SciDev Net

Global Science Journalism Report

Working Conditions & Practices, Professional Ethos and Future Expectations

Martin W Bauer & Assistant Susan Howard, London School of Economics
Yulye Jessica Romo Ramos, SciDev.Net
Luisa Massarani, SciDev.Net and Museu da Vida - Casa de Oswaldo Cruz – Fiocruz (Brazil)
Luis Amorim, Museu da Vida - Casa de Oswaldo Cruz – Fiocruz (Brazil)

OUR LEARNING SERIES

LSE

Ministério da Saúde
FIOCRUZ
Fundação Oswaldo Cruz
Casa de Oswaldo Cruz

Museu da Vida

www.scidev.net

In partnership with LSE, Fiocruz & Museu da Vida

About SciDev.Net

SciDev.Net – the Science and Development Network – is committed to putting science at the heart of global development.

Our mission is to help individuals and organisations apply evidence and innovations from science and technology to decision making in order to have a positive impact on equitable and sustainable development and poverty reduction.

The SciDev.Net website [www.scidev.net] is the world's leading source of reliable and authoritative news, views and analysis on information about science and technology for global development.

Our main office is based in London but we have 6 regional news desks based in Sub-Saharan Africa, South Asia, Latin America & the Caribbean, South-East Asia & Pacific, Middle-East & North Africa and West Africa. Between us we manage a worldwide network of registered users, advisors, consultants and freelance journalists, who drive our activities and vision.

For more information please consult our website: www.scidev.net

For free email updates visit: www.scidev.net/sign-up

Contact Details

For queries about this paper please contact SciDev.Net's Monitoring and Evaluation Coordinator:

Yulye Jessica Romo Ramos

9-11 Richmond Buildings | London | W1D 3HF | UK
+44 (0) 20 7292 9910
ourlearning@scidev.net
www.scidev.net

Join us on Facebook: www.facebook.com/scidevnet

Follow us on Twitter: @SciDevNet

First published by SciDev.Net in the UK in 2013

ISBN 978-1-909528-02-4

Printed and bound by Trident Printers, UK
Cover design by www.stevendickie.com/design
Photo Credit (Cover): iStockphoto.com / Anett Somogyvári

SciDev Net

Putting science at the heart
of global development

OUR LEARNING SERIES

Global Science Journalism Report

Working Conditions & Practices, Professional Ethos and Future Expectations

Martin W Bauer & Assistant Susan Howard, London School of Economics
Yulye Jessica Romo Ramos, SciDev.Net
Luisa Massarani, SciDev.Net and Museu da Vida - Casa de Oswaldo Cruz – Fiocruz (Brazil)
Luis Amorim, Museu da Vida - Casa de Oswaldo Cruz – Fiocruz (Brazil)

January 2013

Table of Contents

List of Tables

List of Figures

Executive Summary

We report on a survey of the working conditions, practice and ethos of science journalists across the globe. This is a project in partnership with SciDev.Net, the LSE and Museu da Vida - *Casa de Oswaldo Cruz – Fiocruz (Brazil)*. The LSE started collecting data in May 2009 (mainly from the USA, Canada and Europe) and in 2010/11 Museu da Vida - *Casa de Oswaldo Cruz – Fiocruz (Brazil)* helped collect more responses, this time from Latin America only. In 2012 SciDev.Net gathered data from all over the world except for Latin America and the developed countries.

The above organisations wanted to explore the profile of science journalists as well as their perceptions regarding two historical trends: a) the crisis of print journalism (mainly in USA, Canada and Europe), and b) the commercialisation of science globally. The implications these trends have for science journalism across the globe form the focus of this study but also what it means for research communication and all those interested in building a culture of science.

- **The present report: perception indicators**

The present report investigates the climate of opinion among science journalists around the world. The results report perceptions that do not amount to a complete diagnosis of the situation. Our data gages opinions with regards to the trends mentioned above, and as we know, perceptions can match reality but also deviate from it in two ways: by false alarms and by missing the point. But matches and mismatches are in themselves interesting observations.

Perception data needs to be complemented with structural information about changes in the profession in different contexts: the numbers of science writers; the number of full-time positions in the mass media system; the development of public relations positions in universities and research institutions; and the trends in salary and working conditions. To collate this information was not our present brief: thus others will have to make this information accessible to reach a rounded assessment of the global situation (see William and Clifford, 2010 for the UK).

The present study is significant in another context. It contributes to the construction of a system of indicators that tracks and assesses the science culture of a country in a comparative manner. Science culture comprises the production and consumption of information for the wider conversation of science in society (see Bauer et al, 2012; Bauer, 2012). The societal conversation of science is a vital part of any modern culture, and it is of eminent importance to track the changing conditions of producing this conversation of science in different contexts. Clearly, science journalists have an eminent role to play and we need to understand their working conditions and their ethos across the globe.

- **Working conditions of science journalists**

The study found that the average science journalist works on 9 items over a two week period. The majority of writers produce between 5 and 11 items during this period. Africa and Asian journalists are slightly busier than journalists from other regions. Women and men face the same workload, except in North Africa, where men report higher workloads than women, and in Asia where the opposite is the case: women report higher workloads than men.

The typical science journalist is male and aged between 21 and 44 years old. However, in USA, Canada and Latin America, science is more likely the field of women journalists. Most writers hold a university degree plus additional journalism training; only 10% learned their trade on the job. About 10% hold a PhD, more so in Europe and in USA and Canada. Fifty one per cent are in full-time employment, and 32% are working freelance. Precarious working conditions are the norm for about half the world's science journalists.

Most reporters work on a beat that covers science, technology, and the environment. Other beats group 'agriculture, energy and climate change', or 'science policy, innovation and science communication', or 'social science and health', or 'technology, social science and business'. The majority of science journalists work in print, on web stories and on Facebook. About half work for radio and a third for television. Social media, such as Twitter and blogs, are engaged in by half the respondents; this is much more likely in North Africa and the Middle East. Around half the reporters indicated they have produced more print and web stories in recent years. There might have been a decline in newspaper outlets, but no decline in printed science news.

About 10% of journalists work without any feedback from their audience; at most they rely on occasional letters from readers, or increasingly on clickstream data from the Internet. Friends and family are relevant for about a third of journalists. Personal contacts, conferences and press releases, other media outlets, blogs by scientists, specific science journals and newswire services define the main sources of news for 85% of all professionals. Blogs by scientists and science media centres are less evident in Europe, USA and Canada than elsewhere. Social networking is the flavour of the Middle East and North Africa, and newswire services are much used in Latin America and both North and Southern Africa.

Seventy two per cent of science journalists are happy in their jobs; 10% are clearly dissatisfied. In Europe, USA and Canada professionals are more satisfied with the specifics of their jobs such as safety and access to information and people, but they are less happy in their jobs overall. In the rest of the world, the opposite is the case: there is happiness on the job, but dissatisfaction with the specifics of the operation.

- **The work ethos of science journalists**

Every profession has a certain understanding of its mission in the world. Science journalists see themselves as reporters who inform the public and translate complex matters, to aid a better understanding of science. However, there are clear regional differences: educating, being a watch-dog and mobilising the public is the prevailing ethos of science journalists in North Africa and the Middle East but those in Europe, the Americas or in Asia do not share the same ethos.

Respondents believe that a good science journalist is ***'well-trained and reports the facts, independently, neutrally and in an original manner'***. In addition, two third of all respondents consider that those in the profession are not critically astute enough when writing or investigating leads. Having a formal science degree is of lesser importance than the previously described journalistic attributes. Overall we find that the espoused ethos of science journalists has two dimensions: 'attention to training & facts' and a 'passion for science'. A passion for science is more important in the US, North Africa and the Middle East, and less so in Asia and Latin America. Training & facts are perceived to be more important in North Africa, the Middle East and Latin America than elsewhere. This preponderance might reflect the formal training deficit in these regions.

- **Expectations for the future: sense of crisis?**

Two third of our science journalists respondents do not agree with the statement that 'newspapers are a thing of the past', and an ever larger proportion considers predictions of the 'death of print journalism' to be widely exaggerated. However, most journalists belief that the Internet is changing the trade. Europe, USA and Canada expect more mass produced 'Churnalism' and 'Mcnews', while elsewhere journalists are more worried about sloppy craft work. A crisis of journalism is widely perceived in Europe, USA and Canada, and, to a lesser extent, in Latin America. In Latin America, the issue of greatest concern to journalists is job security, while elsewhere people worry more about the quality of copy. In Europe, USA and Canada, more people doubt that they will be working as science journalists in five years' time, and fewer recommend the career to a youngster. By contrast, across Asia, North and Southern Africa, the future of science journalism is exciting: the profession is seen to be moving on the right track. Here, as well as in Latin America, there is little doubt about the future, and people happily recommend the career to younger generations.

A sponsored science desk — so called 'Philanthro-journalism' — is seen by most as representing a solution for a situation "where a national or an international news wire service does not have a science desk, or can no longer afford to have one" (Q34). This solution is widely embraced by journalists from USA, Canada and Latin America. In Europe and elsewhere, we find more caution with sponsorship. On the question of who might be a suitable sponsor, national or international charitable organisations are favoured over governments, while industrial sponsors are treated with much more caution, although more favourably in Sub-Saharan Africa than elsewhere.

1. Methodology

1.1 Terms of Reference

We situate our study in the context of two societal trends that make an investigation of the situation of science journalists a pressing issue on a global scale. However it is important to note that these two trends are structural in nature and our report does not have structural data on the working conditions of journalists (how many employees, salary changes, other changes over time etc.). Our data only offers 'perceptions' on such trends.

Trend 1: Crisis of Journalism — the decline of the traditional business model

In USA, Canada and Europe, the traditional news business model — i.e. the selling of news in return for advertising and reader subscriptions — seems to be in crisis, and has led to a frantic search for viable alternatives (see Manning, 2009; Economist, 2012). Newspapers have been the mainstay of the societal conversation of politics, and of science, for much of the 19th and 20th centuries in Western countries. A 400-year-old newsprint business model has, within only 15 years, been thrown into jeopardy by the high-tech Internet-based misconception that quality content comes for free. Apparently 7000 newspapers around the world have picked up on a comment by Rupert Murdoch, the international media proprietor, in which he warned that the publishing industry 'is cannibalising itself' (NZZ Folio, 2009) — testifying to the global sensitivity of the question.

Newspapers are facing their worst crisis in history, as the stock market prices of large titles have collapsed (Greenslade, 2011). Newspaper readership, especially among the younger generation, is declining and lost to internet bulletins. In consequence, advertising spending also shifts. News organisations are under pressure. Traditional print titles are closing down, merging, or are distributed freely in an attempt to woo reader attention and advertising revenues. Watchdogs argue for a reconstruction of journalism, as this crisis poses a threat to independent reporting that provides information, investigation, analysis and community knowledge (Downie & Schudson, 2009).

Uncertainty at this news front puts pressure on the working conditions, the quality of reportage and the job security of journalists in general, and specialist writers like science journalists in particular. Expensive specialist beats are first in line for the squeeze. Weaver et al. (2007) reported that, since the 1990s: the number of full-time positions in US journalism has declined by 5%, the average age of journalists has increased, and the average wage has decreased by 10% over 40 years. In 2008, 87% of US newspaper revenues came from advertising (and 13% from copy sales), while this figure was 50% in the UK, and less than 40% in Denmark or Japan (OECD, 2010, p35). Clearly, newsprint is vulnerable to the migration of advertising, but differentially so. This suggests that the pressure of this crisis might not be universal. In large Asian countries such as China and India, newspaper reading is expanding (OECD, 2010; Economist, 2012, p66). We need to keep this trend in perspective.

Taking a global perspective, economic pressures are not the only threats to quality journalism. Bodies like the International Press Institute (IPI) or Reporters without Borders monitor and attempt to safeguard freedom of opinion and expression across the world. They record the names of journalists who have lost their lives in the pursuit of investigations. They record the conditions of journalists who work under threat and political pressures, being psychologically and physically harassed. In many countries, censorship is avoided only by self-censorship of media organisations and those working for them. In such context the core ethos of the profession is to investigate and report critically in order to bridge the information gap that exists between those in power and the wider public. It is in these cases when quality information is thus not only an economic asset but also a public responsibility. It is also possible that in politically difficult contexts, science journalism is a relatively save option for journalists.

Trend 2: The commercialisation of scientific research and PR for science

Since the 1970s, increasing amounts of scientific research is conducted under private patronage, and thus researchers operate increasingly in a commercial climate, which includes the imperatives of reputation management and securing market shares for knowledge products. This puts pressure on science communication. Decreasingly, science writing is following an ethos of public information and education on a substantive issue, as the profession is increasingly used to secure public attention for particular scientists, research groups, and scientific institutions. The model of professional PR for science, though nothing new, turns into a generalised and domineering practice.

This all increases the dual risks of a) 'scientific fraud' because of higher production pressures on scientists (see Cookson, 2009; van Noorden, 2011) on the one hand, and b) lower quality in the societal conversation of science, because of the publicity imperative for research and researchers (Nelkin, 1987), on the other hand. In order not to turn into a festival of hyperbole and misinformation, science reporting requires the structures of a public sphere capable of scrutinising the process of knowledge production outside science itself and supporting the peer review process. For science communication this amounts to a paradigm change (see Bauer, 2008).

It is an historical irony that when society is most in need of high quality science communication (trend 2), its foundation of independent professionalism is being eroded (trend 1). The weakness of science journalism is the power of science public relations, as Winfried Goepfert (2007) remarked after lifelong research into the profession. Moreover, the 2012 meeting of the UK science writers association raised this as a dilemma between 'exposing' and 'explaining', saying there is too much explaining and too little exposing.

A feature in *Nature* (March 19, 2009) sounded the alarm bell on the 'end of science journalism as we know it' (Brumfield et al, 2009). The securely employed specialist correspondent, writing for print and seriously investigating a story, is an endangered species. Paradoxically, while science news is expanding worldwide, science journalism is under pressure, both in terms of employment and traditional formats.

1.2 The Survey

We initially constructed this questionnaire by consulting some older sources such as PEW studies on 'Journalism in the US', a *Nature* (Brumfield, 2009) questionnaire similar to our own, and various commentaries echoing the *Nature* feature in newspapers like the NZZ (2009).

The forty-year-old study of Maldidier and Boltanski (1969) suggested questions that will allow us to track long-term changes in the culture of science writing for the wider public (q03, q08, q17a-f, q19) going back to the 1960s. The UK national study Jobs2000 (McGovern et al., 2004) provided items on the employment situation and job satisfaction (q14, q37)[1], to benchmark the situation of science journalists to that of the entire workforce. The survey conducted by *Nature* in March 2009 offered several useful items to benchmark against their results (q8, q9, q12, q13, q16a – q16k, q21a – q21l, q22, q23, q24a, q25, q26a – q26j, q27, q28, q38). Finally the PEW surveys of 2004 and 2007 of how US journalists see journalism offer useful comparisons of the situation of science journalists with that of all journalists in the US (q6a, q23, q24, q30, q31, q33a – q33k, q35).

The questionnaire has gone through a number of revisions and extensions since it was first used in WCSJ-2009. A version with minor changes and adaptation was used in the Latin American Study (Massarani, 2012), and in the current study. The latest version of the questionnaire was used in the *SciDev.Net* journalism study of 2012.

The questionnaire is generally structured into six sections. First, we asked about the personal and educational background of the respondents, followed by questions about their current professional situation, their employment status and country of activities. The third section explores the working routines and workloads and how these have changed over the last five years. The fourth section explores views about the current status of journalism in general, and science writing in particular, and their likely futures. The fifth and final section asks questions pertaining to the ethos of science communicators and what it takes to be a professional in the field. We end with a general assessment of work satisfaction and considerations of training needs.

The questionnaire used in this study comprises 43 questions with more than 150 items.

[1] The 'jobs2000' Working in Britain in the year 2000 – questionnaire as kindly provided by Patrick McGovern, LSE Department of Sociology.

1.3 Data collection and the profile of respondents

The focus of the present study is 'science journalists'. One might define this activity as 'writing about science in the news media'. However, only a minority of people writing science news are on the 'science beat' — i.e. being employed part-time or full-time by a local, national or international news outlet to cover science news events. Many other science writers are working for universities, research institutions or foundations that are involved in research. Furthermore, feedback from the respondents of this study suggested that, from the way we framed our questions, our implicit target were 'print journalists' rather than those working for TV or radio, although our sample includes a good number of the latter.

Tracing and estimating the number of science journalists in any one country is even more difficult than defining a 'journalist on the science beat'. For example, Williams and Clifford (2010) accounted for 82 certified science journalist positions in UK private and public mass media in 2009, while the number of people attending the conferences of the British Association of Science Writers (BASW) is considerably larger. Similarly, attempts by our team to estimate the number of science journalists active in Brazil varied between 300 and 1000, depending on which list one consults, or who one might ask for an estimate.

It seems notoriously difficult to define a population of specialist journalists for whom there are no readily available lists of professional certification. In this context, statistical sampling procedures with estimates of non-response rates and potential biases are difficult or impossible to apply. We are left with using as many channels as possible to distribute questionnaires and to integrate the resulting information in order to establish an estimate. Thus, it was our strategy to collect data for this study from as wide a field as possible. The distribution of our survey is biased towards the global 'South' and it is likely to under-represent the science journalists in Europe, USA and Canada.

Half of our respondents (48%, 476 respondents answering Q8a) identify themselves as full-time science journalists. A further six per cent are scientists who write occasionally for the public, 5% are PR officers working with journalists, and 2% are journalists who occasionally writing on a science topic.

In conclusion, and by way of a proviso, we need to say that it remains unclear who the current survey is representative of. The final sample is unlikely to be representative of the world's science journalists, as we have little information about this group except that it exists. To a large extent, our sample is haphazard and opportunistic; but some information is better than none at all, and we are comparing results with previous studies (e.g. *Nature*, 2009) to get a sense of concurrent validity on some items. The present results will be a further step towards forming a systematic picture of any one country, and towards a systematic comparison of the state of affairs and the situation of science journalism across the world.

1.4 The current database

The current SciDev.Net database on 'science journalism' consists of data from four different studies

- The World Conference of Science Journalists (WCSJ) is a survey with N=179 respondents that was conducted in 2009 on the occasion of the bi-annual meeting of the World Conference of Science Journalists (WCSJ-09) in London (see Bauer & Howard, 2009).
- The data 'Latin America' brings N=320 respondents from Latin American countries (see Massarani et al., 2010); this study was conducted in 2010 and 2011. Please notice that in the Americas "North America" is thought to include Canada, the USA and Mexico. However for practical purposes and with the aim of focusing on developing countries; we have treated Latin America as a region that includes Mexico since this country was covered as part of our Latin America survey. Due to this reason, we will refer to Canada and USA separately.
- 'SciDev.Net Journalist' is the study conducted specifically for this report and brings an additional n=93 respondents mainly from Africa and Asia.
- The 'SciDev.Net Editor' study is a subset of data taken from SciDev.Net's Global Review (see Romo, 2012). The latter project collected around 3,000 responses from six different sectors around the world - mainly developing countries. The project included questions relevant to this report and was distributed to journalists but also editors. The subset of data relevant to this report is worth a total of 361 responses (see Romo, 2012).

Table 1: Different questionnaire sources

	Frequency	Per cent
WCSJ	179	18.8
Latin America	320	33.6
SciDev.Net Journalists	93	9.8
SciDev.Net Editors	361	37.9
Total	953	100.0

Overall, we are dealing with a database of N=953 respondents. By comparison, the PEW survey reported using smaller samples (N=538, Sept-Dec 2007), and so did the *Nature* survey (N=493). Each questionnaire round covered slightly different questions, with an overlap of common questions (eg gender). Therefore non-responses on some items arise from slightly different versions of the questionnaire; the different questionnaires vary on the inclusion or exclusion of items. The report maximises the comparability of the data. In the following section, we characterise briefly the different samples that we combined into the current database.

In addition some changes have been made to allow for comparison, such as turning 'V010 in which country are you based', was an open question. A variety of spellings and commentary included did not allow a clear interpretation. Thus the variable was changed for a categorical variable. Please note that for both 'V010' and 'Based', when cross-comparing with 'V009 world region' there will be discrepancies, as the world region enquired after here is the region mainly reported on, rather than the region in which based.

A full elaboration of the four questionnaires' similarities and differences, and the measures taken to merge them, can be found on application to the authors.

a) LSE-WCSJ Survey 2009

The questionnaire responses were collected mainly but not exclusively from participants at the bi-annual World Conference of Science Journalists (WCSJ_09), which took place 30 June–2 July 2009 in London's Westminster Hall. All 800+ delegates received a questionnaire in their conference welcome pack, with the repeated invitation to complete and to return the questionnaire to the reception desk. Sixty six of 800 delegates did so. Another 113 responses were obtained via a follow-up invitation that was set up online. The online survey opened on 30 June 2009 and closed on 15 October 2009. Respondents that reached the survey after this date are not included (N=179 in total).

Of the 179 respondents, 104 had been delegates at the London conference; the others responded to the invitation via colleagues in China, Germany, Korea, Nigeria, Spain, Sweden and the US.

The response rate among conference delegates was (around 12%), despite several follow-up invitations; the response rate is even smaller among British delegates than among delegates from overseas. Journalists are a difficult population to reach via questionnaire or email invitation for study participation. We can assume that science writers are flooded with email correspondence and ignore most of it. By comparison, the response rate of the PEW survey is in the region of 55% (see PEW 2007, 35), while for the *Nature* survey of 2009 there is no available information on response rates.

b) Ibero-American Network Study 2010/2011

The Latin American sample was collected by the 'Ibero-American Network for Monitoring and Training in Science Journalism,' under the leadership of Dr Luisa Massarani (see Massarani, 2012), at the *Museu da Vida – Casa de Oswaldo Cruz – Fiocruz* (Rio de Janeiro). The questionnaire was translated into Portuguese and Spanish and uploaded as two online links on the London School of Economic and Political Science (LSE) website. The data collection was open for the Portuguese version (Brazil) between July 2010 and January 2011; the Spanish version was open between January and June 2011. The links to the online surveys were distributed via contact lists from the network, local journalist associations, and various presentations of preliminary data from the project to interested parties. The survey mobilised n=320 responses from 16 countries: Argentina, Bolivia, Brazil, Chile, Columbia, Costa Rica, Cuba, Ecuador, Guatemala, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. We have no sense of the level of the response rate.

c) SciDev.Net Science Journalist Study 2012

SciDev.Net's (SDN) Monitoring and Evaluation (M&E) Co-ordinator, Yulye Jessica Romo Ramos, mobilised a sample of responses through SDN's network of regional co-ordinators in North Africa and the Middle East, Sub-Saharan Africa, and Asia and Pacific regions. The questionnaire was written in English and also translated into French and Arabic. Three different online links — one for each language — were opened on the LSE website. Regional co-ordinators were advised, several times, to spread awareness of the link. The link was also advertised on the World Federation of Science Journalists (WFSJ) website. In addition, private emails to interested colleagues in these regions were dispatched to further add to the publicity of this survey.

The data was collected in April and May 2012. This activity yielded n=93 responses. We have no sense of the level of response rates in the different contexts.

d) SciDev.Net Editor / Media Sector Study 2012

SciDev.Net's Monitoring and Evaluation (M&E) Co-ordinator, Yulye Jessica Romo Ramos, undertook a global evaluation of SciDev.Net's activities, focusing on the global South and targeting the public, private, media, NGO and research sectors. The media survey included questions relevant to this study, sharing data where appropriate. The countries of focus included: Algeria, Cambodia, Columbia, Egypt, Guatemala, India, Indonesia, Kenya, Nepal, Palau, the Philippines and Uganda. The questionnaires were disseminated in Arabic, English, French and Spanish. Locals (mainly freelancers from the SciDev.Net network in the different countries) were hired and reported directly to the M&E Coordinator; they helped collect information either manually — handing in questionnaires and personally interviewing respondents — or directing people to an online link. The data was then sent to London and collated by SciDev.Net. This effort yielded n=361 responses. Again, there is no sense of the level of response rate in the different countries.

The above depicts a research project that spreads across years (2009-2012) and whose collection methods involved a total of 3 different versions for the survey. Therefore it is important to highlight that the total number of respondents varies, in some cases significantly, which is directly linked to the nature of this project and the surveys used throughout the 4 collection periods as described in the previous sections.

2. Results

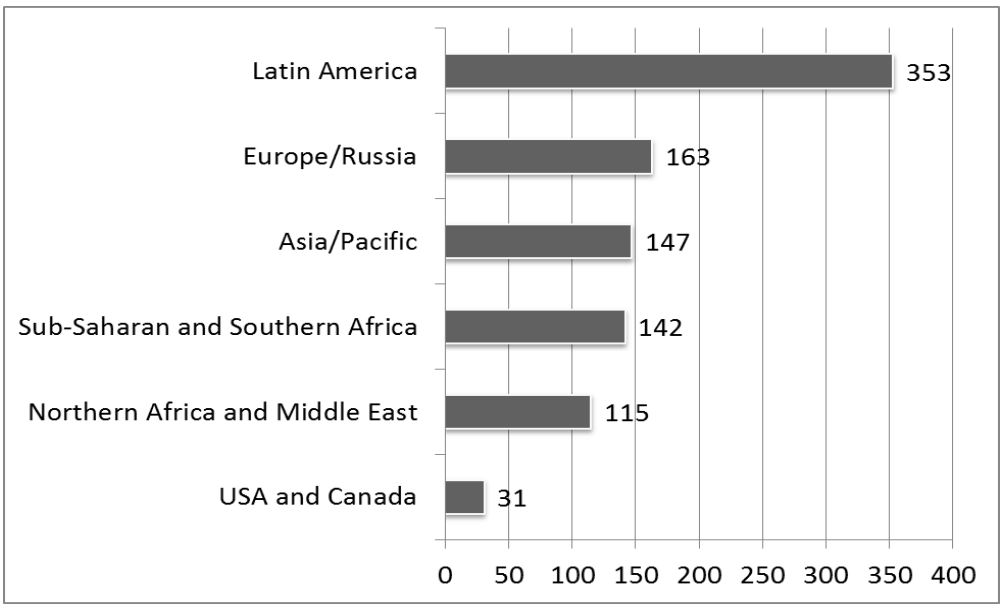
2.1 Basic Observations

For a quick run through some of the basic results of this investigation, we focus on four aspects of the daily practice of science journalists:

- Their working conditions and current work practices;
- The professional ethos of science journalists;
- Their sense of crisis and worries about the future; and
- The potential role of SciDev.Net.net in this field of activity.

Overall results will be compared across six world regions. Figure 1 shows the structure of the data from six world regions that are at our disposition. Compare this to the *Nature* survey of 2009 which mobilised 42% of its responses from the US/Canada, 50% from Europe/Russia, 4.5% from Asia, and 3.5% from Latin America. Our present sample is more balanced across the globe, although it most likely oversamples Latin America. We have less USA and Canada respondents than the number we believe there are, but we also include more African and Asian voices. In the absence of any real information about the world population of 'science journalists', we cannot effectively estimate any biases in our data, thus we abstain from applying any corrective weighting to the result.

Figure 1: Number of respondents from different world regions



All our results are statistical, and the reader therefore has to consider all reported percentages and ratios within a margin of error: for a sample size of n=1000 and a reported 50%, the true figure is likely in the area of 47-53% (or +/-

3.1%). This means that the smaller the sample the larger this error is, and the smaller the percentage is the smaller the error margin will be.

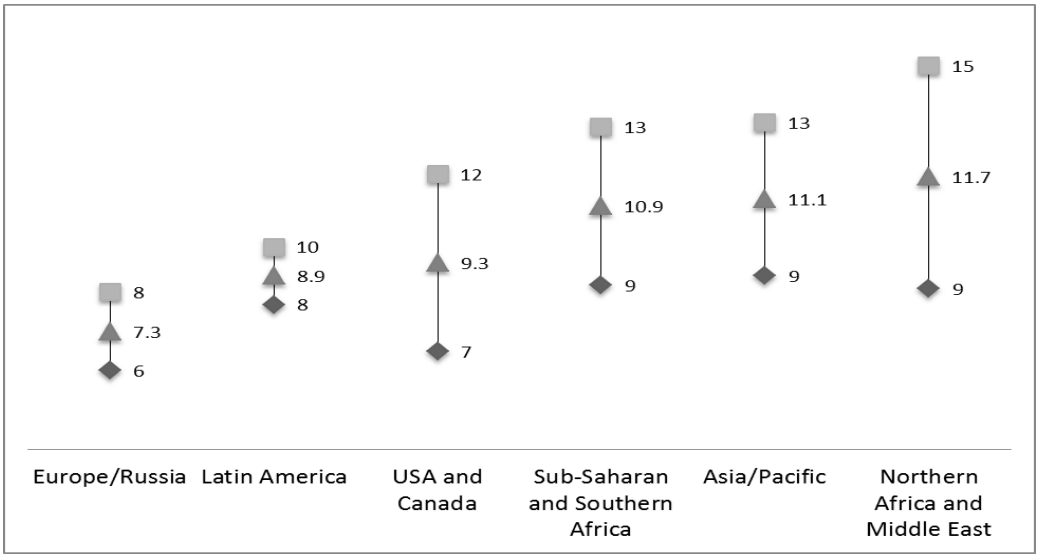
2.2 Working conditions and working practices

We explore the working conditions of science journalists around the globe in terms of their workload, age profile, training and employment situation, work practice along the lines of topics, outlets, use of feedback and sources, and their specific and general job satisfaction.

2.2.1 Work load: bi-weekly output on average

On average, science journalists write 9 items per two week period (median=7; n=576). This varies between 1 and 55 items. Twenty five per cent write 4 or less items, and another 25% write 12 or more items over an average two week period. The majority of all respondents operate with a workload of between 5 and 11 items over a two week period. The distribution is heavily skewed with modes on 3 and 6 items. Figure 2 shows reported workloads vary across different world regions: North African, Pacific and Sub-Saharan African are busiest with 11 and more pieces of work (but very large variation between writers); USA, Canada and Latin American journalists work at about the same intensity with an average of 9 pieces; Europeans seem less busy with 7 pieces and smaller variation. The median of 7 pieces in production over two weeks seems to be a robust measure of journalistic workload up to 2012.

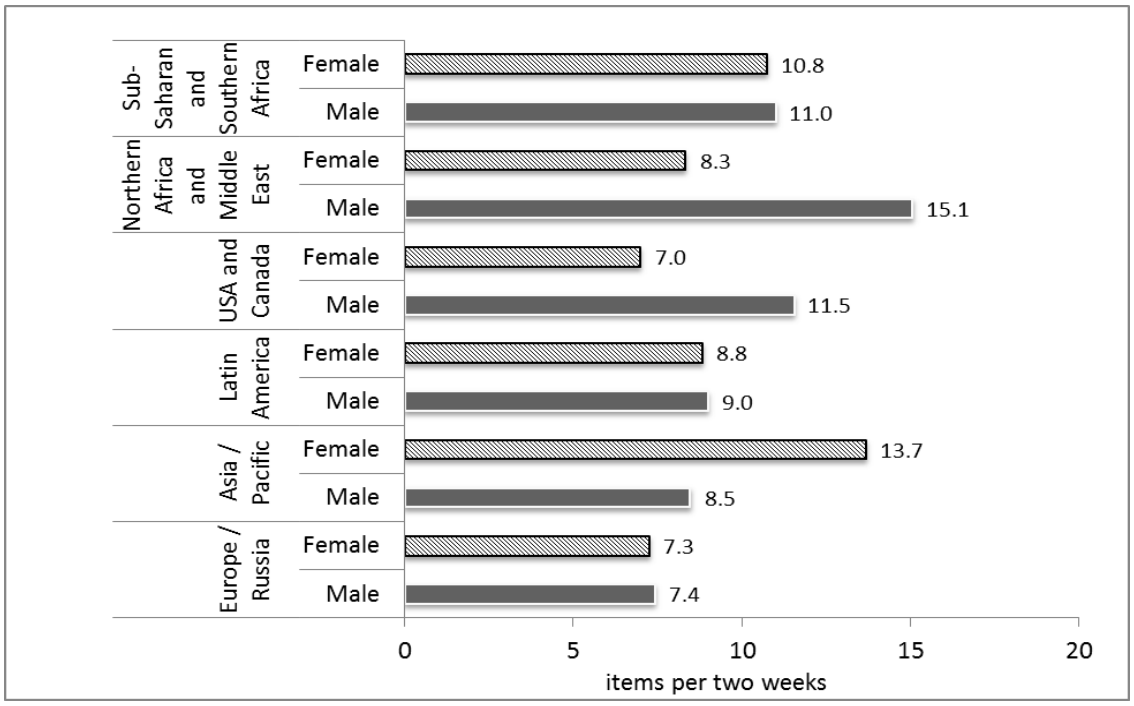
Figure 2: The number of pieces of work over the last two weeks in different regions



Note (Figure 2): +/- one standard deviation, i.e. about two thirds of science journalists work within that range of bi-weekly items.

We can compare the different world regions and gender at the same time (see Figure 3) and we find that in Europe, Latin America and Sub-Sahara Africa, there is no gender gap in weekly production. However, in Asia, women tend to work more, while in USA and Canada and the Middle East region, men tend to work more (eta^2=0.064). Overall there is no significant difference between men or women journalists in terms of average number of items in production per two week period, while the regions differ: North Africa, Asia and Southern Africa work harder, than USA, Canada, Latin America and Europe.

Figure 3: Comparing workload by region and gender in number of items over two-week



Also, note that 64% of respondents report an increase in bi-weekly item production over the last 5 years (Q25). This is particularly the case in Sub-Saharan Africa. The Europeans and Asian reporters are less sure on whether work load has increased or decreased.

2.2.2 Profile of science journalist: training and employment situation

Of the 946 participants who gave their age, 37% were aged between 21 and 34, 33% were aged between 35 and 44, and 26 % between 45 and 64. Only 1% and 2%, respectively, were younger than 21 or older than 65 (Q4a). There seem to be very few science journalists active beyond retirement age. The average age of science journalists does not differ across world regions. However, considering age groups, we find science journalists to be slightly younger in Latin America and the Middle East/North Africa regions than in other parts of the world.

Fifty five per cent of respondents are men and 45% are women science journalists. In most world regions, men are in the majority among the science journalists; however, this is not the case in Latin America (55%) and USA and Canada (55%) where women science journalists have the upper hand; in the Americas the gender ratio of science journalism is reversed compared to the rest of the world. This reversal seems interesting in a world region where journalism in general is a male-dominated profession (see Weaver et al, 2007).

Of those who gave details of their training background (n=591), 36% reported a university degree and training on the job; 26% have a university degree with a specialist science journalism training; 19% hold a university degree and have undergone general journalism training; 9% went to journalism school, and 11% were trained on the job (Q2). 537 participants gave answers about their highest degree (Q2b): there were 26% with a first degree, 21% with a master's, and 10% with a doctorate. The level of formal education among science journalists is generally higher in Europe, USA, Canada and Asia, than it is in Latin America, the Middle East and Sub-Saharan Africa. PhDs among science journalists are far more common in Europe (32%) and in USA and Canada (31%) than in other world regions.

There were 586 participants who gave information on how long they had worked in science journalism (Q12). A notable percentage had only been working in science journalism for five years or less (38%), while 27% had worked in the field for 6-10 years, 15% for 11-15 years and 21% for over 15 years. Compare the *Nature* survey of 2009, where 22% had been on the job for less than 5 years, 21% for 6-10 years, 16% for 11-15 years, and 41% for 16 years or more. While *Nature*'s study managed to mobilise the 'older work horses', our surveys engaged more of the 'new kids on the block'.

Of the respondents (592 asked Q13a), 51% are in full time staff positions, only 8% are part time staff, 14% are part-time freelance and 18% are full-time freelance. Fifty seven per cent of the 584 respondents who answer Q14 reported that their employment had not changed recently, while a sizeable 15% said they made the move from employed to self-employed. We also asked about changes in the workforce of their company. About 39% (of 560 answering Q24a) report no recent changes made in workforce, 29% reported workplaces hiring more science, environment, health and technology staff, and 20% reported employers cutting staff on the science, environment, health and technology beat. There are no differences across world regions with respect to the changing job situation for science journalists. Consider the *Nature* survey of 2009, which reported 13% part-time freelance staff, 24% full-time freelance, 5% part-time, and 55% respondents in full-time positions, and 3% other positions. Twenty seven per cent reported hiring more people on the science beat, while more reported cutting jobs (29%). These two samples match each other fairly well, considering the overall employment situation.

About 38% of our respondents reported a wider professional engagement - here we combine responses to two items: reported membership of a professional organisation and/or having participated in one of the meetings of the World Conference of Science Journalists (WCSJ) since the Tokyo meeting in 1992. In these particular terms, professional engagement is more common among science journalists in Europe, USA and Canada than in other world regions. Here we have to consider that many countries do not have a professional organisation with membership opportunities.

Of the 562 participants who were prepared to define their political positioning, the majority described themselves as left or centre left (59% in combination), with 21% defining their politics as ‘centre-moderate’, and only 8% describing themselves as right or centre right (Q6a). Compare these figures to the Pew Research Center surveys, which regularly ask this question of US journalists, of whom 32% identify themselves as 'left-liberal', 53% as 'centre-moderate,' 8% as 'right-conservative,' and 7% do not position themselves. By comparison, in this survey, science journalists across the world seem to be considerably more left-leaning than the average US journalist according to PEW (see PEW07). This political affiliation of science journalists to the 'left' of the spectrum is particularly strong in USA and Canada (86%) and in Europe (72%), but less so in other world regions where science journalists position themselves more as moderates in the political centre.

2.2.3. Practice of science journalism

We characterise the daily practice of science journalists with four indicators: the preferred topics they are working on; the preferred media outlets for their production; the feedback they are receiving for their work; and the sources they are using for their stories.

The topics and outlets of work

We asked the question: which were the main topic areas that the respondent covered (Q15)? Table 2 shows the rank order of the responses (based on the sum of answers for those answering 'mainly' and 'occasionally'). Science (Q15b), environment (Q15d), technology (Q15c) and health and medicine (Q15a) are covered 'mainly' or 'occasionally' by 90% plus of the respondents.

Table 2: Ranked topic areas covered and media outlets used

Q15 Topic area covered	% (mainly and occasionally, summed)	Total N	Q16 Media outlets used in work	% (mainly and occasionally, summed)	Total N
Q15b Science	95	937	Q16a Print	90	589
Q15d Environment	92	937	Q16g Web story	87	581
Q15c Technology	91	933	Q16l Facebook	75	93
Q15a Health and medicine	90	935	Q16m Twitter	56	93
Q15j Climate change	89	446	Q16f Blog	54	570
Q15i Agriculture	87	447	Q16b Radio	47	575
Q15k Energy	84	444	Q16h Book	43	575
Q15m Science innovation	83	443	Q16i Exhibition	38	568
Q15f Social science	81	926	Q16c Television	37	571
Q15l Science communication	68	445	Q16n Other social media	29	93
Q15n Science policy	62	442	Q16k Other	27	266
Q15e Business	50	573	Q16d Podcast	25	568
Q15h Other	29	922	Q16e Video podcast	18	564

Note: Questions were worded:

Q15: What topic areas do you primarily cover?

Q16: In which of these media does your work appear?

Table 2 shows the rank of outlets (Q16) used by respondents (again, based on combined answers 'mainly' and 'occasionally'). Print, web stories and Facebook dominate: 90%, 87% and 75% respectively were found to be 'mainly' or 'occasionally' using these outlets. At the lower end of the scale, only 18% utilise video podcasts.

Table 3 represents the types of media outputs that have experienced change — ranking them from most increased (more respondents rate them as having increased) to least increased (Q26). Web stories are on the increase for the majority of respondents (55%). Print material is equally strong (48%). This reflects the paradox that while there might be a newspaper crisis, there is less of a crisis in news print production; prints science news was on the increase for most respondents. Additionally, over a third of those who answered — 35% and 38% respectively — told us that podcasts and video podcasts are 'never used'. These high tech — and often hyped — delivery formats are still less frequent across the globe. Among those working in print, radio or TV formats, about half work on national outlets, and the other half on regional or local outlets. Radio is the most locally oriented medium.

Table 3: Ranked media outlets by increases over last five years

Q26 Media outlets	% using media more often	Total N
Q26g Web story	55	574
Q26a Print	48	586
Q26l Facebook	33	93
Q26f Blog	32	572
Q26b Radio	23	575
Q26c Television	17	574
Q26m Twitter	15	93
Q26h Book	14	570
Q26i Exhibition	12	568
Q26n Other social media	11	93
Q26d Podcast	9	570
Q26e Video podcast	7	567
Q26k Other	7	263

Note: Question was worded: “For each of these media, did your work appear [available options]: “more often”, “less often”, “the same” or “it never appeared at that time”?”

Feedback on stories

Asked what they consider their target audience to be, most respondents – 76% – said they mainly write for a 'general, wider public' (Q17). Around a third (38%) of respondents write for 'specialist' publics, the private sector (34%), and nongovernmental organisations (34%). The audience least addressed is the 'scientific audience', with only 21% of participants mainly writing for them.

Audience feedback (Q18) is mostly received by 'occasional letters' and 'clickstream ratings' (58% and 56% respectively). By comparison, it is rare for respondents to receive no feedback at all. Only 9% of respondents operate in a void (without any feedback from readers) (see Table 4).

Table 4: Q18 Reaching audiences: ranked types of feedback received

Q18	Type of feedback	% respondents
Q18b	Occasional letters	58
Q18c	Click stream ratings	56
Q18e	Friends and family	34
Q18d	Regular research	25
Q18f	Other feedback	21
Q18a	No feedback	9

Note 1: Question was worded: How do you know about your audiences and whether you reach them?
Note 2: N=592

The 'occasional letter' is more in evidence in USA, Canada and Asia than elsewhere. Journalists in North Africa and the Middle East receive feedback via clickstream significantly more than any other medium. Comments from friends and family are also more prevalent in North and Sub-Saharan Africa. Regular research is more evident in Europe, Asia and Southern Africa. Those who report that they operate in a void are relatively more frequent in Europe and Asia than elsewhere.

Sources used

Where do people get story ideas from? Table 5 shows ranked story sources (comparing respondents who frequently and occasionally derive stories from the listed sources). Top story sources are 'personal contacts' (94%) and 'conferences' (90%).

The respondents (N=454) told us that they were looking for reliability in a source (95%), relevance to the topic (93%) and originality of story (91%); additionally, they rated: recentness (89%); links/contacts (88%); the authority of the writer/journal[2] (85%); local commentary and independent comment (84% each); comment from outside the country (81%); and coverage of inaccessible journals (81%).

Table 5: Q21 Main story sources

Q21 Story ideas	% respondents	Total N
Q21i Personal contacts	94	571
Q21b Conference	90	827
Q21a Press release/press officers	88	832
Q21c Other media outlets	88	666
Q21k Blog by working scientist	88	541
Q21f Other science journal	85	535
Q21l Newswire/press agencies	82	547
Q21d *Nature*	70	789
Q21e *Science*	69	798
Q21x Other source	69	52
Q21g Exhibition	68	528
Q21m Alphagalileo/Eurekalert	68	523
Q21n Other blogs	68	489
Q21j Social networking	66	793
Q21w Blogs	61	237
Q21p Scidev.net	49	334
Q21h Science media centre	41	230

Note: Question was worded: Where and how often do you get story ideas from the following sources?

Science and *Nature* and other science journals are less frequently consulted in North and Southern Africa than elsewhere. Conferences are used less as a news source by science journalists working in Europe, Asia or Latin America

[2] It is important to note that when this question was divided into two items — authority of writer and authority of journal — numbers were only fractionally lower at 78% and 77% respectively.

than elsewhere. Exhibitions are more popular in Latin America and North Africa. Science media centres are less frequented in Europe, USA and Canada than elsewhere. Social networking is very much in use in North Africa and the Middle East. Blogging by working scientists supports the work of journalists less in Europe, USA and Canada than it does elsewhere. Newswire services are used more frequently in Latin America and North Africa and the Middle East than elsewhere. Finally, the use of AlphaGalileo is much less evident in USA and Canada than elsewhere — particularly Latin America and North and Southern Africa, where it is used widely.

Looking at the changes made over the last five years, of the 579 respondents who answered, 24% tell us that direct quotes from press releases have increased (Q27). More are finding that these types of quotation are remaining the same (32%), 12% find that they are using them less, and 15% have never used press releases in this way. The direct quoting of press releases has increased more in North Africa and Middle East (38%), Latin America (26%) as well as in the USA and Canada (28%) than elsewhere. In Asia (23%) and Southern Africa (28%) this practice became less frequent.

2.2.4 Job Satisfaction: specific freedoms and overall

Doing a good or bad job is one thing; whether you like the job that you are doing is another. When it comes to job satisfaction for those working in the field of science journalism (Q11), the bugbears are likely to be freedom of and access to information (Table 6), with 24% and 34% dissatisfied to some extent with these aspects, respectively. Of the 592 people asked, 72% were satisfied with their jobs overall and only 10% were dissatisfied (Q37). In rough correlation, when asked if they would recommend a career in science journalism to a young student, 86% said they certainly or probably would do so, while 11% would probably or certainly not (Q38).

Table 6: Satisfaction at work

Q11 Satisfaction	% (completely, very satisfied or satisfied)	% (dissatisfied, very satisfied or completely dissatisfied)	N
Q11c Access to scientists	66	16	953
Q11a Freedom of press	60	24	953
Q11e Freedom in the discharge of your duties as a media organisation	60	16	361
Q11g Other	43	17	361
Q11b Access to information	42	34	953
Q11d Personal safety	41	11	592

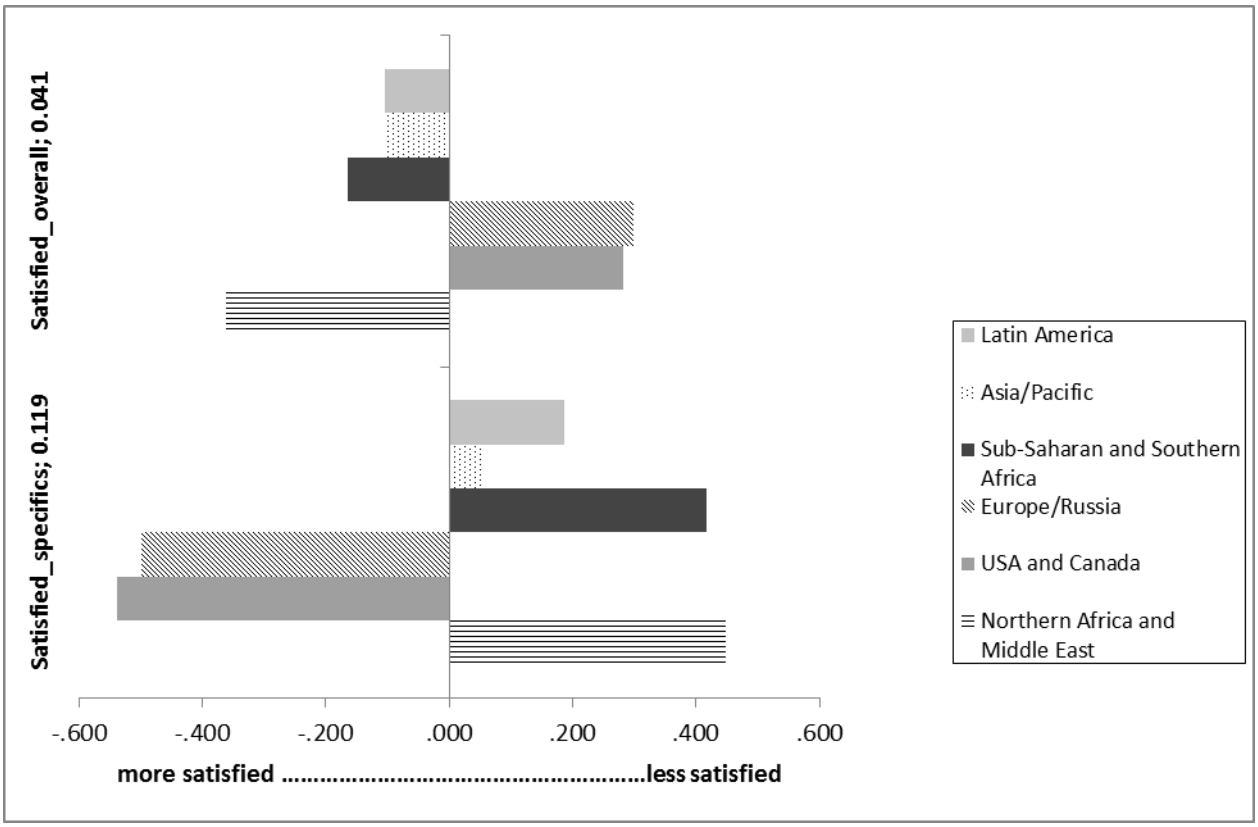
Note: Question was worded: To what extent are you satisfied or dissatisfied with the situation in your country regarding …?

All specific aspects of satisfaction are highly related to each other, and they jointly form an overall dimension of work satisfaction. 'Freedom of the press' and 'personal safety' are the most important components of this dimension (see appendix A). This means that if a respondent is dissatisfied with one element, he or she will also be dissatisfied with the others, and vice-versa. Also, overall satisfaction and giving positive career advice to a young person are highly correlated, and what people say on one set of questions will be reflected in responses to the other. This constitutes the second dimension of the job satisfaction of a science journalist.

Combining our observations into two dimensions of satisfaction, with the specifics (i.e. freedom of the press; personal safety; access to information and scientists) and satisfaction overall (i.e. overall job satisfaction; would recommend the job), we find that science journalists in USA, Canada and Europe are more satisfied with the specifics of their jobs, but

less satisfied overall with their jobs. Meanwhile, in other regions this is reversed: in Asia, Latin America, and North and Southern Africa, overall job satisfaction is higher, while the specifics are a matter of concern.

Figure 4: The regional profile of satisfaction with specific freedom of journalistic work and the overall job satisfaction



This pattern is reflected in responses concerning career recommendations to younger colleagues. Only 29% of respondents in Europe and 32% in USA and Canada would definitely encourage a young person to pursue a science journalist career, compared to 80% and 72% in North and Southern Africa. Asia and Latin America occupy a more middling ground in this respect, with 60% and 55% respectively saying that they would encourage science journalism careers.

In terms of gender, we note no overall difference between the sexes in specific satisfaction or in overall job satisfaction. However, looking further, it appears that women working in North or Southern Africa, and in USA and Canada, are more satisfied with the specifics of their jobs than their male colleagues, but this trend is not reflected amongst Asian women journalists, who are less satisfied than their male counterparts. And women working in Africa, Asia, USA and Canada are less satisfied overall with their jobs than their male colleagues, while there is no difference between men and women's satisfaction in Europe and Latin America. Note that these gender observations are uncertain due to small sample size (ie statistically not significant), but they are indicative of potential differences in women and men's working conditions in different regions; it is something that deserves further investigation.

2.2.5 The Ethos of science journalism

Reflecting on their work as science journalists, 592 respondents were asked what they saw their roles as science journalists to be (Q19). Of these, 43% see their role as 'to inform', 23% 'to translate complex material', 13% 'to educate', while less than 10% saw their role as mobilising or entertaining the public, or to be a public watchdog. The dominant theme here is of informing and educating, rather than engaging or entertaining. Entertaining has a somewhat more prevalent role in Asia regions, and education clearly defines the role of the science journalists in North Africa and the Middle East (31%). The role of the public watchdog (23%) and the notion of mobilising the public (19%) are much more salient in North Africa and the Middle East than in other regions. Mobilising the public is also more in evidence in Asia than elsewhere. Women writers see themselves more in the role of 'providing information' than men, while men see themselves more in the role of 'watchdogs'. There is no difference across the age groups in these role definitions.

Of the 592 respondents contacted, 66% tell us that they see science journalism as 'not critical enough', while 21% consider the tone of science journalism to be 'generally fair', and 4% consider it too critical (Q30). In Latin America particularly, science writing is perceived as 'not critical enough' by professionals, while in Asia and in North and Southern Africa, journalists perceive their work as 'too critical' for its own good — a view which is particularly prevalent among younger journalists.

Table 7: What makes a good science journalist?

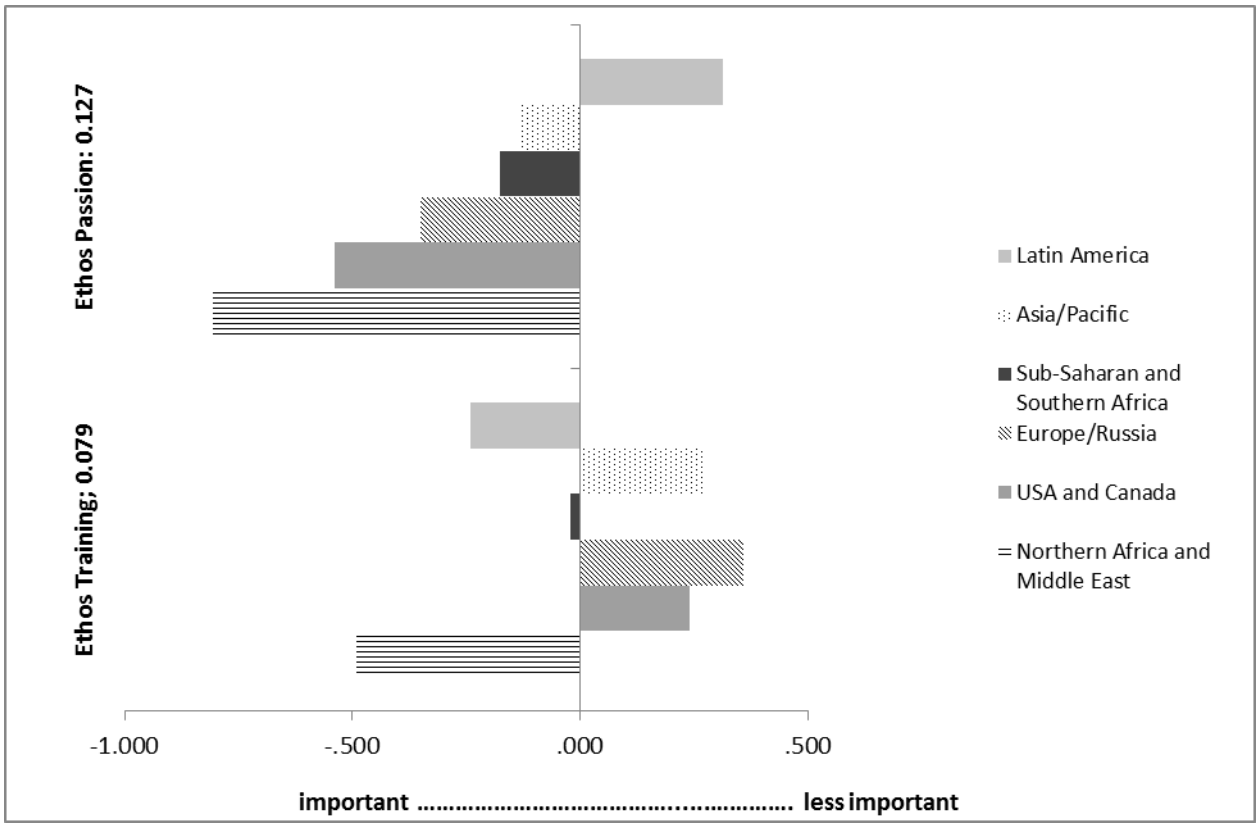
Q36 What makes a good science journalist?	% (important or very important)	N
Q36b Reporting the facts	99	592
Q36o Journalistic independence	97	93
Q36q Original and neutral	96	93
Q36n Science journalism training	95	93
Q36p Following instructions/filing on time	92	93
Q36k Print media training	91	93
Q36r Range of interests represented	87	93
Q36c Passion	84	592
Q36f Investigative journalism	83	592
Q36h Using images	81	592
Q36g Trained in relevant science	76	592
Q36m Television training	76	93
Q36a Online media training	75	592
Q36l Radio training	73	93
Q36d Numeracy/grasp of statistics	68	592
Q36j Other	41	592
Q36e Science degree	35	592

Note: Question was worded: Here are a number of statements that define 'good science journalism' — please indicate how important in your view any of these is to make a good science journalist these days

We asked what qualities respondents thought made a good science journalist (Q36). Table 7 ranks those qualities, according to what respondents deemed 'important' or 'very important'. A science degree comes lowest at 35%, while respondents are almost completely in accord (99%) that 'reporting the facts' is most important.

Analysing the patterns of responses, we find two overarching dimensions, or 'Ethos factors'. One dimension we call **'Training & Facts,'** as it combines: a sense of the importance of new media training; knowing the facts; carrying out investigations; and being good at using images. This dimension is highly correlated with other training expectations, such as training for print media, radio, and TV, and a sense of independence, neutrality and originality. The second dimension we call **'Passion for Science,'** which combines a sense of the importance of a general science education in addition to a journalistic training, knowledge of statistics, and being passionate about the subject. This dimension is highly correlated with the notion of representing a broader spectrum of interests.

Figure 5: Two types of Ethos of science journalism by world region (lower = more important)



Both types of ethos vary by world region, but not by gender or by whether respondents are in a full-time job or work more intermittently. The ethos dimension, 'training & facts', is considered to be more important in North Africa and Latin America, but less so elsewhere, and least so in Europe, USA and Canada. The ethos dimension, 'Passion for Science', however, is considered to be more important in USA, Canada and North Africa, and less so in Latin America (effect size: eta^2=0.082).

2.2.6 A sense of crisis among science journalists?

We asked a number of questions to evaluate the current state of journalism in general, and of science journalism in particular, across the world.

Respondents had to agree or disagree with common criticisms of the general print media (Q33). Most agree that 'too little attention is paid to complex issues', but 67% disagree with the statement that 'newspapers are a thing of the past,' and 75% agree that claims of the 'death of print journalism' are exaggerated. However, 78% do believe that the internet is changing journalism; that being the case, 59% tell us they think too much Internet material is unvetted[3].

Table 8: Future of, and criticisms of science journalism

Q28 Future of Science Journalism	% (disagree and totally disagree)	Q33 Criticisms of print media	% (disagree and totally disagree)
1-Q28a A dying profession	77.7	3-Q33d Newspapers thing of the past	66.8
1-Q28j Cut and paste from UK/US	67.9	1-Q33g Press too cynical	37.2
1-Q28b Libel suits more common	52.4	4-Q33k 24 hour news weakens journalism	36.0
2-Q28d Crisis of sci journalism	46.6	2-Q33a Eroded distinction of report/comment	35.3
1-Q28l More society less science	46.5	1-Q33h Journalists out of touch with audience	34.2
1-Q28m Stories stale after few days	31.4	4-Q33j Press too timid	30.2
2-Q28k Unpopular with editors	21.6	1-Q33i Journalists ideology biasing reporting	28.3
2-Q28o Low pay	18.4	2-Q33b Factual errors; sloppy writing	23.2
4-Q28e PR drives science news	17.2	4-Q33l Internet too unvetted	17.0
3-Q28n Exciting new science	14.5	2-Q33c Little attention to complex issues	10.7
3-Q28i More interesting science	13.5	3-Q33e 'Death of print journalism' exaggerated	10.5
4-Q28g McNews	12.8	4-Q33f Internet changing journalism	10.5
2-Q28h Move to more specialised outlets	11.9		
2-Q28c Too few reports on process	11.5		
3-Q28f High quality	11.0		

Note: for Q28 and Q33, N=592: number 1-4 indicate the allocation in different factor groups. Questions were worded: as follows:

Q28: The following statements are made about the future of science journalism — please indicate for each of them whether you agree or disagree with them, in relation to the context you are working in

Q33: Here are some criticisms often made of the print media in general. For each one of these, do you think this is a valid criticism, or not?

[3] Figures reported for Q33 are cumulative responses for 'agree' and 'totally agree' or for 'disagree' and 'totally disagree'.

Looking to the future (Q28), many of the respondents (74% of N=592) felt the scientific process applied to science journalism will be neglected, and were concerned about 'McNews' (61%)[4]. On the other hand, 78% disagree with the claim that science journalism is 'a dying profession', 67% agree that science will get more interesting, 68% dispute the claim that science journalism is likely to turn into a 'cut and paste' from UK/US journalism, and 52% disagree with the prediction that libel suits will become common in the future. Many do not perceive the risk of the 'cut & paste' nature of their work, as well as the growing risk of libel, the short life cycle of stories or the idea that they face a dying profession. In fact they think that they currently write more about society than about science.

Many of these questions are correlated, meaning if a respondent says one thing, he or she is also likely to say something else. This relation between questions allows us to create more reliable indicators of the sense of crisis on the basis of several questions. The two sets of questions, on the general state of journalism and the specific state of science journalism, can be well summarised with four indicators each.

The state of science journalism is summarised in these four indices (high scores = disagreeing with claimed trends):

- Cut&Paste practices take over (1)
- Crisis of profession (2)
- Exciting Future: ever more interesting science (3)
- McNews: specialisation, PR driven news, creation of ‘Churnalism‘ (4)

State of journalism in general is summarised in these four indices (high score = disagreeing with claimed trends):

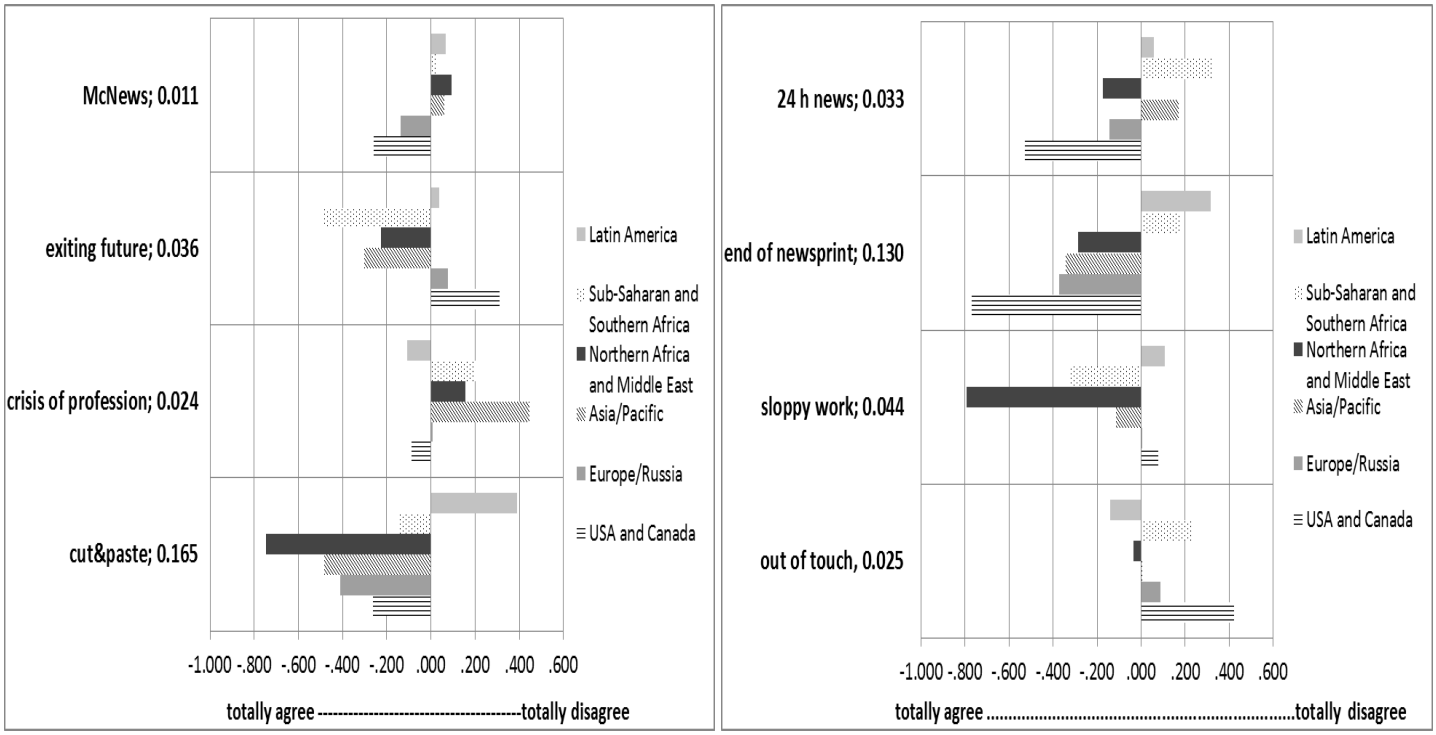
- Out of touch with public (1)
- Sloppy work prevails (2)
- End of newsprint in general (3)
- Negative impact of Internet is clearly felt (3)

We could not identify differences related to gender but we found regional differences in the assessment of the future of journalism in general and science journalism in particular as shown in Figure 3.6

Churnalism and McNews type science news production is expected mainly in Europe, USA and Canada, and less so elsewhere. Furthermore, in these three locations, the future is seen as being less exciting than elsewhere. The future of science journalism seems particularly exciting in Southern Africa. If there is a sense of crisis in science journalism, this is mainly perceived in USA, Canada and Europe, but less so in Latin America, Asia, and North and Southern Africa. The practice of cut & paste journalism is prevalent in most regions, but less so in Latin America.

[4] Figures reported for Q28 are summed responses for 'agree' and 'totally agree' or for 'disagree' and 'totally disagree'.

Figure 6: On the left, future expectations for science journalism (starting with 'McNews'); on the right, future expectations pertaining to journalism in general; figures indicate eta^2 for each profile.



It is informative to consider the regional differences in the anticipated future of journalism. Overall, only one third of journalists think newspapers are 'a thing of the past,' and close to 90% consider this claim an exaggeration. However, the spectre of the end of newsprint (combining both claims: 'newspapers are a thing of the past' and 'the death of print journalism is not exaggerated') is more likely in USA and Canada than in Asia, Europe, the Middle East and North Africa, and least likely in Latin America and Sub-Saharan Africa. Most interestingly, opinions are most divided in North Africa and the Middle East on the future of newsprint (see appendix, codebook p105). Increasingly, sloppy work in journalism is deplored everywhere, but of great concern in North and Southern Africa. The risks involved in having a 24-hour news cycle are strongly in evidence in USA and Canada, while elsewhere, in particular Asia and Sub-Saharan Africa, journalists are less bothered by it. All considered, 39% think science journalism is on the right track, 15% see it moving in the wrong direction, and 41% admit uncertainty (Q35). Europeans and Americans, in particular, are not sure how to respond, while more US colleagues (24%) see the trade to be on the wrong track. Latin American (44%), North African (43%) and Southern African (68%) journalists see the profession moving firmly in the right direction.

That being said, almost two thirds of those asked (N=592) recognise that working pressures are harming the quality of science stories (Q31), and 37% of respondents (N=592, Q32) were more worried about the quality of writing than the type of job (26%) or their job security (22%). Quality of writing greatly preoccupies journalists in Asia (66%), and in North Africa (54%) and Southern Africa (56%), while job security preoccupies science journalists in Europe (34%) and the US (27%) more than elsewhere. Having an interesting assignment concerns journalists in Latin America (33%). Younger and mid-career colleagues worry more about job security, while older journalists are found to worry more about quality of writing.

Table 9: Career expectations in 5 years' time (q23) and career advice to a young person (q38)

World region: 'still working in the field in 5 years' (q23)						
Europe/Russia	Asia/Pacific	Latin America	USA and Canada	Northern Africa and Middle East	Sub-Saharan and Southern Africa	
33.8%	58.5%	74.8%	27.6%	88.5%	62.0%	Yes, certainly: 59.9%
40.1%	24.4%	23.4%	34.5%	7.7%	26.0%	Yes, probably, 28.0%
10.2%	4.9%	.3%	**24.1%**		6.0%	No, probably not, 4.9%
.6%	2.4%					Certainly not, .3%
14.6%	9.8%	1.4%	**13.8%**	3.8%	6.0%	Don't know, 6.6%

Would recommend a science journalism career to a young student (q38)						
Europe/Russia	Asia/Pacific	Latin America	USA and Canada	Northern Africa and Middle East	Sub-Saharan and Southern Africa	
28.7%	60.5%	54.9%	32.1%	80.0%	71.4%	Yes, certainly, 49.7%
49.3%	36.8%	39.4%	39.3%	20.0%	20.4%	Yes, probably, 39.3%
17.3%	2.6%	5.1%	**25.0%**		6.1%	No, probably not, 9.0%
4.7%		.7%	**3.6%**		2.0%	Certainly not, 1.9%

Surprisingly, given this fairly ambivalent picture, 60% of respondents are certain that they will be working in science journalism in five years' time, and 28% think they will probably still be so (Q23). However, this varies across world regions. While science journalists in Latin America, North Africa and the Middle East and Sub-Saharan Africa are very optimistic as to their career, this is less the case in Europe, USA and Canada. Table 9 shows career expectations in 5 years' time by region.

An identical picture emerges in relation to the question of whether people would recommend a science journalism career to a young student — in Latin America, North Africa and the Middle East, and Sub-Saharan Africa, at least. More caution in this regard prevails in Europe, USA and Canada.

2.2.7 Solution for a crisis: Philanthro-journalism

The Economist (9th June 2012) wrote about a new trend towards Philanthro-journalism — 'reporters without orders'. This is seen as a way of bridging the crisis of journalism and securing its social mission to provide independent news information under adverse conditions. These are initiatives supported by charitable foundations — so far mainly in US and UK — to support a truly independent and investigative style of journalism. This type of journalism can be risky in world regions where such activities can put a journalist's life in danger — for example, in the Caucasus. Other situations arise in which investigative journalism is squeezed out for reasons of costs. British science writers have discussed this in their 2012 annual conference, under the dilemma of 'explaining' versus 'exposing'. Exposing is costly and requires particular skills. Hitherto such initiatives focused on general journalism to support independent news information as a public good. We explore here the hypothetical situation that such charitable initiatives might also be considered for the field of science communication to stem its growing commercialisation. The field of science news already receives sponsorship in the form of charitable support from institutions such as SciDev.Net, AlphaGalileo, Euro-alert and the Science Media Centre. It is quite likely that there is more to come.

Table 10: For or against the sponsorship of a science desk

World region: 'sponsorship of a science desk', yes or no?						
Europe/Russia	Asia/Pacific	Latin America	USA and Canada	Northern Africa and Middle East	Sub-Saharan and Southern Africa	
46.0%	48.8%	28.9%	35.7%	50.0%	38.0%	No: 38%
54.0%	51.2%	**71.1%**	**64.3%**	50.0%	**62.0%**	Yes: 62%

Our respondents are split 2 to 1 — 62% (yes) to 38% (no) — on whether there should be sponsorship of science desks or not (Q34, N=483). There is considerable doubt about the wisdom of such a step in the community, and this varies across different world regions. Table 10 shows that a sponsored science desk would be particularly popular in Latin America, USA and Canada; opinions are more divided in other world regions. Europe, Asia and North Africa and the Middle East are particularly dubious about such a move to save science journalism.

Table 11: Sponsors ranked by suitability (Q34)

Potential sponsor	% finding sponsor suitable	N
Q34h National charitable foundation	79	429
Q34i Foreign charitable foundation	67	426
Q34b Government agency	58	430
Q34n Via syndication of news, creative commons policy	58	69
Q34c Leading national university	37	432
Q34f Other national industry	31	404
Q34m Other specified national industry	28	46
Q34d Foreign university	27	322
Q34k Other	27	160
Q34g Foreign industry	21	424
Q34e National pharmaceutical industry	20	428
Q34p Combination of sponsors	15	39

Note: Question was worded: Who, in your preference, should sponsor this science news desk?

Being for or against the sponsorship of a science news desk is one thing, the other is who might be a suitable sponsor. Not every sponsor is equally suitable to lend credibility to such a media innovation. Table 11 shows the ranked order of possible sponsors. National charitable foundations are deemed suitable by 79%, while industry is seen as suitable only by 37% or lower, depending on what sort of industry it is and where it is based.

As mentioned in section 3.3, 40% of respondents believe that science journalism is moving in the right direction; however, a similar proportion (41%) will not commit themselves on this point (Q35). Perhaps the move towards particular sponsors will impel journalists to more emphatic views regarding the direction of science journalism. The suitability of different sponsors is not universal.

Leading national universities are seen as highly suitable sponsors in Asia and Latin America; other regions have more doubts. A leading foreign university, though less favoured, is considered a potential sponsor in Sub-Saharan Africa and Asia, and also more likely in Europe, USA and Canada than elsewhere. National industry would be acceptable as a sponsor in Sub-Saharan Africa, where foreign industry would also be seen more favourably than elsewhere. On all other sponsorship types, there are no regional differences but general agreement on their suitability or non-suitability.

Conclusions

Most respondents (62%) welcome the idea of a science desk that is sponsored by third parties (Philanthro-journalism), with 79% and 67% of people favouring national and foreign charitable foundations respectively. This is great news for research communication organisations such as SciDev.Net and its donors, with great interest in further developing quality science journalism in the global south.

Respondents also report an increase in the production of science & technology-related stories on print, web and radio channels (page 13) which is positive if the goal is to increase exposure of evidence and research results. However of equal importance is to guarantee that quality of the product is secured if science journalism is to be effective. In fact many respondents, especially those with more experience in the profession, are concerned about the quality of stories or the decline in investigative reporting.

There are marked regional and gender differences regarding the role media, in specific science journalism, leaving space for organisations to provide leadership here as well, by concentrating efforts where there is potential for development and poverty reduction.

The fact that many journalists source story ideas from the internet, predominantly social media, AlphaGalileo and scientists' blogs, suggests that it is important to 'push' a larger number of high-quality S&T stories into these channels which would also improve access to information in countries where journalists felt it that access was limited.

Comparing age groups in our survey, we find that in the Global South journalists are younger (more under 35) than in the Western regions. This could be seen as an indication of a growing number of newcomers into this profession in the Global South. An analysis into whether there has been an actual increase in numbers of science journalists or not would be highly beneficial to complement this study.

Overall the fact that the climate in the global south is very optimistic with regards to science journalism further justifies the efforts and goals of SciDev.Net and that of its donors as well as that of similar actors working in this region.

References

Bauer MW (2012), 'Science culture and its indicators', in: Schiele B, M Claessens, S Shi (eds), Science Communication in the World – A Comparative Approach, New York: Springer, pp. 295-312

Bauer MW, R Shukla and N Allum (2012), 'Towards culture indicators of science with global validity', in: Bauer, MW, R Shukla and N Allum (eds), *The Culture of Science – How the Public Relates to Science across the Globe*. New York: Routledge, pp. 1-17

Bauer MW (2008), 'Paradigm change for science communication: commercial science needs a critical public', in: D Cheng, M Claessens, T Gascoigne, J Metcalf, B Schiele, S Shi (eds), *Communicating Science in Social Contexts*, New York: Springer, pp. 1-26

Bauer MW & S Howard (2009), 'The Sense of Crisis among Science Journalists', report of a survey conducted on the occasion of WCSJ_09 in London, London, LSE Institute of Social Psychology, STePS (Science, Technology and the Public Sphere), September 2009

Brumfield G (2009), 'Supplanting the old media?' *Nature*, 19 March 2009, pp. 274-77 (plus editorial 'Filling the Void', p. 260) (*Nature 20*09)

Cookson C (2009), 'The real lab rats – scientific fraud is on the rise', *Financial Times*, 23/24 May 2009, Life&Arts, p13

Downie L and M Schudson (2009), 'The reconstruction of American journalism', *Columbia Journalism Review*, 19 October 2009, pp. 1-28.

Economist (2012), 'Non-news is good news - The threat of the internet has forced magazines to get smarter', 9 June 2012, 66

Economist (2012), 'Philanthro-Journalism, Reporters without orders, 9 June 2012, 59

Goepfert W (2007), 'The strength of PR and the weakness of science journalism', in: Bauer MW and M Bucchi (eds), *Journalism, Science and Society – Science Communication between News and Public Relations*, New York: Routledge, pp. 215-226.

Greenslade R (2011), 'As newspaper shares slide, City expects drastic changes', *Evening Standard*, 15 June, p. 40.

Jenkins B (2012), 'Better journalism in a digital age', Carnegie Trust UK, February 2012.

Maldidier P & L Boltanski (1969), 'La vulgarization scientifique et ses agents', Paris, MSH (France69)

Manning M (2009), 'A new horizon for the news', *The New York Review of Books*, Vol LVI, no 1, Sept 24 – Oct 7 2009, 31-34.

Massarani, L (2012), 'Ciencia y medios masivos en Honduras', conference at Tegucigalpa, Honduras, July 2012.

McGovern, P, D Smeaton, and S Hill (2004), 'Bad jobs in Britain: non-standard employment and job quality', *Work & Occupations*, 31 (2), 225-249.

Nelkin D (1987), 'Selling science: how the press covers science and technology', New York: Freeman, 1987.

OECD (2010), 'Evolution of news and the internet', Paris, 11 June, STI/ICCP/ IE(2009)14 /FINAL

PEW Research Center for the People and the Press Survey of Journalists, Final Topline, March 10 - April 20, 2004 (PEW04)

PEW Research Centre & Project for Excellence in Journalism, Journalist survey report of 2007, 17 March 2008 (PEW07)

NZZ (2008), 'Wissenschaftsjournalismus zwischen Mythos und Markt', no 305, p29, Wed 31 Dec 2008.

NZZ Folio (2009), 'Die Zeitung – das Neueste von der Front', October 2009.

Romo, J (2012) 'SciDev.Net Global Review 2012', London, SciDev.Net. Available at: http://www.scidev.net/en/content/our-learning-series/#X6532D43E561E4F1FB6572E2A29FDECE7

VanNoorden R (2011), 'The trouble with retractions', *Nature*, 478, 6 October 2011, 26-28

Williams, A., and Clifford, S. (2010), 'Mapping the Field: Specialist science news journalism in the UK national media', report produced for the Department of Business, Innovation, and Skills, Cardiff University

Appendix 1: Factor analytic solutions

We conducted data reductive analysis on five sections of the questionnaire, using exploratory factor analysis (principle component analysis, varimax rotation, and mean substitution for missing values). These analyses provide us with composite indicators for five areas of the overall argument of this report:

- Current state of science journalism
- Current state of journalism in general
- Topic areas in which respondents work
- Job satisfaction
- Ethos of science journalism (what makes a good science journalist)

The current state of science journalism (Q28: high score = disagree)

	Component			
	Cut & paste	Crisis of profession	Exciting future	McNews
Cut and paste job	.646			
Libel suits more common	.633			
More society news, less science	.625	-.300		
Science journal, dying profession	.484	.405	-.368	
Stories stale after few days	.423			
Specialisation		.531		.406
Low pay job, only few can afford		.521		
Too few people report on process		.519		
Unpopular with editors		.516		
Crisis of science journalism	.496	.502		
More interesting science			.760	
High quality product			.732	
Exciting new science			.545	
PR driving news and reportage				.768
McNews				.722

Method: Principal Component; varimax rotation with Kaiser Normalization.

a. Rotation converged in 7 iterations;

b. KMO=0.709; 4 factors = 46%; N= 550.

The state of journalism in general (Q33: high score = disagree)

	Component			
	Out of touch	Sloppy work	End of newsprint	Negative internet effect
Criticisms of print media:				
Out of touch with audience	.760			
Press is too cynical	.700			
Ideology biases reporting	.661			
Factual errors, slopping writing		.785		
No distinction report-comment		.674		
Little attention complex issues		.653		
Newspaper a thing of the past			.811	
"Death of print journalism" exaggerated			-.801	
24 hour news weak journalism				.787
Internet is changing journalism				.547
Press is too timid				.537
Internet is too often unvetted	.332			.387

Method: Principal Component; varimax rotation with Kaiser Normalization.

a. Rotation converged in 5 iterations.

b. KMO=0.725; 4 factors = 54%; N=563.

Combinations of topic areas: high scores means never

	Component				
	1	2	3	4	5
Topic area covered: science policy	.814				
Topic area covered: science communication	.808				
Topic area covered: science innovation	.780				
Topic area covered: climate change		.799			
Topic area covered: agriculture		.781			
Topic area covered: energy	.385	.653			
Topic areas covered: environment		.472	.410	.316	
Topic areas covered: science			.829		
Topic areas covered: technology			.714		.386
Topic areas covered: health and medicine				.810	
Topic areas covered: social science				.692	.471
Topic areas covered: business					.865

Method: Principal Component Analysis; Varimax rotation with Kaiser Normalization.

Levels of satisfaction

	Component	
	Satis_specific	Satis_all
Satisfaction: freedom of the press	.809	
Satisfaction: personal safety	.803	
Satisfaction: access to information	.775	
Satisfaction: access to scientists	.704	
Recommend a career as science journalist		.812
Satisfied with work as science journalist		.735

Method: Principal Component Analysis;. Varimax rotation with Kaiser Normalization.

a. Rotation converged in 3 iterations.

b. KMO=0.718, 2 factors = 62%; N=570

Ethos of a 'good science journalist' (high score on scale = unimportant]

	Component	
	Training & Facts	Passion for science
What makes a good science journalist: online media training	.773	
What makes a good science journalist: using images	.721	
What makes a good science journalist: investigative journalism	.420	
What makes a good science journalist: reporting the facts	.412	
What makes a good science journalist: numeracy/grasp of statistics		.765
What makes a good science journalist: passion		.624
What makes a good science journalist: science degree		.616

Method: Principal Component Analysis; Varimax rotation with Kaiser Normalization.

a. Rotation converged in 3 iterations.

b. KMO=0.695; 2 factors explain 44%; N=578, mean substitution of missing values

Our Learning Series

The publications in the SciDev.Net Learning Series derive insights from research projects and analysis regarding science communication. The series is part of SciDev.Net's monitoring and evaluation programme and provides valuable knowledge and lessons regarding the mainstreaming of evidence for policymaking, development programmes and when building a culture of science.

The publications should appeal to anyone with an interest in the use of research, science and technology in development and poverty reduction.

SciDev.Net
9-11 Richmond Buildings | London | W1D 3HF | UK
+44 (0) 20 7292 9910
ourlearning@scidev.net
www.scidev.net