Centre for Communicable Diseases

The Pathway to Publishing:

A Guide to Quantitative Scientific Writing

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icddr,b

Preface

This guide grew out of Steve Luby's review of dozens of draft manuscripts from novice scientists in Pakistan in the mid 1990s. To avoid writing the same critique into multiple manuscripts, he developed a short list of 'most common errors' with explanations of how they should be addressed. This allowed him to refer to manuscript errors more quickly by number, and allowed writers to see a more complete description of the problem than might be typed out when they came up again in a manuscript.

Over the years these 'most common errors' multiplied and Dorothy Southern edited and organized this rather unwieldy list, integrated explanations and examples from a number of different sources, and produced a more systematic guide. As new errors have arisen, they have also been incorporated. This has now grown into the current document that explains the mentor-orientated approach to scientific writing that we promote in the Centre for Communicable Diseases (CCD) at icddr,b.

The Pathway to Publishing: A Guide to Quantitative Scientific Writing focuses on the unique format and data presentation of quantitative studies. It aims to support and encourage scientists who are actively engaged in quantitative research to write effectively, so as to increase the sharing of important scientific results.

Ultimately the goal for CCD is to generate valid scientific knowledge on infectious disease and lifesaving solutions that can be utilized by many public health professionals. To do this we aim to promote and empower each researcher to reflect, analyze and develop an appropriate scientific writing style using The Pathway to Publishing: A Guide to Quantitative Scientific Writing. We hope you find this publication useful.

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1. The pathway to publishing

One of the goals of the Centre for Communicable Diseases (CCD) is to develop local independent scientists who contribute substantially to the global scientific knowledge of communicable diseases. Promoting first authored scientific publications is a prime way to develop scientific reasoning and to share CCD's work with the international community of scientists.

At CCD, building scientific writing skills is the cornerstone of developing our research capacity so study results can be shared with the public health community and policy makers. More writers mean more of our work gets published. However, several barriers to publishing exist, including: lack of focus in framing the research question; inability to explain why the study is important (the 'so what' question); inability to interpret the data and suggest implications for practice or public health policy; unfamiliarity with the requirements of scientific writing formats; and a lack of clarity and conciseness in the use of English language.

To address each of these barriers and attempt to make the pathway to publishing less arduous, the Scientific Writing Unit and the Statistical Unit under the CCD's Training Support Group provide focused and practical training and structure the writing and feedback experience. These two support units respond to the needs of junior scientists and help them to reflect and think critically about the content and style of their scientific papers, and then put their thoughts on paper.

The pathway to publishing is a long process that involves a number of steps. The process includes icddr,b's Research Administration office that hosts the Secretariat for our Institutional Review Board (IRB). The IRB attaches great importance to ensuring that all research conducted by its scientists is valid and meets international ethical standards. The IRB consists of three mandatory committees: the Research Review Committee (RRC), the Ethical Review Committee (ERC), and the Animal Experimentation Ethics Committee (AEEC). The Research Administration office has information related to all scientific writing related policies and guidelines, along with forms to download at www.icddrb.net.bd/jahia/Jahia/pid/663.

The pathway to publishing process has been diagrammed below to show the relationship between the documents that a CCD researcher might be required to write and the steps along the way to becoming a first author. (Figure 1)

Figure 1: The pathway to publishing

Develop research question(s)
<u>If not funded</u>
Develop a first draft concept paper outlining the objectives with broadly summarized methods
After internal review, develop a revised concept paper including sample size and budget
After internal review, develop a full RRC protocol or use the specific donor agency format
<u>If funded</u>
If the funding document lacks sufficient detail, develop a detailed concept paper
After review and approval, expand into RRC protocol format
After internal review, submit for two external reviews
After responding to all comments, submit to RRC for approval
After responding to all comments, submit to ERC for approval
If the protocol involves animal research, submit to AEEC for approval
If the protocol is funded by CDC, submit to CDC IRB for approval
To ensure quality data collection, share data collection tools with the Statistical Unit. For paperless data collection, confirm with PDA programmers at least six weeks before data collection begins
Implement research activities and collect data
Develop table shells, then analyze the data to produce completed tables and figures that identify the main results of your study. Share this framing document with your primary reviewer first, then with co-authors
Develop a high-level outline and share with your primary reviewer first, then with co-authors
After responding to all comments, develop the first draft manuscript
Continue to rewrite again and again, responding to all reviewers comments
Submit for institutional clearance
Submit to appropriate journal
Receive peer reviewers' comments and respond appropriately
Re-submit to journal
Congratulations on your first author published manuscript

2. The 'think before you write' approach

To reflect and think critically about the content of any type of scientific paper, use the two step '*Think before you write'* approach that responds to the needs of junior scientists through a mentor model. To ensure that your scientific paper clearly describes a valid methodology and communicates convincing results, getting feedback is crucial. First, share your structured paper, initially with your primary reviewer, and then with all your co-authors, to receive constructive comments. Who to approach for review and the feedback process is illustrated in a flowchart. (See Appendix 1) Secondly, use the '*most common errors'* listed in this guide as a method for critiquing the first and all subsequent drafts of your paper.

<u>If you are writing a concept paper</u>, start with a research question that expresses an uncertainty about something that you want to resolve. You must do a thorough literature review to know what others have found and concluded, and then determine what else needs to be known. Although individual organizations and funding agencies require different formats, the most important element in a concept paper is the statement of objectives. What specific new information will this study generate? The rationale can be brief and does not need to be as fully referenced as a formal protocol, but it should communicate to the reader why these objectives are important. The methodology must be complete and clearly organized in chronological order. A timeline of activities should be included and if the concept paper will be evaluated by a potential funding agency, also develop a preliminary budget. (See Appendix 2)

<u>If you are writing a protocol</u>, start with a clear outline that focuses on specific questions that are included in the RRC protocol format. These include: how to think critically about the over-all research rationale; how to choose a study design and method that are appropriate for a quantitative study; how to analyze your data; and how to take into account ethical and logistical issues. (See Appendix 3)

<u>If you are writing an abstract for a conference, or aiming for a manuscript</u>, start by thinking about the data your study has generated and how to transform it into the tables figures and graphs that clearly highlight the results. As a first step, simply share the empty table shells (with only row and column headings) with your primary reviewer who can give you early feedback on how to structure your analysis. Once you and your primary reviewer agree on the appropriate statistical analysis, then conduct it and complete the tables, figures or graphs.

Now, by looking at your analysis in the light of the original research question and your study objectives, you should be able to identify one or more significant results that your abstract or manuscript should focus on. Develop a framing document that clearly identifies your objectives, lists your main results, and provides the tables, figures and graphs that support your main results. Share the framing document with your primary reviewer, and then your co-authors. (See Appendix 4)

After sharing and agreeing on the framing document, it is now time to organize your thoughts in a logical manner. For an abstract the main challenge is to be extremely focused and present concise thoughts in a very brief document. (See Appendix 5)

For a manuscript you should organize your ideas by developing a high level outline (HLO). The HLO format envisions a finished manuscript at the outset by following the IMRAD organization (Introduction, Methods, Results and Discussion) favoured by most scientific journals. (See Appendix 6)

Write down your thoughts in each HLO section using brief bullet point statements instead of complete sentences, which evens the playing field for non-native English speakers. The initial HLO that you share with your primary reviewer should be approximately 1,500 words in length. (See Appendix 7) Using an HLO has several benefits for both the researcher and for any reviewer.

HLO benefits	
For researchers	**For reviewers**
Focuses on thinking skills, rather than writing skills	Content is easy to see ▪ Short-hand format for supervisors and co-authors to review ▪ Critical importance of findings stands out
Provides framework to guide the thinking process	Allows input from all at early stage
Ensures inclusion of all key information	Easy to change the framing if necessary

All of the errors listed in this guide have been repeatedly identified in draft scientific papers written by junior researchers. These errors range from problems with punctuation, referencing and data presentation to not understanding the difference between association and causality. Examples of the '*most common errors'* are provided, along with alternative or better options, which makes it easier for a reviewer to describe the error, and easier for the researcher to understand the error and correct it. Reviewing a paper using the '*most common errors'* listed in this guide has several benefits for both the researcher and for any reviewer.

Most common error benefits	
For researchers	**For reviewers**
Seven categories of errors	Covers most possible errors.
Explicit information using real examples	Quick and easy referral and explanation.
Systematic process	Puts the responsibility on the writer to find the corresponding link to the error and to read and learn about it.

The most common errors have been grouped into seven categories:
A) General research and writing practices
B) Content of quantitative papers
C) Mechanics of writing
D) Grammatical structures and stylistic strategies
E) Achieving clarity and conciseness
F) Recording scientific data
G) Approaching publication

In summary, following this two-step *'Think before you write'* approach is a win - win situation. Spending initial time developing a framing document and an HLO saves countless hours in the long run, and responding to the '*most common errors'* identified by your reviewers dramatically improves the quality of your drafts of any scientific paper in the shortest time possible.

3. CCD mentoring principles

3.1 Authorship roles and responsibilities

Scientific writing is a collaborative effort. Inclusion on an author line is an important indicator of one's contribution to scientific work, and an important professional credential. In the most common situation of promoting first authorship of a junior scientist, a principal investigator usually comes up with the study idea, and secures funding. S/he then engages this junior researcher to assume major responsibility for study implementation, analyzing the data and writing the paper. This junior scientist would then be the first author on the paper. The principal investigator would be the senior author and collaborators who made substantial scientific contributions would be co-authors. We generally follow the convention that the senior author is listed as the last author.

The specific responsibilities associated with the various authorship roles are:

<u>First author:</u>

- Conducts the analysis
  - May receive substantive input /support from statistical colleagues on complex elements of the analysis
- Constructs the framing document with tables and figures and shares with senior author
- After revision and approval from senior author, shares the framing document with tables and figures with co-authors
- Drafts an ~ 1500 word high level outline
- After revision and approval from senior author, seeks input from co-authors
- Develops multiple HLO drafts, expanding each section
- Drafts the manuscript
  - Follows all the instructions for a draft manuscript as noted in *Error A5. Not using standard draft manuscript form*
- After revision and approval from senior author, seeks input from co-authors
- Develops multiple drafts of manuscript by responding thoroughly and thoughtfully to co-authors' feedback
- If there is a CDC co-author, CDC approval is required:
  - Identifies the first listed CDC affiliate to submit the paper for approval
  - Emails the CCD affiliate the following documents:
    - A MSWord file with all co-author approvals, including yourself, with date of approval
    - Completed CDC submission form
    - Draft manuscript to be approved
- Once senior author and co-authors agree, submits the manuscript to a journal
  - Circulates submitted draft
  - Keeps co-authors informed of all progress on the submission.
  - Circulates response from editors and comments from reviewers to all co-authors
  - Drafts response to reviewers' comments
  - Circulates response to reviewers' comments along with a marked up version of the manuscript (to highlight changes) to all co-authors for feedback

<u>Senior author:</u>

- Ensures that the paper is framed to make a meaningful contribution to the scientific literature

- When the first author is an early career scientist, the senior author assumes the role of primary reviewer and assists the first author in:
  - Drafting the author line
  - Selecting an appropriate journal
  - Deciding who should be the corresponding author
  - Identifying external reviewers for journal submission
- Reviews the initial drafts of the framing document with tables and figures
- Decides when the framing document with tables and figures is sufficiently developed that it would benefit from review by all co-authors
- Reviews the initial drafts of the high level outline
- Decides when the high level outline is sufficiently developed that it would benefit from review by all co-authors
- Reviews the initial drafts of the draft manuscript
- Decides when the draft manuscript is sufficiently developed that it would benefit from review by all co-authors
- Decides when the draft manuscript is ready for submission either to CDC for clearance or to a journal
- Assists the first author in finalizing the author line. For example, if a proposed co-author was included in the initial draft, but never provided any input to the draft manuscript and so does not meet the international criteria for authorship, this co-author would generally be dropped from the author line
- Carefully reviews the first author's responses to external reviewers' critiques
- Decides when the revised manuscript and responses to external reviewers' critiques are sufficient and the manuscript is ready for re-submission

<u>Second author:</u>
- The second author is generally the person who made the next largest contribution to the manuscript after the first and senior author, although this designation is sometimes used to denote particularly important institutional collaborators
- The particular role of the second author should be discussed with the senior author. The second author may have additional responsibilities in addition to standard co-author roles including:
  - Drafting sections of the manuscript
  - Performing the role of primary reviewer
  - Functioning as senior author
  - Functioning as the corresponding author

<u>Co-author:</u>
- Provides thorough, substantive review of the high level outline
- Provides thorough, substantive review of the draft manuscript
- Drafts specific sections of the manuscript in one's particular area of expertise and contribution as requested by the first or senior author
- Ensures that the elements of the study that are within their area of responsibility and expertise are accurately and appropriately reflected in the manuscript
- Ensures that framing of scientific arguments and references to the literature that are within their area of expertise are sound and appropriate
- Assesses whether or not they meet the criteria of co-authorship.
- Assesses whether or not they are sufficiently comfortable with the quality of the work, with the integrity with which it was conducted and the conclusions that it reaches, that they are willing to accept public responsibility for its content
  - Co-authors can opt out of inclusion on the authorship line during any of the drafts, but they should do so before submission to a journal. It is unprofessional to remove one's name after submission because it signals to

the journal editor that you believe there is something wrong with the manuscript

Getting feedback from the senior author, second author and co-authors is crucial to ensure that a scientific paper has the quality to meet the rigor of external reviews and be accepted by a peer-reviewed journal.

3.2 Timely reviews

Any feedback provided in the review process must be timely. Long delays in giving comments and suggestions to improve a scientific paper can de-motivate the writer and delay the dissemination of meaningful research. The reasonable time frames that the CCD researchers and reviewers follow are:

Review schedule	
Type of document	**Reviewed within**
Concept note	5 working days
Protocol	5 working days
Framing document	5 working days
Conference abstract	5 working days
Poster	5 working days
HLO	10 working days
Draft manuscript	10 working days
Reponses to journal editors and reviewers	5 working days

4. The scientific writing style

The writing style of quantitative scientific papers is unique. Always use the six ‘S’s’ below to guide your scientific writing:

Structured

Write under the guidance of the high-level outline, knowing where the logic starts from and where it is going.

Sequential

A key characteristic of good scientific writing is reader-centricity. Take the reader by the hand through the sequence of thoughts, step by step, without any leaps or missing links in the development of the ideas. Give the reader information when they need it in a logical sequence that anticipates their questions. This facilitates their ability to interpret and critique the information.

Simple

Use simple words to explain what is meant. Imagine trying to explain the concept to a layperson. Don’t use technical or statistical jargon. If you find you about to write or type a word you wouldn’t use in every day conversation, stop and simplify.

Short

Use short sentences containing only one idea in each. Split complex sentences. Cut unnecessary information elements and only include those data which relate to the point of your paper. Do not include data just because you collected them. If it is an interesting result, but is not directly related to the focus of the paper, it should not be included in the paper. Remember, 'If it's only nice to know, it ought to go.'

Strong

Use the verb as the centre of gravity of your sentence. If the verb is weak, the sentence is weak. For example, instead of, 'We did an interview', write, 'We interviewed'. Use active voice instead of passive. For example, instead of, 'The study was conducted' write, 'We conducted the study'. With active voice the subject does the action of the verb, which implies more immediacy and transparency.

Specific

Say clearly and exactly what you want to say. Avoid qualifiers, such as 'very', 'rather' or 'much' that are imprecise and judgmental. Choose your adjectives carefully. Don't use adjectives or qualifiers that imply subjectivity and/or emotion. For example, 'It *was a very large outbreak'. What does very mean?* How big is large? Quantitative writing prefers numbers.

5. Most common errors

A. General research and writing practices

A1. Insufficient knowledge of the literature

The first step in developing a scientific document is not writing, but thinking and then reading. Read, read, read! To write a good paper, you need to know what others think and you need to develop your own thinking skills. This error can take several forms, such as not having read the relevant literature, not understanding and integrating the work of others into the paper, or ignoring work that threatens or contradicts one's findings or beliefs. First, if the author does not know the field, you cannot frame the research question, or the innovative points of the work. Second, if the author cannot show any interest in the topic, you cannot convince readers to be interested in that topic. Third, failure to demonstrate understanding of the topic will jeopardize the credibility of the authors.

Remember, experts in the field will be reviewing your paper. Your initial drafts will be reviewed first by your primary reviewer, then by your co-investigators, co-authors and research group head. Later your paper will be critiqued by external reviewers and members of the RRC and the ERC. When you submit a manuscript to a journal it will be peer reviewed. If you don't find the most up-to-date relevant information, then a reviewer is likely to do it for you, resulting in embarrassment and/or rejection of your paper.

You need to understand and communicate what the state of knowledge in the field is, and describe what your paper adds to what is already known. You are trying to advance the field of knowledge, not just duplicate it. You cannot do this unless you are intimately familiar with what is already known. This should transcend, 'There is almost no data on this subject in Bangladesh'…the implication being that, anything I say will be an improvement! While that may be somewhat true, you need to look at similar settings or even dissimilar settings and see what other researchers have found. What are the principle ideas, explanations, and data that are relevant to your particular paper?

If you cannot answer the question, 'What does this paper add to what is already known about this subject in the literature?', then you are not ready to write the paper. Expect to spend many days finding relevant articles and reading them critically before you can understand and then communicate clearly what new information or idea your paper adds.

When conducting a literature review, it is, at times, acceptable to put together a concept note or a first draft of a protocol by reviewing abstracts of journal articles. However, to cite information in a paper for submission to a journal you need to have read the complete manuscript, not just the abstract, to understand fully how the information relates to your research. There are two reasons for this. First, on the level of a peer-reviewed publication, the specificity in your statements and the requirements for critical understanding require that you know your colleagues' work at a level of detail that is unavailable from an abstract. Second, there may be something in a manuscript that directly challenges a central idea you are presenting in your paper. You should discuss this in your paper. If you fail to note it and discuss it in your paper you will lose credibility in the mind of the reader and reviewer.

Finally, the excuse of, 'I couldn't get the paper', is not acceptable in the arena of international scholarship. You can get any paper. Identify what you need and work to secure it. Online resources and new acquisitions are constantly added to icddr,b's library. Contact the Library Information Services Unit (LISU) for any further queries. Also recognize that different electronic search engines and databases can help you identify different articles: Google Scholar lists the number of times an article is cited; MEDLINE is a literature database of life sciences and biomedical information and ensures that you find classic articles on your topic; while PubMed lists the most recent articles first.

Examples of the error:	**Alternative, better options:**
✗ Key studies in the field are not quoted.	✓ Search the literature carefully.
✗ The studies quoted do not represent the best or the latest studies.	✓ Update literature search, identify 'citation classics'.
✗ Studies are misquoted.	✓ Read all papers quoted fully, not only the abstracts.

A2. Not referencing statements

Scientific writing demands strict specificity. All statements that are not common knowledge or do not flow directly from your data need to be referenced. Referencing is a standardized method of acknowledging sources of information and ideas that you have used in your document in a way that uniquely identifies everything readers need to locate each source. Authors must not make general statements about a problem in the absence of quantification, documentation or references.

Example*: It is estimated that by the end of the century, South Asia will surpass Africa to become the region with the greatest number of HIV infected persons*.

Who made such an estimate? On what is this estimate based? This may pass for casual conversation with your colleagues, but in scientific writing the reader needs to know what the precise basis is of everything you are writing. They can then judge whether this specific argument, and ultimately your overall work, is based upon sound research, or not. If it cannot be documented, it must not be said.

Examples of the error:	Alternative, better options:
× Disease X is a major public health problem.	✓ In 2000, disease X was the XXth leading cause of death in India, accounting for the loss of XXX disability-adjusted life years (DALYs). (ref)
× Hand washing is effective against diarrhoeal diseases.	✓ Interventions based upon the promotion of hand washing in the community lead to a decrease in the incidence of diarrhoeal diseases that ranges between XX% and XX%. (ref)
× Disease X should be considered a major public health priority.	✓ For the prevention and control of disease X, decision makers should allocate a national budget of USD XX/ capita and per year, in accordance to our costing estimate. (ref)

Careful referencing is an important strategy to avoid plagiarism. Plagiarism is the appropriation of another person's ideas, words, processes, or results without giving appropriate credit to the original source through referencing. Careful management of references during the research and writing stages of a manuscript or presentation will prevent unintentional plagiarism. In addition, citing up-to-date respected sources will build credibility for your readers.

Learn and use EndNote, the commercial reference management software package, to manage your references. At other times, keep a log book during your research. When you identify a good source of information, record the relevant documentation in your notes.

Remember, whether intentional or unintentional, plagiarism is unacceptable. As a scientist your ability to secure funding, to collaborate with other groups on projects, and to have your work published in high profile journals depends on your reputation. Even a single incident of plagiarism can substantially undercut your reputation and so your career. icddr,b has a policy for responding to allegations of scientific misconduct that is available on www.icddrb.net.bd/jahia/Jahia/pid/909.

A3. Presenting conclusions rather than data from references

Scientific understanding advances by reasoned interpretation of observation. Indeed, an essential difference between scientific discourse and non-scientific discourse is this reliance on observation as the cornerstone of argument. Science specifically eschews arguments from authority. In optimal scientific reasoning, it does not matter who said it, but rather what observations the argument was based upon, and whether these observations were valid. Thus, if you want to make a persuasive scientific argument you need to present the core data, not just a person's conclusion from that data.

Example: *A baseline evaluation of the quality of sexually transmitted disease case management that was conducted in five areas of Madras in1992 found there was an urgent need for health care providers to adopt the syndromic approach to STD treatment*.

In this example, the cited study may well have concluded that the physicians' performance was so poor in detecting and treating sexually transmitted diseases, that a move to a syndromic approach was the best option. But if this is being presented as evidence that sexually transmitted disease diagnosis and treatment was poor, why should a scientific thinker have to accept the judgment or opinion reached by someone else? Accepting another's judgment without personally evaluating the data upon which that judgment is based is non-scientific reasoning. Non-scientific reasoning is out of place in a scientific manuscript.

Consider the alternative, better option: *In a baseline evaluation of the quality of sexually transmitted disease case management conducted in five areas of Madras in 1992, 74% of persons presenting with symptoms of sexually transmitted diseases were given treatment that differed from World Health Organization guidelines.*

Now, the reader is no longer being asked to accept the interpretation of the author of the original study, or of the author of the present manuscript. He/she has been given the primary empiric observation, the basic unit of reasoning, and so can either accept it as appropriate to the idea being developed or not, but at least can follow the author's reasoning.

A4. Endnotes not in standard style

There are times as a scientific author that require creative thinking and ingenuity. Writing endnotes is not one of those times. Endnotes for manuscripts have standard formats well detailed in the 'Uniform Requirements for Manuscripts submitted to Biomedical Journals' (www.icmje.org). All computers for scientists within CCD should have Endnote loaded. This software allows writers to format references for various journals with just a few clicks of the mouse. Check the specific format required by the journal you want to submit your manuscript to, and then make sure that you use Endnote to match those guidelines. Prior to submission be sure to recheck the Endnote format again, as it does not perfectly conform to all journal formats.

A5. Not using standard draft manuscript form

Most journals have specific instructions for manuscripts submitted to them, usually detailed in their website under 'Instructions to Authors'. However, as a good starting point, the following generic style is what would be expected when submitting a first draft manuscript for review in CCD.

1. Format a title page to include:

    - The title of the article
    - First name, middle initial, and last name of each author (maximum 12)
    - Each author's institutional affiliation as a superscripted note
    - Targeted journal(s)
    - Main text total word count
    - Abstract total word count
    - Key words

2. Include an abstract in the format and word length of the targeted journal. If the journal choice is uncertain, then include a structured abstract (text separated into sections labelled Background, Methods, Results, and Conclusion) of no more than 250 words.

3. The main text of the article should be in the traditional format of Introduction, Methods, Results, and Discussion. Each section should start on a new page. The main text must not exceed the word limit for your particular journal of choice. Shorter is better. If the journal does not suggest a limit, aim for approximately 3,000 words. No article was ever rejected for being too short. A report that is too long will discourage everyone, whether reviewers, editors or readers. In contrast, if a report is too short, anyone can request more information.

4. The manuscript should be double spaced using a common font size 12. This provides more space for comments for reviewers of both the paper and electronic version.

5. The narrative text should be in a single column. Don't try to make it look like a formatted two columned journal article. It makes it harder to review electronically, and it is also not the form it needs to be in for a specific journal submission.

6. Indent the first word of each paragraph one tab width (0.25 – 0.5 inch) or skip a line between paragraphs to signal the reader that this is the start of a new set of ideas. Align text to the left.

7. Insert the acknowledgements after the discussion. Then add a maximum of 50 references.

8. Tables and/or figures should be placed after the references. There is usually a limit of five tables and/or figures. Do not waste time on extra formatting such as 3-D or shading.

A6. Repeating information

Editors of scientific manuscripts prefer succinct writing. Don't repeat ideas. Say it well and say it once. If a point is so important that you feel a deep inner need to repeat it, then include it in both the body of the paper, and the abstract, which is a summary of the manuscript.

The only other situation where a modicum of repetition is appropriate is in the development of some ideas in the discussion when it is appropriate to link the development of these ideas to specific study results, and/or to issues of study rationale raised in the introduction.

However, in a linked discussion, the important point is not to repeat the words, but rather to make a logical connection between what was raised earlier and the discussion about to take place. Thus, a short recall, without quantitative details, is sufficient. Some journals, including the Lancet, want the first paragraph of the discussion to summarize the main results, but we recommend this approach only if specifically requested by the journal.

Examples of the error:	Alternative, better option:
× ‘Disease X causes XXX deaths annually worldwide’ used in the first paragraph of the introduction and in the first paragraph of the discussion.	✓ Don’t repeat an idea. Say it well and say it once. If you are unsure about where to mention it, review the respective roles of the respective sections of a manuscript to identify the most suitable place.
× Full repetition of results, with quantified data and statistical tests in the discussion section.	

A7. Labelling a scientific document as ‘final’

Avoid the word ‘final’ in the title or the description of any scientific document. Scientific thinking is always open to revision. To call a document final implies either dogmatic close-mindedness or naiveté, both characteristics that directly contradict a scientific approach.

Examples of the error:	Alternative, better options:
× Attached is the final version of the protocol.	✓ Attached is the version of the protocol submitted to the Research Review Committee.
× Here is the final version of the manuscript.	✓ Here is the published version of the manuscript. (Who knows, there may be letters to the editor or subsequent insight that requires further revisions?)

A8. Characterizing an observation as ‘the first’

Scientists take pride in identifying novel observations. Galileo was the first person to see moons around Jupiter. Darwin was the first to both notice the very high variation of bird species on tropical islands and to suggest that this variability was best explained by evolution of species. Watson and Crick were the first to identify the structure of deoxyribonucleic acid (DNA). Part of the task of writing a manuscript is to explain to the readers what is new about the information that is being presented, how this new information changes or refines global scientific understanding. In response, many authors will assert that their scientific findings are ‘the first’. However, there are three problems with this:

1) These assertions can create controversy and ill feeling with scientists writing venomous letters to the editor disputing the claim of primacy. Such ill feelings do not help scientific understanding progress. Indeed, if one of your subsequent papers is then reviewed by a scientist who felt slighted by not being appropriately recognized in your earlier work, you risk receiving an unnecessarily devastating review that does not fairly consider the merits or your work. Indeed many journal editors (e.g., those at the Lancet) will not publish claims of first, primarily because they prefer to avoid such non-productive ego driven controversy.

2) Every observation can be described as a first if there are sufficient qualifications. Thus, the assertion of ‘first’ is not, in itself, meaningful. For example, ‘This is the first time that hepatitis E virus has been confirmed using advanced molecular methods in environmental water supplies in Sharkira district during the dry season at night using locally trained staff.’ Philosophically, with enough qualifications, every observation is unique, is a ‘first’. Thus, asserting that

something is ‘first’ does not communicate why it matters.

3) These assertions distract from useful explanations of how these observations contribute to global scientific understanding. If a health condition has been found in the other 10 countries where it has been looked for, then saying that this is the first time this has been recognized in Bangladesh tells us more about the interest of Bangladeshi scientists in this condition and the funding available to work in this area than about the health condition itself or the situation in Bangladesh. It does not tell readers why this observation is important.

Like all rules in the guide, this one is not absolute. An occasional claim of first may be defensible and help to clarify to the reader how to interpret the results, but >95% of scientific articles are best written without any claim to ‘first’.

Examples of the error:	**Alternative, better options:**
× This is the first time that an association between hepatitis C infection and carcinoma of the liver has been demonstrated in Bangladesh.	✓ The link noted between hepatitis C and liver carcinoma in this population in Bangladesh provides further evidence of the importance of hepatitis C as a leading cause of hepatocellular carcinoma globally. It suggests that for a low income country like Bangladesh, preventing the transmission of hepatitis C may be the most cost effective way to prevent liver carcinoma.
× This is the first time that Nipah virus antibodies have been identified in dogs in Bangladesh.	✓ Nipah virus infects a wide range of mammals. Earlier studies in Malaysia identified dogs with evidence of Nipah virus infection, but similar to our findings in Bangladesh, dogs appear to be dead end hosts rather than the reservoir of the infection.

B. Content of quantitative papers

B1. Improper focus or format of title and abstract

The title and the abstract are the most visible parts of your manuscript. Today, with most people relying on electronic search engines to find papers, it is more important than ever to catch the reader’s attention by making the title and abstract as concise, accurate, and readable as possible, and to include key words that potential readers of the paper are likely to use during a literature search. Be as descriptive as possible when writing a title and use specific rather than general terms.

Check the specific ‘Instructions to Authors’ for the journal you plan to submit your manuscript to. The standard length of an abstract is 250 words for structured abstracts and 150 words for unstructured abstracts, though this differs from journal to journal. As 80% of readers will only read the abstract, it is important that you craft your abstract so that it includes all of the essential information within this limit.

The abstract must stand alone. It must tell the reader why the topic is important, what the researchers did, what they found out (the most important results and data from the study) and how these findings make a contribution to knowledge. Do not cite references or use any abbreviations. In an unstructured abstract, methods and results can be merged to a certain extent. A structured abstract should include the following separate sections:

- Background: Explains the rationale for conducting the study, that is, why is this study question important? The last sentence in the background should state the objective of the paper. If space limitations are severe, and there is only sufficient space for a single sentence in the background, that one sentence should state the objective.
- Methods: Summarizes how the study was carried out and explains different techniques and tools used. It should also include details of data analysis.
- Results: This section should describe the main findings of the study and present the raw data.
- Conclusion: A brief summary of the interpretation of the findings, how the findings link to existing knowledge and build on it, and practical recommendations for further actions.

B2. Confusing the role of Introduction, Methods, Results, and Discussion

The standard structure that most journals prefer for a quantitative scientific paper typically includes the Introduction, Methods, Results And Discussion (IMRAD). The IMRAD structure is explicitly recommended in the 'Uniform Requirements for Manuscripts submitted to Biomedical Journals' (www.icmje.org).The content of each of these sections is ruled by conventions that are important to readers (and editors in the case of manuscripts submitted to journals). The Introduction zooms towards the research question, the Methods describe how the study was conducted, the Results present the data, and the Discussion builds upon the results to draw conclusions.

These conventions allow the reader to quickly look for the information if there is no time to read through the entire article. One exception to this rule: When reporting on an outbreak investigation, describe the hypotheses that were generated through the review of the descriptive information. Thus, a short analysis leading to the generation of hypotheses is appropriate either in the Methods or the Results section. See Appendices 6 and 7 for more clarification about what to include in each section.

Examples of the error:	Alternative, better options:
× Too many details in the background.	✓ Bypass burden of disease and other general considerations and use a direct sentence that drives the reader towards the research question or problem statement.
× Too many details in the methods.	✓ Focus on key considerations needed to understand what was done. Do not spell out methods for which you do not present results.
× Too many details in the results.	✓ Narrow down on a set of sub-results that are key for the conclusion.
× Too many details in the conclusion.	✓ Use two short sentences: one to give the big picture related to how your results help us understand a broader topic; then one to state what implications your results have for future public health actions or policy.

B3. Not writing the Methods section in chronological order

The Methods section typically involves explaining a number of interrelated activities. A common error is a disorganized series of sentences that jumps back and forth between various activities. This risks confusing the reader. The most common order that is easy for a reader/reviewer to understand is chronological order. The first part of the Methods section for a public health paper is commonly a brief description of the study site and population to explain the context. Then, explain in detail what study activities were performed in sequential chronological order. In a protocol, the methods are written in future tense as these are planned activities. In a manuscript, the Methods section is always in past tense, to tell the reader exactly what the researcher did.

Example of the error:	Alternative, better option:
× We will also obtain age and socio-economic status data over the phone and demonstrate distribution of typhoid fever mortality in different age groups and income groups for the study's secondary objective, and then get verbal consent.	✓ Break down the Methods section considering the suggested subheadings in Appendix 6. If the subheadings themselves are not desirable, use them at the draft stage to facilitate the construction and delete them afterwards.

B4. Not emphasizing steps taken to protect ethical rights

When describing the ethical practices of a study, a writer can mistake the emphasis by first citing that it was approved by icddrb's Ethical Review Committee (ERC), and then explaining how the participants' rights were protected, and if there was any benefit or risk to them. What this structure mistakenly implies is that the cornerstone of ethical practice is approval by a review committee.

Instead, we need to lead this section by describing exactly what we did to conduct an ethical study. Only the last sentence, somewhat as an afterthought, should confirm that all of these procedures, which we developed and carefully and systematically implemented, were reviewed and approved by an appropriate committee. The idea is that we are acting as moral agents; we are neither delegating the ethical conduct of the study to an external group, nor simply seeking the permission of some ethical authority.

Example of the error:	Alternative, better option:
× Our study protocol was approved by the ERC of icddr,b. Before collecting data we obtained written informed consent form each adult study participant in the household.	✓ We obtained written informed consent from the adult study participants in each household. The study protocol was reviewed and approved by the ERC of icddr,b.

B5. Listing interpretations, but not defending one in the Discussion

The role of the discussion is to explain what the results mean. Sometimes it is tempting to list all the possible interpretations and 'let the reader choose' what is the most reasonable. This is an abrogation of the responsibility of the author. As the person who analyzed the data and knows the study, you are in the best situation to explain what the most likely interpretation is and defend it. This is not to say that other important potential interpretations shouldn't be mentioned, but rather that you as the author should clearly state what you believe the data means and why. For example, the reader who looks at the following text has no idea which of these interpretations is the most plausible:

'*The difference between the commuting rate and the injury rate may be because men are more likely than women to exhibit risky behaviour, particularly not waiting for the bus to stop, hanging on side and climbing on the roof, and running to catch the bus. It could also be explained by a different gender mix on buses during the observation period in these high risk areas than at other times, or perhaps there are fewer males injured by buses, but this is more than compensated by a disproportionate number of males injured from motorcycles.*'

B6. Not fully explaining limitations

The objective of a section on limitations is not to list all aspects of the study that could be done differently with infinite money and flawless data collection tools in a perfect world. Instead, this section identifies limitations in the inferences that can be drawn from the study. There are four rules for discussing study limitations:

1. State only the most serious limitations. Don't list every possible problem. Although a thesis advisor may be interested in them, a journal reader is not. For example, don't write, 'Our sample size was too small.' Delete this as you probably gave your sample size and your confidence intervals, so even if your sample size was too small, the reader has enough information to make an informed opinion about it.
2. Explain the limitation, don't just label it. Instead of writing, 'One of our limitations is selection bias', discuss how you enrolled subjects and how this may result in an unrepresentative study estimate.
3. Be as precise about such limitations as possible, e.g., what were the confidence intervals, and level of detection or discrimination allowed by your sample size.
4. Discuss how you interpret the data in the light of this potential problem, e.g., 'It is unlikely that this procedure substantially affected our results, because...'

B7. Writing generic recommendations

Only make recommendations that your data can support. They should be applicable to the specific context. For example, avoid suggesting interventions in Bangladesh that require a level of national income and government capacity equivalent to that of Western Europe.

Generally, recommendations should not simply call for 'more research'. Such generic calls appear self serving and do not guide the field. By contrast, it is very useful to reflect on what was learned through your study and identify for the global scientific community (including funding agencies) the one or two important research questions that should next be addressed. Don't provide a laundry list of everything you think should be done. Usually you should make no more than two practical recommendations.

Recommendations have to be carried out by someone or some agency. Useful recommendations give clear statements about who the actor is, what they should do, and when. To help ensure that evidence can feed into policy icddr,b fosters a culture of knowledge translation among all researchers. A mechanism to achieve this is through knowledge translation briefs, or one-page summaries of key messages and evidence-based recommendations for action derived from the research results. Aimed at the right institutions and interest groups, evidence-based information and recommendations can inform national policy and programmes to address the problems facing the people of Bangladesh and beyond.

B8. Presenting new data in the Discussion

The role of the Discussion is to tell the reader what the authors believe the results mean. It is a violation of the standard IMRAD (Introduction, Methods, Results,And Discussion) format to present new data in the Discussion section to support an argument you are trying to make. If the data are important enough to be referenced in the Discussion, then these data should be presented in the Results.

B9. Asserting seasonality with a single year of data

It is an error in scientific inference to assert that a phenomenon that occurs at different frequencies at different times of a single year of observation is due to seasonality. This is an error because it is assumes a pattern when no repetitive pattern has been observed. With only a single year of data and only one rainy season observed, identified cases may have increased during that rainy season because a new strain of the pathogen was introduced into the community, a strain that the community did not have immunity against. The strain may have been introduced during the year of observation during that rainy season, but the following year a new strain might be introduced at a different time of year. We are much less prone to scientific error (and have much more credibility) if we draw conclusions conservatively from our data. Multiple years of data that show a similar pattern provide a stronger case to assert that the variability in the observation over time is associated with seasonal patterns.

So what should we do if we have one year of data and see more cases in the rainy season than in the dry season? It is reasonable in the discussion to note that the cases were more common in the rainy season and that multiple years of data would need to be observed to see if this is a seasonal pattern. It would be an error, however, when referring to a single year of data to describe it as seasonal.

B10. Assuming association is causality

Much of our scientific work involves trying to identify associations between different phenomena. For example, is a particular exposure (drinking raw date palm sap) associated with a particular outcome (developing Nipah virus infection)? When we construct 2 x 2 tables or evaluate if there are different mean values between different groups we are exploring whether there are associations within our data. An important element of our data analysis is to identify important associations within our data.

However, just because we find an association, this does not mean that the exposure caused the outcome. For example, if our analysis shows that people who have a lower income have a higher incidence of tuberculosis compared to people who have a higher income, it would be an error in scientific inference to conclude that low income causes tuberculosis infection. Consider for a moment what mechanism we would be asserting. Does the individual *Mycobacterium* have receptors that only attach to the alveolar cells of persons who have an income less than 5,000 *Taka* per month? Does the individual *Mycobacterium* wait to see how much money someone spends a month before deciding whether or not to infect him? In this example, low income is probably not best thought of as a causal, but rather as an indicator of an environment that puts certain people at risk. For example, people who have low incomes more commonly have poor nutrition and this poor nutrition reduces the capacity of the body to defend itself from an infection from *Mycobacterium*. People with low incomes also tend to live in more crowded settings where it is easier for respiratory diseases to spread from one person to another. Thus, there is an association between wealth and tuberculosis, but the causal mechanism is a deeper underlying mechanism.

There are a number of other reasons that we might find associations between exposures and outcomes in our data. Three common reasons for associations in our data are bias, chance and confounding. There are entire books written on each of these topics and we encourage you to read them. However, when it comes to interpreting your data, any time you see an association, you need to be asking yourself the following questions: What is underlying this association? Is there bias? Could this have arisen by chance? Is this a marker of confounding?

Scientific writing is most persuasive when it invokes a thoughtful, conservative interpretation of association. When discussing an association in the result section, for example, one should never use language that asserts the relationship is causal. In the results you are only presenting the data and identifying associations. The argument that an association is causal is an argument that should consider the potential mechanism of action, and the possibility that the association is a result of bias, chance or confounding. This is an argument that should be made in the discussion section; indeed that often is the major point of the discussion section.

B11. Recommending a massive increase in funding

We live and work in a low income country. When we evaluate a public health problem in the context of Bangladesh, and compare how a similar problem is addressed in a high income country context, it seems reasonable to ask that local government authorities take the same steps to resolve the problem. The difficulty with this practical sounding advice is that Bangladesh government authorities do not have the funds available to them that authorities in high income countries have.

Of course you are concerned about the specific public health problem that is the focus of your paper. However, if everyone working on their area of interest always requests the government to provide more money to replicate what high income countries do, this becomes an impossible agenda for the government to fulfil. Indeed, from the perspective of government decision makers, every sector, including transportation, infrastructure, education, economic development, energy and health, wants more money. While we may passionately believe that allocating more money to the health sector would create a better society, in general, this is not a particularly useful suggestion. The demands on government funds so exceed the available funds, that your recommendation is only one among a never ending chorus of similar requests.

If we cannot make a particular government sector richer, what should we do? As the expert on the topic of the paper you are writing, you need to think about and propose practical suggestions that are cost effective, or even better, that cost no money or save money that is currently being spent. These are the recommendations that are much more likely to be implemented. Identifying practical solutions to problems, or at least pointing out where we can begin to develop practical solutions, is a centrally important way that scientists can improve public health.

B12. An insufficiently focused Introduction

In a standard scientific manuscript the role of the Introduction is very specific: the Introduction is not a mini review of interesting themes within the broader field of your study question. The Introduction is an argument that an author crafts to persuade the reader of the importance of his/her study question. After outlining your Introduction, review each assertion and ensure that it directly contributes to a logical, coherent argument that supports your claim that this study question is important. Remove any other points.

However, sometimes it is necessary to explain the context of the study, or how the present analysis fits within other analyses that have already been published. When this kind of explanation is required so that the reader can understand the overall picture, then it is appropriate to include these points.

B13. Failure to clarify key sample size assumptions

Estimating a reasonable sample size for a study requires that the researcher predict what his/her results will be, and then apply the laws of probability to calculate the number of observations that would be reasonably expected to demonstrate a difference of this magnitude with a low probability that the difference was only due to chance. The most common version of this error, which appears in draft concept notes and protocols, is the failure to specify a predicted outcome, or the failure to explain why the predicted outcome asserted by the scientist is reasonable.

Scientists do not conduct studies when they already know what the results will be. The argument, 'I don't know what the outcome is; that is why I am conducting this study', is not an acceptable reason for the absence of a defensible argument for sample size. If it were an acceptable argument, it would apply to all studies. Estimating a sample size is an exercise similar to making a budget for an activity. We cannot foresee all expenses, but we make a judgment based on prior experience to estimate the costs. Similarly, when calculating sample size we make an estimate of what we think we will find, and explain why we think so. Perhaps there will be studies from other regions that have looked at this phenomenon or a similar phenomenon. You may argue that unless a problem is of a certain magnitude, then either it is not important enough or we accept that we won't have sufficient power to see it. A funding agency will look at the sample size estimate, and ask if the money they are investing is likely to achieve the study objectives. They do not want to overpay, but they want reassurance that their money will not be wasted because the sample size was too small to reach the objectives.

A common variation on this error occurs when the primary study outcome is prevalence. The scientist predicts that the outcome will be 50% because they read in a statistics textbook that estimates near 50% require the largest sample size and so they want to be maximally conservative. This is unreasonable because calculating sample size requires both the outcome variable and a reasonable level of precision. If the estimated prevalence is 50%, then a study that estimates this prevalence $\pm$5% may be reasonable. By contrast if the estimated prevalence is 3 per 10,000 then an estimated prevalence $\pm$5% would be unacceptable.

There is no simple statistical rule that will allow a scientist to assert a sample size by a mechanical process that bypasses estimating an outcome and making a reasoned argument for this judgment. When writing a manuscript, the methods section should clarify the assumptions that the scientists originally made of the study outcomes.

Examples of the error:	Alternative, better options:
× We calculated a sample size of 400 based on 80% power and 95% confidence.	✓ We assume, based on studies of indoor air pollution from cooking (Alam NE 2004, Jones FJ 1997), that children living in villages located within 1 km of brick kilns will be at 30% increased risk of pneumonia compared with children who live in villages > 5 km from brick kilns. If we assume an incidence of pneumonia in this community will be 45 per 100 child years of observation (SE Arifeen 2007) then a sample size of 400 will provide 80% power to detect a difference in groups of 30% at 95% confidence.
× We assume that 50% of the poultry workers (~380) will experience at least one episode of symptomatic illness during the study period.	✓ An earlier study found that 44% of adults in an urban community in Dhaka developed a symptomatic episode of influenza like illness between March and September (MA Azziz 2006). We assume that 44% of poultry workers will experience at least one episode of influenza like illness during 6 months of observations.

C. Mechanics of writing

C1. Using non-standard abbreviations

One of the great barriers to communication is overuse of TLAs. What happens is that you work in a specific area and you are quite comfortable with a TLA. You make it up, or hear others in your project or area use it and pretty soon you are using it. Now when you have a chance you start writing, but instead of words you spout TLAs throughout your manuscript. A TLA is a three letter abbreviation. It is annoying to read a passage that is written in code.

While acronyms mean something to those who use them every day, as soon as a document is shared with outsiders, they become an obstacle to understanding. Writers have a tendency to assume that everyone understands them. This is untrue. One should avoid all acronyms, all the time. Using the replace feature of any word processor, you can remove them from your text. This means more people can understand your writing, including, for example, journal editors and journalists who are not topic experts in your area. An article that can be understood without decoding will be understood by more people. It will have a greater influence on global understanding.

The few exceptions to this rule pertain to acronyms that are so standard that the general population would understand them (e.g., HIV). However, even for these, the acronym should be spelt out the first time it is used in the manuscript. The Editor of the American Journal of Public Health states this succinctly, "We frown on all acronyms but those in universal use." The 'Uniform Requirements for Manuscripts submitted to Biomedical Journals' (www.icmje.org) recommends, 'Avoid abbreviations in the title and the abstract.'

Examples of the error:	**Alternative, better options:**
× The NTCP has not been evaluated.	✓ The National Tuberculosis Control Program (NTCP) has not been evaluated.
× The CSF is scheduled to begin at 12 noon every Monday.	✓ The Centre for Scientific Forum (CSF) is scheduled to begin at 12 noon every Monday.

C2. Using non-standard spaces

Non-standard spacing makes a document quite distracting to read, an irritant that you want to avoid with reviewers and editors. This error is particularly common among authors who draft their manuscripts and justify the text.Perhaps all the squeezing and spreading of spaces required by bilateral justification makes it difficult for the author to see the error. It remains distracting to the reader, and is a reason to align all text to the left. There should also be one space between sentences, not two. Non-standard spacing includes:

1) The absence or too many spaces before or after parentheses.

Example: *To evaluate compliance with current World Health Organization(WHO) guidelines of post-exposure rabies treatment(PET), we interviewed all animal bite victims*. *One-hundred-nine(76%) bites were category III and 33(23%) were category II.*
This is incorrect. There should be a space after 'Organization' and before '(WHO)'. Similarly there should be a space after 'treatment' and before '(PET)'. These should be a space after 'nine' and before '(76%)'. There should be a space after '33' and before '(23%)'.

2) The absence of spaces following a comma.

Example: *I need to read five concept notes,three protocols,and one manuscript.*
This is incorrect. There should be a space after the word notes, and after the word protocols.

3) Inserting more than one space between words.

Example: *Approximately six million people annually undergo post-exposure treatments worldwide, most in low-income countries as a consequence of failure of canine rabies control* programmes *or strategies.*
This is incorrect. There should be only one space after the word *'undergo' and* only one space after the word *'as'.*

4) Inserting a space within a numeral > 1,000

Example: *Field workers collected samples from 12, 456 patients.*
This is incorrect. There should be no space after the comma. The numeral should be written as 12,456.

If this error has been pointed out anywhere in your document, then search your entire document and ensure that there are no non-standard spaces. This is an easy error to check for and correct on any word processor. Use the 'Find and Replace' feature. Search for two spaces and replace them with one. If you click on the replace all button, then this removes all of the double spaces in the document. You may have to repeat this process a couple of times if you also have some triple or larger series of spaces within your document.

Example of the error:	Alternative, better option:
× Iodine deficiency disorders, including goiter,have been reported in northern areas for many years(5). In 1908, a survey estimated that 80% of the population had visible goiters(6).	✓ Iodine deficiency disorders, including goiter, have been reported in northern areas for many years (5). In 1908, a survey estimated that 80% of the population had visible goiters (6).

C3. Improper spelling

Improper spelling is distracting and unnecessary with the advent of spell checking. Be sure to thoroughly spell check any document you ask others to review. In Microsoft Word either click on the ABC icon or under Tools use the Spelling option.

Example of the error:	Alternative, better option:
× Mixture of American and British English.	✓ Harmonize spelling in article. See 'Instructions to Authors' for guidance.

C4. Capitalization problems

1) USING ALL CAPITAL LETTERS

LOOK AT ANY PEER-REVIEWED SCIENTIFIC JOURNAL ARTICLE. IS THE TITLE OF THE ARTICLE WRITTEN IN ALL CAPITAL LETTERS? ARE THE TITLES OF THE TABLES AND FIGURES IN ALL CAPITALS? ARE THE WORDS THAT ARE COLUMN AND ROW HEADINGS IN ALL CAPITALS? THE REASON THAT PORTIONS OF JOURNAL ARTICLES ARE NOT WRITTEN IN ALL CAPITALS IS THAT READING ALL CAPITAL LETTERS IS ANNOYING. INDEED, RESEARCH HAS DEMONSTRATED THAT PEOPLE READ ALL CAPITAL LETTERS MORE SLOWLY THAN STANDARD SENTENCE CASE. THUS, PREPARE YOUR DRAFT IN ACCORDANCE WITH THE STANDARDS OF THE LITERATURE.

Avoid all capitals. If you want to emphasize a divider or a heading, use a larger font or **bold.**

2) Capitalizing non-proper nouns

Although you may commonly use the acronym, IEC, to refer to information, education, and communication, that does not make these words proper nouns requiring capitalization. A proper noun refers to a specific person or place. The Director General of Health or Rajshahi Medical College Hospital, but not, for acquired immune deficiency syndrome (AIDS).

Example of the error:	Alternative, better option:
× In low-income countries, Information, Education and Communication (IEC) should focus on high-risk sexual behaviour.	✓ In low-income countries, information, education and communication (IEC) should focus on high-risk sexual behaviour.

C5. Failure to spell out an isolated numeral < 10

The International Committee of Medical Journal Editors (www.icmje.org) used to suggest that numbers < 10 should be spelled out in the text ('four' instead of 4). However, in their April 2010 guidance, they no longer make this recommendation. Journals have different rules on this. Unless journal copy editors recommend otherwise, we recommend you present numerals if you have a direct comparison or multiple numbers in a sentence, some less than ten and some more than ten, but write out numbers if they stand alone.

Example of the error:	Alternative, better option:
× The field team identified 6 community residents with fever and mental status changes.	✓ The field team identified six community residents with fever and mental status changes.
× Following the intervention, five of the 45 health centres were observed to have adequate practices.	✓ Following the intervention, 5 of the 45 health centres were observed to have adequate practices.

C6. Starting a sentence with a numeral

Example: 43 (56%) individuals tested positive to more than one dengue serotype. 24 of them were reactive to type 1 and 2. Historically many journal and copy editors have considered this incorrect, and not permitted it. However Bob Fontaine, the director of China's Field Epidemiology programme, argues that we should present numbers so they can be easily assimilated and compared. Trying to compare a number that is written out to a number that is numerically presented in the same sentence is an unnecessary chore - much like trying to read material that is in all capitals. If you look in leading scientific journals, e.g., *Lancet* and *Science,* you can find examples of articles with numerals beginning a sentence and numerals less than 10 presented numerically.

What should a writer do? The first goal of a writer is to provide clarity and quick understanding. If it is reasonable to initiate a sentence with a number, then do so. If editors (e.g., CDC) do not permit it, then alternative strategies include:

- Write out the numeral in words.
- Recast the sentence so that it doesn't begin with a numeral, but be careful not to make the sentence too awkward.
- String sentences together with semicolons because the next word following a semicolon does not need to be capitalized, thus numerals are OK.

Examples of the error:	Alternative, better options:
× 50 respondents did not complete the survey.	✓ Fifty respondents did not complete the survey.
× 24 study participants (45%) correctly recalled the health education message that they had received.	✓ Of the respondents, 24 study participants (45%) correctly recalled the health education message that they had received.
× 43 (56%) individuals tested positive to more than one dengue serotype. 24 of them were reactive to type 1 and 2.	✓ Forty-three individuals (56%) tested positive to more than one dengue serotype; 24 were reactive to type 1 and 2.

C7. Not indenting paragraphs

To make it clearer to your readers how your paper is organized into different ideas and/or sections, it is necessary to indicate when one paragraph ends and when another begins. The standard format is to indent the first word of each paragraph one tab width (0.25 – 0.5 inch). An alternative form is to skip a line between paragraphs. If you do skip a line between paragraphs, it is still most appropriate to indent the first word, but is acceptable if you just skip a line. Using either of these formats sends a clear signal to the reader that this is a new paragraph with new information.

C8. Not aligning text to the left

Having your word processor align text to both the left and right margin (justify), distorts the space between letters and makes it more difficult for the reader to read the text. Although it creates a clean look along the left and right side of the page, it makes it difficult to identify spacing errors. Leave such text alignment to the journal editor who will finally format your article. For drafts that you send for review, align all text to the left.

C9. Problems with parentheses

In general, parenthetical phrasing should be avoided in the narrative portion of a manuscript. The major exceptions are to report data or to cite a source that is not appropriately included as an end-note. If you find yourself wanting to use parenthetical structure, take that as a message that you have not yet written your ideas with sufficient clarity.

1) Using parentheses to clarify language.

Incorrect: *Personal harm (physical injury) of a friend was reported by 10%.*

Correct: *Ten percent of students reported that a friend was physically injured.*

2) Putting numbers and percentages in parentheses.

Incorrect:
The majority (n=64, 92%) of women reported associated symptoms.
The majority (64, 92%) of women reported associated symptoms.

Correct: *The majority (64,[92%]) of women reported associated symptoms.*

If you want to include both the number and percentage in a narrative results section, use square brackets around the percentage.

C10. Not using the correct form of the icddr,b logo/acronym

Our acronym is a communications nightmare. It is not simple. It is not easy to understand. It does not fully describe what we do. However, it was the same act of Parliament that internationalized the organization that gave us this name, and since it would require an act of Parliament to change it, we are likely to continue to use it for a long while.

Consider some examples of how the acronym icddr,b is written.

icddr,b

Now, look down at your name tag/badge. Next look at the logo that is applied to the buildings or on any official icddr,b publication.

You will note that each time the acronym is written it is not capitalized. icddr,b should always be written in lower case when it stands alone, or is included in a sentence, even if it is at the beginning of a sentence. This format will make it consistent across all publications. It is also intended to stop readers unpacking it, or spelling it out. As above, the name International Centre for Diarrhoeal Disease Research, Bangladesh does not do the ten Centres within icddr,b justice.

You should also note there is no space between the comma and the letter b. Additionally, you should never to use the acronym of a specific centre next to icddr,b, for example, CCD, icddr,b. In this case, always write out the name of the centre in full.

Examples of the error:	Alternative, better options:
× ICDDR, B	✓ icddr,b
× icddr, b	✓ icddr,b
× CCD, icddr,b	✓ Centre for Communicable Diseases, icddr,b

C11. Misplaced commas in large numbers

The standard placement of commas in numbers greater than 999 in international communication is with a comma after every 3 digits and no spaces between digits or between the comma and the digits. The comma is optional, but it can be particularly helpful to readers to understand numbers especially when they exceed 5 digits. The placement of commas and the use of spaces is often different in the Asian subcontinent, but for scientific writing, or anytime you are writing for an international audience, large numbers should be recorded in standard international form.

Examples of the error:	Alternative, better options:
× 7, 51,842	✓ 751,842
× 51, 00,000 doses of vaccine	✓ 5,100,000 doses of vaccine

D. Grammatical structures and stylistic strategies

D1. Using present rather than past tense

When your work is published it becomes a historical document. Years, even decades, later, people can look back at what you did at that time in that place, and what you learned. The present tense might sound OK to your ear as you are writing your first draft and the project is still ongoing, but after one or two years elapses before your manuscript appears in print, and another couple of years before a reader pulls it out of a MEDLINE search, the present tense will not be correct. Editors will insist on the past tense, so from the beginning draft it in the past tense. Present tense can only be used in the introduction or the discussion to report established facts, e.g., 'Tuberculosis is a leading cause of death among adults in low income countries.'

Examples of the error:	Alternative, better options:
× We enrol every fourth house as part of our study.	✓ We enrolled every fourth house as part of our study.
× Data derived from the Thatta Health System Research Project are used for the study.	✓ We used data derived from the Thatta Health System Research Project for the study.

D2. Failure to use definite and indefinite articles

What is an article? An article modifies a noun. English has two articles: **the** and **a/an**. Bengali, the language of Bangladesh, does not use definite and indefinite articles. This makes it hard for native Bengali speakers to consistently apply them in English.

The is a definite article. It is used to refer to specific or particular nouns. For example, if I say, "Let's read **the** book.", I mean a *specific* book.

A/an are indefinite articles. Indefinite articles modify non-specific or non-particular nouns. For example: If I say, "Let's read **a** book", I mean *any* book, rather than a specific book. If I say, "I would like to go see **an** art exhibit.", I don't have a *specific* art exhibit in mind. There are many art exhibits, and we could be talking about *any* art exhibit.

To find out more about articles go to www.owl.english.purdue.edu.

One error that is very common is illustrated in the following examples. This is an exception to the rules of English, so it must be memorized.

Examples of the error:	Alternative, better options:
× Majority of cases (83%) took advice, while very few (17%) did not consult anybody.	✓ The majority of cases (83%) took advice, while very few (17%) did not consult anybody.
× We reviewed the hospital log book to determine in which sub-districts majority of patients resided.	✓ We reviewed the hospital log book to determine in which sub-districts the majority of patients resided.

D3. Excessive use of passive voice

In general, writing should be composed in the active voice because of the sense of immediacy and conciseness conveyed when the subject of the sentence carries out the action. Fewer words are usually required for the active voice, it is more efficient, and it takes the reader from point A to point B in a 'straight line'. Active voice is closer to normal conversational speech and usually reads easier and with greater clarity. There is nothing inherently wrong with the passive voice, but if you can say the same thing in the active mode, you should do so. Your text will have more impact as a result. In other areas of writing, for example business writing and journalism, active voice is almost universally preferred.

In scientific writing there is now a decreasing use of the passive voice. Passive voice is imprecise. It allows you to write without using personal pronouns or the names of particular researchers as the subjects of sentences. Although it creates the appearance of an objective, fact-based discourse, not limited to or biased by individual perspectives or personal interests, it also gives an impression that the authors are not willing to take responsibility over the data presented. If you are willing to use the word ‘we’, your manuscript will be more readable.

Active example: The *study team administered a questionnaire.*

With active voice the subject does the action of the verb. The study team is the subject. The subject performed the action, administered the questionnaire.

Passive example: *A questionnaire was administered by the study team*.

In passive voice the subject is acted upon. It does not actively perform the verb. The subject is passive. The questionnaire did not do the action of the verb. The questionnaire did not administer. It was acted upon by the verb. It was administered.

When to use passive voice:

The passive voice exists for a reason and using it is not automatically the wrong choice. The passive is particularly useful (even recommended) in two situations:

1) When it is more important to draw our attention to the person or thing acted upon.

Correct passive example: The results of the study will be published in the next issue of the journal.

Instead of writing: *The editor of the journal will publish the results of the study in the next issue.*

2) When the actor in the situation is not important: Passive voice is especially helpful in scientific or technical writing or lab reports, where the process or principle being described is of ultimate importance.

Correct passive example: *The first coat of primer paint was applied immediately after the acid rinse.*

Instead of writing: *I applied the first coat of primer paint immediately after the acid rinse.*

Examples of the error:	**Alternative, better options:**
✗ Every third person was chosen.	✓ We chose every third person.
✗ A sample was selected.	✓ We selected a sample.
✗ Questionnaires were administered by field workers.	✓ Field workers administered the questionnaire.

D4. Improper use of ‘we’

A major advantage of using active voice is that it specifies who did which action. It is important that this attribution of action be correct. A manuscript's authors collectively write the manuscript. When the manuscript uses the word ‘we’ this refers to the authors. Work that is conducted by field workers or other members of the team who are not on the author line, should not be attributed to the authors.

Examples of the error:	Alternative, better options:
× We revisited households three and six months after receiving the filter to assess usage.	✓ Fieldworkers revisited households three and six months after receiving the filter to assess usage.
× We interviewed households at baseline and weekly from August 2005 – September 2006.	✓ Trained enumerators interviewed households at baseline and weekly from August 2005 – September 2006.

D5. Writing from a psychological perspective

Science assumes the external world to be real. Scientific articles describe observations of this external world, and try to integrate them into larger theoretical understanding. What interests or surprises people varies and is more likely due to their own background or transient fads than from valid induction from scientific observations. Thus, when you write letters to your family or articles for the popular press, you can include subjective considerations, e.g., interests, surprises, shock. However, when you are writing a scientific manuscript, you must focus on the ideas relevant to the issues examined in your study, and the consistency of ideas and theories with available evidence.

Examples of the error:	Alternative, better options:
× We were surprised to find that people admitted to using alcohol in a country where its use is restricted.	✓ The proportion of people reporting the use alcohol was substantial despite the prohibition in place in the country.
× Review of cases of nosocomial Lassa fever in Nigeria: the high price of poor medical practice (Title)	✓ A nosocomial outbreak of Lassa fever in Nigeria: Identifying missed prevention opportunities.
× The incremental cost of adding hemophilus influenza type B vaccine to the existing immunization schedules in low income countries may not be as high as imagined.	✓ Adding hemophilus influenza type B vaccine to the existing immunization schedules in low income countries would lead to an incremental cost ranging between XX% and XX% of the national immunization budget. (ref)

E. Achieving clarity and conciseness

E1. Labelling rather than explaining

We love our technical terms. We've studied them; we learn them and now while writing a manuscript we finally have a chance to use them! Right? Well, not exactly. The problem with labelling is that it is shorthand for the full development of an idea, and many people have a different idea of exactly what that shorthand really means. Different people use the same term and read the same term with different interpretation. This makes using these terms a problem if you want clear communication. You should strive to explain exactly what you did. Do not label it. The more specific you are about exactly what you did, the easier it is for someone else to read it and understand it. The three most common labelling issues in papers concern study design, sampling methods and limitations.

Examples of the error:	Alternative, better options:
× For the hospital catchment area survey, we selected 20 unions, using a probability proportional to size sampling approach.	✓ What is a probability proportional to size sampling approach? How could another investigator repeat this? Describe what you actually did.
× The population of the catchment area was projected for 2008 on the basis of the 2001 Bangladesh census using population estimation by component method.	✓ We used the 2001 Bangladesh census considering the annual growth rate of 1.4% (ref). This was estimated using crude birth rate, net external migration and national crude death rate.

E2. Using weak opening phrases for sentences

You should try to use phrases and transitions that move along and develop the central theme of the paper. However, most of the phrases below only reflect the psychological state of either the reader or the writer. Strive to write from the perspective of the ideas you are developing. You are better off having no transition than using such vacuous phrases as the examples below:

Examples of the error:	Alternative, better options:
× It was found out that...	✓ Delete
× One important observation from the findings of this study was that...	✓ Delete
× We conclude from our data…	✓ Delete
× Moreover, our survey showed that...	✓ Delete
× Therefore, this will not be an overstatement that...	✓ Delete
× It is known that...	✓ Delete
× It can be seen from the above table that...	✓ Describe
× The explanation could be that...	✓ Explain

E3. Using adjectives and qualifiers

Adjectives are words that modify a noun. Adjectives often imply substantial subjective and emotional content, both of which should be minimized in conventional scientific writing. For example, what is ‘important’ or ‘large’ to one person, may not be ‘important’ or ‘large’ to another.

Qualifiers are words that modify an adjective, but do not carry a specific meaning, such as ‘very’. The addition of a qualifier adds to the subjectivity, as in ‘very important’. It is better to try to chose the best adjective, and provide justification of its use, and not to use a qualifier.

Examples of the error:	Alternative, better options:
× The difference was highly significant.	✓ The difference was significant (OR = 2.33, 95% CI, 2-4).
× This was a very large outbreak.	✓ This outbreak affected 300 school children.
× The incidence was much higher in children < 5.	✓ The incidence in children < 5 exceeded incidence in other age groups by six times.

E4. Overusing studies or authors as sentence subjects

The subject of the sentence should not be the study, or the study's author, or where this external work was done, but the core ideas you are presenting. The use of a study or a study's author as the subject of a sentence distracts the reader from the main idea that links to the author's own study. In scientific writing, the ideas and observations referenced from other studies are central to the argument. The structure of your sentences should reflect this underlying structure and hierarchy, while the ideas you present flow one into another logically and persuasively.

Example of the error:	Alternative, better option:
× A study by Yoruba in Tanzania suggested that 78% of the clients who presented to traditional healers were females, 95% of who were illiterate and of a low socio-economic group (ref).	✓ Demographic parameters are important as they may influence health seeking behaviour; a study in Tanzania found that educated mothers were more likely not to follow traditional healing practices (ref).

E5. Using non-descriptive numeric or alphabetical labels

Study teams commonly develop some study specific vocabulary (e.g. Group 1 and Group 2, Phase 1 and Phase 2). The study team becomes so familiar with these labels that denote meaningful differences to them that they use these labels in everyday conversation. It is not surprising then, that when team members start writing about the study, they use these same labels.
However, such labels are inappropriate for a scientific document. Such non-descriptive numeric or alphabetic labels require your readers to learn your private code, which is useless information not applicable to any other manuscript they will ever read. You want to make your paper as easy to understand as possible. Use descriptive labels for each group.

Examples of the error:	Alternative, better options:
× At baseline, group 1 participants were somewhat less likely to own a television than group 2.	✓ At baseline, participants enrolled from Tongi were less likely to own a television than participants enrolled from Narshindi.
× Group 1 consisted of formal health care providers and Group 2 consisted of informal providers.	✓ The formal health providers had a higher education level than the informal health providers.
× Category A symptoms included cough and difficulty breathing, while category B symptoms included diarrhoea and vomiting.	✓ Respiratory symptoms included cough and difficulty breathing. Gastrointestinal symptoms included diarrhoea and vomiting.

E6. Using respectively

Avoid the respectively structure. It forces reader to go backwards and re-read to mentally connect the pieces. It is an extra effort and breaks the reader's flow of understanding your message. You want to make it easy for them to read from the beginning to the end.

Examples of the error:	Alternative, better options:
× Of the Plasmodium positive children, 17 (4%) and 9 (2%) were positive for P. falciparum, and P. vivax respectively.	✓ Of the smear positive children 17 (4%) had P. falciparum and 9 (2%) had P. vivax.
× Attack rates for any post-operative infection between the suspected outbreak period January - December 1996 and for comparison period June - December 1995 were 14% (10/72) and 6% (2/31) respectively.	✓ The attack rate for any post-operative infection between the suspected outbreak period January to December 1996 was 14% (10/72) compared to 6% (2/31) between June and December 1995.

E7. Using the word etcetera

Scientific writing is characterized by precision. ‘Etcetera’ is not specific. This imprecision suggests that the author’s ideas have not been fully formulated or have not been fully thought through. ‘Etcetera’ should never appear in a scientific concept paper, protocol or manuscript.

Example of the error:	Alternative, better option:
× Medical costs in the hospital included admission fees, bed rent, diagnostic tests, medicine, consultation fees, etc. Non-medical costs included travel, food, tips, etc.	✓ Medical costs in the hospital included admission fees, bed rent, diagnostic tests, medicine and consultation fees. Non-medical costs included travel, food, and tips.

E8. Using Bangla as an English word

*Bangla** is not an English word. The English language word for the language spoken in Bangladesh is Bengali (not italicized). When writing about questionnaires in Latin America, scientists do not use the Spanish word for the Spanish language (*español*). They do not write that the questionnaires were translated into *español*. Instead, they write that the questionnaires were translated into Spanish. Similarly, when writing in English about work in Bangladesh, we should describe the local language as Bengali.

* Note that words from other languages used in an English scientific report should be *italicized.*

E9. Using local words, expressions or monetary figures

Most scientific manuscripts are designed to be a form of international communication. If the writer uses words and expressions that are specific to the country where the work was conducted, this information might not be communicated correctly to the reader. The information might not mean anything, or it might mean something entirely different to readers in other countries. For example, to a reader from North America a ‘block’ will suggest a group of houses located between four streets in a city and not an administrative division. A *gachi* will not be recognized as a date palm sap harvester. A *Taka* will not have much significance outside of Bangladesh and most readers outside of the subcontinent will not know the exchange rate between a local currency and their own. If you want your scientific manuscript to be clearer, though admittedly at some sacrifice to national identity and ethnicity, report the information in terms of internationally recognized definitions.

For monetary information, report the figure in a major international currency (US dollar, Japanese yen or Euro). At the very least you need to put an appropriate conversion (the one prevailing at the time data was collected) between the local currency and an international currency, so that persons reading it can figure out how much money that is by local and international standards.

Examples of the error:	Alternative, better options:
× We conducted a case control study in two *upazilas* in Rajshahi district.	✓ We conducted a case control study in two sub-districts (*upazilas*) in Rajshahi district.
× The cost per fully treated patient was 500 *taka.*	✓ Provide equivalent in US$ and mention in the Methods section the exchange rate that was used.

E10. Using the term 'developing country'

The term 'developing country' is non-standard, imprecise and inaccurate. All countries are developing. Japan is a different country in 2010 than it was in 2005. It has higher income and a greater number of internet connections. It is developing. Japan will look different in 2030 than it does today. It will develop further. There is no standard definition of what constitutes a developing country.
In contrast, the World Bank has clear standards for characterizing low income countries. There is an accepted definition for country classification and using the criteria of gross national income (GNI) is meaningful. For more information see www.worldbank.org under Data and Statistics. In scientific manuscripts we should refer to Bangladesh as a low-income country.

E11. Using the term 'socio-economic status' as a synonym for wealth

When referring to income or poverty/wealth among persons, households or communities, many writers mistakenly use the term socio-economic status. If the available measurements are strictly measurements of wealth or income, e.g., household assets, then use terms that refer to this more narrow concept precisely, e.g., wealth, income, or poverty level. Socio-economic status and wealth are not synonyms. The concept of socio-economic status captures more than just wealth. It refers to income, education, and profession, and also includes the idea of social class. Restrict the use of the term socio-economic status only when the available data supports this broader conceptualization.

E12. Using the term 'random' in its non-technical sense

The term 'random' has a very specific technical meaning within public health. Random selection implies that the entire population is enumerated and that a process, for example a lottery or a random number generator, can be used to select individuals from among the entire population. In a scientific manuscript the word 'random' should only be used within this specific context. In common speech the word 'random' is often used as a synonym for 'haphazard'. For example, "I was walking down the street and selected a restaurant for lunch at random." To a scientist, this was not random selection of a restaurant. Rather the choice of lunch location was based on convenience.

Example of the error:	Alternative, better option:
× In-depth interviews were conducted with 10 randomly selected key informants working there.	✓ We conducted in-depth interviews among 10 key informants we identified working in these communities.

E13. Using the verb 'documented'

The word 'document' is a noun. English often turns nouns into verbs, but not always with good results. To 'document' means to make a document, that is to write something down. So if I write down on a piece of paper the phrase, 'the earth is flat', then, strictly speaking, I have documented that the earth is flat. Creating a document is unrelated to the validity of an assertion. Therefore, we should not use this verb to communicate scientific validity of a statement.

Example of the error:	Alternative, better option:
× Studies in Bangladesh, India and Malaysia also documented neutralizing antibodies against Nipah virus in *Pteropus* bats.	✓ Studies in Bangladesh, India and Malaysia also identified neutralizing antibodies against Nipah virus in *Pteropus* bats.

E14. Framing an argument in terms of need

Quite often arguments in draft scientific papers are framed in terms of needs. The underlying message is that we 'need' to do something. Usually the authors are asking the reader, the government or society more generally to care about the issue in the same way that the authors care about the issue and follow the specific advice of the authors.

It is reasonable to talk about a need for water, oxygen, and food for survival, but it is a much less appropriate use of the language in a scientific manuscript to talk about a need for health-care reform or a need for social change. The problem with this language is that it disguises the goals and aspirations of the authors in terms of a need, when the issue of what constitutes a legitimate need is an open question for individuals, for society and for science.

Scientific writing is most persuasive when it demonstrates the connection between a set of conditions and consequences. Rather than framing arguments in terms of needs, the same ideas should be described as steps that are required to achieve a particular outcome. Importantly, the outcome should be specifically stated.

Examples of the error:	Alternative, better options:
× There is a need to standardize and expedite the assignment of causes of death, thereby enhancing a timely process of appropriate decision-making.	✓ If the assignment of causes of death could be standardized, appropriate decision-making based on these data could be expedited.
× A low-cost, accurate approach to characterize handwashing behaviour is needed.	✓ A low-cost, accurate approach to characterize handwashing behaviour would improve the assessment of handwashing promotion programs.

E15. Using the term ‘illiterate’ as a synonym for ‘no formal education’

We frequently see studies that asked respondents about their years of formal education and then the findings state, ‘The respondents were illiterate’. Although we often use the word ‘illiterate’ as a synonym for ‘no formal education’, these terms are not synonymous. Literacy is generally evaluated by asking people if they can read or write, and is validated by specific literacy tests. People may have attended school for any number of years and still not be able to read or write. What we really are reporting is that because they have had so few years of formal education they probably cannot read. The term ‘illiterate’ also tends to be used in a condescending manner, and is the subjective type of language we want to avoid in scientific writing.

Examples of the error:	**Alternative, better options:**
✗ The age range of programme beneficiaries was 18–65 years old and over 25% who took part in activities were illiterate.	✓ The age range of programme beneficiaries was 18–65 years old and over 25% who took part in activities had less than 4 years of schooling.
✗ Educated mothers were 2.3 times more likely to wash hands at key times than illiterate mothers.	✓ Educated mothers were 2.3 times more likely to wash hands at key times than those with no schooling.

E16. Using the word ‘challenging’ as a synonym for ‘difficult’

We often use the word difficult to describe public health problems or solutions. The word difficult means that the problem or solution is not simple or easy. However, when substituting the word challenging for difficult, the implication is that by engaging in this issue we are somehow tested, and that something about ourselves, our capacity to take on new issues and to grow to address these issues, is revealed. When a situation is difficult, motivational coaches encourage us to see this difficulty as a personal challenge, so that we can strive to overcome it.

This implicit motivational jargon is out of place in scientific writing that values precise description. The substitution of challenging as a synonym for difficult is so overused, that it sounds insincere. It is the kind of language we associate with hucksters selling products on late night infomercials. If the situation is difficult, then call it difficult. If you want to challenge a group, in an editorial or in the discussion section, then do so explicitly. (If you disagree vehemently with this advice, we recommend that you consider it a challenge to write without using the word challenging.)

Examples of the error:	**Alternative, better options:**
✗ We will explore challenges in implementation, as well as find out what factors motivate children.	✓ We will explore difficulties in implementation, as well as find out what factors motivate children.
✗ In these impoverished contexts, changing child feeding behaviour is challenging.	✓ Poverty is a major barrier to improving child feeding behaviour.

E17. Describing a laboratory test result as positive

Scientific communication is characterized by specificity and nuance. It avoids unqualified generalizations. Scientific thinking eschews narrow dichotomies, such as stating that an intervention was a success or failure. Instead, a scientific approach is more likely to identify aspects that achieved objectives, and aspects that did not.

Scientific writing should bring this framework to our description of laboratory results. No laboratory test is ever 100% sensitive and 100% specific. A laboratory test provides additional information that scientists can interpret. When describing laboratory results, use sufficient specificity so that readers can interpret the meaning without having to jump back to the methods section to review which laboratory tests were conducted and how they were interpreted.

Examples of the error:	**Alternative, better options:**
× Out of 23 samples tested for different respiratory viruses, 21 were positive for respiratory syncitial virus.	✓ Out of 23 samples tested for different respiratory viruses, 21 had detectable RNA for respiratory syncitial virus.
× From the surveillance database, we identified 209 influenza positive patients during May to October, 2010.	✓ From the surveillance database, we identified 209 laboratory confirmed influenza patients during May to October, 2010.
× Among the 123 people tested six were positive for Nipah.	✓ Among the 123 people tested, six had IgM antibodies against Nipah virus.

E18. Using the term 'reliable' in its non-technical sense

The term 'reliable' has a specific technical scientific meaning that is somewhat different than its meaning in more common speech. Within science 'reliability' refers to whether the repeated measurements of the same phenomenon are similar. A blood test is reliable if it provides the same result on repeated testing of the same sample. The synonym for 'reliability' in this technical sense is 'repeatability'. To avoid confusing your scientific reader, the words 'reliable' and 'reliability' should only be used in their strict technical sense in any scientific document.

Example of the error:	**Alternative, better option:**
× The self-reported data may not be reliable.	✓ The self-reported data may not be valid.
× The direct observations were conducted to cross check the responses and ensure reliability of the data collected in the self administered survey.	✓ We cross checked the findings from the self administered survey by comparing them with results from direct observation.

F. Recording scientific data

F1. Using statistics in place of the study question to frame results

We become so enamoured with the output of our statistical programmes and our statistical understanding that we sometimes sound like a STATA output. You know you are making this mistake when words like 'association', 'analysis', or 'relationship' are the subject of a sentence. The point of analysis of public health data is not mathematical findings, but what these results mean in terms of the lives and health of people. The statistical analysis is a means to an end and the results should be expressed and communicated with other health professionals in terms of the research question.

Examples of the error:	Alternative, better options:
× Father's literacy was associated with child working as helper in specific skilled services (p=.007).	✓ Children whose fathers were educated were more likely to work in skilled jobs than children of uneducated fathers. (xx% vs., yy%, p =.007).
× In simple regression analysis, education and pregnancy status had significant relationship, while language and counselled by a physician had significant relationship on being screened.	✓ Women who were educated, who spoke Hindi, and who benefited from counselling from a physician, were more likely to consent to the screening test.
× The analysis of association among the independent variables showed that there is an association between the main exposure variable (Distgrp2) and the costgrp and between costgrp and the duration of disease (Durdgrp2).	✓ Cannot be reworded because the results are encoded. The reviewer is required to flip through the report and try to recall what the variable names mean.

F2. Not presenting the raw data

It is crucial that readers be able to evaluate your data. They don't want to just read your conclusions, they want to look at the data and draw their own conclusions. This is the essence of science; reflective consideration of empiric observations. The document must present the data in a way that allows the reader to form an independent opinion as to whether the data were analyzed properly. As a matter of transparency, the reader should always be able to re-do the key calculations. Thus, basic frequencies, rates or means comparing groups on your central findings, are crucial.

A common variant of this error is when comparison between groups is presented. In its most extreme form the measure of association are omitted entirely. Only a p-value is presented. P-values tell you whether or not the results are likely to be due to a random error in the selection of an unrepresentative study population, but because they conflate the size of the effect and the size of the sample they do not communicate clearly the magnitude of the effect. A p-value is never your most important finding. If you have measured an effect between an exposure and an outcome then what you need to do is to present that effect. The fact that the effect is 'statistically significant' is much less important than the study's estimate of the measure of the effect.

If you find a 'statistically significant' result, ask yourself is this the result of bias? Is there a biological/public health meaning in the result?

Examples of the error:	Alternative, better options:
× Most subjects (XX%) were not aware of ….	✓ Of XXX subjects, XX (XX%) were not aware of…. [Always show numerators and denominators in the calculation of proportions].
× There was a significant difference in the proportion of case-patients and control-subjects who reported eating the potato salad (p=0.0001).	✓ Of the XX case-patients, XX (XX%) reported eating the potato salad compared with XX of the XXX control-subjects (XX%, p=0.0001).
× Proportions only in the tables	✓ Always provide numerators and denominators.

F3. Using too many decimal places

When the results of a study are presented with an excessive number of decimals, communication between the writer and the reader is impaired. The extra digits distract the reader from the message and usually add no significant meaning. Another reason to avoid presenting too many decimal places is because it implies a precision that the data generally lack.

This error is most commonly seen with percentages. Data are presented as percents, e.g., 39%, rather than as frequencies e.g., 321/815, so that it is easier to remember and compare one group or scenario to another. Although ten thousand decimal places is a more precise report of the percentage, it is also burdensome to the reader. For example, if 13 of 17 enrolled study subjects have a particular characteristic, this can be reported as 76%, 76.5%, 76.47%, 76.461%, 76.46706....in fact, with a powerful enough calculating programme you could report thousands or millions of decimal places.

However, after reporting percents to one or two decimal places, the numbers are no longer easy to remember and compare. Active readers who want to understand the meaning of your scientific writing will often compare reported numbers to each other. It is much easier for readers to compare numbers and to perform mental arithmetic on rounded numbers. Thus, wherever possible, note percentages without decimal places. Only if the percentage is less than 10, and the figures beyond the decimal point have public health significance, then it might be reasonable to include them.

Similarly, when people report relative risk or confidence intervals they are often reported to two decimal places. For example, the statement that people who ate goat curry were three times more likely to become ill than persons who did not (Relative risk of 3.24, 95% Confidence Interval CI=0.74-12.99, p value=.143). Can your investigation reliably estimate the relative risk and the confidence interval to 2 decimal places? Almost certainly not! If you don't think they do, then you should not imply that level of precision by reporting the extra decimal places.

One rule of thumb for confidence intervals for odds ratio is that they should not have more than two meaningful figures. Whether or not these figures are decimals or not depends upon where the odds ratio fit on a log scale. Remember that the odds ratios for 'protective exposures' and 'risk factors' are symmetrical around the number one on a log scale. Thus, reporting an odds ratio of 243 represents the same amount of precision as an odds ratio of 24.3, an odds ratio of 2.43 and an odds ratio of 0.243. Thus, try to round up (add or subtract digits) so that you always display two meaningful figures, e.g., 24, 2.4, or .24.

Examples of the error:	Alternative, better options:
× The prevalence of active trachoma was 21.01% (95% confidence interval: 6.23-36.77%).	✓ The prevalence of active trachoma was 21% (95% confidence interval: 6.2-37%).
× People who ate goat curry were three times more likely to become ill than people who did not (Relative risk of 3.24, 95% confidence interval CI=0.74-12.99 p value=0.143).	✓ People who ate goat curry were three times more likely to become ill than people who did not (Relative risk of 3.2, 95% confidence interval CI=0.74-13, p value=0.15).

F4. Using too few decimal places

In the enthusiasm to avoid using too many decimal places, occasionally authors present too few. In most contexts you want to communicate two digits of numerical information. (25% is two digits. $1.2 million is two digits). As noted above in reporting a percentage greater than 10, adding a third digit, a decimal place, is generally distracting and uninformative. However, if you are reporting an odds ratio or other relevant small number then it is important to communicate two digits of information (2.1 or 0.63), even if one or more of these digits are decimal places.

Count digits, not decimal places!

Examples of the error:	Alternative, better options:
× Children whose mothers completed primary education were less likely to be hospitalized for diarrhoea (odds ratio 0.6, 95% confidence interval 0.4, 0.8).	✓ Children whose mothers completed primary education were less likely to be hospitalized for diarrhoea (odds ratio 0.57, 95% confidence interval 0.42, 0.77).
× Ambulatory case-patients spent a median of US$2 (IQR=$1–4) in the public hospitals.	✓ Ambulatory case-patients spent a median of US$1.8 (IQR=$1.1–3.6) in the public hospitals.

F5. Using incomplete headings for tables and figures

In a manuscript the figures and tables must stand alone. A reader should be able to look at the table or figure, read the title, and understand it. It should not be necessary to refer to the text to understand the table or the figures. Thus a typical heading will need to include person, place, and time characteristics. The number of study subjects and statistical methodology need to be clear. You may need to use footnotes to explain apparent discrepancies or other issues in the table/figure.

However, for oral presentations, brief titles for tables and figures are fine.

Examples of the error:	Alternative, better options:
× Figure X: Epicurve of the measles outbreak.	✓ Figure X: Cases of measles by date of onset, Chennai city, Tamil Nadu, November 2004.
× Table X: Risk factors associated with illness, univariate analysis.	✓ Table X: Characteristics of meningitis case-patients and control subjects, Kano city, Nigeria, March 1996.

F6. Imbalance between table and narrative presentation of the results

<u>a) Too little narrative</u>
Just as tables, figures and graphs should stand on their own and not require accompanying text, the narrative section of the results should stand alone. A reader should be able to read only the narrative text, not look at any of the figures or tables, and come away with a clear understanding of the important findings from the analysis. This error most commonly takes the form of several well constructed tables being presented in the results section with only a sentence or two in the narrative results section pointing to each table. The results section should not repeat all the data that is in a table, but rather should focus the reader on the highlights. Look at several quality journal articles related to your research question and note the balance between what is presented in the narrative text and what is presented in the tables. Strive for a similar balance.

b) <u>Too much narrative</u>
The other side of this error is when the narrative goes on and on, often through several paragraphs citing innumerable, often minor, comparisons within the table that do not address the core issue of the manuscript. One of the responsibilities of the analyst is to reduce data so it is more easily understandable to the reader. As an example of scientific writing style, *The Lancet* does not permit authors to mention any numbers in the narrative that are already presented in the table. The idea is that the narrative is used to highlight the core ideas or patterns that can be seen from the data presented in the table. Most scientific writing need not invoke *The Lancet's* standard of no repetition of data, but the role of the narrative in the results section of scientific writing should be more summary and perspective, and less repetition of data that is more easily seen and compared in a well constructed table.

Example of the error:	**Alternative, better option:**
× Of all the food items, only the vanilla ice cream was associated with illness (Table X).	✓ The risk of illness was estimated according to consumption of each of the eight menu items that were served at the lunch (Table X). Eating vanilla ice cream was the only exposure that was significantly associated with illness (relative risk: 8.6, p=0.001) and that accounted for the majority of cases (population attributable fraction: 86%).

F7. Pointing too explicitly to tables and figures

In your results section if the words 'Table 1' or 'Figure 2' are the subject of a sentence, you have likely committed this error. The whole paper should be organized around the central ideas you want to communicate and that you want the reader to focus on. Thus, lead with your findings, and compose your language around those findings and related ideas, rather than around structures, i.e., pages, tables, or figures.

Examples of the error:	**Alternative, better options:**
× Table 1 describes the forms in which areca nut was used.	✓ Sweetened varieties of areca nut were most the most popular (Table 1).

Examples of the error:	Alternative, better options:
× Figure X presents the age and sex distribution of our sample and of the general population of the district.	✓ The age and sex structure of our sample did not differ from the age and sex structure of the population obtained from the latest census (Figure X).

F8. Using inappropriate figures

Edward Tufte has argued that figures for scientific manuscripts should be evaluated using a data to ink ratio, e.g., the amount of data that can be presented with the least amount of ink. Excessive ink-to-data ratio in figures mean they include unnecessary axis, gridlines, borders, 3-D effects and other elements that do not add anything, and make the figures less understandable. This is also known as Computer graphics or PowerPoint disease.

Space is always at a premium for journal editors, who look at this more from the angle of data to space ratio. Both pie charts, and simple frequencies presented as bar charts, are inefficient. It is reasonable to assume that the reader of a scientific manuscript understands the difference between 20% and 40% and so does not need it demonstrated by comparing relative widths of a pie or relative heights of a bar. A simple table can efficiently present proportions.

Thus, each figure needs to fill an essential role. Figures are best used in two situations:

1) When they permit you to present a large amount of data in a way that is revealing about underlying characteristics of the distribution. For example, scatter-plots that show trends.
2) When they communicate in a more effective and efficient visual format than could be done with a narrative description or a table, e.g., a figure that presents multiple components of a phenomenon, such as different age trends by sex.

F9. Using the wrong symbol to designate degree

Wrong example: 4 ^{0}C or 4 oC Correct example: 4°C.

To make the degree symbol use the insert symbol feature of Word, select a circle (i.e., not the letter ‘o’ or the number zero) and then make the circle superscript.

Newer versions of MS Word, now even include a degree symbol. Go to Insert, then Symbol to find the figure. Or a shortcut on MS Word Version 2007 is to press the Alt key, then 248 on the number pad. For MS Word Version 2003 press the Alt key, then the @ key, then the space key.

F10. Using non-standard footnote symbols in tables

Footnotes contribute important explanations to data presented in tables. They are useful to clarify analytic approach, groups being compared, statistical significance and other explanatory information. The International Committee of Medical Journal Editors (www.icmje.org) specifies the symbols and their sequence for footnotes.

*, †, ‡, §, ||, ¶, **, ††, ‡‡, §§, ||||, ¶¶, etc.

Do not use other symbols or other sequences unless the journal recommends them (e.g., PLoS Med uses a, b, c, d, . . .).

You can find these symbols using the insert symbol feature of Microsoft Word. Note that these symbols should be in superscript.

F11. Comparing to a varying baseline

We often analyze data where observations are grouped into multiple levels of exposure. In the example below we have categorized observed handwashing behaviour into mutually exclusive categories:

Handwashing after defecation	Group A		Group B		Odds ratio	
	Number	%	Number	%	Varying baseline	Reference group
No handwashing	75	12	150	19	0.6	--
Washed one hand with water alone	150	23	150	19	1.3	2.0
Washed both hands with water alone	**125**	**19**	**150**	**19**	**1.0**	**1.7**
Washed one hand with soap	150	23	100	13	2.1	3.0
Washed both hands with soap	150	23	200	25	0.9	1.5
Total	650		750			

The common error is to compare the prevalence of each level of the variable in group A to the prevalence of the same level of the variable in group B. Thus if we compare the prevalence of washing both hands with water alone, the prevalence is the same (19%) in group A and group B, so we could say that people in group A and B are equally likely to wash both hands with water alone, which is equivalent to an odds ratio of 1.0.

The problem with this comparison is that the people who are not washing both hands with water alone are quite a heterogeneous group. Some of them are practicing less intense handwashing (not washing their hands at all or only washing one hand) and others are practicing more intense handwashing. Indeed, even if we have an elevated odds ratio with such a comparison it is difficult to interpret, because we don't know if this elevation results from a difference in more intense or less intense handwashing.

The standard approach to resolve this dilemma is to arrange the exposure level into a mutually exclusive hierarchy. Set the lowest level of exposure as the baseline and then consider the 2 x 2 table comparing each level of exposure to the baseline. Using this approach illustrated in the final column, we can conclude that compared with Group B, Group A is more likely to wash one hand with water rather than not washing at all.

F12. Generic data tables that lack a clear message

There is no single standard format to present data in tables. Tables are an integral element of the broad scientific argument that you compose through your manuscript. Tables should be organized based on the communication objective of the article. Thus, the first step in drafting a table is to identify the communication objective for the table. Examples might be to describe the baseline characteristics of the population, to compare the outcome of a group who received an intervention with the outcome in a non-intervention group, or to compare the characteristics and exposures of persons who became ill with persons who remained well.

Having identified the communication objective of the table, you then construct the table so that the message comes through clearly. The patterns in the data which you are striving to illustrate should be obvious at a glance, or at least should be obvious once they have been pointed out by the narrative description in the results section of the manuscript (Ehrenberg ASC, J. R. Statist Soc. A, (1977), 140, Part 3, pp. 277-297). Just like narrative scientific writing, expect that you will have to develop and revise tables through several drafts.

F13. Table layout that impairs comparisons*

An advantage of presenting data in tables, rather than in a narrative paragraph, is that by clearly aligning figures different groups and different characteristics can be readily compared. Numbers are easier to compare reading down columns than across rows especially for larger numbers of items. Such comparisons are often the central communication objective of a table. To facilitate comparison avoid:

- Columns that are too wide. This makes it difficult to compare data between columns. One common form of this error is to set the width of the table column based on the length of the column heading, rather than on optimizing column width to permit comparison of data.

- Ordering data haphazardly. Rather than presenting characteristics in the table in alphabetical order, or in the order they were asked in the questionnaire, consider the easiest way for the reader to understand the information. Ordering characteristics from smallest to largest or largest to smallest is an intuitive approach that helps the reader to quickly and easily understand.

- Poorly aligned data that impedes comparison. Align data and decimals so that a vertical list is readily comparable.

<table>
<tr><th>Hard to compare</th><th>Easier</th><th>Still Easier</th></tr>
<tr><td>23 42 34 109 87 42 27 98 114 75</td><td align="right">23
42
34
109
87
42
27
98
114
75</td><td align="right">23
27
34
42
42
75
87
98
109
114</td></tr>
</table>

***These examples and much of the text was contributed by Robert Fontaine with help from Ehrenberg ASC, J. R. Statist Soc. A, (1977), 140, Part 3, pp. 277-297.)

Use the table layout effectively to help the viewer -- place numbers for comparison close together

Year	Both Sexes	Male	Female
1973	600	500	99
1970	670	580	87
1968	550	460	89
1966	330	260	71

Draw columns and rows close together

Year	Both Sexes	Male	Female
1973	600	500	99
1970	670	580	87
1968	550	460	89
1966	330	260	71

Move and minimize intervening numbers

	Rate per 1000 (SE)					
Year	Male		Female		All	
1993	83	(2.3)	78	(2.2)	80	(1.9)
1994	62	(2.5)	66	(2.7)	63	(1.8)
1995	58	(2.1)	54	(2.0)	56	(1.7)
1996	55	(2.0)	45	(2.0)	51	(1.7)

Remove intervening numbers entirely if consequence minimal

	Rate per 1000[a]		
Year	M	F	All
1993	83	78	80
1994	62	66	63
1995	58	54	56
1996	55	45	51

a. Standard errors for all rates less than 5% of rate.

Organize data by magnitude

Exposure	1000 Cases	Rate	Rate Ratio	p
A	11	2.9	1.3	> 0.10
B	6	9.9	4.3	< 0.001
C	34	5.4	2.3	> 0.1
None	27	2.3	1.0	Ref*

a = p-value
b = reference exposure category

Organize data by magnitude

Exposure	1000 Cases	Rate	Rate Ratio	p[a]
B	6	9.9	4.3	< 0.01
C	34	5.4	2.3	< 0.05
A	11	2.9	1.3	> 0.001
None	27	2.3	1.0	Ref[b]

a. = p-value
b. = reference exposure category

G. Approaching publication

G1. Failure to respond to reviewers' comments

One of the biggest errors that a researcher can make is ignoring advice given in the previous reviewed draft. As the first author, it is your paper and you have the right to decide what goes in it and what does not. Having said that, you must respond to every issue raised by a reviewer. It is acceptable to reject the advice offered by a reviewer. Indeed, it is important to reject inappropriate or unsound advice. In a scientific environment, reviewers fully expect that some of their advice will be rejected. However, if you choose to reject the advice of a reviewer or a co-author, you need to defend that decision when you submit the next draft.

To address every point raised by a reviewer, either change the manuscript accordingly, or explain in a separate note the issues you chose not to change and defend why you chose not to change them. If you simply ignore the advice you will just get the same comments from the reviewer again. The paper does not develop further, and both reviewer and author feel like they are wasting time. Often the situation is a problem with written communication. The reviewer doesn't understand something that the author has done. This can be an important clue that you need to add something to your writing to make it understandable. At other times some language needs to be changed to clarify the point. The key is to respond to every issue raised by a reviewer. Be prepared to write and rewrite before and after submission to a journal.

Responding to internal primary reviewers and co-authors: How-to tips

Remember it normally takes 10 working days to get all the reviewers' comments. Read all reviewers' comments carefully before starting to revise to get an overall picture of how others interpreted your paper. Sometimes reviewers 'double-up' on a manuscript and add multiple comments, or sometimes comments are all on individual copies. How can you manage this? Make hard copies of all comments and after reading them thoroughly start from the beginning making changes on a newly named file (Abbreviated Title, Draft 2 Oct 12). Or use two monitors, one with newly named file and the other with all copies opened, ready to pull up and incorporate into the new draft.

Remember, not all comments may be useful or even correct. You, as first author, need to make the decision about what comments to accept and what to revise. If there is a major comment that you do not agree with, you should explain why by either inserting a comment (using track changes), or by stating the reason in the accompanying email.

Responding to editors' and external reviewers' comments: How-to tips

After you submit your manuscript to a journal, the editor will make a decision on whether the article is of interest to the journal or not. Many articles are rejected by the editor after his/her personal review or other in-house review. If after internal review, the editor is interested in the manuscript, then he/she will send it out for an expert peer review. Each review will be a critique that includes an overall evaluation and a list of specific items that need improving. Based on the reviews, the editor's letter will put your paper into one of three categories:

- The manuscript is accepted, pending specified changes.
- The manuscript requires revision and then the editor will review it again.
- The manuscript is rejected.

First, take time to read the all the reviews carefully and completely. Understand, in a holistic way, where the weak parts of your paper have been found. Then begin revising. You will need to resubmit:

- A cover letter that summarizes the changes you made in your manuscript.
- A separate response to each itemized comment.
- Two versions of the manuscript: a marked up version that reflects all the changes you've made, and a clean version.

In the cover letter addressed to the editor, you will briefly describe the changes you have made, both those that were prompted by the reviewers and others that you have added during your review.

Make a copy of the itemized comments, and then draft a document that details the response to each of the comments raised by the reviewer. If a comment is acceptable and seems to make your paper stronger, make the change in the actual manuscript using track changes, and then describe this change under the comment, stating the page number and possibly the sub-heading where this can be verified. If a comment is not acceptable, be polite and professional in tone (even if you think the reviewer is not), while defending your rationale thoroughly.

The task of responding to comments is not to provide a minimalist justification why you wrote what you wrote. Instead the task is to demonstrate to both the editor and the reviewer that you fully understand the critique and the implication of the critique for your paper. If the reviewer raises a meaningful issue, you need to respond to that critique and revise the manuscript so that other readers do not face similar questions and confusion. Indeed, this is a great benefit of having your work undergo peer review. We should not lament that 'the reviewer did not understand our work. If the reviewer did not understand, we should take this as a signal that our message was not written clearly enough to be readily understood, and consider what changes we can make to the paper so that future readers will not suffer the same misunderstanding.

Make clear in the document you draft responding to the reviewers' comments what changes you made in the manuscript as a response to the comment. If you only respond to the reviewers' criticism, but don't change the manuscript many future readers will likely have the same unanswered question or criticism. If you change the manuscript, but don't make it clear in the cover letter that you made these changes, then the editor has to go point by point and try to figure out what you changed and what you didn't change. This is a painstaking, annoying and frustrating task. If you want your manuscript to be accepted, avoid annoying and frustrating the editor. Demonstrate to the editor that you have thoroughly considered and responded to each of these issues. Make it easy for the editor to accept your work.

It is completely acceptable, indeed expected, to disagree at times with some points made by a reviewer, but such disagreement must be framed within the context of a full understanding of their critique. The editor will review this response carefully, and may ask the reviewer(s) to look again at the manuscript and your responses.

G2. Invalid authorship line

The authorship line can sometimes be controversial, so it is important to understand who should be included and who should not. Know your institutional criteria or programme criteria. Both the 'Uniform Requirements for Manuscripts submitted to Biomedical Journals' www.icmje.org and the icddr,b's Authorship Policy that was adopted in May 2009 www.icddrb.net.bd/jahia/Jahia/pid/655 state that authorship credit should be based on three criteria, with authors meeting all these criteria:

- Substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data
- Drafting the article or revising it critically for important intellectual content
- Final approval of the version to be published

If you follow these guidelines, these choices can be defended in any academic setting. However, politics often intrudes. Clarify in your own mind who clearly fulfils the criteria for authorship. Have a separate discussion with your supervisor if you believe that any other person needs to be included. For example, for political reasons, a government colleague that is critical to ongoing scientific collaboration.

Generally, the first author is usually the one who participated significantly in the research by:

- Being involved in the conception and design of the research and collecting the data
- Interpreting the results
- Writing the first drafts of the paper
- Responding to co-authors and supervisors comments
- Submitting the manuscript to the journal and responding to the editors and peer reviewers suggestions

In the best-case scenario all co-authors should:

- Discuss and agree on the responsibilities and contributions early on, preferably in the protocol when defining the roles of the principal investigators and co-investigators
- Discuss and agree on a timeframe for draft development and reviews
- Use the mentor-orientated 'Think before you write' approach by sharing your high-level outline, first with your primary reviewer, and then with all co-authors, to make sure they all agree with the framing at the earliest stage possible

A tool that might help you decide who should be listed as an author on a paper, and the ordinal ranking of authors listed on a paper, is the authorship ranking scorecard. We recommend that you use this authorship scorecard to share your ideas of authorship with your primary reviewer when you develop your framing document. (See Appendix 8)

G3. Missing acknowledgement section

Know your institutional or programme policy for acknowledging the financial or material help from the agency or government who funded your research. You should confirm the donor's grant number by reviewing the contract or ask your supervisor for support. icddr,b has an acknowledgement policy for in-house and external publications that was revised and approved in April 2011. It gives specific templates for acknowledging research financed by:

- icddr,b Core donors
- A donor agency
- More than one donor agency
- A donor agency and icddr,b Core donors

People who contributed to the study, but do not fulfil the criteria for co-authorship, should be listed in the acknowledgment section. These can include:

- Community members of the study site
- Data collectors
- Laboratory support
- Statistical assistance
- Writing assistance
- Departmental head

Look at examples of the acknowledgement section from the journal you are planning to submit to. Usually the wording is straightforward. Don't be too informal in your language. See the 'Uniform Requirements for Manuscripts submitted to Biomedical Journals' (www.icmje.org) for additional guidance.

G4. Choosing an inappropriate journal

Many researchers are unsure about what journal to submit their manuscript to. Choosing a journal depends on who the audience is in relation to your research question. Before you start writing, start exploring some journals by reviewing previous issues. Have they published similar studies? Look at the references from an up-to-date manuscript you have found during your literature search. Do you see any pattern in terms of where this type of paper is being published? When you have identified several journals that have published similar topics, read and critique an article.

Another thing to consider is the journal's impact factor. The impact factor is a measure of the frequency with which the 'average article' published in a given scholarly journal has been cited in a particular year or period. This reflects the importance of communication in scientific work. As previously noted, as science is a social activity, articles that are noted and cited by other researchers are influencing the field. This factor is often used to measure or describe the importance of a particular journal to its field. The Institute for Scientific Information (ISI) ranks, evaluates, and compares journals within subject categories and annually publishes the results in Journal Citation Reports.

The formula to determine impact factor 2009 for a journal would be calculated as follows:

A = the number of times articles published in 2007-8 were cited in indexed journals during 2009
B = the number of articles, reviews, proceedings or notes published in 2007-8

Impact factor 2009 = A/B

Impact factors can have a controversial influence on the way published scientific research is perceived and evaluated and the following criticisms have been made of the system:

- Journal impact factors depend on the research field: high impact factors are likely in journals covering large areas of basic research and less likely in more subject-specific journals.
- Although Journal Citation Reports includes some non-English journals, the index is heavily skewed toward English-language journals, leaving out important international sources.
- Researchers may be more likely to pursue fashionable topics that have a higher likelihood of being published in a high-impact journal than to follow important avenues that may not be the as popular.

Because there are so many journals today, and because most scholars conduct their research using electronic search engines, the impact factor of the journal may be less important now than it was a generation ago. Many very highly cited articles are published in journals that do not have a particularly high average impact factor. You want to select a journal whose editors will be interested in your work and who are able to identify good peer reviewers. Often a specialty journal with a lower impact factor is the best place to reach readers interested in your topic and where journal editors can find high-quality reviewers.

Good reviewers identify important issues for further development in your manuscript. Good reviewers improve your manuscript. Better manuscripts have more influence. If you have results that you and your supervisor believe represent broad international interest, it is reasonable to submit it to a more competitive high impact journal. Recognize however that these high impact journals, for example the *Lancet*, *Science* or *Nature,* reject 97% or more of all submitted manuscripts. Each manuscript submission takes time, time that could be deployed in writing your next manuscript. Therefore, spending time to reach for a high impact journal for a special manuscript may be a good idea, but it is generally prudent to submit to journals where the type of work that you are submitting is common published. For help with finding appropriate journals, explore the website JANE. (See Appendix 9)

G5. Not following a specific journal's details of style

All journals periodically publish their style rules in a hard copy edition, or these style rules are always available on the journals' website under 'Instructions for Authors' or 'Requirements for Manuscripts'. Go online and read the individual journal's instructions and follow them exactly before you submit your manuscript.

G6. Not using a checklist to review your paper before submission

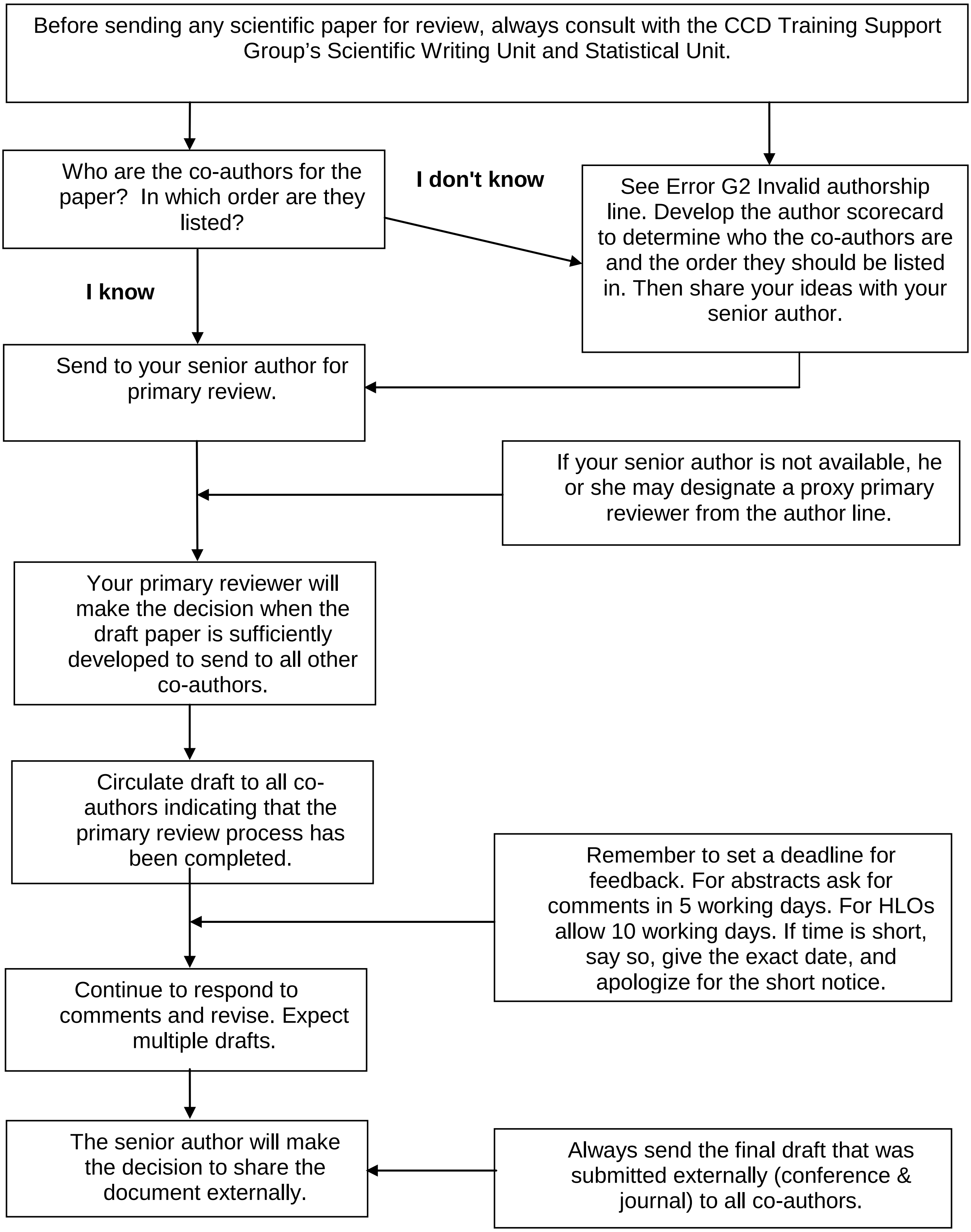
After your manuscript is published it will be read, critically appraised, and hopefully will contribute to systematic reviews, inform specific public health guidelines, and influence overall public health practice. Before you submit your paper to a journal, you need to consider if you have provided enough details about your research study. Some peer-reviewed journals require authors to follow a pertinent guideline. A comprehensive list of the available reporting guidelines appropriate to different study types, including systematic reviews, meta-analyses, and economic evaluations, is available at the EQUATOR Network library for health research reporting at www.equator-network.org/resource-centre/library-of-health-research-reporting/

Two checklists have been included here that might help to prevent inadequate reporting of both observational studies and randomized controlled trials. The STROBE and CONSORT statements both provide an evidence-based, minimum set of recommendations for reporting these types of research studies. Use these checklists to review your paper to make sure all information is included, and also to critically review other scientific research papers. (See Appendix 10 & 11)

G7. Not following icddr,b's sign-off requirements

Every institution has its own requirements for submission of an abstract to a conference or a manuscript to a journal. The icddr,b format for 'Authors Clearance for Submission of Abstracts/Manuscripts' requires authors to show approval of all co-authors and to get ERID clearance related to the proper funding acknowledgment. The completed form must also be signed off by the Centre Director and the Executive Director before submission. You can download this form at www.icddrb.net.bd/jahia/Jahia/pid/777

Appendix 1: CCD flowchart for reviewing scientific papers



Appendix 2: Concept paper outline

1. **Title of the proposed study**

2. **Research question**

3. **Objectives**

4. **Background**

- Current state of knowledge
  - Cite key literature related to the research question
- Gap in knowledge
- Relevance
  - Why the study is important
  - What kind of answers it could provide

5. **Methods**

- Study site and study population
- Study design
- Key definitions (e.g., case definitions)
- Sample size assumptions and calculation
- Sampling methods
- Data collection tools and processes
- Data analysis plan, including statement of the primary outcome
- Ethical considerations

6. **Timeline**

- Gantt chart

7. **Budget (goal is to help decision makers understand the resources required)**

- Only list major items (personnel, transportation, laboratory tests, materials) based on sample size

Appendix 3: Critical questions for protocol development

Thinking Critically

1. What is your over-all research question?
2. What is the hypothesis that you want to test?
3. What is the aim(s) of your study?
4. What do you already know about the subject?
5. What don't you know about the subject? (the gap in knowledge)
6. Why is this research important? What kind of answers will the study provide?

Research Design and Methods

7. What is the identified target group?
8. What type of study design did you choose to test your hypothesis?
9. What is your sample size?
10. How did you estimate your sample size?
11. What is the statistical power of your study?
12. How did you select your study unit of population (explain sampling method)?
13. How will you collect your data?

Data Analysis

14. What variables are you going to study?
    - Outcome variables
    - Exposure variables
15. How are you going to measure these variables?
    - For categorical variables, what are the category definitions?
16. How will you analyze your data to test your hypothesis?

Ethics

17. How will you provide ethical assurance for protection of human/animal rights?

Logistics

18. How long will the study take? What is your time line?
19. How much is it going to cost?
20. When will the results become available, how will you disseminate them?

Appendix 4: Framing document

Name:

Title of study:

Proposed co-author list: (See Error G2. If needed, use the authorship scorecard)

Objective(s) of the study:

Main results

1.

2.

3.

Tables, figures or graphs that support your main results:

(Example only....you might have 5 tables, or any combination)

Table 1:

Table 2:

Figure 1:

Graph 1:

Table 3:

Authorship scorecard:

Appendix 5: Conference/scientific meeting abstracts

Domestic and international conferences often publish a 'Call for Abstracts' to identify oral presentations and posters on relevant subjects that can be featured in that meeting. Before you think of applying, read all of the information about the conference carefully. Ensure that the potential audience is the right fit to showcase your particular results.

Usually the conference will give specific guidelines on the length of the abstract and how to submit using the internet. Read all the instructions carefully before you start developing your abstract. You can think of your abstract as a mini-version of your study that includes four sections: background, methods, results, and conclusion. You do not need to include any references. You can use numerals instead of words to save characters and space. But make sure to include all your main statistical conclusions and provide raw data, especially for primary outcome measures. For an abstract that is under review by your primary reviewer and co-authors, always use a structured abstract to make reviewing easier.

To develop an abstract, follow these steps in sequence:

Step 1: Results

- Use your framing document to identify main results.
- Include raw data such as percentages, confidence intervals (CI), odds ratios (OR), p-values, or whatever statistical analysis is important to showcase your results.

Step 2: Conclusion

- Write a broad statement interpreting your results and how they link to your objective and what they mean for public health.
- Write a practical recommendation and/or next steps for research.

Step 3: Methods

- For each result, check that you have included a corresponding method.

Step 4: Introduction

- Background: Provide concise information directly related to your objective and results.
- Last sentence should be a clear statement of your objective.

Review examples of accepted abstracts at:

ASTMH 2011: http://www.astmh.org/Abstracts_and_Education1.htm

ICEID: http://www.iceid.org/images/iceid_2012_finalprogramme_final.pdf

Appendix 6: Outline for a quantitative HLO

(Use sub-titles that match your study)

Introduction

- What is the problem?
  - Describe the research question to provide context, key terms and concepts so your reader can understand the study.
- What is the gap in information?
  - What gap or unanswered question, untested population, or untried method in existing research does your study address?
- Why is this research important?
  - Review relevant research to provide a rationale for your study…the 'so what' question.
- What is the aim and objective of the study?

Methods

- Describe the study site and study population.
  - Describe the setting in which the study was carried out, e.g., urban vs. rural.
  - Describe the study participants, e.g., women, or children <5.
- How did you study the problem?
  - Explain the study design.
- Give operational definitions.
- State your sample size assumptions and calculations.
- Describe your sampling methods.
  - How did you collect your data?
- Describe the data collection tools and process of collecting data.
  - Describe any special laboratory materials, equipment, or reagents.
- How did you analyze your data?
- How did you protect the ethical rights of humans/animals in your study?
  - Explain how you ensured you would 'do no harm'.

Results

- What did you observe?
  - For each intervention or procedure briefly describe what you found.
  - Support your main results using selected analysis, e.g., odds ratio, confidence intervals, and p-values, or other statistical analysis.
  - Back up statements with data in the tables, or mention 'data not shown'.

Discussion

- Reflect on the fundamental rationale of the study.
  - How do the overall results link to your objectives?
  - List the primary conclusions that you can logically and defensibly draw from the results.
  - Clearly state each conclusion (e.g., exposure X was related to disease Y) and what the specific evidence from your study is that supports this conclusion.
- Explain the implications these findings have for global scientific understanding.
  - How does it extend our collective knowledge? Compare and contrast to other studies' findings.
  - How does it change the way the global community of scientists should think about this issue?
  - What does it mean in the context of the lives and health of people?

- Explain the limitations of the study.
  - Focus on the impact that these limitations have on the conclusions we can draw the study.
  - Discuss how you interpret the data in light of these limitations.
- Draw out the conclusions.
  - Give the big picture: do your results help us understand a broader topic?
  - What implications do your results have for public health or related policies?
- State recommendations.
  - What are the key next steps that are practical and applicable to the context?
  - What specific research question should next be pursued?

- Acknowledgements
  - Funding/Donors.
  - People who helped with the manuscript who are not on the co-author line.

- References

- Tables and figures

Appendix 7: Example of quantitative HLO

Title: Difficulties in Maintaining Improved Handwashing Behaviour, Karachi, Pakistan[1]

Introduction

- Handwashing with soap can reduce diarrhoea and respiratory illness (Refs)
- Handwashing promotion that requires repeated household visits is prohibitively expensive on a large scale (Refs)
- In 2003, we conducted a cluster randomized control trial in low-income squatter settlements in Karachi, Pakistan
- Field workers promoted improved handwashing by providing households with free soap and weekly visits over a 9 month period up to December 2003
- We conducted a follow-up study 18 months later to determine how long selected households sustained improved handwashing practices

Methods

Study Setting

- Adjoining multi-ethnic squatter settlements in central Karachi
- Field work was conducted by Health Oriented Preventive Education (HOPE), a local non-governmental organization

Study Design

- In the 2003 cluster randomized control trial, 47 clusters of households were selected and randomly assigned to 5 arms: 10 received dilute sodium hypochlorite/encouragement to use; 9 received soap/encouragement; 9 clusters received flocculent-disinfectant /encouragement; 10 received soap, handwashing promotion, flocculent disinfectant/encouragement; and 9 controls
- In the 2005 follow-up cohort study, field workers, who had not participated in the 2003 study, attempted to revisit households assigned to either of the intervention clusters that included soap and handwashing promotion or to the control group (Figure 1)

Data Collection

- Field workers conducted a re-enrolment survey using a standard questionnaire and performed spot checks of facilities for handwashing
  - They asked the mother or caregiver of the household:
  - To demonstrate usual handwashing practices
  - If any children in the household had diarrhoea (three or more loose stools within 24 hours) in the preceding week, and, if so, for how many days
  - If mother or caregiver had diarrhoea
  - How much hand soap was purchased in the preceding week

Data Analysis

- We compared characteristics of re-enrolled households by originally assigned intervention groups with the control group using generalized estimating equation
- We calculated respondents' longitudinal prevalence of diarrhoea
- We calculated the coefficient of variation of the longitudinal prevalence of diarrhoea by cluster by dividing the standard deviation of the cluster means of the longitudinal prevalence of diarrhoea by the person-week weighted cluster means of longitudinal prevalence

[1] *Difficulties in Maintaining Improved Handwashing* Behaviour, *Karachi, Pakistan.* S.P. Luby, M.Agboatwalla, A.Bowen, E.Kenah, Y.Sharker, R.M. Hoekstra. Am. J. Trop. Med. Hyg., 81 (1), 2009, pp. 140-145.

- To assess the relationship between soap consumption and diarrhoea, we used the number of bars of soap purchased during the week divided by the number of persons in the households as the independent variable, and the longitudinal prevalence of diarrhoea in the subsequent week as a dependent variable in a generalized estimating equation model
- For all generalized estimating equation models, we used an exchangeable correlation structure applied to neighbourhoods to account for clustering derived from spatial proximity
- We used SAS 9.1 for Windows (SAS Institute, Cary, NC) for analysis of the generalized estimating equation models and STATA 10 (StataCorp LP, College Station, TX) for the linear mixed effect modelling.

Ethical considerations

- Heads of households provided informed consent. Ill children were assessed by field workers and referred to the appropriate level of health care. The study protocol was approved by HOPE Human Research Review Board and CDC's Institutional Review Board

Results

Descriptive

- 577 households were enrolled: 69% (560) were re-enrolled from the original study's 810 households; 17 were households that split and set up new households in the same study area
- The 560 re-enrolled households were similar to the 250 households that declined re-enrolment by household size, water supply, reported income, and amount spent on soap and water (Table 1)
- Households that re-enrolled were more likely to have been assigned to the handwashing promotion with soap intervention during the original study and were more likely to own a refrigerator and television (Table 1)

Handwashing behaviour

- At re-enrolment, intervention and control households were just as likely to have soap in the house and reported similar spending on hand soap (Table 2)
- Households originally assigned to handwashing promotion, but with no water treatment, were more likely to have a handwashing station with soap and water (79%) than control households (53%, P = 0.001), or households that received both handwashing promotion and water treatment (64% P = 0.05)
- In demonstrations, mothers from intervention households were significantly more likely to rub their hands together at least 3 times and to lather their hands for at least 10 seconds than control households (Table 2)

Diarrhoeal prevalence

- During the 63 week follow-up, intervention households purchased a similar quantity of soap and used a similar amount of soap per capita per week compared with control households (Table 2; Figure 2)
- During the first 5 months of follow-up, households from the different intervention groups reported different prevalences of diarrhoea. In the subsequent 8 months, the prevalence was similar across the groups (Figure 3)
- The overall longitudinal prevalence of diarrhoea was 15–16% lower in the intervention households. After accounting for clustering, neither the longitudinal prevalence among all ages, nor any of the age specific diarrhoeal prevalences were significantly different between intervention and control households (Table 3)

- When the two intervention groups were combined, the reduction in longitudinal prevalence of diarrhoea in the intervention groups was still not significantly different from the controls (*P* = 0.66)
- In the linear mixed effect model, the longitudinal prevalence of diarrhoea in households that received soap and handwashing promotion (*P* = 0.67), and soap and handwashing promotion plus water treatment (*P* = 0.70) was not significantly different than control households
- There was no association between weekly per capita soap consumption and longitudinal prevalence of household diarrhoea in the following week (*P* = 0.38)

Discussion

- In the initial cluster randomized controlled trial, neighbourhoods that received free soap and at least twice weekly home visits promoting regular handwashing reported 51-55% less diarrhoea than non-intervention neighbourhoods
- In the follow-up study 18 months later, without any intervening handwashing promotion, households in the original study that had received free soap and handwashing promotion reported purchasing similar quantities of soap compared to non-intervention households
- During the 14 subsequent months of follow-up, intervention households had a similar longitudinal prevalence of diarrhoea compared to non-intervention households
- These findings illustrate important barriers to improving handwashing behaviours globally. Households that received the handwashing intervention:
    - Acquired the habit of washing hands properly and maintained it for several months.
    - Had a better place to wash hands
    - Experienced a substantial reduction in diarrhoea
- When soap was no longer provided free, and regular encouragement to wash hands stopped, their behaviour reverted to less soap consumption and a disease experience that was no different than households that received no intervention
- These results are similar to findings from a follow up of a randomized controlled trial of household water treatment that found high levels of product use during the study period accompanied by a marked reduction in diarrhoea, but no sustained regular use
    - Only four evaluations of long term sustainability of handwashing promotion were identified *(Refs)*
- In the Karachi study the lack of a sustained improvement in handwashing behaviour suggests that specific methods used for short term efficacy, e.g., free soap, did not produce long term behaviour change
- This is consistent with behaviour change specialists who note that maintaining a changed behaviour is fundamentally different from acquiring a new behaviour: Maintenance has different determinants and requires different interventions (*Refs)*
- In the first 6 months there was some difference in diarrhoea experience, but later there was none, suggesting the declining impact of the intervention over time, that might have been lessened with occasional refresher visits
- The amount of soap purchased by households was used as an indirect measure of handwashing, taking into account that soap is used for many household purposes and is sold in different sizes
- We hypothesized if handwashing increased, then soap purchases would increase
- No difference in amount of soap or an increase in spending on soap suggests no sustained change behaviour by this intensive intervention

Limitations

- Limited power to detect a difference in the longitudinal prevalence of diarrhoea between the intervention and control arm
- Of the originally enrolled households, 29% did not participate in the follow-up evaluation.

Conclusion

- Improved handwashing behaviour is not guaranteed to be maintained when the activities promoting that behaviour are withdrawn

Recommendation

- Like other behaviour change interventions, maintaining effective handwashing behaviour requires focused efforts and research on optimal strategies

Tables and Figures

Appendix 8: Authorship scorecard

This paper, 'Worksheet for Authorship of Scientific Articles', by Robert H. Schmidt, details a method for assisting in deciding who is to be listed as an author on a paper, and the ordinal ranking of authors listed on a paper.

Inclusion as an author in a scientific publication is important to many ecologists for reasons of prestige and advancement. Publications are a key factor in deciding on promotions for many ecologists at universities (Jackson and Prados, 1983; Croll, 1984). The order of listed authors on a paper is assumed to be an indication of the relative contribution of each of the included authors. Day (1983:15-19), Croll (1984), Kennedy (1985), and Jackson (1988) reviewed contemporary difficulties with decision-making in assigning authorship. Dickson et al. (1978) proposed guidelines for determining inclusion and ranking in authorship of a scientific publication. They divided research investigations into 5 areas: conception (including funding), design, data collection, data analysis, and manuscript preparation, and recommended that authors need to make, at a minimum, a significant contribution in manuscript preparation and in at least one other area. Authorship order was determined by a ranking of the number of areas in which significant contributions were made.

Of course, the best procedure for dealing with potential problems in assigning authorship is to deal with the issue at the beginning of a study. However, even pre-assigned roles can have complications, especially when personnel on a project change, or when responsibilities are transferred. In addition, people often underestimate the inputs required, especially time, for the various contributions, making initial agreements, in retrospect, seem unfair. The trend toward multi-authored papers may indicate how research is becoming increasingly interdisciplinary. In these situations a method for defining authorship roles becomes useful.

This simple technique should be a useful decision-making aid, especially for projects with many researchers involved. A general framework for a decision-making worksheet, with an example, is given in Table 1.

Potential Co-author	Conception (1.0)	Design (1.0)	Data Collection (1.0)	Data Analysis (1.0)	Writing (1.0)	Total
A	50	90	0	70	40	250
B	50	10	20	0	30	110
C	0	0	40	30	30	100
D	0	0	40	0	0	40
Total	100	100	100	100	100	500

Table 1. Values listed are percent relative contributions. In this example, a natural cut off for authorship status would be between C and D. Authorship ranking should be A, B, and C. The number in parenthesis is a multiplier: see text relating to weighting below.

For each of the 5 parts of the research investigation (as defined by Dickson et al., 1978), the relative contribution of each participant is assessed. For each part, total contributions should equal 100 percent. When all contributions have been assigned, row values are added, resulting in a 'score' of between 1 and 500. The relative contribution of all participants can then be assessed, and a natural break between subsets of scores on the lower end of contributions can be used as a cut off to delineate inclusion as an author. Scores can then be ranked for order of authorship.

This technique has a number of assumptions. First, it assumes that each of the 5 parts of a research investigation should be weighted equally. In some situations, this may not be the case. For example, a study may require minimal funding, the infrastructure of a principal investigator’s laboratory may be essential to a successful project, or the data set may be collected over several years. This situation is easily dealt with by weighting the unbalanced part with a multiplier. For example, all values in the ‘data collection’ column can be multiplied by 1.2, if data collection is judged to have been 20 percent more important than the other areas.

Secondly, this technique assumes that all contributions can be judged fairly and accurately. This may not always be the case; indeed, it may be that this technique would only be necessary for papers where it is difficult to assess contributions. Two points are suggested for resolving this. First, it must be recognized that each contribution score is usually an estimate, and, as such, has some corresponding error associated with it. Therefore, the difference of only a few points between participant’s scores is probably not sufficient to rate relative contributions, and other methods must be utilized to determine authorship ranking (perhaps even a flip of a coin). Secondly, a consensus-type survey system, such as the Delphi system (Schuster et al., 1985), may be useful as an in-house tool for resolving difficult authorship assignment problems; although it is recognized that assigning authorship is rarely a democratic process.

How are contributions assessed? One method that could be used is the actual time (hours, days, years) put into each of the 5 parts of the research investigation. A key problem here is the importance of experience. For example, how would you rate a 2-hour contribution to a project’s design from a person with 30 years of experience with a 2 hour contribution from a person with little or no experience? Another method, admittedly subjective, is an assessment of the ‘importance’ (relating to intellection) of contributions in each area. Again, a consensus-type survey can be helpful in arriving at an acceptable and agreeable assessment. The development of some criteria for better assessment of contributions is needed. Time should be minimized while intellectual contribution should be maximized, yet it is easy to visualize a project in which time is a real measure of effort.

Finally, there is a situation, which involves teams of workers involved in 1 of the 5 parts. A realistic example would be having many workers assisting in data collection. Although the team’s contribution may be large (perhaps 100 percent of the data collection), the relative contribution of each team member is small. The ‘points’ given to this team may then be assigned to the team coordinator or leader. There is some question whether a ‘technician’ should ever be a coauthor, especially if his or her sole responsibility is data collection or data collection and analysis, when the analysis is limited to performing perfunctory operations rather than interpretation (Dickson et al., 1978).

It must be repeated that this system for determining authorship of scientific articles should not replace authors consulting with each other. However, it should be useful in delineating relative individual contributions when there are many, and it can help project coordinators or senior authors identify personnel whom have contributed in a significant way to a study’s conclusion. Authorship is a symbol that means taking responsibility for the contents of the paper (Jackson, 1988). If the responsibility is there, inclusion as a coauthor is appropriate. This worksheet should be helpful in defining this responsibility.

Appendix 9: Jane

More information about the Journal/Author Name Estimator (Jane) is available on http://biosemantics.org/jane

Summary:
With an exponentially growing number of articles being published every year, scientists can use some help in determining which journal is most appropriate for publishing their results, and which other scientists can be called upon to review their work. Jane is a freely available web-based application that, on the basis of a sample text (e.g., the title and abstract of a manuscript), can suggest journals and experts who have published similar articles.

How does Jane work?
First, Jane searches for the 50 articles that are most similar to your input*. For each of these articles, a similarity score between that article and your input is calculated. The similarity scores of all the articles belonging to a certain journal or author are summed to calculate the confidence score for that journal or author. The results are ranked by confidence score. For more information, you can read.

How often is the data behind Jane updated?
We are currently updating the data once every month.

Which journals are included in Jane?
Basically, all journals included in Medline are included in Jane. However, in order to show only active journals, we do not show journals for which no entry was found in Medline in the last year. We have sent requests to several publishers (e.g. ACM and IEEE) whether we could also use their data, but have not received any response.

Which authors are included in Jane?
All authors that have published one or more articles in the last 10 years that have been included in Medline, are included in Jane.

Which papers are included in Jane?
All records in Medline have been included that 1) contained an abstract, 2) were published in the last 10 years, 3) did not belong to one of these categories: comment, editorial, news, historical article, congresses, biography, newspaper article, practice guideline, interview, bibliography, legal cases, lectures, consensus development conference, addresses, clinical conference, patient education handout, directory, technical report, festschrift, retraction of publication, retracted publication, duplicate publication, scientific integrity review, published erratum, periodical index, dictionary, legislation or government publication.

* For the computer geeks: we use the open source search engine. Queries using keywords are parsed with the QueryParser class, titles and abstracts are parsed using the MoreLikeThis parser class.

Appendix 10: STROBE Statement

The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations are aimed at improving the quality of reporting of observational studies. The STROBE Statement provides guidance to authors about how to improve the reporting of cohort, case-control, and cross-sectional studies. It facilitates critical appraisal and interpretation of studies by reviewers, journal editors and readers through the use of a checklist of 22 items, which relate to the title, abstract, introduction, methods, results and discussion sections of the article. Eighteen items are common to cohort studies, case control studies and cross-sectional studies and four are specific to each of the three study designs.

The STROBE checklist is best used in conjunction with an Explanation and Elaboration article that discusses each checklist item and gives methodological background and published examples of transparent reporting.[2] More information about STROBE is available at www.strobe-statement.org.

Manuscript Section	Item Number	Recommendations
TITLE and ABSTRACT	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
INTRODUCTION		
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported
Objectives	3	State specific objectives, including any prespecified hypotheses
METHODS		
Study design	4	Present key elements of study design early in the paper
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	6	(a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants (b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed Case-control study—For matched studies, give matching criteria and the number of controls per case
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable

[2] Vandenbroucke JP, von Elm E, Altman DG, Gøtzsche PC, Mulrow CD, et al. (2007) Strengthening the Reporting of Observational Studies in Epidemiology (STROBE): Explanation and Elaboration. PLoS Med. 2007 Oct 16; 4(10): e297. doi:10.1371/journal.pmed. 0040297 PMID: 17941715

Manuscript Section	Item Number	Recommendations
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) Cohort study—If applicable, explain how loss to follow-up was addressed Case-control study—If applicable, explain how matching of cases and controls was addressed Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses
RESULTS		
Participants	13*	(a) Report the numbers of individuals at each stage of the study—e.g., numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analyzed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (e.g., demographic, clinical, social) and information on exposures and potential confounders (b) Indicate the number of participants with missing data for each variable of interest (c) Cohort study—Summarize follow-up time (e.g., average and total amount)
Outcome data	15*	Cohort study—Report numbers of outcome events or summary measures over time Case-control study—Report numbers in each exposure category, or summary measures of exposure Cross-sectional study—Report numbers of outcome events or summary measures
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included

Manuscript Section	Item Number	Recommendations
		(b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses
DISCUSSION		
Key results	18	Summarize key results with reference to study objectives
Limitations	19	a) Discuss limitations of the study, taking into account sources of potential bias or imprecision. b) Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results
OTHER INFORMATION		
Funding Acknowledgement	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based
*Give such information separately for cases and controls in case-control studies, and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.		

Appendix 11: CONSORT Statement

Investigators and editors developed the CONSORT (CONsolidated Standards of Reporting Trials) Statement to help authors improve reporting of two-parallel design Randomised Control Trials by using a checklist. The most up-to-date revision of the CONSORT Statement is CONSORT 2010, which is shown below. The checklist items pertain to the content of the Title, Abstract, Introduction, Methods, Results, Discussion, and Other information. The checklist includes the 25 items selected because empirical evidence indicates that not reporting the information is associated with biased estimates of treatment effect, or because the information is essential to judge the reliability or relevance of the findings. To download these documents and get more information on the CONSORT group go to www.consort-statment.org.

Section/Topic	Item No	Checklist item	Reported on page No
Title and abstract			
	1a	Identification as a randomised trial in the title	
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance see CONSORT for abstracts)	
Introduction			
Background & Objectives	2a	Scientific background and explanation of rationale	
	2b	Specific objectives or hypotheses	
Methods			
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons	
Participants	4a	Eligibility criteria for participants	
	4b	Settings and locations where the data were collected	
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	
	6b	Any changes to trial outcomes after the trial commenced, with reasons	
Sample size	7a	How sample size was determined	
	7b	When applicable, explanation of any interim analyses and stopping guidelines	
Randomisation:			
Sequence generation	8a	Method used to generate the random allocation sequence	
	8b	Type of randomisation; details of any restriction (such as blocking and block size)	
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	

Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how	
	11b	If relevant, description of the similarity of interventions	
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses	
Results			
Participant flow (a diagram is strongly recommended)	13a	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analysed for the primary outcome	
	13b	For each group, losses and exclusions after randomisation, together with reasons	
Recruitment	14a	Dates defining the periods of recruitment and follow-up	
	14b	Why the trial ended or was stopped	
Baseline data	15	A table showing baseline demographic and clinical characteristics for each group	
Numbers analysed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	
Outcomes and estimation	17a	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	
	17b	For binary outcomes, presentation of both absolute and relative effect sizes is recommended	
Ancillary analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory	
Harms	19	All important harms or unintended effects in each group (for specific guidance see CONSORT for harms)	
Discussion			
Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	
Generalisability	21	Generalisability (external validity, applicability) of the trial findings	
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence	
Other information			
Registration	23	Registration number and name of trial registry	
Protocol	24	Where the full trial protocol can be accessed, if available	
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders	

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