RESEARCH ARTICLE

Reporting quality of the 2014 Ebola outbreak in Africa: A systematic analysis

Nina Huynh¹, Andrea Baumann¹, Mark Loeb²,³,⁴*

¹ Global Health Office, McMaster University, Hamilton, Ontario, Canada, ² Department of Pathology and Molecular Medicine, McMaster University, Hamilton, Ontario, Canada, ³ Department of Health Research Methods, Evidence, and Impact, McMaster University, Hamilton, Ontario, Canada, ⁴ Michael G DeGroote Institute for Infectious Disease Research, McMaster University, Hamilton, Ontario, Canada

* loebm@mcmaster.ca

Abstract

The objective of this study was to conduct a systematic analysis of the reporting quality of the Ebola Virus Disease (EVD) outbreak in West Africa from 2014–2018 using the Modified STROBE statement. We included studies on the 2014 EVD outbreak alone, limited to those on human patients in Africa. We searched the following databases (MEDLINE, EMBASE, and Web of Science) for outbreak reports published between 2014–2018. We assessed factors potentially associated with the quality of reporting. A total of 69 of 131 (53%) articles within the full-text review fulfilled our eligibility criteria and underwent the Modified STROBE assessment for analyzing the quality of reporting. The Modified STROBE scores of the included studies ranged from 11–26 points and the mean was found to be 19.54 out of 30 with a standard deviation (SD) of ± 4.30. The top three reported Modified STROBE components were descriptive characteristics of study participants, scientific background and evidence rational, and clinical significance of observations. More than 75% of the studies met a majority of the criteria in the Modified STROBE assessment tool. Information that was commonly missing included addressing potential source of bias, sensitivity analysis, further results/analysis such as risk estimates and odds ratios, presence of a flowchart, and addressing missing data. In multivariable analysis, peer-reviewed publication was the only predictor that remained significantly associated with a higher Modified STROBE score. In conclusion, the large range of Modified STROBE scores observed indicates variability in the quality of outbreak reports for EVD. The review identified strong reporting in some areas, whereas other areas are in need of improvement, in particular providing an important description of the outbreak setting and identifying any external elements (potential biases and confounding factors) that could hinder the credibility of the findings.

Introduction

Since 1976, Ebola Virus Disease (EVD) has persisted as a rare and deadly illness that has caused socioeconomic disruptions worldwide due to a fatality rate ranging from 25% to 90% in previous outbreaks[1]. Notably, the 2014–2015 epidemic in Africa severely impacted...
Guinea, Sierra Leone and Liberia and was 11 times larger than all of the past outbreaks combined [2]. Numerous studies have demonstrated that many affected countries were ill-equipped to handle the magnitude of the 2014 epidemic because they lacked the clinical capacity and resources; inadequate funds were invested into the public health system; and surveillance systems were poorly governed[3–5].

Outbreaks like these are commonly reported as descriptive observational studies which include case reports, surveillance, and cross-sectional studies to evaluate infection control interventions[6]. High-quality informative reports are interpreted as containing all of the necessary documentation about the relevant study (e.g. outbreak location, pathogen type, number of individuals exposed and infected). This information can act as the fundamental source of epidemiological data for assessing the health of populations; determining how outbreaks can be managed; and improving prevention measures of communicable diseases[7,8].

A movement towards better reporting standards began in the 1990’s with the development of evidence-based medicine due to the recognition that inadequate reporting potentially leads to ineffective healthcare policies and/or treatments, putting patients at risk of adverse effects[9]. Since then, guidelines have been written for many different types of studies to increase the clarity in reporting and credibility of published literature[10]. Examples of standardized guidelines include: CONSORT (Consolidated Standards of Reporting Trials)[11], QUOROM (for meta-analyses of randomized trials)[12], STROBE (Strengthening the Reporting of Observational Studies in Epidemiology)[13, 14], and REMARK (Reporting Recommendations for Tumour Marker Prognostic Studies)[15]. Despite the progress made toward higher-quality reporting, recent literature demonstrates that major methodological weaknesses still exist[16–26].

On a global scale, scientists have assessed the reporting quality of outbreaks without the use of a standardized guideline where quality has been graded based on the consistency and completeness of data collected. Examples of this include the study on compiling the world’s first worldwide database on nosocomial outbreak[27] and the evaluation of Foot-and-Mouth Disease outbreaks in mainland South-East Asia from 2000 to 2010[28]. This led to a review where the newly developed Modified STROBE statement approach was used to systematically assess the quality of Influenza outbreak reports[29]. Compared to the original STROBE criteria, a 22-item checklist[13,14], the Modified STROBE assessment tool has additional criteria that includes outbreak characterization, location, and organization of patient data.

Currently, no studies have evaluated the caliber of reporting outbreaks for EVD, demonstrating the novelty of this review[30–33]. The objective of this study was to conduct a systematic analysis of the reporting quality of the EVD outbreak in West Africa from 2014–2018 using the Modified STROBE statement.

Methods

Eligibility criteria

We included studies on the 2014 EVD outbreak alone, limited to those on human patients in Africa. In addition, eligible reports needed to describe one or more of the following: onset of the outbreak; clinical manifestations; and control measures of specific diagnostic testing. Although outbreak reports that met our inclusion criteria could have conducted transmission modelling, we excluded studies that were not outbreak reports but only transmission models. Randomized trials and intervention studies were also excluded from the review because they did not include components of outbreak reports.
Search strategy and data collection

We searched the following databases (MEDLINE, EMBASE, and Web of Science) for outbreak reports published between 2014–2018 using the combination of search terms seen in the Table in S1 Table. The search strategy used is described in Fig 1.

Quality assessment

The Modified STROBE (a 30-item assessment tool that relates to the title/abstract, introduction, methods, results, and discussion of articles) was used to effectively analyze key factors of outbreak reporting[32]. The methods section is further divided into components that correspond to outbreak characteristics; outbreak setting; and organization of patient data to systematically analyze the quality of reporting. Data was extracted from each outbreak report based on the criteria within the Modified STROBE statement, where each individual component is given a worth of one point. A total score (i.e. completeness of reporting) out of 30 points was assigned for each outbreak report as indicated in the S2 Table. The 69 articles included in the review were analyzed by one researcher who has experience using critical appraisal techniques.

To analyze the proportion of articles that accurately met key component of the Modified STROBE checklist, a post-hoc assessment was performed. We identified the following items to be fundamental in an outbreak report: present key elements of study design early in report (3A); case definitions for outbreaks were included (3G); provide eligibility criteria for selection of cases, participants and/or controls (3J); describe any efforts to address potential sources of bias (3L); and give characteristics of study participants (4B).

Predictor variables

To assess factors potentially associated with the quality of reporting (i.e. Modified STROBE score), the following predictor variables were selected for assessment prior to the study: publication year, author affiliation (academic institution vs. non-academic [e.g. public health agencies, non-governmental organizations]), publication type (peer-reviewed vs. epidemiological report), and outbreak setting (hospital vs. community). We treated publication year as a binary variable, that is, either prior to or after the year 2015, due to the substantial amount of outbreak reports published following the outbreak in Africa. Furthermore, we hypothesized that authors obtaining support from public health officials led to higher quality reports. Author affiliation was determined by the first author. In the case that the outbreak report involved authors from public health and academic institutions, the second author determined the author affiliation. Similarly, we predicted that higher quality reports were from peer-reviewed articles and we sought to observe if this is true. On a similar note, we projected that outbreaks that took place at hospitals were reported more accurately compared to those in the community.

Statistical analysis

We used descriptive statistics to summarize the results of the Modified STROBE scores. For the univariate analysis, a two-tailed t-test was conducted to determine significant predictor variables with p-value <0.05. In terms of the multivariable analysis, a backward stepwise linear regression model was applied to analyze predictor variables associated with better reporting quality. This was done by eliminating non-significant covariates one by one using 5% significance until a final model was obtained. All statistical analysis was conducted using IBM SPSS Statistics Version 25 (SPSS Inc., Armonk, NY, USA).
Fig 1. Flow diagram of search strategy and outbreaks included based on eligibility criteria.

https://doi.org/10.1371/journal.pone.0218170.g001
Reliability and validity tests

A Cronbach’s alpha test was conducted to measure reliability or internal consistency for the Modified STROBE assessment tool. To measure construct validity, a convergent correlation test was carried out. All the included articles (n = 69) were first critically assessed using the ORION (Outbreak Reports and Intervention studies of Nosocomial infection) statement[6], a 22-item checklist that has a similar outbreak investigation guideline to the Modified STROBE tool. The empirical relationship between the Modified STROBE scores and the scores obtained from using the ORION statement was compared through a bivariate Pearson analysis.

Results

Quality assessment

A total of 69 of 131 (53%) articles within the full-text review fulfilled our eligibility criteria and underwent the Modified STROBE assessment for analyzing the quality of reporting [34–102]. The Modified STROBE scores of the included studies ranged from 11–26 points and the mean was found to be 19.54 out of 30 with a standard deviation (SD) of ± 4.30. The distribution of scores is shown in S1 Fig. As indicated in Table 1, all reports provided quantitative data on infected individuals (2C) such as the reported number of suspected and confirmed patients. In terms of frequently reported Modified STROBE components, the top three items commonly reported were: descriptive characteristics of study participants (4B), scientific background and evidence rational (2A), and clinical significance of observations (5A). More than 75% of the studies met majority of the criteria in the Modified STROBE assessment tool. However, information that was commonly missing included: addressing potential source of bias (3L), sensitivity analysis (3O), further results/analysis such as risk estimates and odds ratios (4E), presence of a flowchart (4A), and addressing missing data (3N)(Table 1).

In regard to the post-hoc assessment, majority of papers satisfied four of the five key components within the Modified STROBE checklist. The only criteria that was commonly missed was describe any efforts to address potential sources of bias (3L), as only two reports sufficiently mentioned this information (Table 2).

Factors associated with high-quality reporting

Three variables (publication year, journal type, and author affiliation), were found to be significantly associated with a higher Modified STROBE score in the univariate analysis (Table 3).

Of the 69 reports included, 25(35%) were published from 2016 to 2018 (i.e. >2015) (S2 Table). These had significantly higher Modified STROBE scores compared to reports published prior to 2015 (i.e. ≤2015) (MD 3.61, 95% CI 1.81–5.41, P = <0.001). We found that 46 (67%) of the studies that were peer-reviewed publications had significantly higher scores in comparison to non-peer reviewed public health epidemiological reports (MD 5.83, 95% CI 4.13–7.52, P = <0.001). Similarly, 23(33%) of the included outbreak reports did not have any affiliation with public health agencies. We observed significantly higher scores from reports published through academic institutions, in contrast to public health agencies (MD 2.78, CI 95% 0.83–4.74, P = 0.01). The final predictor, outbreak setting (hospital vs. community) was not found to be a significant predictor for higher Modified STROBE score (P = 0.174).

In the multivariable analysis, peer-reviewed publication was the only predictor that remained significantly associated with a higher Modified STROBE score (P = 0.001).
Table 1. Components of the Modified STROBE checklist and proportion of articles (n = 69) accurately reporting each item [13].

| Modified STROBE Item | Component Description | n(%) Accurately Reported |
|----------------------|-----------------------|--------------------------|
| 1) Title and Abstract | A) Either title, abstract or both sections clearly indicated study design | 60(87) |
|                      | B) Study’s focus and investigation details within title, abstract or both sections (e.g. Ebola subtype, geographic location, setting) were clearly elicited | 64(93) |
|                      | C) Informative summary provided in the abstract discussing steps taken along with investigation findings | 52(75) |
| 2) Introduction      | A) Scientific background, evidence, rationale provided for reporting and conducting investigation | 67(97) |
|                      | B) Specific objectives for study stated, included pre-established hypothesis if applicable | 63(91) |
|                      | C) Specific quantiles provided: for example, number of outbreaks/communities reported, number of patients from Ebola outbreak (suspected, confirmed, total) | 69(100) |
|                      | D) A timeline of the study was provided: includes start/finish dates of conducted investigation or outbreak | 57(83) |
| 3) Methods           | A) Present key elements of study design early in report | 59(86) |
|                      | B) Was decision to report promoted by any outcome data? | 63(91) |
|                      | C) Number of patients admitted during outbreak | 59(86) |
|                      | D) Distribution provided for patient demographics | 48(70) |
|                      | E) Proportion admitted from other hospitals, wards, communities | 32(46) |
|                      | F) Potential risk factors for acquiring organism included | 47(68) |
|                      | G) Case definitions for outbreaks were included | 48(70) |
|                      | H) Proportions of patient outcomes were included (e.g. ICU, hospitalization, mortality) | 58(84) |
| Outbreak Characteristics | I) Description of unit, hospital, community | 28(41) |
|                      | J) Provide eligibility criteria for selection of cases, participants and/or controls (more for cohort/case control) | 51(74) |
|                      | K) Provide number of exposed/unexposed (cohort) or controls per case (case-control) | 42(61) |
|                      | L) Describe any efforts to address potential sources of bias | 2(3) |
|                      | M) Explain how the final study size was arrived at (for patient/case count) | 30(43) |
|                      | N) Explain how missing data were addressed | 17(25) |
|                      | O) Describe any sensitivity analysis | 6(9) |
| 4) Results           | A) Consider use of a flow diagram to depict patient or participant count at each stage of investigation | 13(19) |
|                      | B) Descriptive characteristics of study participants (e.g. demographics, clinical, social) + information on exposures and any other associative factors | 68(99) |
|                      | C) Timeline: chart to display duration of patient stay, date of detecting organisms | 59(86) |
|                      | D) Consideration of any confounding variables (e.g. use of antibiotics, length of stay changes) | 15(22) |
|                      | E) Further results and analysis: if applicable, provide unadjusted and confounder-adjusted estimates with confidence intervals(e.g. risk estimates, odds ratios) | 16(23) |
| 5) Discussion        | A) Clinical signification of observation was considered and hypotheses were reviewed in relation to the findings | 66(96) |
|                      | B) Discuss limitations of study, accounting for any potential bias | 38(55) |
|                      | C) Discussed generalizability (external validity) of findings and applicability with current evidence | 52(75) |

Table 2. Key components of the Modified STROBE checklist and proportion of articles (n = 69) accurately reporting each item.

| Modified STROBE Item | Component Description | n(%) Accurately Reported |
|----------------------|-----------------------|--------------------------|
| 3A                   | Present key elements of study design early in report | 59(86) |
| 3G                   | Case definitions for outbreaks were included | 48(70) |
| 3J                   | Provide eligibility criteria for selection of cases, participants and/or controls (more for cohort/case-control) | 51(74) |
| 3L                   | Describe any efforts to address potential sources of bias | 2(3) |
| 4B                   | Give characteristics of study participants (e.g., demographic, clinical, social) + information on exposures and any other associative factors | 68(99) |

https://doi.org/10.1371/journal.pone.0218170.t001

https://doi.org/10.1371/journal.pone.0218170.t002
Reliability and validity tests

The Cronbach’s alpha test was calculated to be 0.771 and the correlation coefficient value from the convergent validity analysis was found to be 0.832. This demonstrates a strong positive correlation value, indicating the critical appraisal tool measures what it is intended to and has high construct validity.

**Discussion**

The main finding from this study was that of the 69 articles assessed, the reports on average met only a modest number of criteria (66%) within the Modified STROBE assessment tool. The total Modified score out of 30 points ranged from 11 to 26. We also found in the multivariable analysis that peer-reviewed articles were associated with a significantly higher Modified STROBE score in comparison to epidemiological reports. To assist in the interpretation of this analysis, it is fundamental to note that we analyzed the completeness of reporting through the total Modified STROBE score and not methodological quality. Hence, items were recorded based on sufficient information to conduct appraisal.

Certain items on the Modified STROBE assessment tool such as sensitivity analysis(3O), may not be necessary for some studies, based on their objective which explains the fact that only a moderate number were met. Items within the Modified STROBE that are considered crucial for reports include outbreak characteristics and description of outbreak location as the inclusion of this information will assist in future outbreak management. The criteria that was commonly missed within the key Modified STROBE components was the identification to address potential sources of bias (3L).

It is not surprising that peer-reviewed articles were found to be associated with higher Modified STROBE scores. A 2015 survey done by publishing research consortium demonstrated that 82% of researchers agreed that the peer-review process is pivotal to the control of scientific communication and improving the quality of published literature[103]. Thus, journal requirements play a fundamental role in the dissemination of research. The peer-review process and the use of reporting guideline requirements are expected to improve the quality of research. Hence, it is highly recommended authors submit papers to journals who have a peer-review process in place in order to improve the quality of manuscripts.

Two predictor variables (publication date and author affiliation) were found to have superior Modified STROBE scores when assessed respectively as an independent predictor but not

---

**Table 3. Univariate and multivariate analysis of predictors for reporting quality.**

| Predictor Variables | Comparison Groups          | n (%) | Modified STROBE Mean Score (SD) | Mean Difference (95% CI) | P-values (Univariate Analysis) | P-values (Multivariate regression model) |
|---------------------|----------------------------|-------|---------------------------------|--------------------------|-------------------------------|------------------------------------------|
| Publication Year    | >2015                      | 25(36)| 21.84(3.03)                     | 3.61(1.81 to 5.41)       | <0.001                        | 0.089                                    |
|                     | <2015                      | 44(64)| 18.22(4.40)                     |                          |                               |                                          |
| Journal Type        | Peer-reviewed              | 46(67)| 21.48(3.29)                     | 5.83(4.13 to 7.52)       | <0.001                        | 0.001                                    |
|                     | Epidemiologic Report       | 23(33)| 15.65(3.41)                     |                          |                               |                                          |
| Outbreak Setting    | Hospital                   | 47(68)| 20.02(4.63)                     | 1.52(-0.69 to 3.73)      | 0.174                         | 0.812                                    |
|                     | Community                  | 22(32)| 18.50(3.41)                     |                          |                               |                                          |
| Author Affiliation  | Academic Institution       | 23(33)| 21.39(3.50)                     | 2.78(0.83 to 4.74)       | 0.01                          | 0.943                                    |
|                     | Non-academic Institution   | 46(67)| 18.61(4.41)                     |                          |                               |                                          |

CI (confidence intervals); SD (standard deviation)

https://doi.org/10.1371/journal.pone.0218170.t003
in the multivariate regression model. The most obvious explanation for publication date is that reports published after 2015 had the time and data advantage. In addition, it is important to note that 23 out of 25 (92%) of the articles post 2015 were peer-reviewed and did not contain any public health affiliation. This may have acted as a confounding factor and was accounted for in our multivariate analysis. In regard to author affiliation, there could be multiple factors that influence the reason why academic institutions was found to be associated with a higher Modified STROBE score, for instance funding availability, abiding by institutional regulations, and academic capacity and training.

This is the second time the Modified STROBE assessment tool has been used to evaluate the reporting quality of outbreaks; Lo et al[29] was the first to utilize the appraisal tool for influenza outbreaks. Similar to our findings, Lo et al[29] stated that very few reports provided crucial information on patient characteristics and addressing limitations that could potentially bias the findings. As well, our mean Modified STROBE score (19.54) was similar to their study [29], indicating a new potential trend of excluding fundamental outbreak characteristics may be seen in similar pathogen outbreaks. This not only suggests the generalizability of our modified assessment tool towards other pathogens and outbreak settings, it also reiterated the demand for explicit reporting guidelines for outbreak reports.

One strength of this study is that the reliability and validity test indicated that the Modified STROBE assessment tool was an appropriate instrument to measure the quality of reporting outbreaks. The Cronbach’s alpha test was found to be 0.771, which is within the acceptable range of 0.70–0.90 as demonstrated by various studies[104–106]. This indicates that all the items within the critical appraisal tool are interrelated and measure the same construct. The convergent validity test showed a high positive correlation between the two appraisal tools, ORION and Modified STROBE (correlation coefficient of 0.832), which indicates high construct validity and strengthens the application of this instrument for future use[107,108]. Other strengths of this review include an extensive search strategy and a methodology approach based on the STROBE statement, which has been published in over 122 journals [13,14]. The International Committee of Medical Journal editors have endorsed the STROBE statement as a universal requirement for manuscripts submitted to biomedical journals[13,14]. In addition, conducting a backward stepwise regression model reduces the risk of multicollinearity and overfitting, which are frequently seen in this type of analysis[109–111].

We acknowledge that one limitation of our paper was that we did not include an assessment of the gray literature. This remains an important gap in the academic analysis of outbreak management. We would encourage investigators of outbreaks to develop standardized data fields and additional resources to support data collection that could would facilitate bringing investigations to publications. The Health Internetwork Access to Research Initiative is an example of an initiative developed by the WHO and biomedical healthcare journals to allow complementary or low priced online access to key biomedical journals for developing countries[112–114]. Equally as important to increasing access to health research is containing an efficient number of trained personnel to document and facilitate the post hoc analysis. Thus, we recommend once an outbreak has been reported, mobilized teams should contain trained personnel to assist in data collection. Public health agencies should also be encouraged to publish their results as an expectation of their role in data sharing. In addition, restricting studies to the use of only English text, and narrowing the scope to countries in only one continent (Africa), may not be an accurate comprehensive representation of outbreaks reports. On a similar note, it was difficult to distinguish mutual exclusivity between comparison groups for author affiliation based on first corresponding author. In the review, 46 (67%) of the included articles had affiliations with both academic institutions and public health organizations. It is
also important to emphasize that the resources available for reporting outbreaks have not been considered in this analysis.

Outbreaks are a complex situation and multiple external environmental factors—resource availability, public and political climate, response coordination, and development of a skilled workforce—not only directly impact the quality of research collected, but contributes to the spread of the EVD epidemic [3–5]. This clarifies the difficulty in executing routine laboratory analytics and the substantial number of reports with missing data. Hence, this is why it is important to prioritize data collection during an outbreak response. It is clear that there were great challenges in investigating EVD outbreaks and in such circumstances it can be impossible to meet reporting standards. The purpose of this paper is not to disparage those investigators but to draw attention to the need for adequate resources both for outbreak investigation and for reporting.

In summary, the large range of Modified STROBE scores observed indicates the variability in the quality of outbreak reports for EVD. The review identified strong reporting in some areas, whereas other areas are in need of improvement, in particular providing an important description of the outbreak setting and identifying any external elements (potential biases and confounding factors) that could hinder the credibility of the findings. This review acts as a call of action for international organizations (global public health corporations, academic institutions, national non-government agencies) to extend support towards standardizing outbreak reporting, prioritizing data collection, and increasing field epidemiology training programs in developing countries. The Centre for Disease Control's Field Epidemiology program has shown to be an effective approach towards training residents in developing countries to analyze, collect, and interpret disease information [115]. The adaption of the Modified STROBE checklist to this program could enhance sound infection control policies, leading to better reporting outcomes in the future. Several systematic reviews have documented the positive impacts reporting guidelines have had on quality of reporting, demonstrating the potential effects of the Modified STROBE checklist [116–120]. Therefore, better adherence to the Modified STROBE would increase clarity to research findings, facilitate evidence-informed planning towards future outbreak management, and ultimately aid in the synthesis of policy and practice.

Supporting information

S1 Table. Modified STROBE scores for individual outbreak reports (n = 69) 34-102.

S2 Table. Key Word search strategy in MEDLINE/EMBASE/Web of Science in April 2018†.

S1 Fig. Distribution of Modified STROBE score for the 69 outbreak reports.

S1 File. Strobe data.

Author Contributions

Conceptualization: Nina Huynh, Andrea Baumann, Mark Loeb.

Data curation: Nina Huynh.

Formal analysis: Nina Huynh.
Investigation: Nina Huynh, Andrea Baumann, Mark Loeb.

Methodology: Nina Huynh, Andrea Baumann, Mark Loeb.

Project administration: Nina Huynh.

Resources: Andrea Baumann, Mark Loeb.

Supervision: Andrea Baumann, Mark Loeb.

Validation: Nina Huynh, Mark Loeb.

Visualization: Nina Huynh, Andrea Baumann.

Writing – original draft: Nina Huynh.

Writing – review & editing: Andrea Baumann, Mark Loeb.

References

1. Who.int. WHO Ebola Virus Disease. 2018 [cited 19 June 2018]. http://www.who.int/news-room/fact-sheets/detail/ebola-virus-disease

2. Centers for Disease Control and Prevention. Cost of the Ebola Epidemic. 2016 [cited 19 June 2018]. https://www.cdc.gov/vhf/ebola/history/2014-2016-outbreak/cost-of-ebola.html

3. Shoman H, Karafillakis E, Rawaf S. The link between the West African Ebola outbreak and health systems in Guinea, Liberia and Sierra Leone: a systematic review. Globalization and health. 2017 Dec; 13 (1):1. https://doi.org/10.1186/s12992-016-0224-2 PMID: 28049495

4. Brolin Ribeckae KJ, Saulnier DD, Eriksson A, von Schreeb J. Effects of the West Africa Ebola virus disease on health-care utilization—a systematic review. Frontiers in public health. 2016 Oct 10; 4:222. https://doi.org/10.3389/fpubh.2016.00222 PMID: 27777926

5. Cancetta C, Davis SM, Dierberg KL, Lascher J, Kelly JD, Koroma AP, George P, Kamara AA, Marsh R, Sumbuya MS. Strengthening health systems while responding to a health crisis: lessons learned by a nongovernmental organization during the Ebola virus disease epidemic in Sierra Leone. The Journal of infectious diseases. 2016 Oct 4; 214(suppl_3):S153–63. https://doi.org/10.1093/infdis/jiw345 PMID: 27688219

6. Stone SP, Cooper BS, Kibbler CC, Cookson BD, Medley GF, Duckworth G, Lai R, Ebrahim S, Brown EM, Wilf PJ. The ORION statement: a CONSORT equivalent for infection control studies—Guidelines for transparent reporting of Outbreak Reports and Intervention studies Of Nosocomial infection. Journal of Infection. 2007 Sep 1; 55(3):e89.

7. Grimes DA, Schulz KF. Descriptive studies: what they can and cannot do. The Lancet. 2002 Jan 12; 359(9301):145–9.

8. Sanderson S, Tatt ID, Higgins J. Tools for assessing quality and susceptibility to bias in observational studies in epidemiology: a systematic review and annotated bibliography. International journal of epidemiology. 2007 Jun 1; 36(3):666–76 https://doi.org/10.1093/ije/dym018 PMID: 17470488

9. Claridge JA, Fabian TC. History and development of evidence—based medicine. World journal of surgery. 2005 May 1; 29(5):547–53. https://doi.org/10.1007/s00268-005-7910-1 PMID: 15827845

10. Vandenbroucke JP, Strega, Strobe, Stard, Squire, Moose, Prisma, Gnosis, Trend, Orion, Coreq, Quorum, Remark… and Consort: for whom does the guideline toll?. Journal of clinical epidemiology. 2009 Jun 1; 62(6):594–6. https://doi.org/10.1016/j.jclinepi.2008.12.003 PMID: 19181482

11. Moher D, Schulz KF, Altman DG (2001) The CONSORT statement: Revised recommendations for improving the quality of reports of parallel–group randomized trials. Lancet 357: 1191–1194. PMID: 11323066

12. Moher D, Cook DJ, Eastwood S, Olkin I, Rennie D, et al. (1999) Improving the quality of reports of meta–analyses of randomized controlled trials: The QUOROM statement. Quality of Reporting of Meta–analyses. Lancet 354: 1896–1900 https://doi.org/10.1016/S0140-6736(99)04149-5 PMID: 10584742

13. Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. Strobe Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. PLOS medicine. 2007 Oct 16; 4(10):e296. https://doi.org/10.1371/journal.pmed.0040296 PMID: 17941714

14. Vandenbroucke JP, von Elm E, Altman DG, Gøtzsche PC, Mulrow CD, Pocock SJ, Poole C, Schleselman JJ, Egger M; STROBE Initiative. Strengthening the Reporting of Observational Studies in
15. McShane LM, Altman DG, Sauerbrei W, Taube SE, Gion M, et al. (2005) REporting recommendations for tumour MArkEr prognostic studies (REMARK). Br J Cancer 93: 387–391. https://doi.org/10.1038/sj.bjc.6602678 PMID: 16106245

16. Chan AW, Altman DG. Epidemiology and reporting of randomized trials published in PubMed journals. The Lancet. 2005 Mar 26; 365(9465):1159–62.

17. Gibson CA, Kirk EP, LeChehminant JD, Bailey BW, Huang G, Donnelly JE. Reporting quality of randomized trials in the diet and exercise literature for weight loss. BMC medical research methodology. 2005 Dec; 5(1):9.

18. Hayden JA, Côté P, Bombardier C. Evaluation of the quality of prognosis studies in systematic reviews. Annals of internal medicine. 2006 Mar 21; 144(6):427–37. PMID: 16549855

19. Latronico N, Botteri M, Minelli C, Zanotti C, Bertolini G, Candiani A. Quality of reporting of randomized controlled trials in the intensive care literature. Intensive care medicine. 2002 Sep 1; 28(9):1316–23. https://doi.org/10.1007/s00134-002-1339-x PMID: 12209283

20. Lee CW, Chi KN. The standard of reporting of health-related quality of life in clinical cancer trials. Journal of Clinical Epidemiology. 2000 May 1; 53(5):451–8. PMID: 10812316

21. Long CR, Nick TG, Kao C. Original research published in the chiropractic literature: Evaluation of the research report. Journal of Manipulative & Physiological Therapeutics. 2004 May 1; 27(4):223–8.

22. Mallett S, Deeks JJ, Halligan S, Hopewell S, Cornelius V, Altman DG. Systematic reviews of diagnostic tests in cancer: review of methods and reporting. Bmj. 2006 Aug 24; 333(7565):413. https://doi.org/10.1136/bmj.38895.467130.55 PMID: 16649365

23. Mills E, Loke YK, Wu P, Montori VM, Perri D, Moher D, Guyatt G. Determining the reporting quality of RCTs in clinical pharmacology. British journal of clinical pharmacology. 2004 Jul 1; 58(1):61–5. https://doi.org/10.1111/j.1365-2125.2004.2092.x PMID: 15206994

24. Riley RD, Abrams KR, Sutton AJ, Lambert PC, Jones DR, Heney D, Burchill SA. Reporting of prognostic markers: current problems and development of guidelines for evidence-based practice in the future. British Journal of Cancer. 2003 Apr 15;88(6):1191. https://doi.org/10.1038/sj.bjc.6600886 PMID: 12698183

25. Smidt N, Rutjes AW, van der Windt DA, Ostelo RW, Reitsma JB, Ostelo RW, Reitsma JB, Bossuyt PM, Bouter LM, de Vet HC. Quality of reporting of diagnostic accuracy studies. Radiology. 2005 May; 235(2):347–53. https://doi.org/10.1148/radiol.2352040507 PMID: 15770041

26. Thakur A, Wang EC, Chiu TT, Chen W, Ko CY, Chang JT, Atkinson JB, Fonkalsrud EW, Grosfeld JL. Methodology standards associated with quality reporting in clinical studies in pediatric surgery journals. Journal of pediatric surgery. 2001 Aug 1; 36(8):1160–4. https://doi.org/10.1053/jpsu.2001.25737 PMID: 11479847

27. Vonberg RP, Weitzel–Kage D, Behnke M, Gastmeier P. Worldwide Outbreak Database: the largest collection of nosocomial outbreaks. Infection. 2011 Feb 1; 39(1):29–34. https://doi.org/10.1007/s15010-010-0064-6 PMID: 21153042

28. Madin B. An evaluation of Foot–and–Mouth Disease outbreak reporting in mainland South–East Asia from 2000 to 2010. Preventive veterinary medicine. 2011 Dec 1; 102(3):230–41. https://doi.org/10.1016/j.prevetmed.2011.07.010 PMID: 21889809

29. Lo C, Mertz D, Loeb M. Assessing the reporting quality of influenza outbreaks in the community. Influenza and other respiratory viruses. 2017 Nov 1; 11(6):556–63. https://doi.org/10.1111/irv.12516 PMID: 29054122

30. Pocock SJ, Collier TJ, Dandreo KJ, de Stavola BL, Goldman MB, Kalish LA, Kasten LE, McCormack VA. Issues in the reporting of epidemiological studies: a survey of recent practice. BrMJ. 2004 Oct 14; 329(7471):883. https://doi.org/10.1136/bmj.38250.571088.55 PMID: 15469946

31. Cooper BS, Stone SP, Kibbler CC, et al. Systematic review of isolation policies in the hospital management of methicillin–resistant Staphylococcus aureus: a review of the literature with epidemiological and economic modelling. Health Technol Assess 2003; 7:1 194.

32. Ramsay C, Brown E, Hartman G, Davey P. Room for improvement: a systematic review of the quality of evaluations of interventions to improve hospital antibiotic prescribing. J Antimicrob Chemother 2003; 52:764 771. https://doi.org/10.1093/jac/dkg460 PMID: 14563901

33. Davey P, Brown E, Hartman G, et al. Interventions to improve antibiotic prescribing practices for hospital in patients. Cochrane Library: CD003543. 2005. 5 [Issue 1] https://doi.org/10.1002/14651858.CD003543

34. Furuse Y, Fallah M, Oshitani H, Kiyuji L, Mahmoud N, Musa E, Gasasira A, Nyenswah T, Dahn B, Bawo L. Analysis of patient data from laboratories during the Ebola virus disease outbreak in Liberia,
35. Muoghalu IS, Moses F, Conteh I, Swaray P, Ajudua A, Nordström A. The Transmission chain analysis of 2014–2015 Ebola Virus Disease Outbreak in Koinadugu District, Sierra Leone: an Observational study. Frontiers in public health. 2017 Jul 10; 5:160. https://doi.org/10.3389/fpubh.2017.00160 PMID: 28740846

36. Haaskjold YL, Bolkan HA, Krogh KØ, Jongopi J, Lundebuy KM, Mellesmo S, García PS, Jesendal O, Østpad Å, Svensen E, Fuentes LM. Clinical features of and risk factors for fatal Ebola virus disease, Moyamba District, Sierra Leone, December 2014—February 2015. Emerging infectious diseases. 2016 Sep; 22(9):1537. https://doi.org/10.3201/eid2209.151621 PMID: 27268303

37. Schieffelin JS, Shaffer JG, Goba A, Gbakie M, Gire SK, Colubri A, Sealton RS, Kanneh L, Moigboi A, Momoh M. Clinical illness and outcomes in patients with Ebola in Sierra Leone. New England journal of medicine. 2014 Nov 27; 371(22):2092–100. https://doi.org/10.1056/NEJMoa1411680 PMID: 25353969

38. Hunt L, Gupta–Wright A, Simms V, Tamba F, Knott V, Tamba K, Heisenberg–Mansaray S, Tamba E, Conteh S, Smith T, Tobin S. Clinical presentation, biochemical, and hematologic parameters and their association with outcome in patients with Ebola virus disease: an observational cohort study. The Lancet infectious diseases. 2015 Nov 1; 15(11):1292–9. https://doi.org/10.1016/S1473-3099(15)00144-9 PMID: 26271406

39. Nyenswah T, Fallah M, Sieh S, Kollie K, Badio M, Gray A, Dilah P, Shannon M, Duwor S, Ihekweazu C, Cordier–Lassalle T. Controlling the last known cluster of Ebola virus disease–Liberia, January–February 2015. MMWR. Morbidity and mortality weekly report. 2015 May; 64(18):500–4. PMID: 25974635

40. Lindblade KA, Kateh F, Nagbe TK, Neatherlin JC, Pillai SK, Attfield KR, Dweh E, Barradas DT, Williams SG, Blackley DJ, Kirking HL. Decreased Ebola transmission after rapid response to outbreaks in remote areas, Liberia, 2014. Emerging infectious diseases. 2015 Oct; 21(10):1800. https://doi.org/10.3201/eid2110.150912 PMID: 26402477

41. Shultz JM, Espinel Z, Espinola M, Reckhemmer A. Distinguishing epidemiological features of the 2013–2016 West Africa Ebola virus disease outbreak. Disaster health. 2016 Jul 2; 3(3):78–88. https://doi.org/10.1080/21665044.2016.1228326 PMID: 28222017

42. Grinnell M, Dixon MG, Patton M, Fitter D, Bilivogui P, Johnson C, Dotson E, Diallo B, Rodier G, Rahguthornathan P. Ebola Virus Disease in Health Care Workers–Guinea, 2014. MMWR Morb Mortal Wkly Rep. 2015 Oct 2; 64(38):1083–7. https://doi.org/10.15585/mmwr.mm6438a6 PMID: 26421761

43. Maganga GD, Kapetshi J, Berther N, Kebela Ilunga B, Kabange F, Mbala Kingebeni P, Mondonge V, Muyembe JJ, Bertherat E, Briand S, Cabore J. Ebola virus disease in the Democratic Republic of
Ebola reporting quality

Congo. New England Journal of Medicine. 2014 Nov 27; 371(22):2083–91. https://doi.org/10.1056/NEJMoa1411099 PMID: 25317743

51. WHO Ebola Response Team. Ebola virus disease in West Africa—the first 9 months of the epidemic and forward projections. New England Journal of Medicine. 2014 Oct 16; 371(16):1481–95. https://doi.org/10.1056/NEJMoa141100 PMID: 25244186

52. Shuaib F, Gunnara R, Musa EO, Mahoney FJ, Oguntimehin O, Nguku PM, Nyantil SB, Knight N, Gwarzo NS, Idigbe O, Nasidi A. Ebola virus disease outbreak—Nigeria, July–September 2014. MMWR. Morbidity and mortality weekly report. 2014 Oct; 63(39):867–72. PMID: 25275332

53. Incident Management System Ebola Epidemiology Team, CDC, Guinea Interministerial Committee for Response Against the Ebola Virus, CDC Guinea Response Team, Liberia Ministry of Health and Social Welfare, CDC Liberia Response Team, Sierra Leone Ministry of Health and Sanitation, CDC Sierra Leone Response Team, Viral Special Pathogens Branch, National Center for Emerging and Zoonotic Infectious Diseases, CDC. Update: Ebola Virus Disease Outbreak—West Africa, October 2014. Morbidity and Mortality Weekly Report. 2014 Oct 31; 63(43):978–81. PMID: 25356607

54. Hersey S, Martel LD, Jamba I, Keita S, Yoli Z, Meyer E, Seeman S, Bennett S, Ratto J, Morgan O, Akeempong MA. Ebola virus disease—Sierra Leone and Guinea, August 2015. MMWR Morb Mortal Wkly Rep. 2015 Sep 11; 64(35):981–4. https://doi.org/10.15585/mmwr.mm6435e6 PMID: 26355422

55. Folarin OA, Ehichioya D, Schaffner SF, Winnicki SM, Wohl S, Eromon P, West KL, Gladden–Young A, Akyeampong MA. Ebola virus disease outbreak in Montserado County, Liberia, June–October 2014. Morbidity and Mortality Weekly Report. 2014 Nov 21; 63(46):1067–71. PMID: 25412066

56. Luo H, Qian J, Kargbo D, Zhang XG, Yang X, Hu Y, Sun Y, Cao YQ, Su HX, Deng YQ, Dafae F. Ebola virus outbreak investigation, Sierra Leone, September 28–November 11, 2014. Emerging infectious diseases. 2015 Nov; 21(11):1921. https://doi.org/10.3201/eid2111.150982 PMID: 26485317

57. Kouadio KI, Clement PE, Bolongei J, Tamba A, Gasasira AN, Warsame A, Okeibunor JC, Ota MO, Kargbo D. Epidemiology and surveillance response to Ebola virus disease outbreak in Lofa County, Liberia (March–September, 2014); lessons learned. PLoS currents. 2015 May 6; 7:

58. Wang L, Yang G, Jia L, Li Z, Xie J, Li P, Qiu S, Hao R, Wu Z, Ma H, Song H. Epidemiological features and trends of Ebola virus disease in West Africa. International Journal of Infectious Diseases. 2015 Sep 1; 38:52–3. https://doi.org/10.1016/j.ijid.2015.07.017 PMID: 26216765

59. Musa EO, Adedire E, Adeoye O, Adewusi P, Waziri N, Nguku P, Nonjuya M, Adebayo B, Fatiregun A, Enya B, Oluabunwo C. Epidemiological profile of the Ebola virus disease outbreak in Nigeria, July–September 2014. Pan African Medical Journal. 2015; 21(1).

60. Ministries of Health of Guinea S, Leone L. Ebola virus disease outbreak—West Africa, September 2014. MMWR. Morbidity and mortality weekly report. 2014 Oct 3; 63(39):865. PMID: 25275331

61. Rico A, Brody D, Coronado F, Rondy M, Fiebig L, Carcelen A, Deyde VM, Mesfin S, Retzer KD, Bilivogui P, Keita S. Epidemiology of epidemic Ebola virus disease in Conakry and surrounding prefectures, Guinea, 2014–2015. Emerging infectious diseases. 2016 Feb; 22(2):176. https://doi.org/10.3201/eid2202.151304 PMID: 26812047

62. Lamunu M, Obu OO, Bangura J, Yoti Z, Samba TT, Kargbo DK, Dafae FM, Rajee A, Sempria N, Ivan ML, Sing A. Epidemiology of Ebola virus Disease in the Western area region of Sierra leone, 2014–2015. Frontiers in public health. 2017 Mar 2; 5:33. https://doi.org/10.3389/fpubh.2017.00033 PMID: 28303239

63. Gleason B, Redd J, Kilmarx P, Sesay T, Bayor F, Mozalevskis A, Connolly A, Akpabie J, Prybylski D, Moffett D, King M. Establishment of an Ebola treatment unit and laboratory—Bombali District, Sierra Leone, July 2014–January 2015. Morb Mortal Wkly Rep. 2015 Oct 9; 64(39):1108–7. PMID: 26355422

64. Fitzgerald F, Naveed A, Wing K, Gbessay M, Ross JC, Checchi F, Youkee D, Jalloh MB, Baiou D, Mustapha A, Jah H. Ebola virus disease in children, Sierra Leone, 2014–2015. Emerging infectious diseases. 2016 Oct; 22(10):1769. https://doi.org/10.3201/eid2210.160579 PMID: 27649367

65. Sharma A, Heijenberg N, Peter C, Bolongei J, Reeder B, Alpha T, Stork E, Robert H, Kurth A, Cannas A, Boquain A. Evidence for a decrease in transmission of Ebola virus—Lofa County, Liberia, June 8–November 1, 2014. Emerging infectious diseases. 2016 Oct; 22(10):1769. https://doi.org/10.3201/eid2210.160579 PMID: 27649367

66. Nyenswah TG, Westercamp M, Kamali AA, Qin J, Zielinski–Gutierrez E, Amegashie F, Fallah M, Gergonne B, Nugba–Ballah R, Singh G, Aberle–Grasse JM. Evidence for declining numbers of Ebola cases—Montserrado County, Liberia, June–October 2014. Morbidity and Mortality Weekly Report. 2015 Oct 21; 64(46):1072–6. PMID: 25412066

67. Skrable K, Roshania R, Mallow M, Wolfman V, Siakor M, Levine AC. The natural history of acute Ebola Virus Disease among patients managed in five Ebola treatment units in West Africa: A
retrospective cohort study. PLoS neglected tropical diseases. 2017 Jul 19; 11(7):e0005700. https://doi.org/10.1371/journal.pntd.0005700 PMID: 28723900

68. Richardson ET, Kelly JD, Barrie MB, Mesrobian AW, Karku S, Quwa K, Marsh RH, Koedoyoma S, Daboh F, Barron KP, Grady M. Minimally symptomatic infection in an Ebola ‘hotspot’: a cross-sectional serosurvey. PLoS neglected tropical diseases. 2016 Nov 15; 10(11):e0005087. https://doi.org/10.1371/journal.pntd.0005087 PMID: 27846221

69. Valenza C, Bah H, Fatoumata B, Rodier G, Diallo B, Koné M, Giese C, Conde L, Maliano E, Mollet T, Jansa J. Network visualization for outbreak response: Mapping the Ebola Virus Disease (EVD) chains of transmission in N’Zérékoré, Guinea. Journal of Infection. 2017 Mar 1; 74(3):294–301. https://doi.org/10.1016/j.jinf.2016.09.012 PMID: 27840270

70. Kateh F, Nagbe T, Kielta A, Barskey A, Gasasira AN, Driscoll A, Tucker A, Christie A, Karmo B, Scott C, Bowah C. Rapid response to Ebola outbreaks in remote areas—Liberia, July—November 2014. MMWR. Morbidity and mortality weekly report. 2015 Feb; 64(7):188–92. PMID: 25719682

71. Loko ke K, Caleo G, Greig J, Duncombe J, McWilliam N, Squire J, Lamin M, Veltus E, Wolz A, Kobinger G, de la Vega MA. Successful control of Ebola virus disease: analysis of service based data from rural Sierra Leone. PLoS neglected tropical diseases. 2016 Mar 9; 10(3):e0004498. https://doi.org/10.1371/journal.pntd.0004498 PMID: 26959413

72. Ajelli M, Parlamento S, Bome D, Ke bbi A, Aztori A, Frasson C, Putoto G, Carraro D, Merler S. The 2014 Ebola virus disease outbreak in Pujehun, Sierra Leone: epidemiology and impact of interventions. BMC medicine. 2015 Dec; 13(1):281.

73. Stehling-Áriz A, Rosewell W, Al Disebbay BA, Ndomiana KD, Jimmsia KS, Leidman E, Rijken DJ, Basler C, Wood J, Manso D. The impact of active surveillance and health education on an Ebola virus disease cluster—Kono District, Sierra Leone, 2014–2015. BMC infectious diseases. 2016 Dec; 16(1):811. https://doi.org/10.1186/s12879-016-1941-0 PMID: 27784275

74. Fasina FO, Shittu A, Lazarus D, Tomori O, Simonsen L, Viboud C, Chowell G. Transmission dynamics and control of Ebola virus disease outbreak in Nigeria, July to September 2014. Eurosurveillance. 2014 Oct 9; 19(40):20820. https://doi.org/10.2907/1560-7917.es2014.19.40.20820 PMID: 25323076

75. Incident Management System Ebola Epidemiology Team, CDC, Guinea Interministerial Committee for Response Against the Ebola Virus and the World Health Organization, CDC Guinea Response Team, Liberia Ministry of Health and Social Welfare, CDC Liberia Response Team, Sierra Leone Ministry of Health and Sanitation, CDC Sierra Leone Response Team, Viral Special Pathogens Branch, National Center for Emerging and Zoonotic Infectious Diseases, CDC. Update: Ebola Virus Disease Epidemic—West Africa, November 2014. Morbidity and Mortality Weekly Report. 2014 Nov 21; 63(46):1064–6. PMID: 25120644

76. Alpren C. Ebola Virus Disease Cluster—Northern Sierra Leone, January 2016. MMWR. Morbidity and mortality weekly report. 2016;65.

77. Arranz J, Lundeby KM, Hasson S, Fuentes LM, García PS, Haaskjold YL, Bolk H, Krogh KØ, Jon-gopi J, Mellesmo S, Jenseadal O. Clinical features of suspected Ebola cases referred to the Moyamba ETC, Sierra Leone: challenges in the later stages of the 2014 outbreak. BMC infectious diseases. 2016 Dec; 16(1):308.

78. Cherif MS, Koonrungsesomboon N, Diallo MP, Le Gall E, Kassé D, Cherif F, Koné A, Diakité M, Camara F, Magassouba N. The predictor of mortality outcome in adult patients with Ebola virus disease during the 2014–2015 outbreak in Guinea. European Journal of Clinical Microbiology & Infectious Diseases. 2017 Apr 1; 36(4):689–95.

79. Cherif MS, Koonrungsesomboon N, Kassé D, Cissé SD, Diallo SB, Cherif F, Camara F, Avenido EF, Diakité M, Diallo MP, Le Gall E. Ebola virus disease in children during the 2014–2015 epidemic in Guinea: a nationwide cohort study. European journal of pediatrics. 2017 Jun 1; 176(6):791–6. https://doi.org/10.1007/s00431-017-2917-z PMID: 28444452

80. Curran KG. Cluster of Ebola virus disease linked to a single funeral—Moyamba District, Sierra Leone, 2014. MMWR. Morbidity and mortality weekly report. 2016;65.

81. Dallatamosina S, Crestani R, Sylvester Squire J, Declerk H, Caleo GM, Wolz A, Stinson K, Patten G, Brechard R, Gbabai OB, Sprecher A. Ebola outbreak in rural West Africa: epidemiology, clinical features and outcomes. Tropical Medicine & International Health. 2015 Apr 1; 20(4):448–54.

82. Dietz PM, Jambal A, Paweska JT, Yoti Z, Ksaiez TG. Epidemiology and risk factors for Ebola virus disease in Sierra Leone—23 May 2014 to 31 January 2015. Clinical Infectious Diseases. 2015 Jul 15; 61(1):1648–54. https://doi.org/10.1093/cid/civ568 PMID: 26179011

83. Damkjaer M, Rudolf F, Mishra S, Young A, Storgaard M. Clinical features and outcome of Ebola virus disease in pediatric patients: a retrospective case series. The Journal of pediatrics. 2017 Mar 1; 182:378–81. https://doi.org/10.1016/j.jpeds.2016.11.034 PMID: 27939106
84. Fang LO, Yang Y, Jiang JF, Yao HW, Kargbo D, Li XL, Jiang BG, Kargbo B, Tong YG, Wang YW, Liu K. Transmission dynamics of Ebola virus disease and intervention effectiveness in Sierra Leone. Proceedings of the National Academy of Sciences. 2016 Apr 19; 113(16):4488–93.

85. Faye O, Boïlle PY, Heleze E, Faye O, Loucoubar C, Magassouba NF, Soropogui B, Keita S, Gakou T, Koivogui L, Cauchermes S. Chains of transmission and control of Ebola virus disease in Conakry, Guinea, in 2014: an observational study. The Lancet Infectious Diseases. 2015 Mar 1; 15(3):320–6. https://doi.org/10.1016/S1473-3099(14)71075-8 PMID: 25819149

86. Ji YJ, Duan XZ, Gao XD, Li L, Li C, Ji D, Li WG, Wang LF, Meng YH, Yang X, Ling BF. Clinical presentations and outcomes of patients with Ebola virus disease in Freetown, Sierra Leone. Infectious diseases of poverty. 2016 Dec; 5(1):101. https://doi.org/10.1186/s40249-016-0195-9 PMID: 27806732

87. Kelly JD, Barrie MB, Mesman AW, Kerkis S, Quwa K, Drasher M, Schlough GW, Dierberg K, Koe- doyoma S, Lindan CP, Jones JH. Anatomy of a Hotspot: Chain and Seroepidemiology of Ebola Virus Transmission, Sukudu, Sierra Leone, 2015–16. The Journal of infectious diseases. 2018 Jan 9; 217 (8):1214–21. https://doi.org/10.1093/infdis/jiy004 PMID: 29325149

88. Lado M, Walker NF, Baker P, Haroon S, Brown CS, Youkee D, Studd N, Kessete Q, Maini R, Boyles T, Hanciles E. Clinical features of patients isolated for suspected Ebola virus disease at Connaught Hospital, Freetown, Sierra Leone: a retrospective cohort study. The Lancet infectious diseases. 2015 Sep 1; 15(9):1024–33. https://doi.org/10.1016/S1473-3099(15)00137-1 PMID: 26213248

89. Mobula LM, MacDermott N, Hoggart C, Brantly K, Plyler L, Brown J, Kauffeldt B, Eisenhut D, Cooper LA, Fankhauser J. Clinical Manifestations and Modes of Death among Patients with Ebola Virus Disease, Monrovia, Liberia, 2014. https://doi.org/10.3201/eid2209.160354 PMID: 27533284

90. Nangclares C, Famiyesin W, Mohammed A. Clinical profile and containment of the Ebola virus disease outbreak in Gbarpolu County, Liberia, 2014. MMWR Morb Mortal Wkly Rep. 2015 Feb 27; 64(7):175–8. PMID: 25719678

91. National Center for Emerging and Zoonotic Infectious Diseases, CDC. Update: Ebola Virus Disease Transmission, Sukudu, Sierra Leone, 2015–16. The Journal of infectious diseases. 2018 Jan 9; 217 (8):1214–21. https://doi.org/10.1093/infdis/jiy004 PMID: 29325149

92. Oluabinwo C, Heleze E, Faye O, Loucoubar C, Magassouba NF, Soropogui B, Keita S, Gakou T, Koivogui L, Cauchermes S. Chains of transmission and control of Ebola virus disease in Conakry, Guinea, in 2014: an observational study. The Lancet Infectious Diseases. 2015 Mar 1; 15(3):320–6. https://doi.org/10.1016/S1473-3099(14)71075-8 PMID: 25819149

93. Pini A, Zomahoun D, Duraffour S, Derrough T, Charles M, Quick J, Loman N, Cowley L, Leno M, Oue-drango N, Thiam O. Field investigation with real-time virus genetic characterisation support of a cluster of Ebola virus disease cases in Dubréka, Guinea, April to June 2015. Eurosurveillance. 2018 Mar 22; 23(12):17–00140.

94. Qin E, Bi J, Zhao M, Wang Y, Guo T, Yan T, Li Z, Sun J, Zhang J, Chen S, Wu Y. Clinical features of patients with Ebola virus disease in Sierra Leone. Clinical infectious diseases. 2015 May 20; 61 (4):491–5. https://doi.org/10.1093/cid/civ319 PMID: 25995207

95. Williams GS, Naijero I, Gayfior J, Malibiche T, Zogbou-Gbogbo N, Nayeri F. Twenty-one days of isolation: A prospective observational cohort study of an Ebola–exposed hot zone community in Liberia. Journal of Infection. 2015 Aug 1; 71(2):150–7. https://doi.org/10.1016/j.jinf.2015.05.003 PMID: 25982026

96. Xu Z, Jin B, Teng G, Rong Y, Sun L, Zhang J, Du N, Liu L, Su H, Yuan Y, Chen H. Epidemiologic characteristics, clinical manifestations, and risk factors of 139 patients with Ebola virus disease in western Sierra Leone. American journal of infection control. 2016 Nov 1; 44(11):1285–90. https://doi.org/10.1016/j.ajic.2016.04.216 PMID: 27317404

97. Yan T, Mu J, Qin E, Wang Y, Liu L, Wu D, Jia H, Li Z, Guo T, Wang X, Qin Y. Clinical characteristics of 154 patients suspected of having Ebola virus disease in the Ebola holding center of Jui Government Hospital in Sierra Leone during the 2014 Ebola outbreak. European Journal of Clinical Microbiology & Infectious Diseases. 2015 Oct 1; 34(10):2089–95.

98. Blackley DJ, Lindblade KA, Kateh F, Broyles LN, Westercamp M, Neatherlin JC, Pillai SK, Tucker A, Mott JA, Walke H, Nyenswah T. Rapid intervention to reduce Ebola transmission in a remote village—Gbarpolu County, Liberia, 2014. MMWR Morb Mortal Wkly Rep. 2015 Feb 27; 64(7):175–8. PMID: 25719678

99. Incident Management System Ebola Epidemiology Team, CDC, Guinea Interministerial Committee for Response Against the Ebola Virus and the World Health Organization, CDC Guinea Response Team, Liberia Ministry of Health and Social Welfare, CDC Liberia Response Team, Sierra Leone Ministry of Health and Sanitation, CDC Sierra Leone Response Team, Viral Special Pathogens Branch, National Center for Emerging and Zoonotic Infectious Diseases, CDC. Update: Ebola Virus Disease Epidemic—West Africa, November 2014. Morbidity and Mortality Weekly Report. 2014 Nov 21; 63 (46):1064–6. PMID: 25412064

90. Incident Management System Ebola Epidemiology Team, CDC, Guinea Interministerial Committee for Response Against the Ebola Virus and the World Health Organization, CDC Guinea Response Team,
100. Bawo L, Fallah M, Kateh F, Nagbe T, Clement P, Gasasira A, Mahmoud N, Musa E, Lo T, Pillai S, Seeman S. Elimination of Ebola virus transmission in Liberia—September 3, 2015. MMWR Morb Mortal Wkly Rep. 2015 Sep 11; 64(35):979–80. https://doi.org/10.15609/mmwr.mm6435a5 PMID: 26355323

101. Fitzpatrick G, Vogt F, Moi Gbabai OB, Decroo T, Keane M, De Clerck H, Grolla A, Brechard R, Stinson K, Van Herp M. The contribution of Ebola viral load at admission and other patient characteristics to mortality in a Medecins Sans Frontieres Ebola case management centre, Kailahun, Sierra Leone, June–October 2014. The Journal of infectious diseases. 2015 May 22; 212(11):1752–8. https://doi.org/10.1093/infdis/jiv304 PMID: 26002981

102. Nyenswah T, Blackley DJ, Freeman T, Lindblade KA, Arzoaquoi SK, Mott JA, Williams JN, Halldin CN, Kollie F, Laney AS; Centers for Disease Control and Prevention (CDC). Community quarantine to interrupt Ebola virus transmission—Mawah Village, Bong County, Liberia, August-October, 2014. MMWR Morb Mortal Wkly Rep. 2015 Feb 27; 64(7):179–82. PMID: 25719679

103. Bland J, Altman D. Statistics notes: Cronbach’s alpha. BMJ. 1997; 314:275. https://doi.org/10.1136/bmj.314.7080.572 PMID: 9055718

104. Nunnally J, Bernstein L. Psychometric theory. New York: McGraw–Hill Higher, INC; 1994

105. Streiner DL. Starting at the beginning: an introduction to coefficient alpha and internal consistency. Journal of personality assessment. 2003 Feb 1; 80(1):99–103. https://doi.org/10.1207/S15327752JPA8001_18 PMID: 12584072

106. Mukaka MM. A guide to appropriate use of correlation coefficient in medical research. Malawi Medical Journal. 2012; 24(3):69–71. PMID: 23638278

107. Whittingham MJ, Stephens PA, Freckleton RP. Why do we still use stepwise modelling in ecology and behaviour?. Journal of animal ecology. 2006 Sep 1; 75(5):1182–9. https://doi.org/10.1111/j.1365-2666.2006.01141.x PMID: 16922854

108. Marriott S, Palmer C, Lelliott P. Disseminating healthcare information: getting the message across. BMJ Quality & Safety. 2000 Mar 1; 9(1):58–62.

109. Anderson D.R., Burnham K.P. & Thompson W.L. (2000) Null hypothesis testing:problems, prevalence, and an alternative. Journal of Wildlife Management, 64, 912–923.

110. Mathema DM, Nderitu J, Mutonga D, Otiti MI, Siegel K, Demaio AR. Open access: academic publishing and its implications on knowledge equity in Kenya. Global Health. 2014; 10:26. https://doi.org/10.1186/1744-8603-10-26 PMID: 24716579

111. McWhinney IJ, Coggeshall P, O’Neill JA, O’Neill JA. Global Health Protection and Security [Internet]. Centers for Disease Control and Prevention. Centers for Disease Control and Prevention; 2018 [cited 2019Apr1]. https://www.cdc.gov/globalhealth/healthprotection/resources/fact-sheets/fetr-factsheet.html

112. Moher D, Jones A, Lepage L, Consort Group. Use of the CONSORT statement and quality of reports of randomized trials: a comparative before-and-after evaluation. JAMA. 2001 Apr 18; 285(15):1992–5. PMID: 11308436

113. Plint AC, Moher D, Morrison A, Schulz K, Altman DG, Hill C, Gaboury I. Does the CONSORT checklist improve the quality of reports of randomised controlled trials? A systematic review. Medical journal of Australia. 2006 Sep 18; 185(5):263–7. PMID: 16948622

114. Smidt N, Rutjes AW, Van der Windt DA, Ostelo RW, Bossuyt PM, Reitsma JB, Bouter LM, De Vet HC. The quality of diagnostic accuracy studies since the STARD statement: has it improved?. Neurology. 2006 Sep 12; 67(5):792–7. https://doi.org/10.1212/01.wnl.0000238386.41398.30 PMID: 16966539
119. Prady SL, Richmond SJ, Morton VM, MacPherson H. A systematic evaluation of the impact of STRICTA and CONSORT recommendations on quality of reporting for acupuncture trials. PloS one. 2008 Feb 13; 3(2):e1577. https://doi.org/10.1371/journal.pone.0001577 PMID: 18270568

120. Moher D, OcampoM AD, Kenneth F, Moher S. Citing the CONSORT statement and explanation and elaboration paper: What’s it all about? 2009. InVancouver, Canada: 6th International Congress on Peer Review and Biomedical Publication.