?

Response 3.2. We agree this makes sense. In addition to clarifying the structure, we have reframed the Discussion particularly to highlight lessons for other similar settings under each theme (pp 15-18).

Reviewer 3.3: might be useful to compare and contrast Ghouta and Aleppo to see if different reactions to the same problems yielded different results? you said aleppo was more prepared-- did that pay off? is that just comparing apples to oranges?

Response 3.3. Thank you for your comment. To clarify as much as possible, we revised introductory sentences as: “The Eastern Aleppo siege was characterised by an acute and heavy military offensive (July-December 2016), while the siege of Ghouta (2013-2018) was protracted with relatively less intensive military activity” (p4). Under Results and Discussion, we highlighted the main areas of differences between Aleppo and Ghouta, i.e. medical school and dispersion of health units in Ghouta; differences in blood transfusion between Aleppo and Ghouta and smuggling in Ghouta versus stockpiling in Aleppo. Overall, Aleppo was more prepared for a its shorter siege so it would be unfair to compare it and Ghouta directly, as the latter siege would have been virtually impossible to fully prepare for.

Reviewer 3.4: I would try to keep the organization really clear from the start. You say interviews focused on targeting of health and besiegement, and mass casualties. I would restructure that as: (1) general responses to conflict events (mass casualties, etc), (2) responses to besiegement and (3) responses to targeted attacks on health. then I would go through the entire paper and make sure every single section has the same organization, in the same order, with the same titles. You generally do this but tightening it up more would make it easier to read.

Response 3.4. We agree that this is clearer and have reorganised the manuscript accordingly.

ABSTRACT

E1.2: Please provide a date in the abstract (at the moment you just say ‘during the sieges’).

Response E1.2. We have revised this as “…during the sieges in Aleppo (July to December 2016) and Rural Damascus (August 2013 to February 2018)” (p2).

Reviewer 3.7: abstract is sort of disorganized. I'd use the above structure and rewrite it under the three headings in both the results and the conclusions sections. I'd avoid the weaponization term in the keywords-- but perhaps I'm biased that I don't think that term is well accepted or understood.

Response 3.7. Please also see response 3.4 above. We have replaced the key word ‘weaponisation’ with ‘besiegement’ as we agree this is more relevant (p1) and reorganised the results and conclusion sections of the abstract using our three themes (p2).

BACKGROUND

Reviewer 3.5: strongly reconsider the 'weaponization' framework. I see that you describe healthcare attacks but I'm not sure in this case, that you are proving that healthcare is being weaponized. moreover, that is not an accepted framework beyond a single paper, if I remember correctly, that defined it. Stick to the standard IHL framework and definitions.

Response 3.5. We agree that this was overemphasised and have removed the sentence and added a comment in the discussion: “Our findings are similar to those described by Fouad et al as ‘weaponisation of healthcare,’ the “purposeful use of violence to restrict or deny access to healthcare as a strategy of war”. While the term is not widely recognised, it appears relevant to our participants’ experiences.” (p15)

Reviewer 3.8: you do a good job in the background defining health attacks, IHL and besiegement-- nice work. The 522K people dead is a total estimate-- please highlight that these numbers are not verified or confirmed anywhere-- they are just a huge guess and could be much much higher. I might even stick with "unknown estimated dead" and avoid sticking a wrong number on it.

Response 3.8. Thanks for pointing that out. We revised this as follows: “The Syrian conflict enters its eighth year with an unknown number dead (371,122 deaths documented), 6.3 million internally displaced, and 6 million refugees in neighbouring countries.”

Reviewer 3.9: for 542 attacks on health-- please qualify that as "at least 542" and that is just PHR data. other groups have different numbers, but I don't know the totals for those. again, this is not fully verified data. ITs still the fog of war....

Response 3.9. Thank you for noting this. We revised accordingly as: “For example, Physicians for Human Rights reported at least 542 attacks on 348 health facilities between March 2011 and September 2018(15), 490 committed by the Syrian regime and its allies.” Indeed, those figures are only the tip of the iceberg (p3).

Reviewer 3.10: page 3, line 32-- "refrain from violence against those (PEOPLE?); page 3, line 29 and 51-- why are these quotes in italics? Page 4, line 4-5: standardize n=XX, (percentage) for all the same way

Response 3.10. To make this clearer, we added ‘people’ (p3), removed italics in quotes (p3-4), and unified numbers and percentage style (p4).

METHODS

Reviewer 2.2: Development of the topic guide: on page 5 the authors state that this was developed based on the literature and expert consultation among other sources. What literature was consulted?

Response 2.2. Thanks. Since there is limited literature on healthcare provision in such constrained settings, we primarily used grey literature and have added the following references: SAMS 2015: Slow death; MSF 2016a; MSF 2016b; Smith 2015; Fakhouri 2017 (p 5).

Reviewer 2.3: Confidentiality: on page 5 the authors state that participants were sent transcripts for further comment/feedback. Ensuring confidentiality in electronic communication is difficult - what, if any, steps were the authors able to take to address this?

Response 2.3. We agree that this is challenging. We sent anonymised transcripts using LSHTM’s email accounts, which are encrypted by Microsoft office encryption. We have clarified this as: “Where

possible, participants were sent their transcripts via encrypted institutional emails for further comment/correction…" (p5).

Reviewer 2.4: Coding: were interviews analysed thematically by BOTH of the interviewers, or just one? How did you ensure consistency of approach in coding between the two interviewers?

Response 2.4. We have clarified this as: "Each coded half of total transcripts and shared analysis, with NH checking consistency of coding and analysis" (p5).

Reviewer 3.11: Methods: nice work! I'm impressed you could get written consent inside beseiged Syria!

Response 3.11. Thank you. We consider this access to be one of our research team's strengths.

RESULTS

Reviewer 2.5: Disaggregation by location: it would be interesting to know - insofar as it is possible to disclose this kind of information - how observations between participants differed across the two study locations. Were there distinctive aspects of the dynamics of siege in Aleppo and other locations that meant the reported experiences of participants were different? If so, in what ways? This matters for the recommendations.

Response R2.5. Please see Response 3.3 above (in Background). We noted differences where they emerged, but there were more similarities overall in terms of our themes.

Reviewer 3.10: page 7, line 42: dispersal is awkward. maybe "decentralization?"

Response R3.10. We agree that dispersal is a bit awkward, but it seems to be the closest English equivalent to the Arabic term used by participants. Decentralisation is perhaps more familiar as a concept but is generally about allowing decision-making at the periphery. Thus, we prefer to use 'dispersal', but will defer to Editors if they want this changed (p6).

Reviewer 3.12: page 6, line 34: :Underground working" is awkward. rephrase that. .. moving underground? underground facilities? Page 6, line 48-49-- please elaborate on this idea. ITs really interesting and needs to be thought out more-- perhaps another quote?

Response R3.12. Thanks. We have revised 'underground working' as 'working underground' and expanded the last sentence with added references as: "…working underground could increase the risk of injuries and fatalities because gases tended to settle and become more concentrated unless dispersed by air movements" (p6).

Reviewer 3.13: page 7, line 1-7-- not sure what happened to the translation but I don't understand this quote. might need ot replace it with something more understandable or retranslate it.

Response R3.13. Thanks for your comment. We have retranslated this quote as: "Managing those who come to the hospital with the patients helps to protect health-workers. So, there should be [security personnel] for the hospital in case someone, out of emotion and worries about a patient, bullied the health-worker" NA

Reviewer 3.14: generally, can you put [age, gender, speciality] for each of teh quotes?

Response R3.14. Thank you for your comment. Please see Response 3.6 (at the end under References and Tables/Figures). We ensured Table 1 provides basic characteristics of participants (i.e. job title, location, type of interview (p 21). As all participants were male, we did not repeat gender. We intentionally did not include information about participant age or years working to minimise the risk of potential identification, but most were aged between 25-50 years old. We can try to clarify further if Editors prefer, but did not want to repeat demographic details with each quote as this can be checked by those interested using the table.

Reviewer 3.15: pge 8, line 26: how is this triage issue different from other mass casualty events like natural disasters? It sounds pretty similar to hurricaines etc, no? maybe consider rewriting this section to focus on HOW and WHERE this conflict mass casualty is interesting and different from natural disasters or other triage events. maybe one big thing here that you mention is the ETHICS around treating people in this way-- the desperation vs. the lack of sufficient skills.... and how that can be improved?

Response R3.15. Thanks for your comment. We did not collect enough data about triage to compare differences from standard practice. However, the most interesting aspects were the ethics and that previously only emergency specialist doctors trained in triage whereas during the siege all health-workers said it was useful to learn to implement it. We revised this as: “The triage process was new to most, as only emergency doctors were trained to use it prior to the conflict, and participants were quick to note its value for all health-workers faced with the new reality of frequent mass casualty events […] Triage also helped health-workers deal with the ethical issues around rationing care for desperate patients given the lack of sufficient resources and skills.” (p 6).
In the Discussion, we revised as follows: “Despite not having needed it prior the conflict when only emergency doctors had trained in triage, besieged doctors and nurses emphasised its importance in reducing mortality and benefits of triage trainings they received, supporting the concept casualty flow in disasters proposed by Frykberg” (p 15, line 34).

Reviewer 3.16: page 10, line 50-52: this is interesting that NGOs did some decent trainings. Highlight this in the conclusions about mitigation measures.

Response R3.16. Thanks for your point. Only a couple of participants mentioned useful security/safety trainings in passing, so we have clarified this as: “Two health-workers reported some NGOs providing helpful security trainings before the siege” (p 10). In the Discussion, under primary findings, we highlighted specific NGO-organised trainings participants thought would be useful, in-person or via skype (p 16) and in the conclusion (p 17).

Reviewer 3.17: page 11, line 43-50: this quote is fantastic. really inteesting-- maybe continue to elaborate on this for future planning...

Response R3.17. This is indeed a persuasive point as to why this equipment is most useful in electricity-poor environments. We included a comment on this in the Discussion under implications (p 16).

DISCUSSION

Reviewer 2.6: Protective measures: the authors identify this as a gap in the literature identified by their study but do not expand on where they think the key gaps that they have identified are (International legal instruments? Economic measures? Other approaches?). This goes to the heart of what has made some recent conflict environments - including Syria but also Yemen among others - such incredibly difficult ones for health workers to operate in, but meaningful solutions are in short supply. Is there anything further the authors can add here?

Response R2.6. Thanks for your feedback. By protective measures we specifically meant operational strategies to improve the safety of health-workers operating in conflict zones. However, legal protection as established in International Humanitarian Law, is also insufficient in the literature in terms of pragmatic and case-based recommendations or enforcing IHL in the pursuit of protecting health-workers and accountability. We have clarified this as: “We found a gap in the health literature regarding evidence on operational protective measures, possibly due to the challenges in conducting such research, and more could be learnt from the military medical literature. However, literature on effective means of enforcing International Humanitarian Law and enhancing accountability was also lacking” (p 16).

Reviewer 2.7: Broader recommendations: I was not wholly clear what the authors' recommendations for improving preparedness were. There is discussion of online training for example - but what would this cover, and what evidence of effectiveness for these interventions can the authors cite (there is literature on remote training support, a lot of this from the Syria crisis although less focused on siege and the practicalities of trauma care delivery admittedly)?

Response 2.7. Thanks for your feedback. As this is exploratory qualitative research, we can’t make strong recommendations. We have instead indicated lessons learned that could be useful for other settings. For example, fortification, working underground, protecting generators and other safety procedures may require technical/engineering expertise to provide in-depth specifics. We added detail on trainings recommended by participants, e.g. war injuries management, war-related trauma treatment, triage, stabilising injuries, and damage control (p 16).

Reviewer 3.18: Discussion: again, I think this needs to be slightly reorganized to fit the headings more tightly, making it easier to read. I'd also reframe this to focus on lessons learned for the future-- both in Syria and in other conflicts. In Syria-- how can there be reparations for what happened? can the docs get some therapy? can the medical school in ghouta get accreditation? funding? what mitigation measures are possible now? How are things now? where are teh doctors now and what do they need? and internationally, can beseigments be planned for? since attacks on health are frequent, perhaps they can be planned for-- what does your study say about how?

Response 3.18. We have reorganised this section to focus on lessons under each theme and respond to some of your queries. The issue of reparations is beyond the scope of this research. However, online training and some form of medical school accreditation might be feasible. Most of the doctors are now in Idlib city, though some have escaped to Turkey. Please also see Response 2.7 above.

Reviewer 3.19: Limtations: page 16, line 43: not "potential" as these were real limitations of a previously conducted study. why were women not sampled enough? may need to elaborate more on where these doctors are now and if that changes their perspectives?

Response 3.19. Thank you for your comment. To clarify further, we have added: “Relatively fewer women health-workers worked in besieged areas and those who did were less willing than their male counterparts to participate in research due to expressed concerns about safety and confidentiality. Potential means of helping address this in future research include lengthening the data collection period to allow more time to gain the confidence of potential participants, including at least one woman interviewer, and oversampling women health-workers.” (p 16). Most of the doctors interviewed are now in Idleb city and some have fled to Turkey.

REFERENCES AND TABLES/FIGURES

Editor 1.1: Do you have permission to publish figure 1 as part of your manuscript?

Response E1.1. Figure 1 is from UNOCHA besieged community report, which is publicly available via the link under the figure (p 24).

E1.3: The in text citation for 'Figure 1' is missing on your main text of your main document file. Please amend accordingly.

Response E1.3. Thank you. We have added this (p 4).

E1.4: Please provide better qualities figures, ensuring the figures are not pixelated when zoomed in on. Figures can be supplied in TIFF, JPG or PDF format (figures in DOCUMENT, EXCEL or POWERPOINT format will not be accepted), we also request that they have a resolution of at least 300 dpi and 90mm x 90mm of width.

Response E1.4. We have provided Figure 1 as pdf (separate file).

Reviewer 3.6: even though this is a qualitative work, we still need at least one table showing the basic demographics of the health wrokers you interviewed. Age, gender, years working, speciality or training, etc. That will help us understand who exactly you interviewed which is completely missing now.

Response 3.6. Table 1 provides basic characteristics of participants (i.e. job title, location, type of interview (p 21). We intentionally did not include information about participant age or years working to minimise the risk of potential identification. All participants were male, which we clarified in Results (p 22).

Reviewer 3.20: references-- just check them. some are repeated.

Response 3.20. Thanks for your feedback. We have removed the duplicates (e.g. PHR Anatomy of the crisis 2017, and Haar 2018 (pp 18-21).

VERSION 2 – REVIEW

REVIEWER	Sharif Ismail 1. Clinical Research Training Fellow, London School of Hygiene and Tropical Medicine, UK 2. Honorary Clinical Research Fellow, Imperial College London, UK
REVIEW RETURNED	18-Jun-2019

GENERAL COMMENTS	Thank you for the opportunity to again review this paper, and to the authors for addressing comments previously raised. This is a strong manuscript which will make an important contribution to the (still limited) literature on this topic and I would recommend it for publication.

REVIEWER	Rohini J Haar University of California, Berkeley. USA
REVIEW RETURNED	02-Jul-2019

GENERAL COMMENTS	This looks great! I have no further comments.