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Researcher views on authorship, plagiarism and conflict of interest in low- and middle-income countries: a mixed-methods study

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Abstract

Objectives

To explore low-and middle income country (LMIC) researchers' views about authorship, redundant publication, plagiarism and conflicts of interest and their awareness of the occurrence of poor practices.

Design

Mixed-methods study comprising an online survey and follow-up interviews. We developed and piloted a questionnaire containing scenarios related to authorship, redundant publication, plagiarism and conflicts of interests. We asked participants whether the described practices were acceptable or not, whether they themselves or someone they knew had ever engaged in these practices, and how often these occurred at their institutions. We conducted semi-structured interviews with respondents who agreed to be interviewed.

Participants

We invited 607 corresponding authors of Cochrane reviews working in LMICs. 583 emails were delivered and we obtained 199 responses (34%). We interviewed 15 respondents.

Results

Respondents mostly believed that poor practices were unacceptable, however, they indicated that these occurred at their institutions. Guest authorship was the most common practice and 77% stated it occurred in their institution. Respondents knew that plagiarism occurred occasionally (12%) or rarely (24%) and 45% had not declared conflict of interest in the past or knew others that had not.

Themes identified from interviews were: 1) authorship rules are simple in theory, but not consistently applied; 2) academic status and power underpin behaviours; 3) institutions and culture fuel bad practices; and 4) researchers are uncertain about what conflicts of interest are.

Conclusions

There is widespread acceptance of guest authorship. Plagiarism and undeclared conflicts of interest are seen as unacceptable, but actual practices suggest it remains frequent. There is a need for institutional guidance and senior commitment to promote good practices and a culture of research integrity. Future research should explore ways to promote research integrity at various levels within institutions and consider roles of external stakeholders such as journals and funders.

Strengths and limitations of this study

- We elucidated what health researchers believed was acceptable practice through real life scenarios.
- Respondents were part of an international collaborative partnership with strong values, and thus may improve the reliability of the responses.
- Our response rate, whilst about average for such research, is a study limitation.
- The study is one of the first to show that guest authorship is common practice in low- and middle income countries.
- Despite good knowledge of best practice, institutional and academic power relationships and culture strongly influence these aspects of poor research practice.

Introduction

Intellectual honesty and personal responsibility for our actions as researchers is core to research integrity and accountability. Common areas of dishonesty include inappropriate authorship attribution, plagiarism, and unreported conflicts of interest. Indeed, these may pose a threat to the integrity of research that is at least as great a threat as blatant misconduct such as data falsification, mainly because they appear to be common (1-3).

Developing the science capacity in low-and middle income countries (LMICs) is important and is attracting increasing investment from national governments and donors. Assuring strong moral principles and honest practice is an important part of this development. As there are few studies on research reporting practices in LMICs (4, 5), we initiated research to understand researchers' perceptions of, and experiences with, good and poor reporting practices to inform activities that promote research integrity and further research in this field. Our objectives were to describe, explore and analyse LMIC researchers' perceptions about problems with authorship, redundant publication, plagiarism and conflicts of interest, to explore which practices they consider acceptable and to assess their awareness of the occurrence of poor practices.

Methods

Study participants and design

We conducted an online survey and follow-up in-depth interviews. Our target population was corresponding authors of Cochrane systematic reviews working in LMICs (countries defined by the World Bank(6)). We chose this group as they were identifiable, have all contributed to a published systematic review using international standards, and represented a sample frame for active medical researchers.

For the qualitative part of the study, we recognised that the researcher's values and morals play a part in interpreting phenomena and how knowledge is created (7, 8). The research team have diverse experience and skills, including nursing and clinical epidemiology (AR), infectious diseases (PG), publication ethics (EW) and public health (TY). They are all authors on Cochrane reviews, have editorial and training roles within Cochrane and publication ethics; two team members are based at a LMIC institution, and all members have extensive experience in working in LMIC settings.

Data collection

We developed a questionnaire with questions based on nine scenarios (Supplementary file 1). The scenarios covered guest authorship, ghost authorship, plagiarism, redundant publication and declaration of conflicts of interest. Participants were asked whether they considered the practice portrayed in the scenario as acceptable, whether they or someone they know had ever done this and whether the practice was common in their institution (Table 1). The questionnaire underwent two rounds of piloting with a group of researchers not eligible for our study. We set up the survey using Google forms (which permitted anonymous responses) and sent an invitation containing the link to the survey via email. We surveyed all LMIC contact authors of active Cochrane reviews (published in the Cochrane Library in May 2015) and reminded non-responders twice. The survey asked participants if they were willing to take part in a follow-up interview, and asked them to indicate this through a link separate from the online questionnaire to preserve anonymity.

We developed an interview guide for semi-structured interviews (Supplementary file 2), aligned with our objectives and informed by the survey results. AR conducted all the interviews between October and December 2015. Interviews lasted 45-60 minutes and were conducted in person or via Skype/telephone. All interviews were recorded with a digital voice recorder and additional notes were taken during the interviews to provide a comprehensive data set.

Data analysis

We dichotomised the survey data by combining categories of potential answers and analysed it with SPSS, using descriptive statistics for each scenario. We stratified results by region and compared results between regions using the chi-squared test.

We analysed interviews using the framework method, which fits into the broader family of thematic analysis (9) using transcriptions of the audio recordings. Three researchers (AR, TY, EW) independently coded one of the transcripts using an inductive method of coding. We compared and discussed our individual codes and developed a set of preliminary codes that could be applied to the other transcripts. We did not consider the set of codes to be exhaustive and continually added new codes until all transcripts were coded. One researcher (AR) coded all the subsequent transcripts using Atlas.ti software, version 7.5 (10). We categorised the codes (Supplementary file 3) and extracted illustrative quotations. Emerging themes were identified through discussions with the whole research team in an iterative process.

Ethics

The Stellenbosch University Health Research Ethics Committee approved the study (N14/12/158) and the Cochrane Steering Group approved the participation of authors. Participation in the survey was voluntary and submitting a response was taken as informed consent. Respondents who indicated willingness to be interviewed signed an electronic consent form before the interview. Anonymity was ensured for both the survey and the interview responses.

Results

We sent 607 invitations to corresponding authors of Cochrane systematic reviews. Twenty-four were not deliverable; for the remainder, the response rate was 34% (199/583), with one incomplete response that was omitted from the analysis. Respondents were roughly equally divided between Latin America, Sub-Saharan Africa, South and South-East Asia, and East Asia; with one tenth from North Africa, the Middle East and Eastern Europe (Table 2). We interviewed 15 of the 28 people who volunteered to be contacted. The interview group comprised junior researchers (PhD students or those who had recently obtained their PhD; n=7) and senior researchers (professors who had supervised PhD students; n=8).

Survey responses

For guest authorship given to the head of department (Table 3), one third of the 198 respondents thought this was acceptable or did not matter; 81% had done this or were aware of others doing this; and 77% indicated this happened at their institution.

Adding an expert in the field who had not contributed sufficiently was similarly regarded as acceptable by one third, they had done this (81%) and it happened in their institution (71%).

Omitting an author who has contributed substantially to the research was recognised as not acceptable, yet 41% reported that it happens, but mainly “occasionally” (14%) or “rarely” (26%). Responses related to acknowledging rather than giving authorship to the biostatistician for assistance with data analysis were more mixed (Table 3).

For plagiarism (Table 3), almost all the respondents (95%) thought that it was unacceptable to translate a text from another language without acknowledging the original source. A third of respondents indicated that they had either done this in the past or knew someone who had done this, and that this practice occurred at their institution “occasionally” (12%) or “rarely” (24%).

Copying an idea without acknowledging the original source was reported as unacceptable by 90% of respondents, but 45% indicated that they had either done this themselves or knew of others who had done this and that this occurred at their institution “occasionally” (12%) or “rarely” (30%).

Most respondents (87%) thought that failure to disclose a financial reimbursement from a company involved in a research project (Table 3), was unacceptable. Yet, 45% of respondents indicated that they had not declared known conflicts of interest in the past or knew someone who had done this; 40% said that it happened at their institution "occasionally" (15%) or "rarely" (24%).

Most respondents (76%) thought that it was unacceptable for an author not to declare a spouse's link to a company involved in a research project. A third of respondents indicated that they had not declared this in the past or knew someone who had not done this, while 28% said that this practice occurred at their institution "occasionally" (7%) or "rarely" (22%).

We explored if there were obvious differences between regions (Supplementary file 4). We found that two thirds (67%) of respondents from East Asia thought that adding a head of department who had not contributed significantly to the paper was acceptable or did not matter, whereas most respondents (61 to 87%) from other regions thought that this practice was unacceptable.

Interviews

Among the people who were interviewed, the main topic of concern was authorship practices. These included adding authors who had not contributed substantially to the research, omitting authors who had contributed substantially, and conflicts about the order of authors. Interviewees were also aware of cases of plagiarism, especially amongst students and junior researchers whose first language was not English, duplicate publication in different languages, not publishing negative results and inaccurate reporting of research to the public. Some interviewees also said that they knew of researchers who had fabricated data, manipulated data or engaged in data dredging. They were worried that misconduct was probably more prevalent than was officially acknowledged.

Our analysis identified four main themes, outlined below, with illustrative quotes for each theme in Table 4.

Authorship rules are simple in theory, but not consistently applied

Interviewees were mostly aware of the International Committee of Medical Journal Editors (ICMJE) criteria. Some reported diligent application of the criteria; others were clearly frustrated with the whole process, as *"it should be simple";* and describing it as "*not straightforward*" with *"blurring of lines"* in defining contribution. Most were aware of authorship decisions in their institutions based on factors other than contribution. *"We have a lot of issues on what we call 'add my name'. It's very popular."*

Adding authors at a late stage who had done little or nothing was common in all regions, for a variety of reasons: a *"favour"* and loyalty towards colleagues, family and friends; as a means of rewarding research assistants; to make a publication look better; out of respect for a senior researcher; and in return for paying open access publication fees. Sometimes authors from different disciplines or even non-academics were added. In contrast to this haphazard way of assigning authorship, other researchers felt they were expected to follow *"unwritten rules"*.

Academic status and power underpin behaviours

Senior and junior interviewees described the *"power play"* between senior and junior researchers. Junior researchers, were described as the *"work horses",* who had to *"abide"* by the *"mandatory rules"* of their bosses in order to avoid conflict or a "*change in attitude"* towards them. They found it *"very difficult to fight senior professors"* who were described as being *"arrogant"* and *"corrupt".* All those reporting this had personal stories. In many countries, junior researchers were obliged to add the names of heads of department, bosses, or supervisors to their publications even when they did not contribute. Others reported that professors or supervisors expected to be first author on a publication that was based on a student's dissertation or junior researchers' work. Some respondents described cases where professors published students' research without including them

as authors and sometimes even without students knowing that their work had been published. Junior researchers, in particular, were frustrated about these practices which they viewed as unfair.

It seems students and junior researchers may have no choice but to tolerate this manipulative behaviour in order to complete their degrees and advance their careers. Some interviewees who had experienced this spoke vehemently about how upset they were - and recounting their experiences evoked strong emotions: anger, betrayal, frustration and hurt. They also found it difficult to stand up against seniors in these situations. Their place in the hierarchy determined whether their voice was heard or not, and they were often *"brushed off"* by more senior people. Interviewees were concerned that researchers, especially those who are *"not in a position of power"* were unable to raise concerns or make anonymous remarks when they suspected misconduct.

The desire for academic status was reported as a big driver. Publications are the *"bread and butter"* of researchers – more publications lead to promotions and more power. Interviewees felt that researchers often did not care about the research itself, but rather about the number of publications they had authored and the power that comes with publication. Academics are willing to do almost anything to be *"recognised in the scientific community", "associated with high-impact publications"* and ascend the institutional hierarchy. This behaviour was described as not being *"in the best interest of the research…but certainly in the best interests of the researcher".*

Institutions and culture fuel bad practices

A recurrent theme was the *"overemphasis"* on publications, particularly the quantity required for promotion, fuelling and encouraging a variety of forms of misconduct. Respondents were aware of researchers who submitted papers they had *"photo-shopped"* to include their names and affiliations for promotion, or *"set up phony journals"* where they published a reworked version of somebody else's paper. Another described clinicians and nurses publishing fabricated data in local journals. Although researchers were aware that this was unethical, they did not really care since papers published in these journals were known to be untrustworthy. Yet such publications counted towards promotion.

Interviewees also highlighted the lack of structures and systems to support and promote research integrity in their institutions such as research integrity offices, clear policies on research misconduct and channels for whistleblowing. Interviewees thought that offenders should be punished appropriately, as this might also deter poor practices. Whilst most institutions had guidelines on plagiarism, use of text-matching software was directed towards students rather than academics. Institutional guidelines on good research reporting practices were either lacking or interviewees did not know where to find them.

In addition to flawed systems, an emerging theme was the cultures within institutions. A fundamental concern was the lack of research integrity champions within institutions. Interviewees, especially senior researchers, reported playing a big role in promoting research integrity in their institutions. However, they often felt like *"lone voice(s) in the wilderness"* and lacked *"the critical mass"* to change poor practices. Awareness about research integrity amongst other researchers was perceived as low. Leadership was seen as an essential factor in fostering a culture of research integrity. The lack of positive role models and mentors at institutions was raised as a concern and respondents noted that having a good mentor was essential to learn *"what is right and wrong"*.

Researchers are uncertain about what conflicts of interest are

Respondents expressed various views on managing and disclosing conflicts of interest. Some believed that they would not be influenced – neither by commercial companies, nor by personal relationships – and would just report the evidence *"as is".* Some believed that researchers should not refuse to work with commercial companies per se, as their expertise could help in the advancement of science. Key to both points of view was being transparent and declaring funding sources and links to commercial companies. A contrasting view was that links to commercial

companies would always influence researchers on some level, even if this influence was very subtle. Some interviewees supported the idea that it was better to decline participation in a research project when there was a financial or academic conflict of interest.

Uncertainty around academic conflicts of interest was frequently raised. Examples of dilemmas included examining a thesis describing research that was similar to one's own work, including clinical experts who had received funding from pharmaceutical companies in systematic reviews, and peer-reviewing papers of colleagues without being biased.

Interviewees also questioned the validity and adequacy of declaring conflicts of interest. Some thought that declaring conflicts of interest did not mean that the research was *"free of any kind of internal, external manipulation"*, while others believed that researchers generally declared that they did not have conflicts of interest, even if they did. Interviewees were also confused about declaring personal relationships with friends, family and spouses in a scientific paper. Most interviewees thought that there was inadequate guidance on what to declare and when to declare it and that all conflicts of interests should be judged according to the impact they had in a specific situation.

Discussion

Although authors of Cochrane reviews from LMICs perceived certain reporting practices to be unacceptable, they indicated that these occurred at their institutions. Our research showed that generally, researchers know what good practice is, but in reality, they do not always follow it. We found that guest authorship was widespread, that plagiarism is a problem, and there is a lack of awareness about conflicts of interest. The in-depth interviews showed that, rather than mitigating this, institutional culture and promotion fostered poor practice.

Of all the irresponsible practices explored, perceptions and occurrence of guest authorship stood out. In light of the availability of international guidelines (11) and journal requirements on contributions of authors, this result is striking although not unexpected when considering results of other studies. A meta-analysis on the misuse of authorship (12) found a self-reported prevalence of 55% (95%CI 45% to 64%) amongst health researchers from countries outside of the USA and UK, including South Africa, India and Bangladesh. A survey conducted amongst medical professionals in India (13) found a high prevalence of guest authorship (65%; 101/155), while in a study conducted in Nigeria, 36% (47/133) of participating health professionals indicated that they had encountered disagreements about authorship (14). In our survey, 77% (153/198) of respondents indicated that guest authorship occurred at their institutions.

Our findings show that the desire for power and academic status, as well as institutional systems and academic culture greatly influence research integrity. These findings are in line with other international publications (15-17) and suggest that factors driving research misconduct are similar across low, middle and high-income countries. Of particular concern is the lack of mentors and role-models for junior researchers. Indeed, mentoring has been shown to positively influence research career development, productivity and success, and plays an important role in preventing misconduct (16, 18). Junior researchers appear to know what good practices are, but are discouraged from following these by seniors.

The impact of financial conflicts of interest on study results and reported conclusions is well recognised (19, 20). More recently, the importance of considering non-financial conflicts of interest has been highlighted (21-23). We found that non-financial conflicts of interest were poorly understood and that participants were reluctant to report them. A recent study found that authors of systematic reviews reported non-financial conflicts of interests less frequently than financial conflicts of interests (24). Our study participants felt that there was inadequate guidance on declaring financial and non-financial conflicts of interest and that a universal framework would be helpful. This need for standardised methods of reporting conflicts of interest has been recognised

(22, 24-26) and some approaches proposed (22, 24, 25). However, a universal system has not been realised and the onus is on journals and institutions to provide clear policies and guidelines on the transparent reporting of conflicts of interests.

We identified Cochrane authors as a group of people based in academic institutions in LMICs, but who had contact with an international collaboration that promotes good scientific and reporting practice. Whilst this restricted the size of the sample, it provided an identified sampling frame and respondents with some awareness of the aspects of research integrity that we were investigating (27). Survey and interview participants were from various LMICs and included junior as well as senior researchers.

We used a number of documented strategies to maximise our response rate, as a low response rate is a well-documented disadvantage and challenge of online surveys (28, 29). We sent the survey to participants in individual and personalised emails, emphasising the value of participants' knowledge and understanding of health research reporting practices, ensuring anonymity of responses, and inviting them to engage in further discussions. We also sent two reminders (28-30). Despite our efforts, we only obtained a response rate of 34% for the survey. We were unable to contact non-respondents to obtain demographic information and reasons for not responding as anonymity of participants did not allow us to distinguish between respondents and non-respondents. We thus cannot rule out the possibility that non-respondents had different views from respondents (28, 31). Only 28 survey respondents (14%) indicated that they were willing to participate in follow-up interviews and 15 of those accepted the email invitation. Although this is a small sample, participants were very aware of what was happening at their institution and generally addressed the same problems. However, generalisability of our results is limited and results have to be interpreted with caution.

There are few published studies on irresponsible research practices amongst health researchers from LMICs (4). To our knowledge, this is the first survey that includes participants from several LMICs. The use of an online survey and in-depth interviews allowed us to gather rich data that supplemented our quantitative findings. This work highlights researcher concerns about several aspects of poor reporting practice in LMICs and the belief that such practices are common in some institutions. In particular, guest authorship emerged as a major concern. Limited institutional processes and systems, lack of role-models and emphasising promotions and publications are important factors thought to influence research integrity in LMICs. There is a need for institutional guidance and senior faculty commitment to promote good practices and create a culture of research integrity.

Future research in LMICs should explore ways to promote research integrity at various levels within institutions (e.g. research team, departmental, institutional) and consider roles of external stakeholders such as journals and funders.

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Contribution of authors

All authors contributed to the design of the study. AR collected and analysed data, with input from EW, TY and PG. AR drafted the manuscript. PG, TY and EW critically engaged with the manuscript and provided input. All authors have approved the final manuscript.

Competing interests

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: financial support from the Effective Health Care Research Consortium (EHCRC). This Consortium is funded by UK aid from the UK Government for the benefit of developing countries (Grant: 5242). EW is a self-employed consultant and received personal fees for training related to publication ethics outside of the study. All authors are involved with Cochrane and EW is the author of a Cochrane systematic review on interventions to promote research integrity.

Data sharing

Unpublished data from the survey can be obtained upon request from AR.

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Tables

Table 1: Examples of survey scenarios and accompanying questions

A junior researcher, J, adds the head of department, D, as the last author on a research paper. D provided suggestions for direction of J's work that helped her obtain the grant, although he hasn't contributed to the actual research or the publication.	**My view on this is:**	This is acceptable because D should be an author	
		This is not best practice, but it does not really matter, as it doesn't affect the science	
		This is unacceptable because D has not contributed to this paper	
	Have you ever done something like this?	Yes	
		No, and I am not aware of anybody else doing it	
		No, but I am aware of other people doing it	
	In my current department or unit, this pattern of authorship:		
	Is usual practice and happens most of the time	Happens occasionally	Happens rarely
	Never happens	Other: (please specify)	
	Comments or clarifications:		
A PhD student "copies and pastes" nearly all of the introduction from a paper that she has previously published into her next manuscript, since she is doing a series of experiments on the same topic.	**My view on this is:**	This is acceptable because it is her own work	
		This is not allowed by journals but it does not really matter, as it doesn't affect the science	
		This is unacceptable behaviour	
	Have you ever done something like this?	Yes	
		No, and I am not aware of anybody else doing it	
		No, but I am aware of other people doing it	
	In my current department or unit, such text-recycling		
	Is usual practice and happens most of the time	Happens occasionally	Happens rarely
	Never happens	Other: (please specify)	
	Comments or clarifications:		
A researcher, T, is working on a diagnostic test study. The company manufacturing the test has supplied the kits for free but did not design or fund the research. T was paid for a consultancy for the same company two years ago. In the publication of the study, he declares that he has no conflicts of interest.	**My view on this is:**	This is acceptable because T does not have a conflict of interest	
		This is not best practice, but it does not really matter, as it doesn't affect the science	
		This is unacceptable because T should disclose his consultancy	
	Have you ever done something like this?	Yes	
		No, and I am not aware of anybody else doing it	
		No, but I am aware of other people doing it	
	In my current department or unit, this behaviour:		
	Is usual practice and happens most of the time	Happens occasionally	Happens rarely
	Never happens	Other: (please specify)	
	Comments or clarifications:		

Table 2: Characteristics of survey respondents

	Median (IQR)
Age	44 (38 to 52)
Years at current workplace	10 (4.75 to 19.5)
% Time spent on research	40 (20 to 60)
Year of first publication	2003 (1997 to 2008)
Number of peer-reviewed articles	20 (7 to 41)
Number of Cochrane reviews	3 (1 to 5)
	N (%)
Gender	
Female	95 (48)
Male	104 (52)
Highest qualification	
Bachelor's degree	14 (7)
Master's degree	82 (41)
PhD	103 (52)
Place of work[1]	
University	141 (66)
Other research institution	40 (19)
Hospital	24 (11)
Other	10 (5)
Regions	
Latin America	52 (26)
Sub-Saharan Africa	48 (24)
South and South East Asia	44 (22)
East Asia	37 (19)
Other	18 (9)

[1] Multiple responses – total responses n=215

Table 3: LMIC researchers' perceptions and awareness of occurrence of heath research reporting

Health research reporting practice Total n=198	Perception: Acceptable or does not really matter	Behaviour: Have done this themselves or are aware of other people doing it	Occurrence at institution: This happens
	n (%)	n (%)	n (%)
Authorship			
Adding the head of department who has not contributed sufficiently[1]	69 (35)	161 (81)	153 (77)
Adding an expert in the field who has not contributed sufficiently to the research	64 (32)	145 (73)	140 (71)
Acknowledging a biostatistician for assistance with data analysis (as opposed to listing as an author)	132 (67)	163 (82)	166 (84)
Omitting an author who has contributed substantially to the research	3 (2)	87 (44)	81 (41)
Redundant publication			
Text-recycling (using one's own work from a previous publication in another)	57 (29)	117 (60)	118 (60)
Plagiarism			
Translating a text without acknowledging the original source	9 (5)	77 (39)	74 (37)
Copying an idea without acknowledgement of the original source	20 (10)	89 (45)	85 (43)
Conflicts of interest			
Not declaring previous financial reimbursement from a company involved in a research project	25 (13)	90 (45)	80 (40)
Not declaring your spouse's link to a company involved in a research project	47 (24)	61 (31)	56 (28)

[1]The full scenarios can be found in Supplementary file 1

Table 4: Selected quotations

Theme 1: Authorship rules are simple in theory, but not consistently applied
"I think it is not fair. If you don't work and you want to be an author. It's not fair… I think that the author should be the person involved in the work, the person who thought about the work, elaborated on the work, the person who works with the main author. And the people who really wrote the work… And not the chief of a discipline for example. He is an author just because he is the chief and I think it is unfair." (JNR_5)
"You know, there is this thing about somebody… that is above you and that you look up to and sometimes they will have told you that they are interested in that paper. So if you don't put their name there will be friction. It is going to be a serious issue. It happens." (JNR _6)
"I mean I generally use the medical editors' guidelines, the requirements for authorship, but it is clearly not being followed by most people." (SNR_5)
"So he did it [adding an author] out of good intent that he is helping a colleague, and what goes around, comes around. One day, I will be in need for this and he will help me, the idea of sharing and caring." (SNR_8)
Theme 2: Academic status and power underpin behaviours
"They have their names on the publication, otherwise there is no publication. Otherwise they do not give us the degree. They are actually part of the jury." (JNR_5)
"The senior author, the professor, took over first authorship and he knew the paper was actually accepted in a high impact publication. And it has gotten many citations. But it was not the senior author, the first author who did the work. He just came in on the last minute and said I'm going to be first author." (JNR_7)
"So what they care about is not the research, but the publication." (JNR_4)
"I was frustrated. I felt betrayed. I felt cheated out of my efforts and it was more like a failed expectation." (SNR_4)
"I think largely it is a power thing. You know, once you got some you want more…and status. I think that is absolutely huge. I don't know that it is personal money, personal financial interest as much as professional and as I say, brining money for one's programme. So it does not really matter if we fudge some of these results, but we will get more money and can do a bigger, better study next time." (SNR_5)
Theme 3: Institutions and culture fuel bad practices
"Especially before promotions and appraisal. Some people are desperate to have the requisite number of papers so they are willing to have their name on just any paper." (JNR_3)
"They have to choose a quick way to publish your paper and they also know that nobody will…use their results, especially if they publish it under general journals…" (JNR_4)
"There is some overemphasis on promotions rather than getting appraised based on what impact say the quality of the research and impact of the research." (SNR_1)
"I suspect that people stay in their rooms and cook up data and especially the ones that are smart." (SNR_2)
"We have to repeat this message over and over again, so that maybe at the end of the day, one day we reach the critical mass where we can change that." (SNR_8)
"I don't think we have got a guideline on that. I suppose I would have to write it if there was one." (SNR_7)

"Clear leadership from the top in the form of showing a good example is key because that creates a culture in the younger generation of researchers." (JNR_2)
"I'm very lucky to have been…developed as a young researcher in this specific environment…with my bosses and supervisors because they have…helped me to realise, you know, what is right and wrong so…they are good role models. But everyone is definitely not that lucky to work in the environment that I work in." (JNR_1)
Theme 4: Researchers are uncertain about what conflicts of interest are
"Well, I know, you know in those publications there's only the section for you to declare if there's any conflict of interest but no, they don't, people just say no, no, no so you there's no way you can tell if the person does or does not have (Conflicts of interest)" (JNR_6)
"I just report the evidence as it is so not declaring that my husband works for a…company and we have potential conflict of interest, I fail to understand how that can be a conflict of interest if his work did not really affect…the findings of the review…" (JNR_7)
"We all actually have conflict of interest and in some ways, it starts getting a bit ridiculous because you are trying to think back to, I mean how far do you go? If a rep has given you a pen at a conference, do you then have a conflict of interest if you are dealing with their product? I am not really sure" (SNR_5)
"I don't know if this is sufficient in the end – you can say "yes, I am employed by [a drug company]" but and then what? And then? I don't know if this is sufficient? Because in the end you are saying yes, I am defending the ideas of my employer and in the end you read the article and ask yourself, who is this that is speaking?" (SNR_6)

Supplementary file 1: Questionnaire on health research reporting practices

Section A: Please answer the following questions:

1. Which country are you currently working in?

2. Where do you currently work?
   - University
   - Other research institution
   - Other (please specify)

3. How long have you been working here? (months and years)

4. What is your highest qualification?
   - Bachelor's degree
   - Master's degree
   - PhD

5. On average, how much of your time (%) do you spend on research?

6. How many peer reviewed research articles have you been an author on?

7. What was the year of your first publication?

8. How many Cochrane reviews are you an author on?

9. What is your first language?

10. What is your gender?
    - Male
    - Female

11. What is your age?

Section B: Please read the following scenarios and answer the questions that follow:

1. A junior researcher, J, adds the head of department, D, as the last author on a research paper. D provided suggestions for direction of J's work that helped her obtain the grant, although he hasn't contributed to the actual research or the publication.

My view on this is:

- This is acceptable because D should be an author
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because D has not contributed to this paper

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this pattern of authorship

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

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2. A professor, M, who did not contribute to study design, data collection or data analysis but is an expert in the field, reviews the draft manuscript and suggests some minor changes to the English. He asks to be listed as an author on the paper.

My view on this is:

- This is acceptable because M should be an author
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because M has not sufficiently contributed to this paper

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this pattern of authorship

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

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3. A Master's student consults with the resident biostatistician, P, to help with data analysis on her research project. In the manuscript that she submits for publication, she lists P in the "Acknowledgement" section.

My view on this:

- This is acceptable because P should be acknowledged in this way
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because P has made substantial contributions to the work

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

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4. A PhD student "copies and pastes" nearly all of the introduction from a paper that she has previously published into her next manuscript, since she is doing a series of experiments on the same topic.

My view on this is:

- This is acceptable because it is her own work
- This is not allowed by journals but it does not really matter, as it doesn't affect the science
- This is unacceptable behaviour

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department such text-recycling:

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens

- Other: (please specify)

Comments or clarifications:

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5. A researcher in Mozambique wants to submit his manuscript to a journal published in English. He finds a text book in Portuguese that explains an aspect of the background to the disease very well. He translates one paragraph into English, and puts this into his introduction without reference to the book.

My view on this is:

- This is acceptable because the text has been translated
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable behaviour

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, such use of other people's material:

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments and clarifications:

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6. A researcher, T, is working on a diagnostic test study. The company manufacturing the test has supplied the kits for free but did not design or fund the research. T was paid for a consultancy for the same company two years ago. In the publication of the study, he declares that he has no conflicts of interest.

My view on this is:

- This is acceptable because T does not have a conflict of interest
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because T should disclose this consultancy

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this behaviour:

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or Clarifications:

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7. A researcher, K, writes a review for treatment guidelines of herbal remedies for children's cough. K's spouse is employed by the company that manufactures one of these remedies. In the review, K declares that he has no conflicts of interest.

My view on this is:

- This is acceptable because K does not have a conflict of interest
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because K should disclose his spouse's link to the company

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this behaviour:

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

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8. A researcher, S, contributes to the design and does most of the data collection in a study but goes on maternity leave as it is being analysed. When she returns to her post she discovers that the research has been published by her supervisor without her name or any acknowledgement of her contributions.

My view on this is:

- This is acceptable because S did not contribute to the publication
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because S should have been invited to contribute to the publication

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this type of practice (leaving out a junior author who has made substantial contributions):

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

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9. A researcher from India attends an international conference where a European research study with a novel design is presented. He submits a protocol for an identical study to the ethics committee at his home institution. He does not reference the European study.

My view on this:

- This is acceptable
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because the original idea should be acknowledged

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this behaviour:

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

Section C: Please answer the following questions:

1. Are you aware of any written institutional policies that cover the situations described in our scenarios?

- Yes
- No

2. Would you be interested in participating in an interview via Skype or telephone to discuss research reporting practices further?
   - Yes
   - No

3. Would you be interested in receiving feedback on this study?
   - Yes
   - No

Thank you for participating in this survey!

Please click on the link below if you indicated that you would be interested in participating in a telephonic/Skype interview on this topic or if you would like to receive feedback on the survey results.

Supplementary file 2: Interview guide

Hi *(Name)*

Thanks so much for agreeing to talk to me about research reporting today. I just want to check – have you read the information sheet? Is there anything that is unclear? As noted in the sheet, I will record our conversation – are you fine with that? Please note that all reporting is anonymous and you will not be identified in any way, and you are free to stop the interview at any time.

Another thing I want to mention is that we invited you to complete the survey because you are an author on a Cochrane review, but I would like you to think about any research publication – not just Cochrane reviews – during our conversation.

Let's start then. You work at the *(institution as provided by participant)*, right? What is your job there?

Let's talk about the survey that you completed a few weeks ago. What did you think about the situations we gave, did any seem familiar? What do you remember?

Some of the scenarios were about being an author on a paper. Have you come across any issues here yourself? What happened?

- *Prompts depending on answer:*
  - What about omitting an author that has contributed sufficiently to the research paper?
  - What about adding an author that has not made a big enough contribution to the research paper?
- Have you experienced something like this?
- How do you decide on authorship at your institution?
- Are there any guidelines about authorship at your institution? Are these being followed?

Some of the scenarios were about people copying other people's work, often called plagiarism.

What do you think about this? What do you understand by it? What do you think are the main problems with plagiarism?

- *Prompts depending on answer:*
  - What about translating a text into another language?
  - What about copying a text from another paper?
  - What about using someone else's idea?
- Do you have guidelines on plagiarism at your institution?

There were also scenarios about conflict of interest. How do you understand conflict of interest? Why do you think this is a problem?

- *Prompts depending on answer:*
  - What about being paid by a drug company for a consultation not related to the research project?
  - What about conflicts of interest that do not involve money?
- How do you deal with these competing interests at your institution and how are they reported in a paper?

What about other problems that we did not address in the survey, like making-up or manipulating data - Are you aware of any other poor practices happening at your institution?

Why do you think people engage in this bad practice?

What do you think can be done to prevent this behaviour?

Any other comments or questions?

Supplementary file 3: Final list and categories of codes

Poor practices happening at institutions
Adding authors that have not contributed substantially
Being added as an author when not contributed substantially
Being omitted
Omitting authors that have contributed
Ranking of authors not according to contributions
Change in author team
Changing author names on published papers
Using ideas without acknowledging their origin
Detection of plagiarism when doing systematic reviews
Students using existing projects
Academic CoI
Non-financial CoI
Data dredging
Data fabrication
Duplicate publication in different languages
Influence of sponsor
Non-reporting of results
Inaccurate reporting to public
Data manipulation
What was done when irregularity was detected?
Discussions within author team
Nothing was done
Formal complaint
Punishment
Discussions within author team
Decline further participation
Channels for complaints
Feelings associated with experience
Upset about what happened
Feeling powerless
Unfair process
Frustration
Did not care
Not sure how to handle situation
Insecurity
Discomfort
Concerned
Factors influencing practices/reasons for poor practices
Author team dynamics
Academic (personal) gain
Payment for assistance
Endorsement

Personal relationships
Professional relationships
Publication fees
Lack of knowledge and skills
Direct research environment (research team)
Institutions
Hierarchies within institutions
Requirements for promotion
Personal values
Lack of resources
Journal requirements
Guidelines
Cultural environment
Lack of time for research
Lack of funding
Lack of interest
Journals
Providing a service
Academic status
Researcher
Funders
Who is an author?
Challenges with authorship criteria
Timing of authorship discussions
What contribution warrants authorship? (ICMJE criteria)
Other criteria that warrant authorship
Guidelines
Arbitrary
Role of authors
What is plagiarism?
Various degrees of plagiarism
Not acknowledging origin of ideas
Using text without acknowledging source
Not sure about meaning
Translating text
Challenges related to plagiarism
What are conflicts of interest?
Levels of COI
Relationships with industry
Academic CoI
Difficult to understand CoI
Guideline panels
Professional relationships
Personal relationships
Anything that influences research
Research misconduct in general

Levels of misconduct
Complex issue
Crime
Global issues
Implications of poor practices
Affects organizational culture
Image of institution
Bias study results
Impact on researcher
Mistrust of study results
Impact on patients
Far-reaching consequences
Dealing with poor practices
Forgive
Responsibilities of researcher
Challenging
Institutional guidelines
Institutional support
Disciplinary action
Using Technology
Declaring COI
Decline participation
Relationships with industry
Need universal system
Learn from others
Promoting good practices
Training
Research team
Role-modelling
International collaborations
Organizational culture
Creating awareness
Auditing research
Institutional structures and channels
Rewards and punishments
Funding
Clear and accessible guidelines for all staff
Realistic research projects
Perceptions of prevalence of poor practices
Adding authors very common
Adding not common
Omitting authors relevant to clinical trials
Links with Pharmaceutical industries
Plagiarism does occur
Relevant topic
Common issue but not always overt

Attitudes of researchers
Criteria restrictive
Arrogance
Hopeless?
Not tolerated
Difficult to be 100% honest
Accountability
Aware of research integrity issues

Supplementary file 4: Survey results per region

Health research reporting practice per region Total n=198	Perception: Acceptable or does not really matter	Behaviour: Have done this themselves or are aware of other people doing it	Occurrence at institution: This happens
Adding the head of department who has not contributed sufficiently			
Sub-Saharan Africa (n=48)	6 (13)	34 (71)	32 (67)
Latin America (n=52)	16 (31)*	44 (85)	40 (77)
South and South East Asia (n=44)	16 (36)*	37 (84)	30 (68)
East Asia (n=36)	24 (67)*	31 (86)	36 (100)
Other (n=18)	7 (39)*	15 (83)	15 (83)
Difference between regions	p=0.000	p=0.324	p=0.003
Adding an expert in the field who has not contributed sufficiently to the research			
Sub-Saharan Africa (n=48)	10 (21)	29 (60)	25 (52)
Latin America (n=52)	16 (31)	43 (83)	39 (75)*
South and South East Asia (n=44)	17 (39)	30 (68)	29 (66)
East Asia (n=36)	17 (47)	29 (81)	34 (94)*
Other (n=18)	4 (22)	14 (78)	13 (72)
Difference between regions	p=0.083	p=0.086	p=0.001
Acknowledging a biostatistician for assistance with data analysis (as opposed to listing as an author)			
Sub-Saharan Africa (n=48)	29 (60)	33 (69)	35 (73)
Latin America (n=52)	37 (71)	45 (87)	45 (87)
South and South East Asia (n=44)	33 (75)	39 (89)	39 (89)
East Asia (n=36)	19 (53)	30 (83)	32 (89)
Other (n=18)	14 (78)	16 (89)	15 (83)
Difference between regions	p=0.146	p=0.076	p=0.204
Omitting an author who has contributed substantially to the research			

Sub-Saharan Africa (n=48)	1 (2)	17 (35)	15 (31)
Latin America (n=52)	0 (0)	25 (48)	20 (38)
South and South East Asia (n=44)	1 (2)	22 (50)	17 (39)
East Asia (n=36)	1 (3)	14 (39)	21 (58)
Other (n=18)	0 (0)	9 (50)	8 (44)
Difference between regions	p=0.784	p=0.546	p=0.153
Text-recycling (using one's own work from a previous publication in another)			
Sub-Saharan Africa (n=48)	7 (15)	18 (38)	18 (38)
Latin America (n=52)	27 (52)*	38 (73)*	35 (67)*
South and South East Asia (n=44)	9 (20)	31 (70)*	26 (59)*
East Asia (n=36)	13 (36)*	20 (57)	29 (81)*
Other (n=18)	1 (6)	10 (56)	10 (56)
Difference between regions	p=0.000	p=0.003	p=0.001
Translating a text without acknowledging the original source			
Sub-Saharan Africa (n=48)	1 (2)	10 (21)	8 (17)
Latin America (n=52)	4 (8)	25 (48)*	20 (38)*
South and South East Asia (n=44)	3 (7)	19 (43)*	14 (32)
East Asia (n=36)	1 (3)	13 (36)	23 (64)*
Other (n=18)	0 (0)	10 (56)*	9 (50)*
Difference between regions	p=0.478	p=0.027	p=0.000
Copying an idea without acknowledgement of the original source			
Sub-Saharan Africa (n=48)	0 (0)	12 (25)	9 (19)
Latin America (n=52)	6 (12)	26 (50)*	25 (48)*
South and South East Asia (n=44)	4 (9)	25 (57)*	18 (41)*
East Asia (n=36)	8 (22)	17 (47)*	25 (69)*
Other (n=18)	2 (11)	9 (50)	8 (44)*

Difference between regions	p=0.022	p=0.026	p=0.000
Not declaring previous financial reimbursement from a company involved in a research project			
Sub-Saharan Africa (n=48)	2 (4)	10 (21)	11 (23)
Latin America (n=52)	4 (8)	29 (56)*	21 (40)
South and South East Asia (n=44)	3 (7)	25 (57)*	18 (41)
East Asia (n=36)	11 (31)*	17 (47)*	22 (61)*
Other (n=18)	5 (28)*	9 (50)*	8 (44)
Difference between regions	p=0.001	p=0.002	p=0.013
Not declaring the wife's link to a company involved in a research project			
Sub-Saharan Africa (n=48)	6 (13)	7 (15)	6 (13)
Latin America (n=52)	10 (19)	16 (31)	15 (29)
South and South East Asia (n=44)	12 (27)	19 (43)*	11 (25)
East Asia (n=36)	14 (39)*	12 (33)*	19 (53)*
Other (n=18)	5 (28)	7 (39)*	5 (28)
Difference between regions	p=0.062	p=0.045	p=0.002

*Indicates significant difference compared to Sub-Saharan Africa

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Authorship, plagiarism and conflict of interest: views and practices from low and middle income country health researchers

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Authorship, plagiarism and conflict of interest: views and practices from low and middle income country health researchers

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Abstract

Objectives

To elucidate low and middle income country (LMIC) health researchers' views about authorship, redundant publication, plagiarism and conflicts of interest and their awareness of the occurrence of poor practices.

Design

Mixed-methods study. We developed a questionnaire based on scenarios about authorship, redundant publication, plagiarism and conflicts of interest. We asked participants whether the described practices were acceptable, whether they, or someone they knew, had behaved in this way, and whether these behaviours were common at their institutions. We conducted semi-structured interviews with respondents who agreed to be interviewed.

Participants

We invited 607 corresponding authors of Cochrane reviews working in LMICs. From the 583 emails delivered, we obtained 199 responses (34%). We interviewed 15 respondents.

Results

Seventy seven percent (95%CI 72 to 83) reported guest authorship occurred at their institution; plagiarism occurred occasionally (12%) or rarely (24%); and 40% (95%CI 33 to 47) indicated that their colleagues had not declared conflicts of interest in the past. Respondents generally recognised poor practice in all three domains, but reported the practices occurred at their institutions. Themes identified from interviews were: 1) authorship rules are simple in theory, but not consistently applied; 2) academic status and power underpin behaviours; 3) institutions and culture fuel bad practices; and 4) researchers are uncertain about what conflicts of interest means, and how this may influence research.

Conclusions

Guest authorship is widely accepted and common. Plagiarism and undeclared conflicts of interest are perceived as unacceptable, but in practice appear common. Determinants relate to power, institutional norms, generally, although conflicts of interest do not seem to be well understood.

Strengths and limitations of this study

- We elucidated health researchers' views about what was acceptable practice and behaviour in relation to authorship, plagiarism and conflicts through real life scenarios.
- Respondents were part of Cochrane which has strong ethical values and thus may improve the sensitivity of reporting practices.
- Our response rate, whilst about average for such research, is a study limitation.
- The study is one of the first to show that guest authorship is common practice in LMICs.
- Despite good knowledge of best practice, institutional and academic power relationships and culture strongly influence these aspects of poor research practice.

Introduction

Intellectual honesty and personal responsibility for our actions is core to research integrity and accountability, alongside institutional culture and policies to help assure best practice. Research misconduct is a threat to all researchers as it puts the trustworthiness of science and researchers at risk. Blatant misconduct such as data fabrication, data falsification and plagiarism receives most attention, both in the media and within universities (1). However, less wholesale misrepresentation is much more common, and may pose a threat to the integrity of research that is at least as great a threat as blatant misconduct (2-6). One aspect of this is poor reporting practices, which includes guest or ghost authorship, not declaring conflicts of interest, or redundant publication. These reflect poor practice, and are important basics of reporting science, and we thus chose them to be the subject of this research.

The prevalence of research misconduct has been estimated in systematic reviews, and is based on surveys asking researchers about misconduct. Results show that 1.97% (95%CI 0.89 to 4.45) of survey participants admitted to having fabricated or falsified data (7), 1.7% (95%CI 1.2 to 2.4) admitted to having committed plagiarism (8) while 29% (95% CI 24% to 35%) reported knowing of authorship problems (9). Yet there are few empirical studies on research practices in low and middle income countries (LMICs). Only one of the systematic reviews mentioned above (9) included studies conducted in LMICs – only three of the 14 studies that contributed data to the meta-analysis. Published literature focuses on high income countries and research misconduct in terms of data falsification, data fabrication and plagiarism (7, 10). In LMICs, research outputs are increasing, through local and international collaborations, but national policies on research integrity are lacking (11) and the pressure to perform and live up to global standards is rising (12).

Developing the science capacity in LMICs is important and is attracting increasing investment from national governments and donors. Assuring strong moral principles and honest practice is an important part of this development. We initiated research to describe health researchers' perceptions of good and poor reporting practices and their perceptions about how common this is. Our objectives were to describe and analyse LMIC health researchers' perceptions about best and actual practice with authorship, redundant publication, plagiarism and conflicts of interest through a survey; and to explore influences on what people do in practice through in-depth interviews.

Methods

Study participants and design

Our target population was corresponding authors of Cochrane systematic reviews working in LMICs (countries defined by the World Bank (13)). We chose this group as they were identifiable, have all contributed to a published systematic review using international standards, and represented a sample frame for active medical researchers. Cochrane has strong ethical principles, so it was thought likely this group may have awareness of best practice with authorship, plagiarism and conflicts of interest, and thus provide a more sensitive and accurate estimate.

For the qualitative part of the study, we recognised that the researcher's values and morals play a part in interpreting phenomena and how knowledge is created (14, 15). The research team have diverse experience and skills, including nursing and clinical epidemiology (AR), infectious diseases (PG), publication ethics (EW) and public health (TY). They are all authors on Cochrane reviews, have editorial and training roles within Cochrane and publication ethics; two team members are based at a LMIC institution, and all members have extensive experience in working in LMIC settings. AR completed formal training in qualitative interview and data analysis methods and has some experience in doing qualitative research.

Data collection

We developed a questionnaire with questions based on nine scenarios (Supplementary file 1). The nine scenarios covered guest authorship, ghost authorship, plagiarism, redundant publication and declaration of conflicts of interest. Participants were asked whether they considered the practice portrayed in the scenario as acceptable, whether they or someone they knew had ever done this and whether the practice was common in their institution. Three illustrative scenarios and the response options are shown in Table 1. The questionnaire was piloted with researchers not eligible for our study. We set up the survey using Google forms and sent an invitation containing the link to the survey via email. In the email, we stated that participation in the survey was voluntary, that responses were anonymous and that the survey would take 15-20 minutes to complete. We surveyed all LMIC contact authors of active Cochrane reviews (published in the Cochrane Library in May 2015) and sent two reminders after the original invitation. The survey asked participants if they were willing to take part in a follow-up interview, and asked them to indicate this through a link separate from the online questionnaire to preserve anonymity. All respondents that provided contact details were contacted via email to set up a time for the interview that was convenient to them.

We developed an interview guide for semi-structured interviews (Supplementary file 2) aligned with our objectives and informed by the survey results. AR conducted all the interviews between October and December 2015. Interviews lasted 45-60 minutes and were conducted in person or by Skype or telephone. All interviews were recorded with a digital voice recorder and notes were taken during the interviews to provide a comprehensive data set.

Data analysis

We dichotomised survey data by combining categories of potential answers and analysed it with SPSS, using descriptive statistics for each scenario. We stratified results by region and compared results between regions using the chi-squared test.

We analysed interviews using the framework approach, which fits into the broader family of thematic analysis (16) using transcriptions of the audio recordings. Three researchers (AR, TY, EW) independently coded one of the transcripts using an inductive method of coding. We compared and discussed our individual codes and developed a set of preliminary codes that could be applied to the other transcripts. We did not consider the set of codes to be exhaustive and continually added new codes until all transcripts were coded. One researcher (AR) coded all the subsequent transcripts using Atlas.ti software, version 7.5 (17). We categorised the codes (Supplementary file 3) and extracted illustrative quotations. Emerging themes were identified through discussions with the whole research team in an iterative process.

Ethics

The Stellenbosch University Health Research Ethics Committee approved the study (N14/12/158) and the Cochrane Steering Group approved the participation of authors. Participation in the survey was voluntary and submitting a response was taken as informed consent. Anonymity was ensured, as participants were not required to provide their names or the names of their institutions. Respondents who indicated willingness to be interviewed signed an electronic consent form before the interview. The interview transcripts contained no names to ensure anonymity of interview responses.

Results

We sent 607 invitations to corresponding authors of Cochrane systematic reviews. Twenty-four were not delivered; for the remainder, the response rate was 34% (199/583), with one incomplete response that was omitted from the analysis. Similar numbers of respondents were obtained across Latin America, Sub-Saharan Africa, South and South-East Asia, and East Asia, with one tenth from

North Africa, the Middle East and Eastern Europe (Table 2). We contacted all 28 respondents who provided their contact details, and 15 of these were available to be interviewed within the study period. The interview group comprised junior researchers (PhD students or those who had recently obtained their PhD; seven respondents) and senior researchers (professors who had supervised PhD students; eight respondents).

Survey responses

The responses are summarised in Table 3. Supplementary file 4 has a more detailed analysis.

For guest authorship given to the head of department, one third of the 198 respondents thought this was acceptable or did not matter (35%, 95%CI 29 to 42). For behaviour, 24% (95%CI 19 to 30) said they had done this, while 57% (95%CI 50 to 64) had not done this, but were aware of others doing it; and 77% (95%CI 72 to 83) indicated this happened at their institution.

Adding an expert in the field who had not contributed sufficiently was similarly regarded as acceptable by one third, 21% had done this (95%CI 16 to 27) and it happened in their institution (71%; 95%CI 65 to 77).

Omitting an author who has contributed substantially to the research was recognised as unacceptable (99%, 95%CI 97 to 100), yet 41% (95%CI 35 to 48) reported that it happens, but mainly "occasionally" (14%) or "rarely" (26%). While only 2% (95%CI 0.5 to 4) indicated that they had done this, 42% (95%CI 35 to 49) had not done it themselves, but knew of other people doing it. Responses related to acknowledging rather than giving authorship to the biostatistician for assistance with data analysis were more mixed.

For plagiarism, almost all the respondents (96%; 95%CI 92 to 99) thought that it was unacceptable to translate a text from another language without acknowledging the original source. Only 2% (95%CI 0.5 to 4) indicated that they had done this, but 37% (95%CI 31 to 44) of respondents indicated that they had not done this but knew of someone who had. Respondents thought that this practice occurred at their institution "occasionally" (12%) or "rarely" (24%).

Copying an idea without acknowledging the original source was reported as unacceptable by 90% of respondents (95%CI 85 to 94). Only 3% (95%CI 0.5 to 5) indicated that they had done this themselves, but 43% (95%CI 36 to 50) indicated that they knew of others who had done this. Respondents said that this occurred at their institution "occasionally" (12%) or "rarely" (30%).

Most respondents (87%; 95%CI 82 to 91) thought that failure to disclose a financial reimbursement from a company involved in a research project was unacceptable. Five respondents indicated that they had done this themselves (3%, 95%CI 0.5 to 5), yet 43% (95%CI 36 to 50) of respondents knew someone who had not declared known conflicts of interests. Respondents (40%; 95%CI 33 to 47) said that it happened at their institution "occasionally" (15%) or "rarely" (24%).

Most respondents (76%; 95%CI 71 to 82) thought that it was unacceptable for an author not to declare a spouse's link to a company involved in a research project. Three respondents indicated that they had not declared this in the past, but 29% (95%CI 23 to 36) knew someone who had not declared this, while 28% (95%CI 22 to 34) said that this practice occurred at their institution "occasionally" (7%) or "rarely" (22%).

We explored if there were obvious differences between regions (Supplementary file 5). We found that two thirds (67%; 95%CI 50 to 80) of respondents from East Asia thought that adding a head of department who had not contributed significantly to the paper was acceptable or did not matter, whereas most respondents (61 to 87%) from other regions thought that this practice was unacceptable. All respondents (100%) from East Asia indicated that this happened at their institution.

Interviews

Authorship practices was a uniform concern across all the people interviewed. People reported adding authors who had not contributed substantially to the research, omitting authors who had contributed substantially, and conflicts about the order of authors. Interviewees reported they knew about plagiarism in colleagues and in their institution. At risk were students and junior researchers whose first language was not English who published the same material in different languages. Others reported not publishing results that did not show any effect. Some interviewees also said that they knew of researchers who had fabricated data, manipulated data or engaged in data dredging. Almost all commented that misconduct was probably more prevalent than was officially acknowledged.

Our analysis identified four main themes. These are described below, with illustrative quotes in Table 4.

Theme 1. Authorship rules are simple in theory, but not consistently applied

Interviewees were mostly aware of the International Committee of Medical Journal Editors (ICMJE) criteria. Some reported diligent application of the criteria; others were clearly frustrated with their colleagues, as *"it should be simple";* and described it as "*not straightforward*" with *"blurring of lines"* in defining contribution. Most were aware of authorship decisions in their institutions based on factors other than contribution. *"We have a lot of issues on what we call 'add my name'. It's very popular."*

Adding authors at a late stage who had done little or nothing was common in all regions, for a variety of reasons: a *"favour"* and loyalty towards colleagues, family and friends; as a means of rewarding research assistants; to make a publication look better; out of respect for a senior researcher; and in return for paying open access publication fees. Sometimes authors from different disciplines or non-academics were added. In contrast to this haphazard way of assigning authorship, other researchers felt they were expected to follow *"unwritten rules"*.

Theme 2: Academic status and power underpin behaviours

Senior and junior interviewees described the *"power play"* between senior and junior researchers. Junior researchers, were described as the *"work horses"*, who had to *"abide"* by the *"mandatory rules"* of their bosses to avoid conflict or a "*change in attitude"* towards them. They found it *"very difficult to fight senior professors"* who were described as *"arrogant"* and *"corrupt".* All those reporting this had personal stories. In many countries, junior researchers were obliged to add the names of heads of department, bosses, or supervisors to their publications even when they did not contribute. Others reported that professors or supervisors expected to be first author on a publication that was based on a student's dissertation or junior researchers' work. Some respondents described cases where professors published students' research without including them as authors and sometimes even without students knowing that their work had been published. Junior researchers were frustrated about these practices which they viewed as unfair.

It seems students and junior researchers may have no choice but to tolerate this manipulative behaviour to complete their degrees and advance their careers. Some interviewees who had experienced this spoke vehemently about how upset they were - and recounting their experiences evoked strong emotions: anger, betrayal, frustration and hurt. They also found it difficult to stand up against seniors in these situations. Their place in the hierarchy determined whether their voice was heard or not, and they were often *"brushed off"* by more senior people. Interviewees were concerned that researchers, especially those who are *"not in a position of power"* were unable to raise concerns or make anonymous remarks when they suspected misconduct.

The desire for academic status was reported as a big driver. Publications are the *"bread and butter"* of researchers – more publications lead to promotions and more power. Interviewees felt that researchers often did not care about the research itself, but rather about the number of publications

they had authored and the power that comes with publication. Academics are willing to do almost anything to be *"recognised in the scientific community", "associated with high-impact publications"* and ascend the institutional hierarchy. This behaviour was described as not being *"in the best interest of the research…but certainly in the best interests of the researcher".*

Theme 3: Institutions and culture fuel bad practices

A recurrent theme was the *"overemphasis"* on publications, particularly the quantity required for promotion, fuelling and encouraging a variety of forms of misconduct. Respondents were aware of researchers who submitted papers they had *"photo-shopped"* to include their names and affiliations for promotion, or *"set up phony journals"* where they published a reworked version of somebody else's paper. Another described clinicians and nurses publishing fabricated data in local journals. Although researchers were aware that this was unethical, they did not really care since papers published in these journals were known to be untrustworthy. Yet such publications counted towards promotion.

Interviewees also highlighted the lack of structures and systems to support and promote research integrity in their institutions such as research integrity offices, clear policies on research misconduct and channels for whistleblowing. Interviewees thought offenders should be punished appropriately, as this might deter poor practices. Whilst most institutions had guidelines on plagiarism, use of text-matching software was directed towards students rather than academics. Institutional guidelines on good research reporting practices were either lacking or interviewees did not know where to find them.

In addition to flawed systems, an emerging theme was the culture within institutions. Interviewees noted the lack of research integrity champions within institutions. Interviewees, especially senior researchers, reported playing a big role in promoting research integrity in their institutions. However, they often felt like *"lone voice(s) in the wilderness"* and lacked *"the critical mass"* to change poor practices. Awareness about research integrity amongst other researchers was perceived as low. Leadership was reported as an essential factor in fostering a culture of research integrity. The lack of positive role models and mentors at institutions was raised as a concern and respondents noted that having a good mentor was essential to learn *"what is right and wrong"*.

Theme 4: Researchers are uncertain about what conflicts of interest means, and how this may influence research

Respondents expressed various views on managing and disclosing conflicts of interest. Some believed that they would not be influenced – neither by commercial companies, nor by personal relationships – and would just report the evidence *"as is".* Some believed that researchers should not refuse to work with commercial companies *per se*, as their expertise could help in the advancement of science. Key to both points of view was being transparent and declaring funding sources and links to commercial companies. A contrasting view was that links to commercial companies would always influence researchers on some level, even if this influence was very subtle. Some interviewees supported the idea that it was better to decline participation in a research project when there was a financial or academic conflict of interest.

Uncertainty around academic conflicts of interest was frequently raised. Examples of dilemmas included examining a thesis describing research that was similar to their own, including clinical experts who had received funding from pharmaceutical companies in systematic reviews, and peer-reviewing papers of colleagues without being biased.

Interviewees also questioned the validity and adequacy of declaring conflicts of interest. Some thought that declaring conflicts of interest did not mean that the research was *"free of any kind of internal, external manipulation"*, while others believed that researchers generally declared that they did not have conflicts of interest, even if they did. Interviewees were also confused about declaring

personal relationships with friends, family and spouses in a scientific paper. Most interviewees thought that there was inadequate guidance on what to declare and when to declare it.

Discussion

We used a number of documented strategies to maximise our response rate, as a low response rate is a well-documented disadvantage and challenge of online surveys (18, 19). We sent the survey to participants in individual and personalised emails, emphasising the value of participants' knowledge and understanding of health research reporting practices, ensuring anonymity of responses, and inviting them to engage in further discussions. We also sent two reminders (18-20). Despite our efforts, we only obtained a response rate of 34% for the survey. We were unable to contact non-respondents to obtain demographic information and reasons for not responding as anonymity of participants did not allow us to distinguish between respondents and non-respondents. We thus cannot rule out the possibility that non-respondents had different views from respondents (18, 21). Only 28 survey respondents (14%) indicated that they were willing to participate in follow-up interviews and 15 of those accepted the email invitation.

Authors of Cochrane reviews from LMICs perceived certain reporting practices as unacceptable, but noted that these happened in their institutions. We found that guest authorship was widespread, plagiarism is a problem, and there is a lack of awareness about conflicts of interest. There are several caveats that need to be considered when interpreting the results of surveys on research misconduct. It is almost impossible to eliminate social desirability bias, which refers to the tendency of survey participants to answer questions about their own values and behaviours in a way that is socially acceptable (22, 23). Although having an anonymous, self-administered, online survey aims to reduce this bias, rates of self-reported misconduct might be underestimated (24). In addition, rates of reported misconduct in others might be overestimated, as participants from the same institution might refer to the same acts of misconduct. In contrary, rates of misconduct in others might also be underestimated, as researchers might want to protect their colleagues and the reputation of their institution (7). In addition, the survey wording might affect participants' understanding and interpretation of the practices described. However, we aimed to standardise understanding of practices by using scenarios that portrayed certain irresponsible practices. We chose scenarios that included nuanced decisions but still had fairly clear correct answers and designed them to elicit responses that dichotomise these as right or wrong. However, we could not measure "overall" knowledge and behaviour in relation to all aspects of authorship practices, plagiarism and conflicts of interest, so the findings should be interpreted within the specific focus and examples of research reporting we examined.

The in-depth interviews suggested that the institutions, their hierarchy and culture tended to encourage poor practice. Although our sample was small and self-selected, participants were very aware of what was happening at their institution and generally addressed the same problems. However, generalisability of our results is limited and results have to be interpreted with caution. We identified Cochrane authors as a group of researchers based in academic institutions in LMICs, who had contact with an international collaboration that promotes good scientific and reporting practice. Whilst this restricted the size of the sample, it provided an identified sampling frame and respondents with some awareness of the aspects of research integrity that we were investigating (25). Survey and interview participants were from various LMICs and included junior as well as senior researchers. We considered the possible biases such a sample might entail, since Cochrane has strong ethical principles, and the critical appraisal of research papers for systematic reviews is likely to make Cochrane authors aware of authorship issues, plagiarism and conflicts of interest. This awareness means that their responses are probably reasonably accurate. For those interviewed, it may be that they have volunteered because of frustration with the system they are working in, or because they were upset about injustice that they had experienced themselves, but the analysis seemed to ring true and was remarkably consistent between those interviewed. However, we accept

that using this sampling frame may have limited the representativeness of our respondents and that Cochrane authors may have greater understanding of publication ethics than other researchers.

Of all the irresponsible practices explored, perceptions and occurrence of guest authorship stood out. In light of the availability of international guidelines (26) and journal requirements on contributions of authors, this result is striking although not unexpected when considering results of other studies. A meta-analysis on the misuse of authorship (9) found a self-reported prevalence of 55% (95%CI 45% to 64%) amongst health researchers from countries outside of the USA and UK, including South Africa, India and Bangladesh. A survey conducted amongst medical professionals in India (27) found a high prevalence of guest authorship (65%; 101/155), while in a study conducted in Nigeria, 36% (47/133) of participating health professionals indicated that they had encountered disagreements about authorship (28). In our survey, 77% (95%CI 72 to 83) of respondents indicated that guest authorship occurred at their institutions.

For plagiarism, few of our respondents admitted to having translated a text or copied an idea without acknowledgement of the original source. However, they were aware of this happening in their institutions. Other studies from LMICs report much higher levels of self-reported plagiarism; 5% (n=132) among Nigerian dental researchers (29), 9% (n=130) among Nigerian health researchers (28), and 73% (n=82) among medical faculty members in Pakistan (30). Our findings are similar to self-reported rates of plagiarism in high-income countries as found in a systematic review (8) that reported a pooled estimate of 1.7% (95%CI 1.2 to 2.4) of survey participants admitting to any type of plagiarism. The pooled estimate for observed plagiarism in colleagues was 29.6% (95%CI 17.4 to 45.5), which is lower than our estimates of 37% (95% CI 31 to 44) and 43% (95%CI 36 to 50). However, our scenarios referred only to translation of text and copying of an idea and not to simply copying of text, which is generally a more common understanding of plagiarism.

Our findings show that the desire for power and academic status, as well as institutional systems and academic culture greatly influence research integrity. These findings are in line with other international publications (31-33) and suggest that factors driving research misconduct are similar across low, middle and high-income countries. Of concern is the lack of mentors and role-models for junior researchers. Indeed, mentoring has been shown to positively influence research career development, productivity and success, and plays an important role in preventing misconduct (32, 34). Junior researchers appear to know what good practices are, but are discouraged from following these by seniors.

The impact of financial conflicts of interest on study results and reported conclusions is well recognised (35, 36). More recently, the importance of considering non-financial conflicts of interest has been highlighted (37-39). We found that non-financial conflicts of interest were poorly understood and that participants were reluctant to report them. A recent study found that authors of systematic reviews reported non-financial conflicts of interests less frequently than financial conflicts of interests (40). Our study participants felt that there was inadequate guidance on declaring financial and non-financial conflicts of interest and that a universal framework would be helpful. This need for standardised methods of reporting conflicts of interest has been recognised (38, 40-42) and some approaches proposed (38, 40, 41). However, a universal system has not been realised and the onus is on journals and institutions to provide clear policies and guidelines on the transparent reporting of conflicts of interests.

There are few published studies on irresponsible research practices amongst health researchers from LMICs (10). To our knowledge, this is the first survey followed up with in-depth interviews that includes participants from several LMICs. The use of an online survey and in-depth interviews allowed us to gather rich data that supplemented our quantitative findings. This work highlights researcher concerns about several aspects of poor reporting practice in LMICs and the belief that such practices are common in some institutions. In particular, guest authorship emerged as a major

concern. Limited institutional processes and systems, lack of role-models and emphasising promotions and publications are important factors thought to influence research integrity in LMICs. There is a need for institutional guidance and senior faculty commitment to promote good practices and create a culture of research integrity.

Future research in LMICs should explore ways to promote research integrity at various levels within institutions (e.g. research team, departmental, institutional) and consider roles of external stakeholders such as journals and funders.

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Contribution of authors

All authors contributed to the design of the study. AR collected and analysed data, with input from EW, TY and PG. AR drafted the manuscript. PG, TY and EW critically engaged with the manuscript and provided input. All authors have approved the final manuscript.

Competing interests

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: financial support from the Effective Health Care Research Consortium (EHCRC). This Consortium is funded by UK aid from the UK Government for the benefit of developing countries (Grant: 5242). EW is a self-employed consultant and received personal fees for training related to publication ethics outside of the study. All authors are involved with Cochrane and EW is the author of a Cochrane systematic review on interventions to promote research integrity.

Data sharing

Unpublished data from the survey can be obtained upon request from AR.

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Tables

Table 1: Examples of survey scenarios and accompanying questions

A junior researcher, J, adds the head of department, D, as the last author on a research paper. D provided suggestions for direction of J's work that helped her obtain the grant, although he hasn't contributed to the actual research or the publication.	**My view on this is:**	This is acceptable because D should be an author	
		This is not best practice, but it does not really matter, as it doesn't affect the science	
		This is unacceptable because D has not contributed to this paper	
	Have you ever done something like this?	Yes	
		No, and I am not aware of anybody else doing it	
		No, but I am aware of other people doing it	
	In my current department or unit, this pattern of authorship:		
	Is usual practice and happens most of the time	Happens occasionally	Happens rarely
	Never happens	Other: (please specify)	
	Comments or clarifications:		
A PhD student "copies and pastes" nearly all of the introduction from a paper that she has previously published into her next manuscript, since she is doing a series of experiments on the same topic.	**My view on this is:**	This is acceptable because it is her own work	
		This is not allowed by journals but it does not really matter, as it doesn't affect the science	
		This is unacceptable behaviour	
	Have you ever done something like this?	Yes	
		No, and I am not aware of anybody else doing it	
		No, but I am aware of other people doing it	
	In my current department or unit, such text-recycling		
	Is usual practice and happens most of the time	Happens occasionally	Happens rarely
	Never happens	Other: (please specify)	
	Comments or clarifications:		
A researcher, T, is working on a diagnostic test study. The company manufacturing the test has supplied the kits for free but did not design or fund the research. T was paid for a consultancy for the same company two years ago. In the publication of the study, he declares that he has no conflicts of interest.	**My view on this is:**	This is acceptable because T does not have a conflict of interest	
		This is not best practice, but it does not really matter, as it doesn't affect the science	
		This is unacceptable because T should disclose his consultancy	
	Have you ever done something like this?	Yes	
		No, and I am not aware of anybody else doing it	
		No, but I am aware of other people doing it	
	In my current department or unit, this behaviour:		
	Is usual practice and happens most of the time	Happens occasionally	Happens rarely
	Never happens	Other: (please specify)	
	Comments or clarifications:		

Table 2: Characteristics of survey respondents

	Median (IQR)
Age	44 (38 to 52)
Years at current workplace	10 (4.75 to 19.5)
% Time spent on research	40 (20 to 60)
Year of first publication	2003 (1997 to 2008)
Number of peer-reviewed articles	20 (7 to 41)
Number of Cochrane reviews	3 (1 to 5)
	N (%)
Gender	
Female	95 (48)
Male	104 (52)
Highest qualification	
Bachelor's degree	14 (7)
Master's degree	82 (41)
PhD	103 (52)
Place of work[1]	
University	141 (66)
Other research institution	40 (19)
Hospital	24 (11)
Other	10 (5)
Regions	
Latin America	52 (26)
Sub-Saharan Africa	48 (24)
South and South East Asia	44 (22)
East Asia	37 (19)
Other	18 (9)

[1] Multiple responses – total responses n=215

Health research reporting practice Total n=198	Perception: Acceptable or does not really matter		Behaviour: Have done this themselves		Occurrence at institution: This happens	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Authorship						
Adding the head of department who has not contributed sufficiently[1]	69	35 (29 to 42)	48	24 (19 to 30)	153	77 (72 to 83)
Adding an expert in the field who has not contributed sufficiently to the research	64	32 (26 to 39)	42	21 (16 to 27)	140	71 (65 to 77)
Acknowledging a biostatistician for assistance with data analysis	132	67 (60 to 73)	103	52 (45 to 59)	166	84 (78 to 89)
Omitting an author who has contributed substantially to the research	3	2 (0.0 to 4)	4	2 (0.5 to 4)	81	41 (35 to 48)
Redundant publication						
Text-recycling (using one's own work from a previous publication in another)	57	29 (23 to 35)	22	11 (7 to 16)	118	60 (53 to 66)
Plagiarism						
Translating a text without acknowledging the original source	9	5 (2 to 8)	4	2 (0.5 to 4)	74	37 (31 to 44)

Table 3: LMIC researchers' perceptions and awareness of occurrence of heath research reporting

Copying an idea without acknowledgement of the original source	20	10 (6 to 15)	5	3 (0.5 to 5)	85	43 (36 to 50)
Conflicts of interest						
Not declaring previous financial reimbursement from a company involved in a research project	25	13 (8 to 18)	5	3 (0.5 to 5)	80	40 (33 to 47)
Not declaring your spouse's link to a company involved in a research project	47	24 (18 to 30)	3	2 (0.0 to 4)	56	28 (22 to 34)

[1]The full scenarios can be found in Supplementary file 1

Table 4: Selected quotations

Theme 1: Authorship rules are simple in theory, but not consistently applied
"I think it is not fair. If you don't work and you want to be an author. It's not fair… I think that the author should be the person involved in the work, the person who thought about the work, elaborated on the work, the person who works with the main author. And the people who really wrote the work… And not the chief of a discipline for example. He is an author just because he is the chief and I think it is unfair." (JNR_5)
"You know, there is this thing about somebody… that is above you and that you look up to and sometimes they will have told you that they are interested in that paper. So, if you don't put their name there will be friction. It is going to be a serious issue. It happens." (JNR _6)
"I mean I generally use the medical editors' guidelines, the requirements for authorship, but it is clearly not being followed by most people." (SNR_5)
"So, he did it [adding an author] out of good intent that he is helping a colleague, and what goes around, comes around. One day, I will be in need for this and he will help me, the idea of sharing and caring." (SNR_8)
Theme 2: Academic status and power underpin behaviours
"They have their names on the publication, otherwise there is no publication. Otherwise they do not give us the degree. They are actually part of the jury." (JNR_5)
"The senior author, the professor, took over first authorship and he knew the paper was actually accepted in a high impact publication. And it has gotten many citations. But it was not the senior author, the first author who did the work. He just came in on the last minute and said I'm going to be first author." (JNR_7)
"So, what they care about is not the research, but the publication." (JNR_4)
"I was frustrated. I felt betrayed. I felt cheated out of my efforts and it was more like a failed expectation." (SNR_4)
"I think largely it is a power thing. You know, once you got some you want more…and status. I think that is absolutely huge. I don't know that it is personal money, personal financial interest as much as professional and as I say, brining money for one's programme. So, it does not really matter if we fudge some of these results, but we will get more money and can do a bigger, better study next time." (SNR_5)
Theme 3: Institutions and culture fuel bad practices
"Especially before promotions and appraisal. Some people are desperate to have the requisite number of papers so they are willing to have their name on just any paper." (JNR_3)
"They have to choose a quick way to publish your paper and they also know that nobody will…use their results, especially if they publish it under general journals…" (JNR_4)
"There is some overemphasis on promotions rather than getting appraised based on what impact say the quality of the research and impact of the research." (SNR_1)
"I suspect that people stay in their rooms and cook up data and especially the ones that are smart." (SNR_2)
"We have to repeat this message over and over again, so that maybe at the end of the day, one day we reach the critical mass where we can change that." (SNR_8)
"I don't think we have got a guideline on that. I suppose I would have to write it if there was one." (SNR_7)

"Clear leadership from the top in the form of showing a good example is key because that creates a culture in the younger generation of researchers." (JNR_2)
"I'm very lucky to have been…developed as a young researcher in this specific environment…with my bosses and supervisors because they have…helped me to realise, you know, what is right and wrong so…they are good role models. But everyone is definitely not that lucky to work in the environment that I work in." (JNR_1)
Theme 4: Researchers are uncertain about what conflicts of interest means, and how this may influence research
"Well, I know, you know in those publications there's only the section for you to declare if there's any conflict of interest but no, they don't, people just say no, no, no so you there's no way you can tell if the person does or does not have (Conflicts of interest)" (JNR_6)
"I just report the evidence as it is so not declaring that my husband works for a…company and we have potential conflict of interest, I fail to understand how that can be a conflict of interest if his work did not really affect…the findings of the review…" (JNR_7)
"We all actually have conflict of interest and in some ways, it starts getting a bit ridiculous because you are trying to think back to, I mean how far do you go? If a rep has given you a pen at a conference, do you then have a conflict of interest if you are dealing with their product? I am not really sure" (SNR_5)
"I don't know if this is sufficient in the end – you can say "yes, I am employed by [a drug company]" but and then what? And then? I don't know if this is sufficient? Because in the end you are saying yes, I am defending the ideas of my employer and in the end you read the article and ask yourself, who is this that is speaking?" (SNR_6)

Supplementary file 1: Questionnaire on health research reporting practices

Section A: Please answer the following questions:

1. Which country are you currently working in?

2. Where do you currently work?
   - University
   - Other research institution
   - Other (please specify)

3. How long have you been working here? (months and years)

4. What is your highest qualification?
   - Bachelor's degree
   - Master's degree
   - PhD

5. On average, how much of your time (%) do you spend on research?

6. How many peer reviewed research articles have you been an author on?

7. What was the year of your first publication?

8. How many Cochrane reviews are you an author on?

9. What is your first language?

10. What is your gender?
    - Male
    - Female

11. What is your age?

Section B: Please read the following scenarios and answer the questions that follow:

1. A junior researcher, J, adds the head of department, D, as the last author on a research paper. D provided suggestions for direction of J's work that helped her obtain the grant, although he hasn't contributed to the actual research or the publication.

My view on this is:

- This is acceptable because D should be an author
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because D has not contributed to this paper

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this pattern of authorship

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

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2. A professor, M, who did not contribute to study design, data collection or data analysis but is an expert in the field, reviews the draft manuscript and suggests some minor changes to the English. He asks to be listed as an author on the paper.

My view on this is:

- This is acceptable because M should be an author
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because M has not sufficiently contributed to this paper

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this pattern of authorship

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

3. A Master's student consults with the resident biostatistician, P, to help with data analysis on her research project. In the manuscript that she submits for publication, she lists P in the "Acknowledgement" section.

My view on this:

- This is acceptable because P should be acknowledged in this way
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because P has made substantial contributions to the work

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

---

4. A PhD student "copies and pastes" nearly all of the introduction from a paper that she has previously published into her next manuscript, since she is doing a series of experiments on the same topic.

My view on this is:

- This is acceptable because it is her own work
- This is not allowed by journals but it does not really matter, as it doesn't affect the science
- This is unacceptable behaviour

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department such text-recycling:

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens

- Other: (please specify)

Comments or clarifications:

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5. A researcher in Mozambique wants to submit his manuscript to a journal published in English. He finds a text book in Portuguese that explains an aspect of the background to the disease very well. He translates one paragraph into English, and puts this into his introduction without reference to the book.

My view on this is:

- This is acceptable because the text has been translated
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable behaviour

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, such use of other people's material:

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments and clarifications:

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6. A researcher, T, is working on a diagnostic test study. The company manufacturing the test has supplied the kits for free but did not design or fund the research. T was paid for a consultancy for the same company two years ago. In the publication of the study, he declares that he has no conflicts of interest.

My view on this is:

- This is acceptable because T does not have a conflict of interest
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because T should disclose this consultancy

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this behaviour:

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or Clarifications:

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7. A researcher, K, writes a review for treatment guidelines of herbal remedies for children's cough. K's spouse is employed by the company that manufactures one of these remedies. In the review, K declares that he has no conflicts of interest.

My view on this is:

- This is acceptable because K does not have a conflict of interest
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because K should disclose his spouse's link to the company

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this behaviour:

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

---

8. A researcher, S, contributes to the design and does most of the data collection in a study but goes on maternity leave as it is being analysed. When she returns to her post she discovers that the research has been published by her supervisor without her name or any acknowledgement of her contributions.

My view on this is:

- This is acceptable because S did not contribute to the publication
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because S should have been invited to contribute to the publication

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this type of practice (leaving out a junior author who has made substantial contributions):

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

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9. A researcher from India attends an international conference where a European research study with a novel design is presented. He submits a protocol for an identical study to the ethics committee at his home institution. He does not reference the European study.

My view on this:

- This is acceptable
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because the original idea should be acknowledged

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this behaviour:

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

Section C: Please answer the following questions:

1. Are you aware of any written institutional policies that cover the situations described in our scenarios?

- Yes
- No

2. Would you be interested in participating in an interview via Skype or telephone to discuss research reporting practices further?
   - Yes
   - No

3. Would you be interested in receiving feedback on this study?
   - Yes
   - No

Thank you for participating in this survey!

Please click on the link below if you indicated that you would be interested in participating in a telephonic/Skype interview on this topic or if you would like to receive feedback on the survey results.

Supplementary file 2: Interview guide

Hi *(Name)*

Thanks so much for agreeing to talk to me about research reporting today. I just want to check – have you read the information sheet? Is there anything that is unclear? As noted in the sheet, I will record our conversation – are you fine with that? Please note that all reporting is anonymous and you will not be identified in any way, and you are free to stop the interview at any time.

Another thing I want to mention is that we invited you to complete the survey because you are an author on a Cochrane review, but I would like you to think about any research publication – not just Cochrane reviews – during our conversation.

Let's start then. You work at the *(institution as provided by participant)*, right? What is your job there?

Let's talk about the survey that you completed a few weeks ago. What did you think about the situations we gave, did any seem familiar? What do you remember?

Some of the scenarios were about being an author on a paper. Have you come across any issues here yourself? What happened?

- *Prompts depending on answer:*
  - What about omitting an author that has contributed sufficiently to the research paper?
  - What about adding an author that has not made a big enough contribution to the research paper?
- Have you experienced something like this?
- How do you decide on authorship at your institution?
- Are there any guidelines about authorship at your institution? Are these being followed?

Some of the scenarios were about people copying other people's work, often called plagiarism.

What do you think about this? What do you understand by it? What do you think are the main problems with plagiarism?

- *Prompts depending on answer:*
  - What about translating a text into another language?
  - What about copying a text from another paper?
  - What about using someone else's idea?
- Do you have guidelines on plagiarism at your institution?

There were also scenarios about conflict of interest. How do you understand conflict of interest? Why do you think this is a problem?

- *Prompts depending on answer:*
  - What about being paid by a drug company for a consultation not related to the research project?
  - What about conflicts of interest that do not involve money?
- How do you deal with these competing interests at your institution and how are they reported in a paper?

What about other problems that we did not address in the survey, like making-up or manipulating data - Are you aware of any other poor practices happening at your institution?

Why do you think people engage in this bad practice?

What do you think can be done to prevent this behaviour?

Any other comments or questions?

Supplementary file 3: Final list and categories of codes

Poor practices happening at institutions
Adding authors that have not contributed substantially
Being added as an author when not contributed substantially
Being omitted
Omitting authors that have contributed
Ranking of authors not according to contributions
Change in author team
Changing author names on published papers
Using ideas without acknowledging their origin
Detection of plagiarism when doing systematic reviews
Students using existing projects
Academic CoI
Non-financial CoI
Data dredging
Data fabrication
Duplicate publication in different languages
Influence of sponsor
Non-reporting of results
Inaccurate reporting to public
Data manipulation
What was done when irregularity was detected?
Discussions within author team
Nothing was done
Formal complaint
Punishment
Discussions within author team
Decline further participation
Channels for complaints
Feelings associated with experience
Upset about what happened
Feeling powerless
Unfair process
Frustration
Did not care
Not sure how to handle situation
Insecurity
Discomfort
Concerned
Factors influencing practices/reasons for poor practices
Author team dynamics
Academic (personal) gain
Payment for assistance
Endorsement

Personal relationships
Professional relationships
Publication fees
Lack of knowledge and skills
Direct research environment (research team)
Institutions
Hierarchies within institutions
Requirements for promotion
Personal values
Lack of resources
Journal requirements
Guidelines
Cultural environment
Lack of time for research
Lack of funding
Lack of interest
Journals
Providing a service
Academic status
Researcher
Funders
Who is an author?
Challenges with authorship criteria
Timing of authorship discussions
What contribution warrants authorship? (ICMJE criteria)
Other criteria that warrant authorship
Guidelines
Arbitrary
Role of authors
What is plagiarism?
Various degrees of plagiarism
Not acknowledging origin of ideas
Using text without acknowledging source
Not sure about meaning
Translating text
Challenges related to plagiarism
What are conflicts of interest?
Levels of COI
Relationships with industry
Academic CoI
Difficult to understand CoI
Guideline panels
Professional relationships
Personal relationships
Anything that influences research
Research misconduct in general

Levels of misconduct
Complex issue
Crime
Global issues
Implications of poor practices
Affects organizational culture
Image of institution
Bias study results
Impact on researcher
Mistrust of study results
Impact on patients
Far-reaching consequences
Dealing with poor practices
Forgive
Responsibilities of researcher
Challenging
Institutional guidelines
Institutional support
Disciplinary action
Using Technology
Declaring COI
Decline participation
Relationships with industry
Need universal system
Learn from others
Promoting good practices
Training
Research team
Role-modelling
International collaborations
Organizational culture
Creating awareness
Auditing research
Institutional structures and channels
Rewards and punishments
Funding
Clear and accessible guidelines for all staff
Realistic research projects
Perceptions of prevalence of poor practices
Adding authors very common
Adding not common
Omitting authors relevant to clinical trials
Links with Pharmaceutical industries
Plagiarism does occur
Relevant topic
Common issue but not always overt

Attitudes of researchers
Criteria restrictive
Arrogance
Hopeless?
Not tolerated
Difficult to be 100% honest
Accountability
Aware of research integrity issues

Supplementary file 4: Detailed survey responses

Table 1: Researchers' perceptions of irresponsible research reporting practices

Health research reporting practice Total n=198	This is acceptable		This is not best practice, but it does not really matter, as it doesn't affect the science		This is unacceptable	
	n	% (95%CI)	n	% (95%CI)	n	% (95%CI)
Authorship practices						
Adding the head of department who has not contributed sufficiently	26	13 (9 to 18)	43	22 (16 to 27)	129	65 (59 to 72)
Adding an expert in the field who has not contributed sufficiently to the research	21	11 (7 to 15)	43	22 (16 to 27)	134	68 (61 to 74)
Acknowledging a biostatistician for assistance with data analysis (as opposed to listing as an author)	127	64 (58 to 71)	5	3 (0.5 to 5)	66	33 (27 to 39)
Omitting an author who has contributed substantially to the research	1	0.5 (0.0 to 2)	2	1 (0.0 to 3)	195	99 (97 to 100)
Redundant publication						
Text-recycling (using one's own work from a previous publication in another)	34	17 (12 to 22)	23	12 (8 to 16)	141	71 (64 to 77)
Plagiarism						
Translating a text without acknowledging the original source	3	2 (0.0 to 4)	6	3 (1 to 6)	189	96 (92 to 99)
Copying an idea without acknowledgement of the original source	5	3 (0.5 to 5)	15	8 (4 to 12)	178	90 (85 to 94)
Conflict of interest						
Not declaring previous financial reimbursement from a company involved in a research project	13	7 (4 to 11)	12	6 (4 to 9)	173	87 (82 to 91)
Not declaring the wife's link to a company involved in a research project	26	13 (9 to 18)	21	11 (7 to 15)	151	76 (71 to 82)

Table 2: Researchers' awareness of occurrence of irresponsible research reporting practices

Health reporting practice Total n=198	Have done this before		Have not done this but *are* aware of other people doing it		Have not done this and are *not* aware of other people doing it	
	n	% (95%CI)	n	% (95%CI)	n	% (95%CI)
Authorship practices						
Adding the head of department who has not contributed sufficiently	48	24 (18 to 31)	113	57 (50 to 64)	37	19 (14 to 24)
Adding an expert in the field who has not contributed sufficiently to the research	42	21 (16 to 27)	103	52 (45 to 60)	53	27 (20 to 33)
Acknowledging a biostatistician for assistance with data analysis (as opposed to listing as an author)	103	52 (46 to 59)	60	30 (24 to 37)	35	18 (13 to 23)
Omitting an author who has contributed substantially to the research	4	2 (0.5 to 4)	83	42 (35 to 49)	111	56 (49 to 63)
Redundant publication						
Text-recycling (using one's own work from a previous publication in another)	23	11 (7 to 16)	95	48 (42 to 55)	80	41 (34 to 47)
Plagiarism						
Translating a text without acknowledging the original source)	4	2 (0.5 to 4)	73	37 (31 to 43)	121	61 (54 to 68)
Copying an idea without acknowledgement	5	3 (0.5 to 5)	84	42 (36 to 50)	109	55 (48 to 62)
Conflict of interest						
Not declaring previous financial reimbursement from a company involved in a research project	5	3 (0.5 to 5)	85	43 (36 to 49)	108	55 (48 to 61)
Not declaring the spouse's link to a company involved in a research project	3	2 (0.0 to 3.5)	58	29 (23 to 36)	137	69 (63 to 76)

Table 3: Occurrence of irresponsible health research reporting practices in respondents' current institution

Health reporting practice Total n=198	Happens most of the time		Happens occasionally		Happens rarely		Never happens		Don't know	
	n	% (95%CI)	n	% (95%CI)	n	% (95%CI)	n	% (95%CI)	n	% (95%CI)
Authorship practices										
Adding the head of department who has not contributed sufficiently	26	13 (9 to 18)	78	39 (33 to 47)	49	25 (19 to 31)	35	18 (13 to 23)	10	5 (2 to 8)
Adding an expert in the field who has not contributed sufficiently to the research	26	13 (9 to 19)	65	33 (27 to 39)	49	25 (19 to 31)	51	26 (20 to 32)	7	4 (1 to 6)
Acknowledging a biostatistician for assistance with data analysis (as opposed to listing as an author)	70	35 (29 to 42)	62	31 (25 to 38)	34	17 (13 to 22)	22	11 (7 to 16)	10	5 (2 to 8)
Omitting an author who has contributed substantially to the research	2	1 (0.0 to 3)	28	14 (9 to 19)	51	26 (20 to 31)	103	52 (46 to 59)	14	7 (4 to 11)
Redundant publication										
Text-recycling (using one's own work from a previous publication in another)	16	8 (4 to 13)	50	25 (19 to 31)	52	26 (20 to 32)	56	28 (22 to 34)	24	12 (8 to 17)
Plagiarism										
Translating a text without acknowledging the original source	3	2 (0.0 to 4)	24	12 (8 to 17)	47	24 (18 to 30)	101	52 (44 to 58)	23	12 (8 to 16)
Copying an idea without acknowledgement	2	1 (0.0 to 3)	24	12 (8 to 17)	59	30 (24 to 36)	91	46 (38 to 53)	22	11 (7 to 16)
Conflict of interest										
Not declaring previous financial reimbursement from a company involved in a research project	3	2 (0.0 to 4)	30	15 (11 to 21)	47	24 (18 to 30)	95	48 (41 to 55)	23	12 (8 to 16)
Not declaring the wife's link to a company involved in a research project	1	0.5 (0.0 to 2)	14	7 (4 to 11)	41	21 (15 to 26)	110	56 (48 to 63)	32	16 (11 to 21)

Supplementary file 5: Survey results per region

Health research reporting practice per region Total n=198	Perception: Acceptable or does not really matter	Behaviour: Have done this themselves	Occurrence at institution: This happens
Adding the head of department who has not contributed sufficiently			
Sub-Saharan Africa (n=48)	6 (13)	5 (10)	32 (67)
Latin America (n=52)	16 (31)*	14 (27)	40 (77)
South and South East Asia (n=44)	16 (36)*	10 (23)	30 (68)
East Asia (n=36)	24 (67)*	12 (33)	36 (100)
Other (n=18)	7 (39)*	3 (17)	15 (83)
Difference between regions	p<0.001	p=0.178	p=0.003
Adding an expert in the field who has not contributed sufficiently to the research			
Sub-Saharan Africa (n=48)	10 (21)	7 (15)	25 (52)
Latin America (n=52)	16 (31)	14 (27)	39 (75)*
South and South East Asia (n=44)	17 (39)	5 (11)	29 (66)
East Asia (n=36)	17 (47)	11 (31)	34 (94)*
Other (n=18)	4 (22)	5 (28)	13 (72)
Difference between regions	p=0.083	p=0.109	p=0.001
Acknowledging a biostatistician for assistance with data analysis (as opposed to listing as an author)			
Sub-Saharan Africa (n=48)	29 (60)	21 (44)	35 (73)
Latin America (n=52)	37 (71)	31 (60)	45 (87)
South and South East Asia (n=44)	33 (75)	25 (57)	39 (89)
East Asia (n=36)	19 (53)	16 (44)	32 (89)
Other (n=18)	14 (78)	10 (56)	15 (83)
Difference between regions	p=0.146	p=0.211	p=0.204
Omitting an author who has contributed substantially to the research			

Sub-Saharan Africa (n=48)	1 (2)	0 (0)	15 (31)
Latin America (n=52)	0 (0)	3 (6)	20 (38)
South and South East Asia (n=44)	1 (2)	0 (0)	17 (39)
East Asia (n=36)	1 (3)	1 (3)	21 (58)
Other (n=18)	0 (0)	0 (0)	8 (44)
Difference between regions	p=0.784	p=0.546	p=0.153
Text-recycling (using one's own work from a previous publication in another)			
Sub-Saharan Africa (n=48)	7 (15)	2 (4)	18 (38)
Latin America (n=52)	27 (52)*	10 (19)	35 (67)*
South and South East Asia (n=44)	9 (20)	4 (9)	26 (59)*
East Asia (n=36)	13 (36)*	4 (11)	29 (81)*
Other (n=18)	1 (6)	2 (11)	10 (56)
Difference between regions	p<0.001	p=0.015	p=0.001
Translating a text without acknowledging the original source			
Sub-Saharan Africa (n=48)	1 (2)	1 (2)	8 (17)
Latin America (n=52)	4 (8)	1 (2)	20 (38)*
South and South East Asia (n=44)	3 (7)	0 (0)	14 (32)
East Asia (n=36)	1 (3)	1 (3)	23 (64)*
Other (n=18)	0 (0)	1 (6)	9 (50)*
Difference between regions	p=0.478	p=0.105	p<0.001
Copying an idea without acknowledgement of the original source			
Sub-Saharan Africa (n=48)	0 (0)	0 (0)	9 (19)
Latin America (n=52)	6 (12)	2 (4)	25 (48)*
South and South East Asia (n=44)	4 (9)	0 (0)	18 (41)*
East Asia (n=36)	8 (22)	3 (8)	25 (69)*
Other (n=18)	2 (11)	0 (0)	8 (44)*

Difference between regions	p=0.022	p=0.013	p<0.001
Not declaring previous financial reimbursement from a company involved in a research project			
Sub-Saharan Africa (n=48)	2 (4)	0 (0)	11 (23)
Latin America (n=52)	4 (8)	1 (2)	21 (40)
South and South East Asia (n=44)	3 (7)	2 (5)	18 (41)
East Asia (n=36)	11 (31)*	1 (3)	22 (61)*
Other (n=18)	5 (28)*	1 (5)	8 (44)
Difference between regions	p=0.001	p=0.02	p=0.013
Not declaring a spouse's link to a company involved in a research project			
Sub-Saharan Africa (n=48)	6 (13)	0 (0)	6 (13)
Latin America (n=52)	10 (19)	1 (2)	15 (29)
South and South East Asia (n=44)	12 (27)	0 (0)	11 (25)
East Asia (n=36)	14 (39)*	2 (6)	19 (53)*
Other (n=18)	5 (28)	0 (0)	5 (28)
Difference between regions	p=0.062	p=0.043	p=0.002

*Indicates significant difference compared to Sub-Saharan Africa

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Authorship, plagiarism and conflict of interest: views and practices from low and middle income country health researchers

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Authorship, plagiarism and conflict of interest: views and practices from low and middle income country health researchers

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Abstract

Objectives

To document low and middle income country (LMIC) health researchers' views about authorship, redundant publication, plagiarism and conflicts of interest, and how common poor practice was in their institutions.

Design

We developed a questionnaire based on scenarios about authorship, redundant publication, plagiarism and conflicts of interest. We asked participants whether the described practices were acceptable and whether these behaviours were common at their institutions. We conducted semi-structured interviews with respondents who agreed to be interviewed.

Participants

We invited 607 corresponding authors of Cochrane reviews working in LMICs. From the 583 emails delivered, we obtained 199 responses (34%). We carried out in-depth interviews with 15 respondents.

Results

Seventy-seven per cent reported guest authorship occurred at their institution, 60% reported text-recycling. For plagiarism, 12% of respondents reported this occurred 'occasionally', and 24% 'rarely'. Forty per cent indicated that their colleagues had not declared conflicts of interest in the past. Respondents generally recognised poor practice in scenarios, but reported that they occurred at their institutions. Themes identified from in-depth interviews were: 1) authorship rules are simple in theory, but not consistently applied; 2) academic status and power underpin behaviours; 3) institutions and culture fuel bad practices; and 4) researchers are uncertain about what conflict of interests means, and how this may influence research.

Conclusions

LMIC researchers report that guest authorship is widely accepted and common. Whilst respondents report that plagiarism and undeclared conflicts of interest are unacceptable in practice, they appear common. Determinants of poor practice relate to academic status and power, fuelled by institutional norms and culture.

Strengths and limitations of this study

- We elucidated health researchers' views about what was acceptable practice in relation to authorship, plagiarism and conflicts of interest through scenarios, and asking how common poor practice was in their experience.
- Respondents were part of Cochrane which has strong ethical values and thus may increase their awareness of reporting guidelines.
- Our response rate, whilst about average for such research, is a study limitation.
- The study is one of the first to show that guest authorship is common practice in LMICs.
- Despite good knowledge of best practice, institutional and academic power relationships and culture strongly influence these aspects of poor research practice.

Introduction

Intellectual honesty and personal responsibility for our actions is core to research integrity and accountability, alongside institutional culture and policies to help assure best practice. Research misconduct is a threat to all researchers as it puts the trustworthiness of science and researchers at risk. Blatant misconduct such as data fabrication, data falsification and plagiarism receives most attention, both in the media and within universities (1). However, less wholesale misrepresentation is much more common, and may pose a threat to the integrity of research that is at least as great a threat as blatant misconduct (2-6). One aspect of this is poor reporting practice, which includes guest or ghost authorship, not declaring conflicts of interest, and redundant publication (Table 1). These reflect poor practice, and are important basics of reporting science, and we thus chose them to be the subject of this research.

[insert table 1 here]

The prevalence of research misconduct has been estimated in systematic reviews that examined misconduct in scientists across disciplines. Fanelli (2009) found that 1.97% (95%CI 0.89 to 4.45) of survey participants from 18 studies admitted to having fabricated or falsified data (7). Pupovac and Fanelli (2014) found that 1.7% (95%CI 1.2 to 2.4) of survey participants from seven studies admitted to having committed plagiarism (8), while 29% (95% CI 24% to 35%) of survey participants from 14 studies in a review by Marusic and colleagues (2011), reported knowing of authorship problems (9). Yet there are few empirical studies on research practices in low and middle income countries (LMICs). Only one of the systematic reviews mentioned above (9) included studies conducted in LMICs – only three of the 14 studies that contributed data to the meta-analysis on authorship problems. Published literature focuses on high income countries and research misconduct in terms of data falsification, data fabrication and plagiarism (7, 10). In LMICs, research outputs are increasing, through local and international collaborations, but national policies on research integrity are lacking (11) and the pressure to perform and live up to global standards is rising (12).

Developing the science capacity in LMICs is important and is attracting increasing investment from national governments and donors. Assuring strong moral principles and honest practice is an important part of this development. We initiated research to describe health researchers' perceptions of good and poor reporting practices and their perceptions about how common these are. Our objectives were to describe and analyse LMIC health researchers' perceptions about best and actual practice with authorship, redundant publication, plagiarism and conflicts of interest through a survey, and to explore influences on what people do in practice through in-depth interviews.

Methods

Study participants and design

Our target population was corresponding authors of Cochrane systematic reviews working in LMICs (countries defined by the World Bank (13)). We chose this group as they were identifiable, have all contributed to a published systematic review using international standards, and represented a sample frame for active medical researchers. Cochrane has strong ethical principles, so it was thought likely this group may have awareness of best practice with authorship, plagiarism, redundant publication and conflicts of interest, and thus provide a more sensitive and accurate estimate of practices within their institutions.

For the qualitative part of the study, we recognised that the researcher's values and morals play a part in interpreting phenomena and how knowledge is created (14, 15). The research team have

diverse experience and skills, including nursing and clinical epidemiology (AR), infectious diseases (PG), publication ethics (EW) and public health (TY). They are all authors on Cochrane reviews, have editorial and training roles within Cochrane and publication ethics; two team members are based at a LMIC institution, and all members have extensive experience in working in LMIC settings. AR completed formal training in qualitative interview and data analysis methods and has some experience in doing qualitative research.

Data collection

We developed a questionnaire with questions based on nine scenarios (Supplementary file 1). The nine scenarios covered guest authorship, ghost authorship, plagiarism related to translation of a text and copying of an idea, redundant publication in terms of text-recycling, and declaration of conflicts of interest. Participants were asked whether they considered the practice portrayed in the scenario as acceptable, whether they, or someone they knew, had ever done this and whether the practice was common in their institution. Three illustrative scenarios and the response options are shown in Table 2. The questionnaire was piloted with researchers not eligible for our study. We set up the survey using Google forms and sent an invitation containing the link to the survey via email. In the email, we stated that participation in the survey was voluntary, that responses were anonymous and that the survey would take 15-20 minutes to complete. We surveyed all LMIC contact authors of active Cochrane reviews (published in the Cochrane Library in May 2015) and sent two reminders after the original invitation. The survey asked participants if they were willing to take part in a follow-up interview, and asked them to indicate this through a link separate from the online questionnaire to preserve anonymity. All respondents that provided contact details were contacted via email to set up a time for the interview that was convenient to them.

We developed an interview guide for semi-structured interviews (Supplementary file 2) aligned with our objectives and informed by the survey results. AR conducted all the interviews between October and December 2015. Interviews lasted 45-60 minutes and were conducted in person or by Skype or telephone. All interviews were recorded with a digital voice recorder and notes were taken during the interviews to provide a comprehensive data set.

Data analysis

We dichotomised survey data by combining categories of potential answers and analysed it with SPSS, using descriptive statistics for each scenario. We stratified results by region and compared results between regions using the chi-squared test.

We analysed interviews using the framework approach, which fits into the broader family of thematic analysis (16) using transcriptions of the audio recordings. Three researchers (AR, TY, EW) independently coded one of the transcripts using an inductive method of coding. We compared and discussed our individual codes and developed a set of preliminary codes that could be applied to the other transcripts. We did not consider the set of codes to be exhaustive and continually added new codes until all transcripts were coded. One researcher (AR) coded all the subsequent transcripts using Atlas.ti software, version 7.5 (17). We categorised the codes (Supplementary file 3) and extracted illustrative quotations. Emerging themes were identified through discussions with the whole research team in an iterative process.

Ethics

The Stellenbosch University Health Research Ethics Committee approved the study (N14/12/158) and the Cochrane Steering Group approved the participation of authors. Participation in the survey was voluntary and submitting a response was taken as informed consent. Anonymity was ensured, as participants were not required to provide their names or the names of their institutions. Respondents who indicated willingness to be interviewed signed an electronic consent form before the interview. The interview transcripts contained no names to ensure anonymity of interview responses.

Results

We sent 607 invitations to corresponding authors of Cochrane systematic reviews. Twenty-four were not delivered; for the remainder, the response rate was 34% (199/583), with one incomplete response that was omitted from the analysis. Similar numbers of respondents were obtained across Latin America, Sub-Saharan Africa, South and South-East Asia, and East Asia, with one tenth from North Africa, the Middle East and Eastern Europe (Table 3). We contacted all 28 respondents who provided their contact details, and 15 of these were available to be interviewed within the study period. The interview group comprised junior researchers (PhD students or those who had recently obtained their PhD; seven respondents) and senior researchers (professors who had supervised PhD students; eight respondents).

Survey responses

The responses are summarised in Table 4. Supplementary file 4 has a more detailed analysis.

For the scenario of guest authorship given to the head of department, one third of the 198 respondents thought this was acceptable or did not matter (35%). For behaviour, 24% said they had done this, while 57% had not done this, but were aware of others doing it; and 77% indicated this happened at their institution.

Adding an expert in the field who had not contributed sufficiently was similarly regarded as acceptable by one third, 21% had done this and 71% said it happened in their institution.

Omitting an author who has contributed substantially to the research was recognised as unacceptable (99%), yet 41% reported that it happened, but mainly 'occasionally' (14%) or 'rarely' (26%). While only 2% indicated that they had done this, 42% had not done it themselves, but knew of other people doing it. Responses related to acknowledging rather than giving authorship to the biostatistician for assistance with data analysis were more mixed.

For redundant publication, 29% of respondents thought that text-recycling was acceptable or did not matter. Eleven per cent admitted to having done this, while 60% indicated that it occurred in their institution 'occasionally' (25%) or 'rarely' (26%).

For plagiarism, almost all the respondents (96%) thought that it was unacceptable to translate a text from another language without acknowledging the original source. Only 2% indicated that they had done this, but 37% of respondents indicated that they had not done this but knew of someone who had. Respondents thought that this practice occurred at their institution 'occasionally' (12%) or 'rarely' (24%).

Copying an idea without acknowledging the original source was reported as unacceptable by 90% of respondents. Only 3% indicated that they had done this themselves, but 43% indicated that they knew of others who had done this. Respondents said that this occurred at their institution 'occasionally' (12%) or 'rarely' (30%).

Most respondents (87%) thought that failure to disclose a financial reimbursement from a company involved in a research project was unacceptable. Five respondents indicated that they had done this themselves (3%), yet 43% of respondents knew someone who had not declared known conflicts of interests. Forty per cent of respondents said that it happened at their institution 'occasionally' (15%) or 'rarely' (24%).

Most respondents (76%) thought that it was unacceptable for an author not to declare a spouse's link to a company involved in a research project. Three respondents indicated that they had not declared this in the past, but 29% knew someone who had not declared this, while 28% said that this practice occurred at their institution 'occasionally' (7%) or 'rarely' (22%).

We explored if there were obvious differences between regions (Supplementary file 5). We found that two thirds (67%) of respondents from East Asia thought that adding a head of department who had not contributed significantly to the paper was acceptable or did not matter, whereas most respondents (61 to 87%) from other regions thought that this practice was unacceptable. All respondents (100%) from East Asia indicated that this happened at their institution.

Interviews

Authorship was a uniform concern across all the people interviewed. People reported adding authors who had not contributed substantially to the research, omitting authors who had contributed substantially, and conflicts about the order of authors. Interviewees reported they knew about plagiarism in colleagues and in their institution. At risk were students and junior researchers whose first language was not English who published the same material in different languages. Others reported not publishing results that did not show any effect. Some interviewees also said that they knew of researchers who had fabricated data, manipulated data or engaged in data dredging. Almost all commented that misconduct was probably more prevalent than was officially acknowledged.

Our analysis identified four main themes. These are described below, with illustrative quotes in Table 5.

Theme 1. Authorship rules are simple in theory, but not consistently applied

Interviewees were mostly aware of the International Committee of Medical Journal Editors (ICMJE) criteria. Some reported diligent application of the criteria; others were clearly frustrated with their colleagues, as *"it should be simple";* and described it as "*not straightforward*" with *"blurring of lines"* in defining contribution. Most were aware of authorship decisions in their institutions based on factors other than contribution. *"We have a lot of issues on what we call 'add my name'. It's very popular."*

Adding authors at a late stage who had done little or nothing was common in all regions, for a variety of reasons: a *"favour"* and loyalty towards colleagues, family and friends; as a means of rewarding research assistants; to make a publication look better; out of respect for a senior researcher; and in return for paying open access publication fees. Sometimes authors from different disciplines or non-academics were added. In contrast to this haphazard way of assigning authorship, other researchers felt they were expected to follow *"unwritten rules"*.

Theme 2: Academic status and power underpin behaviours

Senior and junior interviewees described the *"power play"* between senior and junior researchers. Junior researchers, were described as the *"work horses",* who had to *"abide"* by the *"mandatory rules"* of their bosses to avoid conflict or a "*change in attitude"* towards them. They found it *"very difficult to fight senior professors"* who were described as *"arrogant"* and *"corrupt".* All those reporting this had personal stories. In many countries, junior researchers were obliged to add the names of heads of department, bosses, or supervisors to their publications even when they did not contribute. Others reported that professors or supervisors expected to be first author on a publication that was based on a student's dissertation or junior researchers' work. Some respondents described cases where professors published students' research without including them as authors and sometimes even without students knowing that their work had been published. Junior researchers were frustrated about these practices which they viewed as unfair.

It seems students and junior researchers may have no choice but to tolerate this manipulative behaviour to complete their degrees and advance their careers. Some interviewees who had experienced this spoke vehemently about how upset they were - and recounting their experiences evoked strong emotions: anger, betrayal, frustration and hurt. They also found it difficult to stand up against seniors in these situations. Their place in the hierarchy determined whether their voice was heard or not, and they were often *"brushed off"* by more senior people. Interviewees were

concerned that researchers, especially those who are *"not in a position of power"* were unable to raise concerns or make anonymous remarks when they suspected misconduct.

The desire for academic status was reported as a big driver. Publications are the *"bread and butter"* of researchers – more publications lead to promotions and more power. Interviewees felt that researchers often did not care about the research itself, but rather about the number of publications they had authored and the power that comes with publication. Academics are willing to do almost anything to be *"recognised in the scientific community", "associated with high-impact publications"* and ascend the institutional hierarchy. This behaviour was described as not being *"in the best interest of the research…but certainly in the best interests of the researcher".*

Theme 3: Institutions and culture fuel bad practices

A recurrent theme was the *"overemphasis"* on publications, particularly the quantity required for promotion, fuelling and encouraging a variety of forms of misconduct. Respondents were aware of researchers who submitted papers they had *"photo-shopped"* to include their names and affiliations for promotion, or *"set up phony journals"* where they published a reworked version of somebody else's paper. Another described clinicians and nurses publishing fabricated data in local journals. Although researchers were aware that this was unethical, they did not really care since papers published in these journals were known to be untrustworthy. Yet such publications counted towards promotion.

Interviewees also highlighted the lack of structures and systems to support and promote research integrity in their institutions such as research integrity offices, clear policies on research misconduct and channels for whistleblowing. Interviewees thought offenders should be punished appropriately, as this might deter poor practices. Whilst most institutions had guidelines on plagiarism, use of text-matching software was directed towards students rather than academics. Institutional guidelines on good research reporting practices were either lacking or interviewees did not know where to find them.

In addition to flawed systems, an emerging theme was the culture within institutions. Interviewees noted the lack of research integrity champions within institutions. Interviewees, especially senior researchers, reported playing an important role in promoting research integrity in their institutions. However, they often felt like *"lone voice(s) in the wilderness"* and lacked *"the critical mass"* to change poor practices. Awareness about research integrity amongst other researchers was perceived as low. Leadership was reported as an essential factor in fostering a culture of research integrity. The lack of positive role models and mentors at institutions was raised as a concern and respondents noted that having a good mentor was essential to learn *"what is right and wrong"*.

Theme 4: Researchers are uncertain about what conflict of interests means, and how this may influence research

Respondents expressed various views on managing and disclosing conflicts of interest. Some believed that they would not be influenced – neither by commercial companies, nor by personal relationships – and would just report the evidence *"as is".* Some believed that researchers should not refuse to work with commercial companies *per se*, as their expertise could help in the advancement of science. Key to both points of view was being transparent and declaring funding sources and links to commercial companies. A contrasting view was that links to commercial companies would always influence researchers on some level, even if this influence was very subtle. Some interviewees supported the idea that it was better to decline participation in a research project when there was a financial or academic conflict of interest.

Uncertainty around academic conflicts of interest was frequently raised. Examples of dilemmas included examining a thesis describing research that was similar to their own, including clinical experts who had received funding from pharmaceutical companies in systematic reviews, and peer-reviewing papers of colleagues without being biased.

Interviewees also questioned the validity and adequacy of declaring conflicts of interest. Some thought that declaring conflicts of interest did not mean that the research was *"free of any kind of internal, external manipulation"*, while others believed that researchers generally declared that they did not have conflicts of interest, even if they did. Interviewees were also confused about declaring personal relationships with friends, family and spouses in a scientific paper. Most interviewees thought that there was inadequate guidance on what to declare and when to declare it.

Discussion

Our study was unusual, if not unique, in documenting the attitudes and experiences of health researchers from LMICs using a survey followed by in-depth interviews. Their responses highlight several areas of concern relating to poor and unacceptable research reporting practices.

We used a number of documented strategies to maximise our response rate, as a low response rate is a well-documented disadvantage and challenge of online surveys (18, 19). We sent the survey to participants in individual and personalised emails, emphasising the value of participants' knowledge and understanding of health research reporting practices, ensuring anonymity of responses, and inviting them to engage in further discussions. We also sent two reminders (18-20). Despite our efforts, we only obtained a response rate of 34% for the survey. We were unable to contact non-respondents to obtain demographic information and reasons for not responding as anonymity of participants did not allow us to distinguish between respondents and non-respondents. We thus cannot rule out the possibility that non-respondents had different views from respondents (18, 21). Only 28 survey respondents (14%) indicated that they were willing to participate in follow-up interviews and 15 of those accepted the email invitation.

Authors of Cochrane reviews from LMICs perceived certain reporting practices as unacceptable, but noted that these happened in their institutions. We found that guest authorship was widespread, plagiarism is a problem, and there is a lack of awareness about conflicts of interest. There are several caveats that need to be considered when interpreting the results of surveys on research misconduct. It is almost impossible to eliminate social desirability bias, which refers to the tendency of survey participants to answer questions about their own values and behaviours in a way that is socially acceptable (22, 23). Although having an anonymous, self-administered, online survey aims to reduce this bias, rates of self-reported misconduct might be underestimated (24). In addition, rates of reported misconduct in others might be overestimated, as participants from the same institution might refer to the same acts of misconduct. On the other hand, rates of misconduct in others might also be underestimated, as researchers might want to protect their colleagues and the reputation of their institution (7). In addition, the survey wording might have affected participants' understanding and interpretation of the practices described. However, we aimed to standardise understanding of practices by using scenarios that portrayed certain irresponsible practices. We chose scenarios that included nuanced decisions but still had fairly clear correct answers and designed them to elicit responses that dichotomise these as right or wrong. However, we could not measure "overall" knowledge and behaviour in relation to all aspects of authorship practices, plagiarism, redundant publication and conflicts of interest, so the findings should be interpreted within the specific focus and examples of research reporting we examined.

The in-depth interviews suggested that the institutions, their hierarchy and culture tended to encourage poor practice. Although our sample was small and self-selected, participants were very aware of what was happening at their institution and generally addressed the same problems. However, generalisability of our results is limited and results have to be interpreted with caution. We identified Cochrane authors as a group of researchers based in academic institutions in LMICs, who had contact with an international collaboration that promotes good scientific and reporting practice. Whilst this restricted the size of the sample, it provided an identified sampling frame and respondents with some awareness of the aspects of research integrity that we were investigating

(25). Survey and interview participants were from various LMICs and included junior as well as senior researchers. We considered the possible biases such a sample might entail, since Cochrane has strong ethical principles, and the critical appraisal of research papers for systematic reviews is likely to make Cochrane authors aware of authorship issues, redundant publication, plagiarism and conflicts of interest. This awareness means that their responses are probably reasonably accurate. For those interviewed, it may be that they have volunteered because of frustration with the system they are working in, or because they were upset about injustice that they had experienced themselves, but the analysis seemed to ring true and was remarkably consistent between those interviewed. However, we accept that using this sampling frame may have limited the representativeness of our respondents and that Cochrane authors may have greater understanding of publication ethics than other researchers.

Of all the irresponsible practices explored, perceptions and occurrence of guest authorship stood out. In light of the availability of international guidelines (26) and journal requirements on contributions of authors, this result is striking although not unexpected when considering results of other studies. A meta-analysis on the misuse of authorship (9) found a self-reported prevalence of 55% (95%CI 45% to 64%) amongst health researchers from countries outside of the USA and UK, including South Africa, India and Bangladesh. A survey conducted amongst medical professionals in India (27) found a high prevalence of guest authorship (65%; 101/155), while in a study conducted in Nigeria, 36% (47/133) of participating health professionals indicated that they had encountered disagreements about authorship (28). In our survey, 77% of respondents indicated that guest authorship occurred at their institutions.

For plagiarism, few of our respondents admitted to having translated a text or copied an idea without acknowledgement of the original source. However, they were aware of this happening in their institutions. Other studies from LMICs report much higher levels of self-reported plagiarism; 5% (n=132) among Nigerian dental researchers (29), 9% (n=130) among Nigerian health researchers (28), and 73% (n=82) among medical faculty members in Pakistan (30). Our findings are similar to self-reported rates of plagiarism in high-income countries as found in a systematic review (8) that reported a pooled estimate of 1.7% (95%CI 1.2 to 2.4) of survey participants admitting to any type of plagiarism. The pooled estimate for observed plagiarism in colleagues was 29.6% (95%CI 17.4 to 45.5), which is lower than our estimates of 37% and 43%. However, our scenarios referred only to translation of text and copying of an idea and not to simply copying of text, which is generally a more common understanding of plagiarism.

Our findings show that the desire for power and academic status, as well as institutional systems and academic culture greatly influence research integrity. These findings are in line with other international publications (31-33) and suggest that factors driving research misconduct are similar across low, middle and high-income countries. Of concern is the lack of mentors and role-models for junior researchers. Indeed, mentoring has been shown to positively influence research career development, productivity and success, and plays an important role in preventing misconduct (32, 34). Junior researchers appear to know what good practices are, but are discouraged from following these by seniors.

The impact of financial conflicts of interest on study results and reported conclusions is well recognised (35, 36). More recently, the importance of considering non-financial conflicts of interest has been highlighted (37-39). We found that non-financial conflicts of interest were poorly understood and that participants were reluctant to report them. A recent study found that authors of systematic reviews reported non-financial conflicts of interests less frequently than financial conflicts of interests (40). Our study participants felt that there was inadequate guidance on declaring financial and non-financial conflicts of interest and that a universal framework would be helpful. This need for standardised methods of reporting conflicts of interest has been recognised (38, 40-42) and some approaches proposed (38, 40, 41). However, a universal system has not been

realised and the onus is on journals and institutions to provide clear policies and guidelines on the transparent reporting of conflicts of interests.

There are few published studies on irresponsible research practices amongst health researchers from LMICs (10). To our knowledge, this is the first survey followed up with in-depth interviews that includes participants from several LMICs. The use of an online survey and in-depth interviews allowed us to gather rich data that supplemented our quantitative findings. This work highlights researcher concerns about several aspects of poor reporting practice in LMICs and the belief that such practices are common in some institutions. In particular, the researchers highlighted guest authorship as something that troubled them. Limited institutional processes and systems, lack of role-models and emphasising promotions and publications are important factors thought to influence research integrity in LMICs.

Future research in LMICs should explore ways to promote research integrity at various levels within institutions. This includes a multi-layered approach, at research team, within departments and across the institution.

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Contribution of authors

All authors contributed to the design of the study. AR collected and analysed data, with input from EW, TY and PG. AR drafted the manuscript. PG, TY and EW critically engaged with the manuscript and provided input. All authors have approved the final manuscript.

Competing interests

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: financial support from the Effective Health Care Research Consortium (EHCRC). This Consortium is funded by UK aid from the UK Government for the benefit of developing countries (Grant: 5242). EW is a self-employed consultant and received personal fees for training related to publication ethics outside of the study. All authors are involved with Cochrane and EW is the author of a Cochrane systematic review on interventions to promote research integrity.

Data sharing

Unpublished data from the survey can be obtained upon request from AR.

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Tables

Table 1: Definitions of poor research reporting practices

Research reporting practice	Definition
Guest authorship	Adding authors who did not contribute substantially to the work
Ghost authorship	Omitting authors who have contributed substantially to the work
Plagiarism	Copying text or part of a text, an idea or an image from someone else, without properly referencing the source and using it as one's own work
Redundant publication	Republishing one's own work including copying of an entire manuscript (duplicate publication), publication of parts of the results in separate papers (salami publication) and re-using of text in several publications (text-recycling)
Non-disclosure of conflicts of interest	Not declaring a financial or non-financial (personal, political, academic, religious, institutional) interest that can potentially influence professional judgement and bias results

Table 2: Examples of survey scenarios and accompanying questions

A junior researcher, J, adds the head of department, D, as the last author on a research paper. D provided suggestions for direction of J's work that helped her obtain the grant, although he hasn't contributed to the actual research or the publication.	**My view on this is:**	This is acceptable because D should be an author		
		This is not best practice, but it does not really matter, as it doesn't affect the science		
		This is unacceptable because D has not contributed to this paper		
	Have you ever done something like this?	Yes		
		No, and I am not aware of anybody else doing it		
		No, but I am aware of other people doing it		
	In my current department or unit, this pattern of authorship:			
	Is usual practice and happens most of the time		Happens occasionally	Happens rarely
	Never happens	Other: (please specify)		
	Comments or clarifications:			
A PhD student "copies and pastes" nearly all of the introduction from a paper that she has previously published into her next manuscript, since she is doing a series of experiments on the same topic.	**My view on this is:**	This is acceptable because it is her own work		
		This is not allowed by journals but it does not really matter, as it doesn't affect the science		
		This is unacceptable behaviour		
	Have you ever done something like this?	Yes		
		No, and I am not aware of anybody else doing it		
		No, but I am aware of other people doing it		
	In my current department or unit, such text-recycling			
	Is usual practice and happens most of the time		Happens occasionally	Happens rarely
	Never happens	Other: (please specify)		
	Comments or clarifications:			
A researcher, T, is working on a diagnostic test study. The company manufacturing the test has supplied the kits for free but did not design or fund the research. T was paid for a consultancy for the same company two years ago. In the publication of the study, he declares that he has no conflicts of interest.	**My view on this is:**	This is acceptable because T does not have a conflict of interest		
		This is not best practice, but it does not really matter, as it doesn't affect the science		
		This is unacceptable because T should disclose his consultancy		
	Have you ever done something like this?	Yes		
		No, and I am not aware of anybody else doing it		
		No, but I am aware of other people doing it		
	In my current department or unit, this behaviour:			
	Is usual practice and happens most of the time		Happens occasionally	Happens rarely
	Never happens	Other: (please specify)		
	Comments or clarifications:			

Table 3: Characteristics of survey respondents

	Median (IQR)
Age	44 (38 to 52)
Years at current workplace	10 (4.75 to 19.5)
% Time spent on research	40 (20 to 60)
Year of first publication	2003 (1997 to 2008)
Number of peer-reviewed articles	20 (7 to 41)
Number of Cochrane reviews	3 (1 to 5)
	N (%)
Gender	
Female	95 (48)
Male	104 (52)
Highest qualification	
Bachelor's degree	14 (7)
Master's degree	82 (41)
PhD	103 (52)
Place of work[1]	
University	141 (66)
Other research institution	40 (19)
Hospital	24 (11)
Other	10 (5)
Regions	
Latin America	52 (26)
Sub-Saharan Africa	48 (24)
South and South East Asia	44 (22)
East Asia	37 (19)
Other	18 (9)

[1] Multiple responses – total responses n=215

Table 4: LMIC researchers' perceptions and awareness of occurrence of heath research reporting

Health research reporting practice Total n=198	Perception: Acceptable or does not really matter	Behaviour: Have done this themselves	Occurrence at institution: This happens
	n (%)	n (%)	n (%)
Authorship			
Adding the head of department who has not contributed sufficiently[1]	69 (35)	48 (24)	153 (77)
Adding an expert in the field who has not contributed sufficiently to the research	64 (32)	42 (21)	140 (71)
Acknowledging a biostatistician for assistance with data analysis	132 (67)	103 (52)	166 (84)
Omitting an author who has contributed substantially to the research	3 (2)	4 (2)	81 (41)
Redundant publication			
Text-recycling (using one's own work from a previous publication in another)	57 (29)	22 (11)	118 (60)
Plagiarism			
Translating a text without acknowledging the original source	9 (5)	4 (2)	74 (37)
Copying an idea without acknowledgement of the original source	20 (10)	5 (3)	85 (43)
Conflicts of interest			
Not declaring previous financial reimbursement from a company involved in a research project	25 (13)	5 (3)	80 (40)
Not declaring your spouse's link to a company involved in a research project	47 (24)	3 (2)	56 (28)

[1]The full scenarios can be found in Supplementary file 1

Table 5: Selected quotations

Theme 1: Authorship rules are simple in theory, but not consistently applied
"I think it is not fair. If you don't work and you want to be an author. It's not fair… I think that the author should be the person involved in the work, the person who thought about the work, elaborated on the work, the person who works with the main author. And the people who really wrote the work… And not the chief of a discipline for example. He is an author just because he is the chief and I think it is unfair." (JNR_5)
"You know, there is this thing about somebody… that is above you and that you look up to and sometimes they will have told you that they are interested in that paper. So, if you don't put their name there will be friction. It is going to be a serious issue. It happens." (JNR _6)
"I mean I generally use the medical editors' guidelines, the requirements for authorship, but it is clearly not being followed by most people." (SNR_5)
"So, he did it [adding an author] out of good intent that he is helping a colleague, and what goes around, comes around. One day, I will be in need for this and he will help me, the idea of sharing and caring." (SNR_8)
Theme 2: Academic status and power underpin behaviours
"They have their names on the publication, otherwise there is no publication. Otherwise they do not give us the degree. They are actually part of the jury." (JNR_5)
"The senior author, the professor, took over first authorship and he knew the paper was actually accepted in a high impact publication. And it has gotten many citations. But it was not the senior author, the first author who did the work. He just came in on the last minute and said I'm going to be first author." (JNR_7)
"So, what they care about is not the research, but the publication." (JNR_4)
"I was frustrated. I felt betrayed. I felt cheated out of my efforts and it was more like a failed expectation." (SNR_4)
"I think largely it is a power thing. You know, once you got some you want more…and status. I think that is absolutely huge. I don't know that it is personal money, personal financial interest as much as professional and as I say, brining money for one's programme. So, it does not really matter if we fudge some of these results, but we will get more money and can do a bigger, better study next time." (SNR_5)
Theme 3: Institutions and culture fuel bad practices
"Especially before promotions and appraisal. Some people are desperate to have the requisite number of papers so they are willing to have their name on just any paper." (JNR_3)
"They have to choose a quick way to publish your paper and they also know that nobody will…use their results, especially if they publish it under general journals…" (JNR_4)
"There is some overemphasis on promotions rather than getting appraised based on what impact say the quality of the research and impact of the research." (SNR_1)
"I suspect that people stay in their rooms and cook up data and especially the ones that are smart." (SNR_2)
"We have to repeat this message over and over again, so that maybe at the end of the day, one day we reach the critical mass where we can change that." (SNR_8)
"I don't think we have got a guideline on that. I suppose I would have to write it if there was one." (SNR_7)

"Clear leadership from the top in the form of showing a good example is key because that creates a culture in the younger generation of researchers." (JNR_2)
"I'm very lucky to have been…developed as a young researcher in this specific environment…with my bosses and supervisors because they have…helped me to realise, you know, what is right and wrong so…they are good role models. But everyone is definitely not that lucky to work in the environment that I work in." (JNR_1)
Theme 4: Researchers are uncertain about what conflict of interests means, and how this may influence research
"Well, I know, you know in those publications there's only the section for you to declare if there's any conflict of interest but no, they don't, people just say no, no, no so you there's no way you can tell if the person does or does not have (Conflicts of interest)" (JNR_6)
"I just report the evidence as it is so not declaring that my husband works for a…company and we have potential conflict of interest, I fail to understand how that can be a conflict of interest if his work did not really affect…the findings of the review…" (JNR_7)
"We all actually have conflict of interest and in some ways, it starts getting a bit ridiculous because you are trying to think back to, I mean how far do you go? If a rep has given you a pen at a conference, do you then have a conflict of interest if you are dealing with their product? I am not really sure" (SNR_5)
"I don't know if this is sufficient in the end – you can say "yes, I am employed by [a drug company]" but and then what? And then? I don't know if this is sufficient? Because in the end you are saying yes, I am defending the ideas of my employer and in the end you read the article and ask yourself, who is this that is speaking?" (SNR_6)

Supplementary file 1: Questionnaire on health research reporting practices

Section A: Please answer the following questions:

1. Which country are you currently working in?

2. Where do you currently work?
   - University
   - Other research institution
   - Other (please specify)

3. How long have you been working here? (months and years)

4. What is your highest qualification?
   - Bachelor's degree
   - Master's degree
   - PhD

5. On average, how much of your time (%) do you spend on research?

6. How many peer reviewed research articles have you been an author on?

7. What was the year of your first publication?

8. How many Cochrane reviews are you an author on?

9. What is your first language?

10. What is your gender?
    - Male
    - Female

11. What is your age?

Section B: Please read the following scenarios and answer the questions that follow:

1. A junior researcher, J, adds the head of department, D, as the last author on a research paper. D provided suggestions for direction of J's work that helped her obtain the grant, although he hasn't contributed to the actual research or the publication.

My view on this is:

- This is acceptable because D should be an author
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because D has not contributed to this paper

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this pattern of authorship

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

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2. A professor, M, who did not contribute to study design, data collection or data analysis but is an expert in the field, reviews the draft manuscript and suggests some minor changes to the English. He asks to be listed as an author on the paper.

My view on this is:

- This is acceptable because M should be an author
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because M has not sufficiently contributed to this paper

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this pattern of authorship

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

3. A Master's student consults with the resident biostatistician, P, to help with data analysis on her research project. In the manuscript that she submits for publication, she lists P in the "Acknowledgement" section.

My view on this:

- This is acceptable because P should be acknowledged in this way
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because P has made substantial contributions to the work

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

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4. A PhD student "copies and pastes" nearly all of the introduction from a paper that she has previously published into her next manuscript, since she is doing a series of experiments on the same topic.

My view on this is:

- This is acceptable because it is her own work
- This is not allowed by journals but it does not really matter, as it doesn't affect the science
- This is unacceptable behaviour

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department such text-recycling:

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens

- Other: (please specify)

Comments or clarifications:

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5. A researcher in Mozambique wants to submit his manuscript to a journal published in English. He finds a text book in Portuguese that explains an aspect of the background to the disease very well. He translates one paragraph into English, and puts this into his introduction without reference to the book.

My view on this is:

- This is acceptable because the text has been translated
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable behaviour

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, such use of other people's material:

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments and clarifications:

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6. A researcher, T, is working on a diagnostic test study. The company manufacturing the test has supplied the kits for free but did not design or fund the research. T was paid for a consultancy for the same company two years ago. In the publication of the study, he declares that he has no conflicts of interest.

My view on this is:

- This is acceptable because T does not have a conflict of interest
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because T should disclose this consultancy

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this behaviour:

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or Clarifications:

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7. A researcher, K, writes a review for treatment guidelines of herbal remedies for children's cough. K's spouse is employed by the company that manufactures one of these remedies. In the review, K declares that he has no conflicts of interest.

My view on this is:

- This is acceptable because K does not have a conflict of interest
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because K should disclose his spouse's link to the company

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this behaviour:

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

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8. A researcher, S, contributes to the design and does most of the data collection in a study but goes on maternity leave as it is being analysed. When she returns to her post she discovers that the research has been published by her supervisor without her name or any acknowledgement of her contributions.

My view on this is:

- This is acceptable because S did not contribute to the publication
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because S should have been invited to contribute to the publication

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this type of practice (leaving out a junior author who has made substantial contributions):

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

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9. A researcher from India attends an international conference where a European research study with a novel design is presented. He submits a protocol for an identical study to the ethics committee at his home institution. He does not reference the European study.

My view on this:

- This is acceptable
- This is not best practice, but it does not really matter, as it doesn't affect the science
- This is unacceptable because the original idea should be acknowledged

Have you ever done something like this?

- Yes
- No, and I am not aware of anybody else doing it
- No, but I am aware of other people doing it

In my current department or unit, this behaviour:

- Is usual practice and happens most of the time
- Happens occasionally
- Happens rarely
- Never happens
- Other: (please specify)

Comments or clarifications:

Section C: Please answer the following questions:

1. Are you aware of any written institutional policies that cover the situations described in our scenarios?

- Yes
- No

2. Would you be interested in participating in an interview via Skype or telephone to discuss research reporting practices further?
   - Yes
   - No

3. Would you be interested in receiving feedback on this study?
   - Yes
   - No

Thank you for participating in this survey!

Please click on the link below if you indicated that you would be interested in participating in a telephonic/Skype interview on this topic or if you would like to receive feedback on the survey results.

Supplementary file 2: Interview guide

Hi *(Name)*

Thanks so much for agreeing to talk to me about research reporting today. I just want to check – have you read the information sheet? Is there anything that is unclear? As noted in the sheet, I will record our conversation – are you fine with that? Please note that all reporting is anonymous and you will not be identified in any way, and you are free to stop the interview at any time.

Another thing I want to mention is that we invited you to complete the survey because you are an author on a Cochrane review, but I would like you to think about any research publication – not just Cochrane reviews – during our conversation.

Let's start then. You work at the *(institution as provided by participant)*, right? What is your job there?

Let's talk about the survey that you completed a few weeks ago. What did you think about the situations we gave, did any seem familiar? What do you remember?

Some of the scenarios were about being an author on a paper. Have you come across any issues here yourself? What happened?

- *Prompts depending on answer:*
  - What about omitting an author that has contributed sufficiently to the research paper?
  - What about adding an author that has not made a big enough contribution to the research paper?
- Have you experienced something like this?
- How do you decide on authorship at your institution?
- Are there any guidelines about authorship at your institution? Are these being followed?

Some of the scenarios were about people copying other people's work, often called plagiarism.

What do you think about this? What do you understand by it? What do you think are the main problems with plagiarism?

- *Prompts depending on answer:*
  - What about translating a text into another language?
  - What about copying a text from another paper?
  - What about using someone else's idea?
- Do you have guidelines on plagiarism at your institution?

There were also scenarios about conflict of interest. How do you understand conflict of interest? Why do you think this is a problem?

- *Prompts depending on answer:*
  - What about being paid by a drug company for a consultation not related to the research project?
  - What about conflicts of interest that do not involve money?
- How do you deal with these competing interests at your institution and how are they reported in a paper?

What about other problems that we did not address in the survey, like making-up or manipulating data - Are you aware of any other poor practices happening at your institution?

Why do you think people engage in this bad practice?

What do you think can be done to prevent this behaviour?

Any other comments or questions?

Supplementary file 3: Final list and categories of codes

Poor practices happening at institutions
Adding authors that have not contributed substantially
Being added as an author when not contributed substantially
Being omitted
Omitting authors that have contributed
Ranking of authors not according to contributions
Change in author team
Changing author names on published papers
Using ideas without acknowledging their origin
Detection of plagiarism when doing systematic reviews
Students using existing projects
Academic CoI
Non-financial CoI
Data dredging
Data fabrication
Duplicate publication in different languages
Influence of sponsor
Non-reporting of results
Inaccurate reporting to public
Data manipulation
What was done when irregularity was detected?
Discussions within author team
Nothing was done
Formal complaint
Punishment
Discussions within author team
Decline further participation
Channels for complaints
Feelings associated with experience
Upset about what happened
Feeling powerless
Unfair process
Frustration
Did not care
Not sure how to handle situation
Insecurity
Discomfort
Concerned
Factors influencing practices/reasons for poor practices
Author team dynamics
Academic (personal) gain
Payment for assistance
Endorsement

Personal relationships
Professional relationships
Publication fees
Lack of knowledge and skills
Direct research environment (research team)
Institutions
Hierarchies within institutions
Requirements for promotion
Personal values
Lack of resources
Journal requirements
Guidelines
Cultural environment
Lack of time for research
Lack of funding
Lack of interest
Journals
Providing a service
Academic status
Researcher
Funders
Who is an author?
Challenges with authorship criteria
Timing of authorship discussions
What contribution warrants authorship? (ICMJE criteria)
Other criteria that warrant authorship
Guidelines
Arbitrary
Role of authors
What is plagiarism?
Various degrees of plagiarism
Not acknowledging origin of ideas
Using text without acknowledging source
Not sure about meaning
Translating text
Challenges related to plagiarism
What are conflicts of interest?
Levels of COI
Relationships with industry
Academic CoI
Difficult to understand CoI
Guideline panels
Professional relationships
Personal relationships
Anything that influences research
Research misconduct in general

Levels of misconduct
Complex issue
Crime
Global issues
Implications of poor practices
Affects organizational culture
Image of institution
Bias study results
Impact on researcher
Mistrust of study results
Impact on patients
Far-reaching consequences
Dealing with poor practices
Forgive
Responsibilities of researcher
Challenging
Institutional guidelines
Institutional support
Disciplinary action
Using Technology
Declaring COI
Decline participation
Relationships with industry
Need universal system
Learn from others
Promoting good practices
Training
Research team
Role-modelling
International collaborations
Organizational culture
Creating awareness
Auditing research
Institutional structures and channels
Rewards and punishments
Funding
Clear and accessible guidelines for all staff
Realistic research projects
Perceptions of prevalence of poor practices
Adding authors very common
Adding not common
Omitting authors relevant to clinical trials
Links with Pharmaceutical industries
Plagiarism does occur
Relevant topic
Common issue but not always overt

Attitudes of researchers
Criteria restrictive
Arrogance
Hopeless?
Not tolerated
Difficult to be 100% honest
Accountability
Aware of research integrity issues

Supplementary file 4: Detailed survey responses

Table 1: Researchers' perceptions of irresponsible research reporting practices

Health research reporting practice Total n=198	This is acceptable	This is not best practice, but it does not really matter, as it doesn't affect the science	This is unacceptable
	n (%)	n (%)	n (%)
Authorship practices			
Adding the head of department who has not contributed sufficiently	26 (13)	43 (22)	129 (65)
Adding an expert in the field who has not contributed sufficiently to the research	21 (11)	43 (22)	134 (68)
Acknowledging a biostatistician for assistance with data analysis (as opposed to listing as an author)	127 (64)	5 (3)	66 (33)
Omitting an author who has contributed substantially to the research	1 (0.5)	2 (1)	195 (98)
Redundant publication			
Text-recycling (using one's own work from a previous publication in another)	34 (17)	23 (12)	141 (71)
Plagiarism			
Translating a text without acknowledging the original source	3 (2)	6 (3)	189 (95)
Copying an idea without acknowledgement of the original source	5 (3)	15 (8)	178 (90)
Conflict of interest			
Not declaring previous financial reimbursement from a company involved in a research project	13 (7)	12 (6)	173 (87)
Not declaring the wife's link to a company involved in a research project	26 (13)	21 (11)	151 (76)

Table 2: Researchers' awareness of occurrence of irresponsible research reporting practices

Health reporting practice Total n=198	Have done this before	Have not done this but *are* aware of other people doing it	Have not done this and are *not* aware of other people doing it
	n (%)	n (%)	n (%)
Authorship practices			
Adding the head of department who has not contributed sufficiently	48 (24)	113 (57)	37 (19)
Adding an expert in the field who has not contributed sufficiently to the research	42 (21)	103 (52)	53 (27)
Acknowledging a biostatistician for assistance with data analysis (as opposed to listing as an author)	103 (52)	60 (30)	35 (18)
Omitting an author who has contributed substantially to the research	4 (2)	83 (42)	111 (56)
Redundant publication			
Text-recycling (using one's own work from a previous publication in another)	22 (11)	95 (48)	80 (40)
Plagiarism			
Translating a text without acknowledging the original source)	4 (2)	73 (37)	121 (61)
Copying an idea without acknowledgement	5 (3)	84 (42)	109 (55)
Conflict of interest			
Not declaring previous financial reimbursement from a company involved in a research project)	5 (3)	85 (43)	108 (55)
Not declaring the wife's link to a company involved in a research project	3 (2)	58 (29)	137 (69)

Table 3: Occurrence of irresponsible health research reporting practices in respondents' current institution

Health reporting practice Total n=198	Happens most of the time	Happens occasionally	Happens rarely	Never happens	Don't know
	n (%)	n (%)	n (%)	n (%)	n (%)
Authorship practices					
Adding the head of department who has not contributed sufficiently	26 (13)	78 (39)	49 (25)	35 (18)	10 (5)
Adding an expert in the field who has not contributed sufficiently to the research	26 (13)	65 (33)	49 (25)	51 (26)	7 (4)
Acknowledging a biostatistician for assistance with data analysis (as opposed to listing as an author)	70 (35)	62 (31)	34 (17)	22 (11)	10 (5)
Omitting an author who has contributed substantially to the research	2 (1)	28 (14)	51 (26)	103 (52)	14 (7)
Redundant publication					
Text-recycling (using one's own work from a previous publication in another)	16 (8)	50 (25)	52 (26)	56 (28)	24 (12)
Plagiarism					
Translating a text without acknowledging the original source	3 (2)	24 (12)	47 (24)	101 (52)	23 (12)
Copying an idea without acknowledgement	2 (1)	24 (12)	59 (30)	91 (46)	22 (11)
Conflict of interest					
Not declaring previous financial reimbursement from a company involved in a research project	3 (2)	30 (15)	47 (24)	95 (48)	23 (12)
Not declaring the wife's link to a company involved in a research project	1 (0.5)	14 (7)	41 (21)	110 (56)	32 (16)

Supplementary file 5: Survey results per region

Health research reporting practice per region Total n=198	Perception: Acceptable or does not really matter	Behaviour: Have done this themselves	Occurrence at institution: This happens
Adding the head of department who has not contributed sufficiently			
Sub-Saharan Africa (n=48)	6 (13)	5 (10)	32 (67)
Latin America (n=52)	16 (31)*	14 (27)	40 (77)
South and South East Asia (n=44)	16 (36)*	10 (23)	30 (68)
East Asia (n=36)	24 (67)*	12 (33)	36 (100)
Other (n=18)	7 (39)*	3 (17)	15 (83)
Difference between regions	p<0.001	p=0.178	p=0.003
Adding an expert in the field who has not contributed sufficiently to the research			
Sub-Saharan Africa (n=48)	10 (21)	7 (15)	25 (52)
Latin America (n=52)	16 (31)	14 (27)	39 (75)*
South and South East Asia (n=44)	17 (39)	5 (11)	29 (66)
East Asia (n=36)	17 (47)	11 (31)	34 (94)*
Other (n=18)	4 (22)	5 (28)	13 (72)
Difference between regions	p=0.083	p=0.109	p=0.001
Acknowledging a biostatistician for assistance with data analysis (as opposed to listing as an author)			
Sub-Saharan Africa (n=48)	29 (60)	21 (44)	35 (73)
Latin America (n=52)	37 (71)	31 (60)	45 (87)
South and South East Asia (n=44)	33 (75)	25 (57)	39 (89)
East Asia (n=36)	19 (53)	16 (44)	32 (89)
Other (n=18)	14 (78)	10 (56)	15 (83)
Difference between regions	p=0.146	p=0.211	p=0.204
Omitting an author who has contributed substantially to the research			

Sub-Saharan Africa (n=48)	1 (2)	0 (0)	15 (31)
Latin America (n=52)	0 (0)	3 (6)	20 (38)
South and South East Asia (n=44)	1 (2)	0 (0)	17 (39)
East Asia (n=36)	1 (3)	1 (3)	21 (58)
Other (n=18)	0 (0)	0 (0)	8 (44)
Difference between regions	p=0.784	p=0.546	p=0.153
Text-recycling (using one's own work from a previous publication in another)			
Sub-Saharan Africa (n=48)	7 (15)	2 (4)	18 (38)
Latin America (n=52)	27 (52)*	10 (19)	35 (67)*
South and South East Asia (n=44)	9 (20)	4 (9)	26 (59)*
East Asia (n=36)	13 (36)*	4 (11)	29 (81)*
Other (n=18)	1 (6)	2 (11)	10 (56)
Difference between regions	p<0.001	p=0.015	p=0.001
Translating a text without acknowledging the original source			
Sub-Saharan Africa (n=48)	1 (2)	1 (2)	8 (17)
Latin America (n=52)	4 (8)	1 (2)	20 (38)*
South and South East Asia (n=44)	3 (7)	0 (0)	14 (32)
East Asia (n=36)	1 (3)	1 (3)	23 (64)*
Other (n=18)	0 (0)	1 (6)	9 (50)*
Difference between regions	p=0.478	p=0.105	p<0.001
Copying an idea without acknowledgement of the original source			
Sub-Saharan Africa (n=48)	0 (0)	0 (0)	9 (19)
Latin America (n=52)	6 (12)	2 (4)	25 (48)*
South and South East Asia (n=44)	4 (9)	0 (0)	18 (41)*
East Asia (n=36)	8 (22)	3 (8)	25 (69)*
Other (n=18)	2 (11)	0 (0)	8 (44)*

Difference between regions	p=0.022	p=0.013	p<0.001
Not declaring previous financial reimbursement from a company involved in a research project			
Sub-Saharan Africa (n=48)	2 (4)	0 (0)	11 (23)
Latin America (n=52)	4 (8)	1 (2)	21 (40)
South and South East Asia (n=44)	3 (7)	2 (5)	18 (41)
East Asia (n=36)	11 (31)*	1 (3)	22 (61)*
Other (n=18)	5 (28)*	1 (5)	8 (44)
Difference between regions	p=0.001	p=0.02	p=0.013
Not declaring a spouse's link to a company involved in a research project			
Sub-Saharan Africa (n=48)	6 (13)	0 (0)	6 (13)
Latin America (n=52)	10 (19)	1 (2)	15 (29)
South and South East Asia (n=44)	12 (27)	0 (0)	11 (25)
East Asia (n=36)	14 (39)*	2 (6)	19 (53)*
Other (n=18)	5 (28)	0 (0)	5 (28)
Difference between regions	p=0.062	p=0.043	p=0.002

*Indicates significant difference compared to Sub-Saharan Africa