



BRIEF REPORT

REVISÉ Strengthening the core health research capacity of national health systems helps build country resilience to epidemics: a cross-sectional survey [version 2; peer review: 4 approved]

Rony Zachariah , Dermot Maher, Abraham Aseffa, Mahnaz Vahedi, Pascal Launois , Mohammed Khogali, Garry Aslanyan, John C. Reeder

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Abstract

Background: TDR, The Special Programme for Research and Training hosted at the World Health Organization, has long supported Low- and Middle-Income Countries in strengthening research capacity through three training programmes: the Postgraduate Training Scheme (PGTS), the Clinical Research and Development Fellowship (CRDF), and the Structured Operational Research Training Initiative (SORT IT). In the advent of the COVID-19 pandemic, we assessed whether those trained through these programmes were involved in the COVID-19 response and if so, in which area(s) of the emergency response they were applying their skills.

Methods: From the records for each training programme, we identified the individuals who had completed training during the relevant timespan of each programme: 1999-2018 for the CRDF scheme, 2015-2020 for PGTS, and 2009-2019 for SORT-IT. Between March and April 2020, we sent trainees an online questionnaire by e-mail.

Results: Out of 1254 trained, 1143 could be contacted and 699 responded to the survey. Of the latter, 411 were involved with the COVID-19 response, of whom 315 (77%) were applying their acquired skills in 85 countries. With some overlap between programmes, 84% of those trained through CRDF were applying their skills in 27 countries, 91% of those trained through PGTS were applying their skills in 19 countries, and through SORT IT, this was 73% in 62 countries. Skills were being applied in various areas of the emergency response, including: emergency preparedness, situation analysis/surveillance, infection control and clinical management, data generation, mitigating the effect of COVID on the health system, and research. Depending on the type of training programme, 26-74% were involved in implementation, operational or clinical research.

Conclusion: Research training programmes build research capacity and equip health workers with transferable core competencies and skillsets prior to epidemics. This becomes invaluable in building health system resilience at a time of pandemics.

Open Peer Review

Reviewer Status

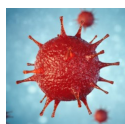
	Invited Reviewers			
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version 2 (revision) 29 Jun 2020				 report
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version 1 09 Jun 2020	 report	 report	 report	

- Bethany Hedt-Gauthier**, Harvard Medical School, Boston, USA
- Stephen M. Graham** , Burnet Institute, Melbourne, Australia
- Desalegn Woldeyohannes** , Addis Ababa University, Addis Ababa, Ethiopia
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Any reports and responses or comments on the article can be found at the end of the article.

Keywords

COVID-19, Pandemic, Health systems, Training, Emergency preparedness



This article is included in the **Disease Outbreaks** gateway.



This article is included in the **TDR** gateway.

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Competing interests: No competing interests were disclosed.

Grant information: The author(s) declared that no grants were involved in supporting this work.

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First published: 09 Jun 2020, 9:583 <https://doi.org/10.12688/f1000research.24192.1>

REVISED Amendments from Version 1

This version of the manuscript has some minor additions as requested by the peer reviewers. The changes include limitations in the Discussion section and some minor edits to improve reader clarity.

Any further responses from the reviewers can be found at the end of the article

Introduction

One of the lessons that should have been learned from the 2014–2015 Ebola epidemic in West Africa, the largest and longest Ebola outbreak in history, was “the need to be better prepared for the next epidemic”¹. “The next epidemic” is happening now in 2020 and is the COVID-19 pandemic. This pandemic, of unprecedented global scale and impact, has tested the preparedness and resilience of every country. Among the many factors that contribute to preparedness and resilience, the capacity to undertake health research is a vital component of the response to infectious disease outbreaks. As we have seen from the current pandemic, all countries are at risk of infectious disease outbreaks and need to strengthen their capacity for a timely and effective research response. Capacity to undertake research varies widely among countries, reflecting the extent of investment and efforts to build and retain that capacity, usually over a long period of time. TDR, The Special Programme for Research and Training hosted at the World Health Organization (WHO), has long supported Low- and Middle-Income Countries (LMICs) in strengthening research capacity, through the range of activities needed to develop the necessary institutional base, research infrastructure, training programmes, career development pathways, research portfolio, regulatory frameworks and networks.

Fortunately, most countries, most of the time, do not have such outbreaks, so the opportunities for developing capacity for research through “on the job” learning during an outbreak are limited. This has two key implications. Firstly, developing capacity for research on infectious disease, including: outbreaks takes place to a large extent before an outbreak (or between outbreaks) and is blind to the next specific infectious agent. Secondly, developing adaptable capacity for research on other health problems contributes to generic research capacity, which becomes applicable during infectious disease outbreaks. TDR supports a number of long-term programmes to strengthen capacity for research on infectious diseases, including: the Postgraduate Training Scheme (PGTS) on implementation research, the Clinical Research and Development Fellowship (CRDF) scheme on clinical research, and the Structured Operational Research Training Initiative (SORT IT) on operational research, a partnership-based initiative led by TDR and implemented in collaboration with various partners (Box 1).

Stimulated by examples of people who trained on these programmes and used the skills they gained to contribute to the COVID-19 response, we were interested to assess this more systematically. We therefore assessed whether those trained

Box 1. Brief description of three TDR-supported programmes to strengthen research capacity²

Postgraduate Training Scheme: TDR strengthens individual and institutional capacity for implementation research by supporting a network of seven universities in disease-endemic regions to train Master's students on courses relevant to implementation research.

Clinical Research and Development Fellowship (CRDF) scheme: TDR supports placements of researchers with relevant partners (including pharmaceutical companies, product development partnerships, and public research institutions involved in clinical research) to strengthen their skills in clinical trials. The scheme started in 1999 with a small number of fellows and was scaled up in 2008 and 2014, with the support of the Bill & Melinda Gates Foundation (Gates Foundation) and in partnership with the International Federation of Pharmaceutical Manufacturers & Associations (IFPMA).

Structured Operational Research Training Programme (SORT IT): TDR coordinates a global partnership-based initiative to support countries and institutions to build sustainable operational research capacity. The target audience is front-line health workers from disease control programmes. The focus of training is on teaching practical skills for the generation of high quality, timely and disaggregated data for evidence-informed decision-making to improve public health.

were involved in the COVID-19 response and if so, in which area(s) of the emergency response they were applying their skills.

Methods

This was a cross-sectional survey that used three online questionnaires in English (one per programme, see *Extended data*³; pre-tested on four selected trainees, following which minor changes were made to improve clarity) to gather information from the individuals who had been trained through the three programmes.

From the records of each training programme, we identified individuals who had completed training during the relevant timespan of each programme: 1999–2018 for the CRDF scheme, 2015–2020 for the PGTS, and 2009–2019 for SORT-IT. For those people with available contact details, we sent online questionnaires by e-mail (in March 2020 for SORT-IT and in April 2020 for the CRDF and PGTS) asking if they were currently involved in the COVID-19 response. We asked about the nature of their involvement, and if they were applying their acquired skills in responding to various key areas for tackling the pandemic.

The survey data was exported to Microsoft Excel for data analysis.

As part of monitoring and evaluation of TDR supported training programmes, routine online surveys are conducted to gather information for improving the quality and performance of such trainings. Participation in this survey was voluntary and individual consent was obtained for use of anonymized data for

reporting and dissemination, including through publications, via the use of a yes/no tick box question within the questionnaires. As this study was part of routine monitoring and evaluation of a training programme, and potential ethical concerns were addressed (responders were all adults, response was voluntary, data were anonymized, personal identifiers were removed and no sensitive personal questions were included that could risk psychological or social harm), this was thus considered a minimal risk study and specific ethical approval for sending questionnaires was not required.

Results

A total of 1143 individuals out of 1254 trained could be contacted; 699 responded to the survey. Table 1 shows the number of participants who reported involvement in the COVID-19 response, the number applying their acquired skills and the number of countries involved. Of 699 individuals who responded to the survey, 411 (59%; 152 female) reported involvement in the COVID-19 response, with 315 (77%) of the latter applying

their acquired skills in 85 countries around the globe. With some overlap between programmes, 84% of those trained through CRDF were applying their skills in 27 countries, 91% of those trained through PGTS were applying their skills in 47 countries, and through SORT IT, this was 73% in 62 countries.

Table 2 shows that trainees are applying their skills in a range of critical areas of the COVID-19 pandemic response. In terms of research, 74% of those trained through the CRDF scheme, were involved in clinical research, most commonly as a clinical trial manager. For PGTS, 45% were involved in implementation, operational research or clinical research, while 26% of trainees from the SORT IT programme were involved in implementation and/or clinical research.

Discussion

The survey findings show that substantial numbers of health workers who were trained to improve their research capacity

Table 1. Numbers involved with the COVID-19 response and applying skills gained through TDR supported training programmes.

Training programme	Trained n	Contacted n	Responded n	Involved in COVID-19 ¹ n (%)	Applying skills ² n (%)	Countries
Clinical Research and Development Fellowship scheme	111	104	68 (65)	45 (66)	38 (84)	27
Postgraduate Training Scheme	248	208	143 (69)	64 (45)	58 (91)	47
Structured Operational Research and Training Initiative	895	831	488 (59)	302 (62)	219 (73)	62
TOTAL	1254	1143	699	411	315	85³

¹ Percentage is calculated using the number who responded as the denominator

² Percentage is calculated using the number involved with COVID-19 as the denominator

³ This figure represents numbers of individual countries without overlaps between programmes.

TDR: UNICEF, UNDP, World Bank, WHO Special Programme for Research and Training in Tropical Diseases.

Table 2. Areas of the COVID-19 response where trainees are applying skills from TDR supported training programmes.

Area of the COVID-19 response	Trainees applying skills ¹		
	CRDF (N=38) n (%)	PGTS (N=58) n (%)	SORT IT (N=219) n (%)
Research	28 (74)	26 (45)	56 (26)
Critical preparedness and response	17 (45)	30 (52)	88 (40)
Situation analysis/surveillance	14 (37)	47 (81)	142 (65)
Infection control and clinical management	14 (37)	30 (52)	82 (37)
Data generation, analysis and reporting	17 (45)	39 (67)	119 (54)
Mitigating effect of COVID on other diseases	4 (10)	19 (33)	50 (23)
Other ²	6 (16)	39 (67)	15 (7)

¹ Participants may be involved in more than one area (so percentages do not add up to 100%).

CRDF: Clinical Research and Development Fellowship; PGTS: Post Graduate Training Scheme; SORT IT: Structured Operational Research and Training Initiative

² E.g. Coordination, training, awareness raising etc.

prior to the COVID-19 pandemic are currently involved in a wide range of emergency response activities.

This suggests that the respondents have used the specific skills they gained through trainings in combination with their abilities and knowledge as transferable competencies in responding to COVID-19 through a range of research and health system areas. This reinforces the value of TDR's emphasis on developing core competencies (i.e. sets of skills combined with abilities and knowledge) through research training^{4,5}. It also underscores the longer-term gains of investing in research capacity building programmes.

Regarding contribution to the research response to COVID-19, the high involvement of those trained through the CRDF scheme in clinical research (74%) is a practical example of applying the recommendation in the 2018 World Bank report "Money and microbes: strengthening clinical research capacity to prevent epidemics" concerning leveraging capacity-building from the private sector⁶.

The significant involvement of trainees from PGTS and SORT IT in implementation and operational or clinical research shows that strengthening of core national research capacity before (or between) epidemics can make an important contribution to the timely mobilization of research resources during an epidemic.

The role played by TDR in supporting LMICs to strengthen capacity for clinical and implementation/operational research is in line with the WHO R&D blueprint¹ (the global strategy and preparedness plan that allows the rapid activation of research and development activities during epidemics). The development of the R&D blueprint in the aftermath of the 2014–2015 Ebola epidemic in West Africa was a recognition of the need to galvanize research, with the aim "to fast-track the availability of effective tests, vaccines and medicines that can be used to save lives and avert large scale crisis"¹. The focus on R&D needs to be complemented by efforts to promote implementation research, which helps to make sure that as new diagnostics, drugs and vaccines emerge from R&D pipelines they are evaluated in clinical trials and approved, they are made available to all who could benefit from them. Resources are needed to strengthen capacity for implementation/operational research, as well as for clinical research, in the LMICs where outbreaks are likely to occur⁷.

Regarding contribution to the broad health system response to COVID-19, the survey results show that more than seven-in-ten of all trained prior to the COVID-19 pandemic are currently involved in a range of health system areas. These areas include: critical preparedness and response, situation analysis/surveillance, infection control and clinical management, data generation, analysis and reporting, and mitigating the effect of COVID-19 on other diseases. The research training has thus had wider benefits going beyond research, to provide generic skills that can be applied to a range of areas needed to tackle the pandemic. Limitations of this study are that we had no comparison group and we are unable to know the influence of non-response and social desirability bias. The extent and

quality of contribution to the COVID response could also not be clearly defined.

In conclusion, the three TDR-supported training programmes have strengthened the health research capacity of health workers, thereby contributing not only to research but also to emergency preparedness and the broad health systems response to COVID-19. Such training programmes help build country resilience to epidemics.

Data availability

Underlying data

Open Science Framework: TDR_Training_COVID_Survey, <https://doi.org/10.17605/OSF.IO/7YSZ2>³.

This project contains the following underlying data:

- Dataset_1_CRDF_Survey_data_F1000.csv (Contains survey data on Clinical Research and development fellowships).
- Dataset_2. PGTS_Survey_data_F1000.csv (Contains survey data on Post Graduate Training Scheme)
- Dataset_3. SORT_IT_Survey_Data_F1000.csv (Contains survey data on Structured Operational Research and Training Initiative)

Extended data

Open Science Framework: TDR_Training_COVID_Survey, <https://doi.org/10.17605/OSF.IO/7YSZ2>³.

The project contains the following extended data:

- Extended_data_questionnaire_1_CRDF.docx (Survey questionnaire for Clinical Research and development fellowships)
- Extended_data_questionnaire_2_PGTS.docx (Survey questionnaire for Post Graduate Training Scheme)
- Extended_data_questionnaire_3_SORT_IT.docx (Survey questionnaire for Structured Operational Research and Training Initiative)

Data are available under the terms of the [Creative Commons Zero "No rights reserved" data waiver](#) (CC0 1.0 Public domain dedication).

Acknowledgements

We are grateful to all collaborating partners involved with the Postgraduate Training Scheme and Clinical Research and Development Fellowship scheme, and all implementing partners of the global SORT IT partnership coordinated by TDR. (<https://www.who.int/tdr/capacity/strengthening/sort/en/>)

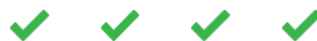
TDR is able to conduct its work thanks to the commitment and support from a variety of funders. These include our long-term core contributors from national governments and international institutions, as well as designated funding for specific projects within our current priorities. A full list of TDR donors is available on our website at: <https://www.who.int/tdr/about/funding/en/>

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[Reference Source](#)
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[Reference Source](#)
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[Reference Source](#)
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[Reference Source](#)

Open Peer Review

Current Peer Review Status:



Version 2

Reviewer Report 01 July 2020

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Yohanna Kambai Avong 

¹ Institute of Human Virology, Abuja, Nigeria

² University of Technology Sydney, Sydney, NSW, Australia

The paper profoundly presents what the World Health Organization has been stressing on the need to develop research capacity at the supply side of healthcare. In the developing countries, training of researchers through traditional institutions, such as the University is one of the reasons we have very few qualified researchers since most people cannot afford the cost of attaining the universities.

The paper is well written, concise, clear, and compelling. I strongly recommend the acceptance and immediate publication of the manuscript, to motivate the local onsite training of researchers and preparation for the next epidemic.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: I am a public health pharmacist. My research interest is in Pharmacoepidemiologic research, with particular emphasis in drug safety and pharmacovigilance.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 30 June 2020

<https://doi.org/10.5256/f1000research.27669.r65685>

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Stephen M. Graham 

Burnet Institute, Melbourne, Vic, Australia

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 23 June 2020

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Desalegn Woldeyohannes 

Aklilu Lemma Institute of Pathobiology, Addis Ababa University, Addis Ababa, Ethiopia

The survey presents evidence of the usefulness of building up health research undertaking capacity to help contribute to strengthening the national health system resilience to epidemics. It addresses an important topic, given ongoing COVID-19 pandemic. The authors found that the research training programme, which was originally designed to strengthen the research capacity of health workers with the necessary competencies further contributing to health system resilience during COVID-19. It is great to see that researchers such as Rony and colleagues have evaluated the contribution of related training for strengthening the existing health system before or during epidemics. Such study findings will undoubtedly add new knowledge in the area, and could further be applied to reinforce health policy and practice. The survey was well-designed, respective data analysis were performed largely with care. The presentation is excellent, with careful writing including tables along with the article help the follow-up to the reader. Below are more specific comments and suggestions by section:

Abstract:

A very informative abstract, although data collection and instrument tool used to collect the data could also be included in the method section as well as in the text.

Introduction:

It was a nice overview and set the scene beautifully for the survey. Be there any similar initiatives in the past that could add to the statement of the problem? In this aspect, I would suggest the inclusion of a few statements from research findings on the 2014-2015 Ebola outbreak with respect to how it impacted the health system operation in affected countries in West Africa. By doing so, the necessity of carrying out the current survey would better be justified.

Methods:

The survey used a pre-tested questionnaire to collect data, and necessary changes were made to the questionnaire accordingly. Further to this, I would like the following points to be considered:

- Study design, only mentioned in the title.
- A few statements on how items in each questionnaire were developed, for example, whether benchmarked/adopted/modified, or what ways had been followed otherwise in developing them.
- Were validity and reliability tests performed on the questionnaire in addition to pre-test so that assuring quality?
- How data were summarized and analysed? Were there any missing data reported, given the low response rate (56%) obtained for the survey, how authors took control of these while analysing the data?

Results:

Well summarized using tables and text. What does “other” refer to in Table 2? Good to mention it as a footnote as, for example the percentage of trainees applying skills in PGTS group for the same was significant, in fact second (67%) next to situation analysis/surveillance (81%), please list them all.

Discussion:

While the dearth of literature/information in the area has largely prevented authors of making a robust scientific argument about the survey findings, their implications have clearly be presented towards practical application, and in national health policy enforcement for a similar pandemic. Further, would authors to expect similar results (percentage) if high response rate was obtained vis-à-vis the low response rate reported on the survey (56%)? This warrants discussion, perhaps as a limitation of the survey.

Conclusion:

The conclusion was drawn adequately supported by the results.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Public health, biomedical science

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 24 Jun 2020

Rony Zachariah, UNICEF/UNDP/WORLD BANK/WHO Special Programme for Research and Training in Tropical Diseases, World Health Organisation, Geneva, Switzerland

Point by point responses to peer reviewer comments**Reviewer 1: Dr. Desalegn Woldeyohannes**

Dear Dr Woldeyohannes,

Thank you very much for reviewing this paper and your useful suggestions. We have revised the

manuscript and have provided a point-by-point response using bold font.

Reviewer: The survey presents evidence of the usefulness of building up health research undertaking capacity to help contribute to strengthening the national health system resilience to epidemics. It addresses an important topic, given ongoing COVID-19 pandemic. The authors found that the research training programme, which was originally designed to strengthen the research capacity of health workers with the necessary competencies further contributing to health system resilience during COVID-19. It is great to see that researchers such as Rony and colleagues have evaluated the contribution of related training for strengthening the existing health system before or during epidemics. Such study findings will undoubtedly add new knowledge in the area, and could further be applied to reinforce health policy and practice.

The survey was well-designed, respective data analysis were performed largely with care. The presentation is excellent, with careful writing including tables along with the article help the follow-up to the reader. Below are more specific comments and suggestions by section:

Response: Thank you for these encouraging comments.

Reviewer: Abstract:

A very informative abstract, although data collection and instrument tool used to collect the data could also be included in the method section as well as in the text.

Response: We have mentioned that we used an on-line questionnaire form.

Reviewer: Introduction:

It was a nice overview and set the scene beautifully for the survey. Be there any similar initiatives in the past that could add to the statement of the problem? In this aspect, I would suggest the inclusion of a few statements from research findings on the 2014-2015 Ebola outbreak with respect to how it impacted the health system operation in affected countries in West Africa. By doing so, the necessity of carrying out the current survey would better be justified.

Response: Unfortunately, there were no similar surveys done in relation to the 2014/2015 Ebola outbreak assessing the role of research training on building health system resilience in the affected countries.

Reviewer: Methods:

The survey used a pre-tested questionnaire to collect data, and necessary changes were made to the questionnaire accordingly. Further to this, I would like the following points to be considered:

- Study design, only mentioned in the title.

Response: We have added the study design to the Methods.

Reviewer: •A few statements on how items in each questionnaire were developed, for example, whether benchmarked/adopted/modified, or what ways had been followed otherwise in developing them.

Response: We have added some brief details to the methods.

Reviewer: •Were validity and reliability tests performed on the questionnaire in addition to pre-test so that assuring quality?

Response: No, but we will consider this in the future. Thank you.

Reviewer: •How data were summarized and analysed? Were there any missing data reported, given the low response rate (56%) obtained for the survey, how authors took control of these while analysing the data?

Response. 699 (61%) out of 1143 responded to the survey and there might indeed be desirability bias. We have mentioned this in the limitations of the study. This limitation notwithstanding, the overall numbers involved with the COVID-19 pandemic and the numbers using their skills is still encouraging.

Reviewer: Results:

Well summarized using tables and text. What does "other" refer to in Table 2? Good to mention it as a footnote as, for example the percentage of trainees applying skills in PGTS group for the

same was significant, in fact second (67%) next to situation analysis/surveillance (81%), please list them all.

Response: We have listed some of the items under 'other' in table 2

Reviewer: Discussion:

While the dearth of literature/information in the area has largely prevented authors of making a robust scientific argument about the survey findings, their implications have clearly be presented towards practical application, and in national health policy enforcement for a similar pandemic. Further, would authors to expect similar results (percentage) if high response rate was obtained vis-à-vis the low response rate reported on the survey (56%)? This warrants discussion, perhaps as a limitation of the survey.

Response. We have already alluded to this point in the limitations.

Reviewer: Conclusion:

The conclusion was drawn adequately supported by the results.

Response: Thank you.

Competing Interests: None

Reviewer Report 16 June 2020

<https://doi.org/10.5256/f1000research.26686.r64563>

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Stephen M. Graham 

Burnet Institute, Melbourne, Vic, Australia

Thanks for the opportunity to review this brief report which provides interesting and novel data, well written and presented.

Some limitations of interpretation of the data could be highlighted in a short paragraph in the discussion, such as:

1. There is no group for comparison that represents the numbers (%) of those not trained who are involved in some way in the COVID response.
2. Could responders represent a biased sample, by nature of actively participating in this evaluation? The total numbers of past trainees involved may not be as high as "seven-in-ten".
3. The extent and quality of contribution to the COVID response is not clearly defined

Suggest in Introduction, the second sentence to delete "which" or "and".

Is this pandemic unprecedented in scale? Over 1.5 billion people infected (asymptomatic) with M.tb, around 10 million TB cases and 1.5 million TB-related deaths annually? What about the global death toll associated with the 1918 influenza pandemic?

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 19 Jun 2020

Rony Zachariah, UNICEF/UNDP/WORLD BANK/WHO Special Programme for Research and Training in Tropical Diseases, World Health Organisation, Geneva, Switzerland

Reviewer 2: Dr. Steve Graham

Dear Dr Steve Graham,

Thank you very much indeed for having taken the time to review this paper and your useful comments and suggestions. We have revised the manuscript in line with your suggestions. We have provided a point-by-point response to your responses using bold font below

Reviewer: Thanks for the opportunity to review this brief report which provides interesting and novel data, well written and presented.

Response: Thank you

Reviewer: Some limitations of interpretation of the data could be highlighted in a short paragraph in the discussion, such as: There is no group for comparison that represents the numbers (%) of those not trained who are involved in some way in the COVID response. Could responders represent a biased sample, by nature of actively participating in this evaluation? The total numbers of past trainees involved may not be as high as “seven-in-ten”. The extent and quality of contribution to the COVID response is not clearly defined

Response: We agree and have added a para on limitations and have covered thee above points

Reviewer: Suggest in Introduction, the second sentence to delete “which” or “and”.

Response: done

Reviewer: Is this pandemic unprecedented in scale? Over 1.5 billion people infected (asymptomatic) with M.tb, around 10 million TB cases and 1.5 million TB-related deaths annually? What about the global death toll associated with the 1918 influenza pandemic?

Response: Since COVID-19 cases were first reported to WHO on 31 December 2019 over 8 million cases have now been reported and the numbers are climbing. We thus prefer to still regard this pandemic of a new human pathogen as unprecedented and we thank you for your kind understanding.

Competing Interests: None

Reviewer Report 15 June 2020

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**Bethany Hedt-Gauthier**

Department of Global Health and Social Medicine, Harvard Medical School, Boston, MA, USA

Overall, this is a clear brief report with straight forward methods and justifiable conclusions. While it is possible that skills used were gained outside of the three training mechanisms, or that skills would have been gained elsewhere in the absence of these mechanisms, what is most important is that trainees identify that they are using skills in the COVID-19 response and the trainees attribute the skills to the specific training mechanisms described here.

A few points to address:

- For the specific question, “what percent of trainees are currently using skills from training in COVID-19 response?” The more accurate denominator for this is all reporting trainees. To say that 77% of trainees are using skills for COVID response, when only 315 out of 699 reported as such, is not accurate. The authors clarify in the table with a footnote, but either they need to add a clause of: Of the 59% working on COVID-19 response, 77% report using their skills as part of that response. Or they need to recalculate and say that 45% report using their skills for the COVID-19 response. This is true for overall and by training type reports and should be reflected in the abstract and main text.
- Can the authors include reporting by gender and a short discussion? There has been expressed concern about how COVID response has been gendered, specifically with working women being excluded from participating in response either because of systemic issues or through home demands. I would be interested to see if this is an issue with trainees.
- Please add a statement about any influence of non-response and desirability bias.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: I have collaborated with individuals on this paper in the last three years but have given this paper an honest and thorough review.

Reviewer Expertise: Health systems research; research training and capacity building

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 19 Jun 2020

Rony Zachariah, UNICEF/UNDP/WORLD BANK/WHO Special Programme for Research and Training in Tropical Diseases, World Health Organisation, Geneva, Switzerland

Point by point responses to peer reviewer comments

Reviewer 1: Dr. Bethany Hedt

Dear Dr Bethany,

Thank you very much for taking time to review this paper and your useful comments and suggestions. We have revised the manuscript in line with your suggestions. We have provided a point-by-point response to your comments and suggestions using bold font.

Reviewer: Overall, this is a clear brief report with straight forward methods and justifiable conclusions. While it is possible that skills used were gained outside of the three training mechanisms, or that skills would have been gained elsewhere in the absence of these mechanisms, what is most important is that trainees identify that they are using skills in the COVID-19 response and the trainees attribute the skills to the specific training mechanisms described here.

Response: Thank you for this encouraging comment

Reviewer: For the specific question, "what percent of trainees are currently using skills from

training in COVID-19 response?" The more accurate denominator for this is all reporting trainees. To say that 77% of trainees are using skills for COVID response, when only 315 out of 699 reported as such, is not accurate.

Response: We have now clearly indicated that for the 77% applying SORT IT skills, the denominator is "those involved with COVID-19" which is 411. Understandably, if one is not involved with COVID-19, it would be impossible to apply SORT IT skills. We thus prefer to keep the denominator of 411 and not 699.

Reviewer: The authors clarify in the table with a footnote, but either they need to add a clause of: Of the 59% working on COVID-19 response, 77% report using their skills as part of that response. Or they need to recalculate and say that 45% report using their skills for the COVID-19 response. This is true for overall and by training type reports and should be reflected in the abstract and main text.

Response. As suggested above, we have added the 59% (those involved with COVID-19) to the abstract and the results section.

Reviewer: Can the authors include reporting by gender and a short discussion? There has been expressed concern about how COVID response has been gendered, specifically with working women being excluded from participating in response either because of systemic issues or through home demands. I would be interested to see if this is an issue with trainees.

Response: Of the 411 involved with COVID, 152 (37%) were women. We have indicated this in the abstract and results section. As this proportion is more or less a reflection of the proportions trained by gender we have avoided further discussion.

Reviewer: Please add a statement about any influence of non-response and desirability bias.

Response: In the Discussion, we have stated that "Limitations of this study are that we had no comparison group and we are unable to know the influence of non-response and social desirability bias."

Competing Interests: None

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