

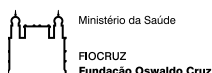
OUR LEARNING SERIES



Global Science Journalism Report 2021

Working conditions and practices, professional ethos and future expectations

Luisa Massarani, Marta Entradas, Luiz Felipe Fernandes Neves and Martin W. Bauer



In partnership with



Collaboration



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October 2021

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Executive summary

The present report investigates the working conditions and climate of opinion among science journalists around the world and is part of the activities for commemorating the 20th anniversary of SciDev.Net – the Science and Development Network, which is committed to putting science at the heart of global development. 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.

In this survey, our aim is to examine science journalism around the world, considering the background, workload and work ethos of science journalists. The survey was carried out during the COVID-19 pandemic and, as such, we have also included questions investigating journalists' perceptions regarding whether (and how) the pandemic has affected them. The data were collected online between February and May 2021, from professionals working in 77 countries in six world regions: Asia/Pacific, Europe/Russia, Latin America, Northern Africa and Middle East, Sub-Saharan and Southern Africa, and the USA and Canada.

A note of caution: comparisons between the results of our 2013 report and the current 2021 survey can give an indication of the changing patterns of opinion among science journalists, but must be interpreted with care as the numbers are not strictly comparable. This is because the "population of science journalists" has only a nominal (rather than a formal) definition that can be used for statistical sampling, as outlined in the methodology section.

Main results

- The average science journalists is 44 years old. Latin America, Northern Africa and the Middle East have younger professionals than other regions
- There is a roughly equal division between men and women, with a slight majority in terms of female professionals. The female presence is greater in the USA and Canada. Male professionals are more frequent in Asian countries and in Sub-Saharan and Southern Africa
- There is a slight majority of more experienced professionals (among those who responded to our survey) who have been working in the field for over 15 years. The USA and Canada have the highest proportion of experienced participants

- In the last five years, the most common professional roles held by respondents (who said science journalism was their main occupation) were freelance writer, science communicator and editor
- In general, respondents work on one story, item or package over a two-week period. The workload is higher in social media. "Article" is the most common form of content production
- Professionals from Asian countries have a higher workload. A lesser workload is more common in Northern Africa and the Middle East
- In nearly all outlets, the highest burden of productivity (working on more than five items over two weeks) is more likely to fall on women professionals
- "Full-time staff" is the most common employment status. This is the situation in almost all regions, except in Sub-Saharan and Southern Africa, where full-time freelance workers predominate
- In all regions, most respondents reported no change in their present employment over the last five years
- Regarding the journalist's primary publication/employer, and compared to five years ago, the situation varies between staff cuts (34%) and no change (31%). In 23% of cases, more journalists were hired. Cuts were more significant in Latin America and less significant in Northern Africa and the Middle East. The proportion of new hires was balanced among the different regions
- Work has become more intense: for 64% of respondents, the number of projects they work on in one week has grown in the past five years. This percentage is slightly higher in Africa and in Europe
- For 45% of respondents, the work situation for journalism professionals has worsened; for 17%, that worsening has been serious. For 31%, the situation has improved, and for 21% it has remained more or less the same
- Participants from the USA and Canada, from Europe/Russia and from Latin America are more likely to declare their situation has worsened. African and Asian countries have seen more improvement in work conditions
- Most respondents said they are satisfied with their work as a science journalist. Middle Eastern and African journalists (including from Northern, Sub-Saharan and Southern Africa) are the most satisfied professionals, followed in declining order by Europe/Russia, the USA and Canada, Latin America and Asia/Pacific
- Of the respondents, 46% said they are happy with their jobs; 42% said they are not. Sub-Saharan and Southern Africa and Latin America have the happiest journalists; Northern African, Middle Eastern and European/Russian journalists are less likely to be happy
- Social media is useful to the work of 97% of the respondents. Facebook is the social network on which science journalists are most present. LinkedIn, Twitter and Instagram appear next in line
- Overall, science journalists are satisfied with accessing scientists as sources of information, but more dissatisfied with accessing information from government agencies. Satisfaction also prevails regarding the freedom of the press/freedom of expression and personal safety in the discharge of their duties as communicators
- Journalists from the USA, Canada and European countries generally show satisfaction in all aspects. In other regions, journalists are dissatisfied with freedom of the press and access to information from government agencies

- Most science journalists would encourage a young student to take up a career in science journalism. However, compared to 2013, in 2021 we see fewer “Yes, certainly” responses, and more “Yes, probably” responses in all regions, and also more “Probably no” responses
- Reporting the facts accurately, having reasonable numeracy skills and a good grasp of statistics, and being passionate about science are the characteristics that define a good science journalist
- Science journalists agree that too few people are reporting on the process of science – there is too much focus on the results of scientific research. Many also agree that, as science and technology become more interesting, so does science journalism; that science communication is a high-quality product; and that the proliferation of press releases from journals, universities and researchers, combined with budget cuts in newsroom, leads to mass production that is not of good quality
- Of participants, 73% did not agree with the statement that science journalism is a dying profession. In 2013, the figure was higher (78%). The current percentage is lower in Latin America than elsewhere
- Doubts are on the rise: 33% reject the idea that “science journalism is in crisis”; back in 2013, a more decisive 47% rejected this idea
- Of respondents, 81% believe they will certainly or probably be working in the field in the next five years; the figure in 2013 was slightly higher (88%). For 55%, working pressures are harming the quality of science journalism
- For 43% of participants, science journalism is on the right track. This response is more likely in Africa and the Middle East. Of the respondents, 17% believe science journalism is on the wrong track; 38% said they did not know
- During the COVID-19 pandemic in 2020–2021, peer-reviewed scientific articles, scientists from journalists’ countries and official institutions are the sources participants have used the most
- More than half (55%) of journalists admitted to using pre-print materials in their COVID-19 stories, and 59% said they have adopted different procedures when covering pre-print research articles. On the other hand, 41% worked with no change of procedure
- For 48% of the respondents, scientists were more easily available to talk to during the COVID-19 pandemic in comparison to normal years; 37% found that scientists were more open and talkative than in previous years



1. The focus: “science journalists”

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The focus of the present study is on the practices of “science journalists”. One might define this activity as “reporting about science in the news media”. However, only a minority of people reporting about science news are employed full-time, or even part-time, by a news outlet to cover science news. Many science journalists may focus on other topics beyond science, but they cover science, health and environmental issues as much as possible. Some of them work freelance. Many others are professionals employed by universities, research institutions or foundations.

In such a context, in this study, we define “science journalists” as professionals who self-denominate as science journalists. Our definition is based on the identity these professionals have about themselves and their profession, which includes objective and subjective factors. Gee (2001) and Jones and McEwen (2000) expand the understanding of a “core identity”, personal and immutable, to an identity that is contextually developed. As this survey deals with a variety of contexts, we consider that the definition of what a science journalist is must come from the participants themselves. Furthermore, the very notion of “professional identity” has changed, including more than educational background (Caza & Creary, 2016). In the specific case of science journalists, the economic and technological contingencies have expanded their remit from their traditional role as reporter, conduit, watchdog and agenda-setter to that of curator, convener, public intellectual and civic educator, while offering them new ways to relate to their audience and sources (Fahy & Nisbet, 2011).

Tracing and estimating the number of science journalists in any one country is even more difficult than defining a science journalist. For example, Williams and Clifford (2008) accounted for 82 certified science journalist positions in the UK private and public mass media in 2009, while the Association of British Science Writers (ABSW) has several hundred members. A survey conducted in Latin America obtained responses from 275 journalists from 16 countries in the region (Massarani et al., 2012). The World Conference of Science Journalism, the biggest biennial global event on science journalism, usually attracts around 1200 professionals per gathering. In 2020, the virtual Science Journalism Forum was held for the first time, bringing together 891 participants. However, it is important to emphasize that these events are not only aimed at journalists, but also at scientists, writers, students and communicators in general. In the previous survey, a data-gathering effort by the study partners over four years (2009–2012) resulted in five fronts for data collection, totalling 953 respondents from all over the world.

It should also be said that certification as a “science journalist” does not exist worldwide and no global lists of science journalists are available. Therefore, it is impossible to define a population of science journalists from which to draw a representative sample of respondents. We rely on a “haphazard sample” of respondents reached through various internet channels, in part by snowballing.

Another challenge is the fact that the questionnaire was available in English, which presented a barrier to participation for many science journalists from non-English countries. Although translation into other languages would mitigate this barrier, it would have required substantial financial and time resources that were not available.

In this context, statistical sampling procedures with estimates of non-response rates and potential biases are impossible to apply. We were left with using as many channels as possible to distribute the survey. We distributed the invitation to participate in the study through calls from the partners of this initiative and related networks and collaborators, including SciDev. Net, the World Federation of Science Journalists, the Australian National Centre of Public Awareness of Science (Australia), Italy's Center for Ethics in Science and Journalism, SciComm X, the European Federation for Science Journalism, Red de Popularización de la Ciencia y Tecnología (RedPOP), Rede Brasileira de Jornalistas e Comunicadores de Ciência (RedeComCiência), the Association of British Science Writers (ABSW), Red Mexicana de Periodistas de Ciência, Science Writers and Communicators of Canada and Association des communicateurs scientifiques du Québec (among others); we also contacted stakeholders around the globe to disseminate it to their networks and used social media targeted at specific groups, as well as personal networks.

It is still not clear whom the current survey represents. The closest to the definition of a population is “people who self-define as science journalists or science communicators in a variety of networks around the globe”. Therefore, 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. This will allow us to gauge some trends in this field empirically.

A note of caution: comparisons between the results of our 2013 report and the current 2021 survey can give an indication of the changing patterns of opinions among science journalists, but must be interpreted with care as the numbers are not strictly comparable. This is because the “population of science journalists” has only a nominal (rather than a formal) definition that can be used for statistical sampling, as outlined in the methodology section.



2. Methodology of the study

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This survey aimed to examine science journalism around the world, considering the background, workload and working conditions of science journalists, as well as their opinions about science journalism and their work environment.

The survey was designed by Martin Bauer from the London School of Economics (UK), Luisa Massarani from SciDev.Net (www.scidev.net) and the Brazilian Institute of Public Communication of Science and Technology/House of Oswaldo Cruz/Oswaldo Cruz Foundation (Brazil), and Marta Entradas from ISCTE–Lisbon University Institute (Portugal). The World Federation of Science Journalists is a partner of this initiative. The Center for Ethics in Science and Journalism (Italy), the Australian National Centre of Public Awareness of Science and SciComm X also collaborated with this initiative.

The survey is a follow-up to the Global Science Journalism Report 2013 (www.scidev.net/global/learning-series/global-science-journalism-report/), which published answers from professionals in several rounds, starting with the participants of the World Conference of Science Journalists 2009 in London, Latin American networks, through to the first SciDev.Net round.

The present survey was fielded between February 2021 and May 2021 and launched on the platform Qualtrics, set up by Marta Entradas and her team at ISCTE–Lisbon. The return of responses with several reminders is indicated by Figure 1.

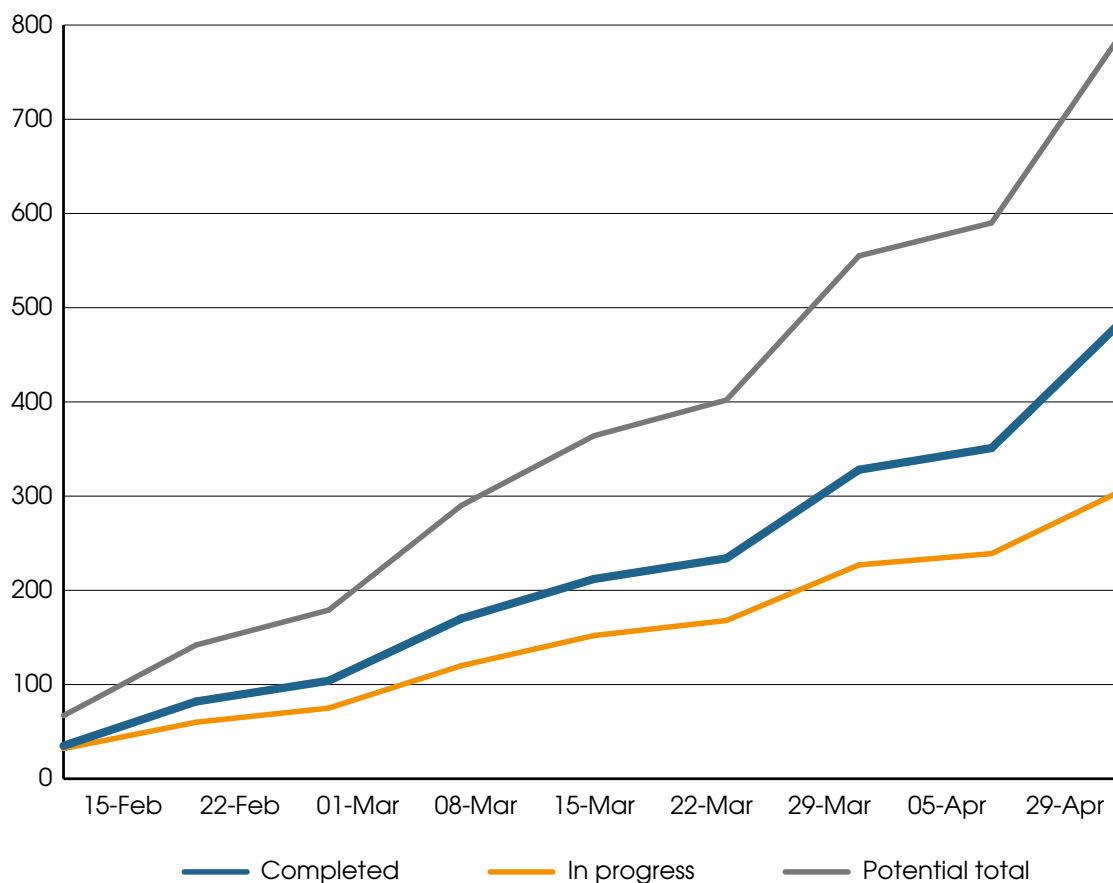


Figure 1: Responses return on Qualtrics

2.1 The questionnaire

The first version of the questionnaire used in this survey was constructed in 2009 by consulting previous sources (Brumfiel, 2009; Maldidier & Boltanski, 1969; McGovern et al., 2004; Pew Research Center, 2004, 2007; Massarani et al., 2012).

Since its first use at the World Science Journalists Conference in 2009, the questionnaire has gone through several revisions, iterations and extensions. A slightly adapted version was used in the Latin American study (Massarani et al., 2012) and in the Global Science Journalism Report 2013 (Bauer et al., 2013).

In the current version, the questionnaire has again undergone minor revisions; however, we preserved most of the questions used in the 2013 report to warrant comparability over time, and we added new items relating to COVID-19. We included questions on whether (and how) the pandemic has affected science reporting. The 2021 questionnaire consisted of 39 questions – 21 closed, 17 mixed (closed + open option) and one open question.



3. Results

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3.1 The profile of “science journalists”/science writers

In total, 633 people answered the survey. Of these, 50% did not answer the full questionnaire, but dropped out for some items [i.e. partial non-responses]; it remains unclear why people did not complete their responses. For some, the questionnaire might have been too long, or there were technical problems – some reported the internet was working badly during the pandemic, as a result of which they were not able to complete the questionnaire. We have included partial responses in our analysis and indicate the variable n (number of responses) in reporting the results to each question.

3.1.1 Global regions

To compare the results with the previous survey, we have kept to the same regional division as in the 2013 report. The 2021 sample consists of respondents from 77 countries across the globe, but with a predominance of responses from Europe/Russia (37%), followed by Latin America (22%), Asia/Pacific (15%), the USA and Canada (11%), Sub-Saharan and Southern Africa (8%) and Northern Africa and Middle East (5%) (Figure 2). Responses from North America more than doubled between the two surveys. The lowest rates of return were from African and Middle Eastern countries.

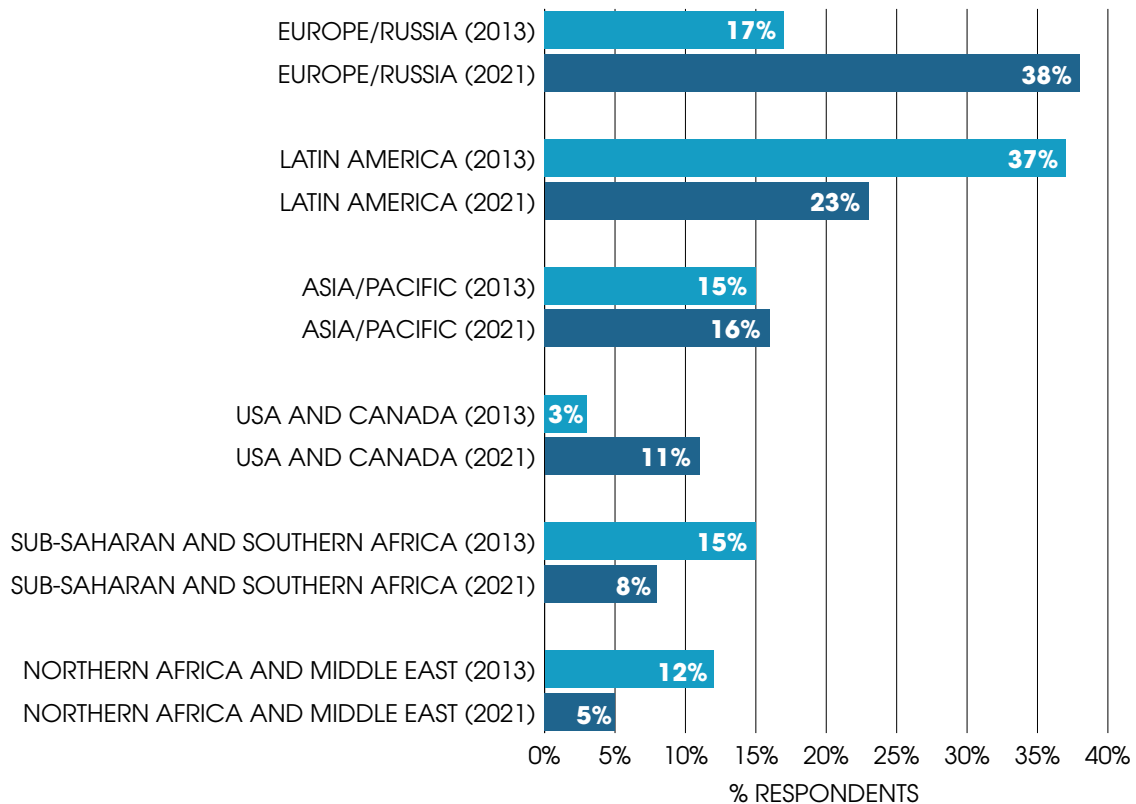


Figure 2: Number of respondents by world region

n(2013) = 951

n(2021) = 611

3.1.2 Profile of the “science journalist”

Most of the 611 respondents who informed us of their age are between 45 and 64 years old (38%). The distribution is as follows: 1% were under 21 years old; 27% were between 21 and 34; 28% were between 35 and 44; and 6% were over 65. The average age is 44 years old ($M = 43.7$, $SD = 12.7$; range 19-89 years). There is a higher percentage of younger professionals in Latin America, where there is a slight predominance of the group aged between 35 and 44, and in North Africa and the Middle East, where there were more responses from professionals aged between 21 and 34 (Figure 3).

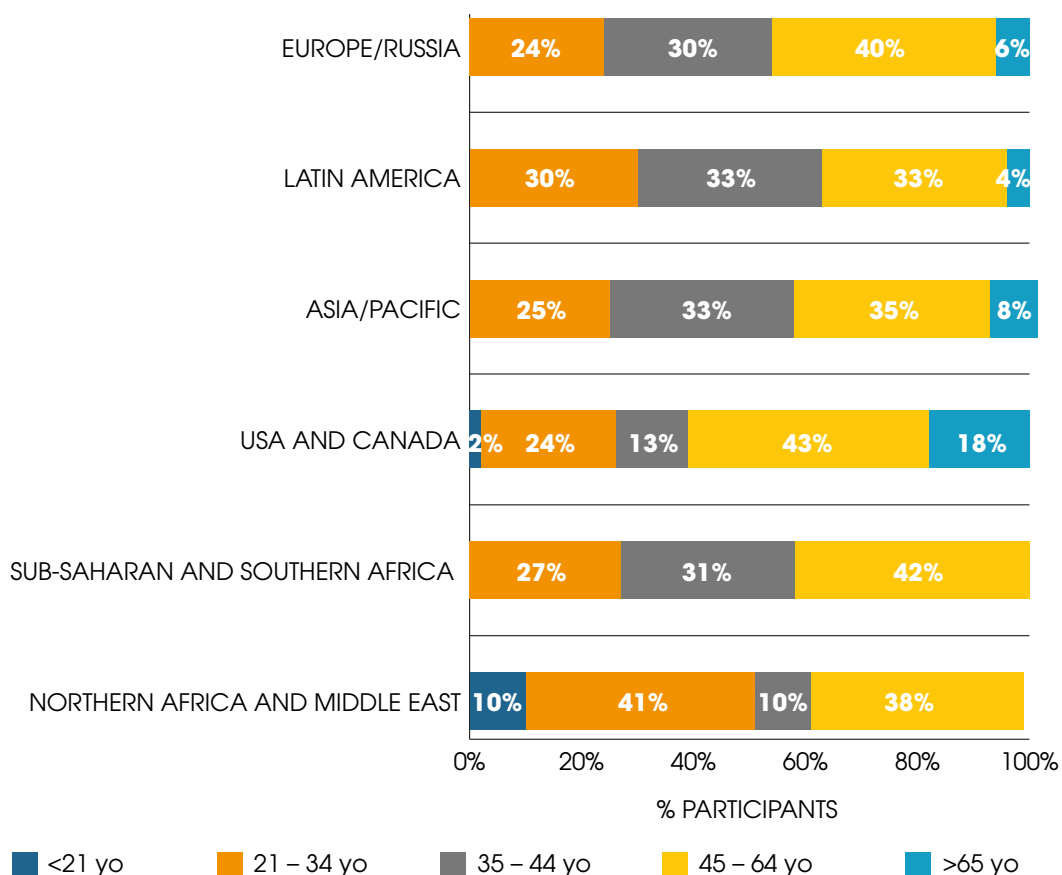


Figure 3: Percentage of participants by age range

Slightly more than half of respondents are women (54%; n = 618). About 2% preferred not to answer. The female presence is greater in the USA and Canada (69%; n = 608). Male professionals are more frequent in Sub-Saharan and Southern African regions (71%).

Almost all participants who provided information about their training background (n = 617) report having a university degree (96%). Of these, most have a university degree in science (42%), a third have a university degree in journalism (37%) and 17% have a university degree in other areas. Only 4% do not have a university degree. Having a background in science is more frequent in Europe (61%; n = 606), also reaching high rates in Asia/Pacific (52%) and the USA and Canada (43%). In Latin America, training in journalism prevails (68%), as well as in Sub-Saharan and Southern Africa (57%) and, a little less, in Northern Africa and Middle East (36%). The highest rates of not having a university degree were verified in these last two regions – 9% and 11%, respectively (Figure 4).

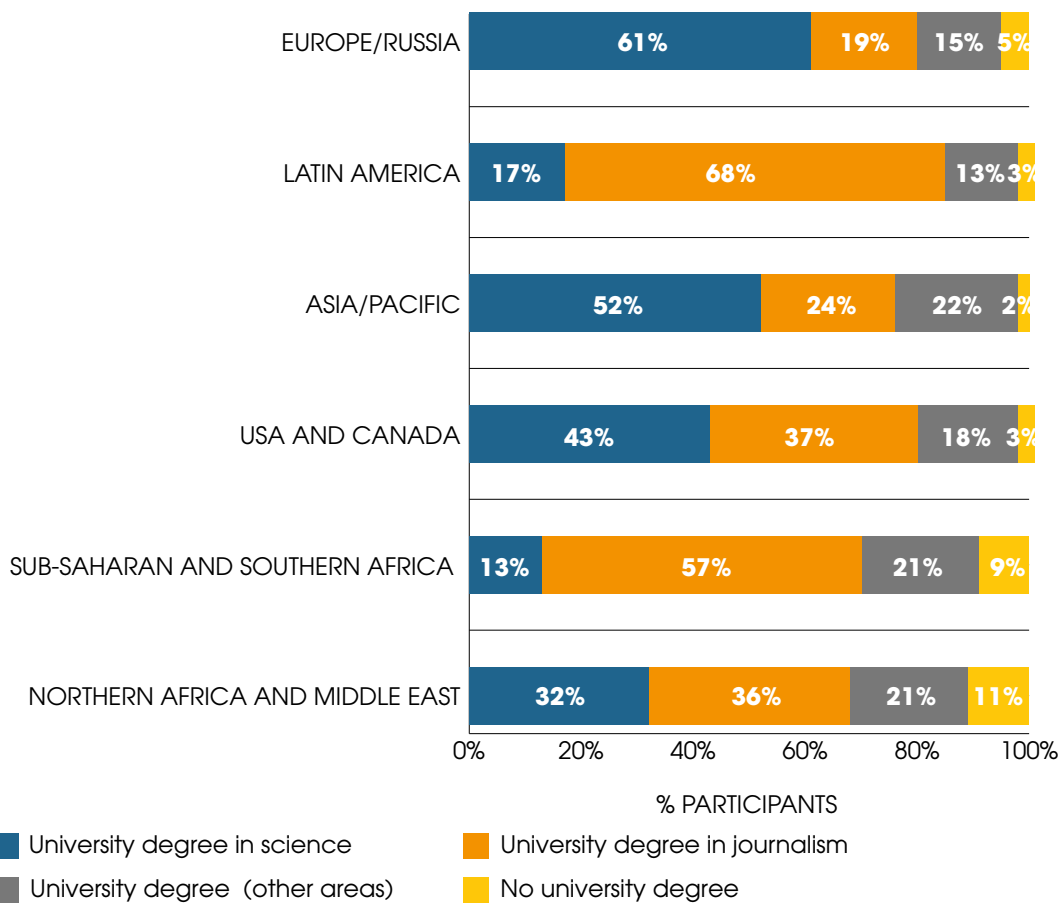


Figure 4: Percentage of participants by training background

A Master’s Degree is the most frequently held qualification (52%) among the 575 participants who provided this information. Another 29% have a first degree and 20% have a PhD. The proportion of professionals with a master’s degree is higher in the USA and Canada (59%), Europe/Russia (56%), Latin America (53%) and Asia/Pacific (50%). In African and Middle Eastern countries, the highest incidence is of professionals with a first degree – 64% in Sub-Saharan and Southern Africa and 56% in Northern Africa and Middle East. European and Asian countries have the highest proportion of participants with a PhD – 28% and 24%, respectively.

The sample consists of more experienced professionals (Figure 5). Of the 601 respondents to this question, 39% have been working in science journalism for more than 15 years; 15% have worked in science journalism for 11 to 15 years; 23% have worked in science journalism for six to 10 years; and 23% have worked in science journalism for less than five years. There is a greater proportion of people with longer experience in the USA and Canada, where 69% (n = 68) have worked in science journalism for over 11 years. Less experienced professionals predominate in Northern Africa and Middle East: 68% (n = 28) have less than 10 years of experience in science journalism.

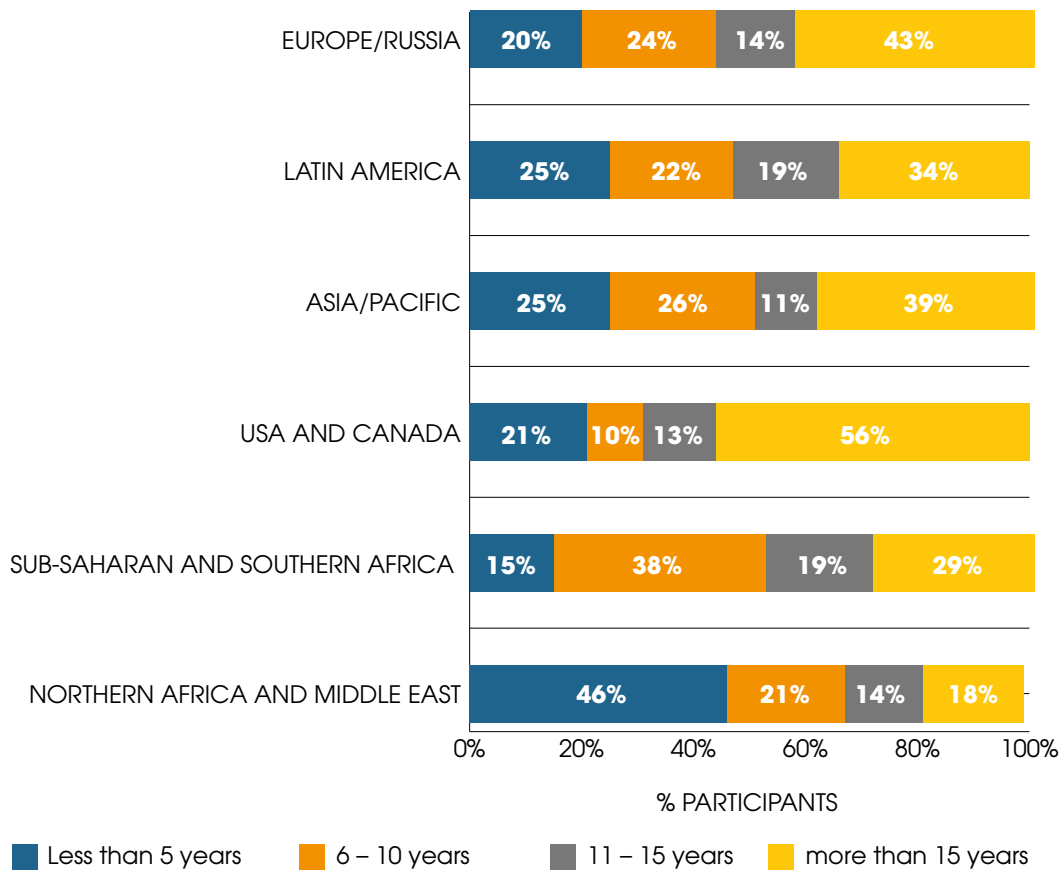


Figure 5: Percentage of participants by working time

Regarding political positioning, the centre-left spectrum and the left spectrum continue to prevail (35% and 32% respectively) among the 587 participants who provided this information. Another 17% declare themselves to be centre-oriented. The centre-right spectrum and the right spectrum add up to 8%. The left spectrum and the centre-left spectrum are more common in the Americas, Asia and Europe. The centre positioning is more frequent in African and Middle Eastern countries. In the US, Canada and Europe, there has been no response from the right-wing.

3.2 Working conditions

3.2.1 Employment conditions

“Full-time staff” is the option that best describes the current professional position for 44% of respondents (n = 600). This is the situation in almost all regions, except in Sub-Saharan and Southern Africa, where full-time freelance workers predominate (36%). In all regions, there has been no change in the work of most respondents over the past five years. This is the reality for 63% of the 595 participants who gave this answer. Less significantly, 16% reported having changed status from “employed” to “self-employed”.

Regarding the journalist's primary publication/employer, the situation of the last five years is distributed between cuts in journalist staff (34%; n = 514) or no change (31%). In 23% of cases, more journalists were hired. Cuts were larger in Latin America and smaller in Northern Africa and Middle East. The proportion of hires was balanced among the different regions.

Of 526 respondents, 64% say the number of projects they work on during one week has grown in the last five years. This percentage is relatively high in all regions, but is slightly higher in Africa and Europe. For 16% there have been no changes, and for 14% there has been a decrease in the number of projects. The biggest drop is registered among workers in the USA, Canada and Latin America.

In this sense, for a larger portion of journalists (45%; n = 525), the situation for professionals like them has got worse; for 17% of them, that worsening has been significant. For 31% the situation has improved, and for 21% it has remained more or less the same. Participants from the USA and Canada, Europe/Russia and Latin America were most likely to declare the situation has worsened. African and Asian countries have the highest rates of improvement in the condition.

3.2.2 Workload

Respondents are asked about their occupation. Of the 609 respondents who provided this information, most mention “science journalism” as their main occupation (59%). This is the most frequently cited situation in the USA and Canada (77%), and is less frequently cited in Northern Africa and Middle East (43%). Regarding their work in the last five years, the most frequent role is cited as “freelance writer” (24%), followed by “science communicator” (17%), “editor” (16%) and “staff writer” (9%). This distribution is similar among countries in North America, Asia and Europe. In Latin America, “science communicator” is cited as the main occupation. In Northern Africa and Middle East, the role of editor is more frequently cited. Note that only in Sub-Saharan and Southern Africa does “researcher” appear among the three most common occupations. “TV anchor” was the least frequently seen occupation in all regions.

Regarding the workload, we ask participants about the number of stories, items or packages they have been working on in the last two weeks, also giving the option to indicate the type of outlet (article, blog, website, podcast, promotional text, press release, exhibition, book, social media or other). In general, respondents report working on one story, item or package per two-week period. The workload is higher only on social media, where 45% of the 295 respondents citing this option reported having worked on more than five items. “Article” was the most chosen option among respondents – in other words, it is the most common form of content production.

Considering the sum of all outlets and comparing them across regions, the highest workload (more than five items per two-week period) is found among professionals from Asian countries (28%; n = 299). The less intense workload (one item per two-week period) is proportionally more frequent in countries in North Africa and the Middle East, compared to other regions (52%; n = 101) (Figure 6). In practically all outlets, the range that represents the highest productivity (more than five items) has the highest participation of women. The two exceptions are “exhibition” and “book”, which are more likely to be reported by men. Only in Asian countries is the proportion of men in the higher-productivity range slightly higher than that of women.

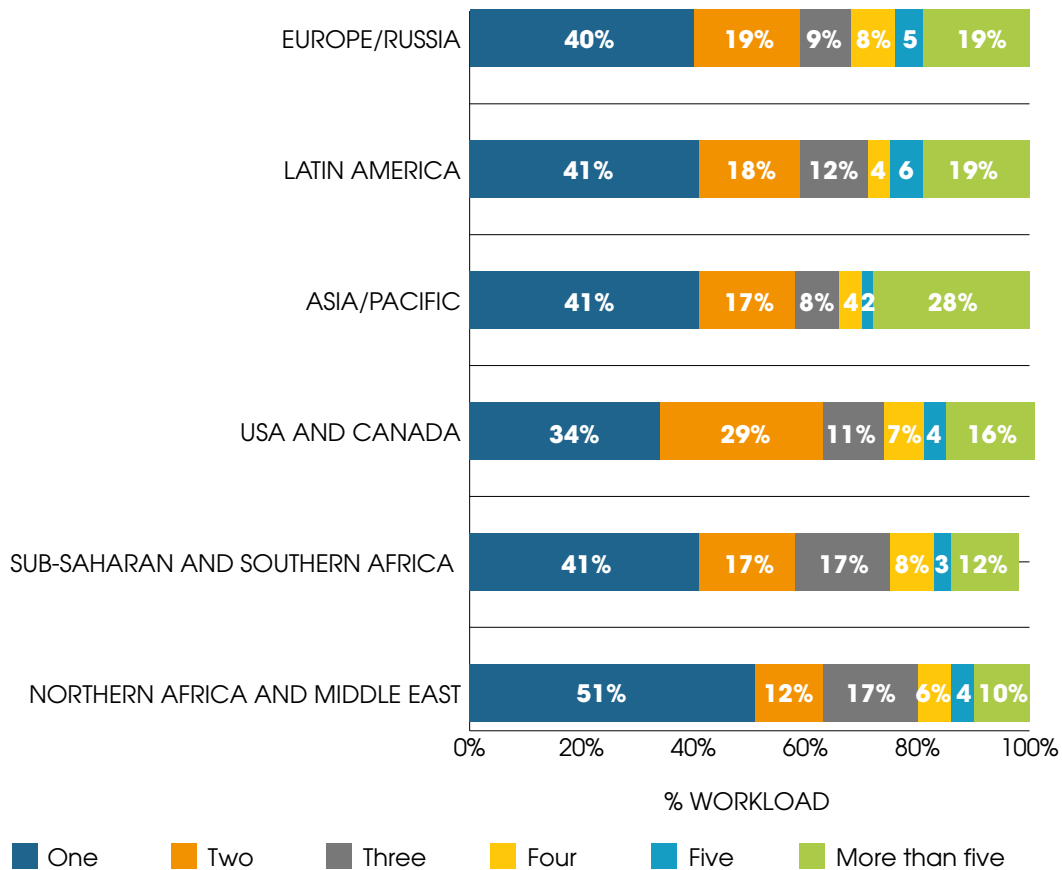


Figure 6: Percentage of workload (number of items or packages) by region

Note: The question was worded as follows: “Think of the last TWO WEEKS. How many stories, items or packages were you working on for the following outlets?”

3.3 Working practice of science journalism

3.3.1 The topics and outlets of work

Science is the main topic covered by participants, representing 99% of the 547 responses given to this item (the sum of “mainly” and “occasionally”). The following topics – Environment (89%; n = 546), Technology (89%; n = 518), Health and Medicine (88%; n = 546) and Climate Change (87%; n = 537) – also appear prominently. Together, these are the top five topics covered in the USA and Canada, Asia/Pacific, Europe/Russia and Sub-Saharan and Southern Africa, with slight variations. In Latin America, Social Science occupies fourth position, and in Northern Africa and Middle East, Science Communication appears third. Business, Agriculture and Energy are the areas in which the “Never” option was most chosen (Figure 7).

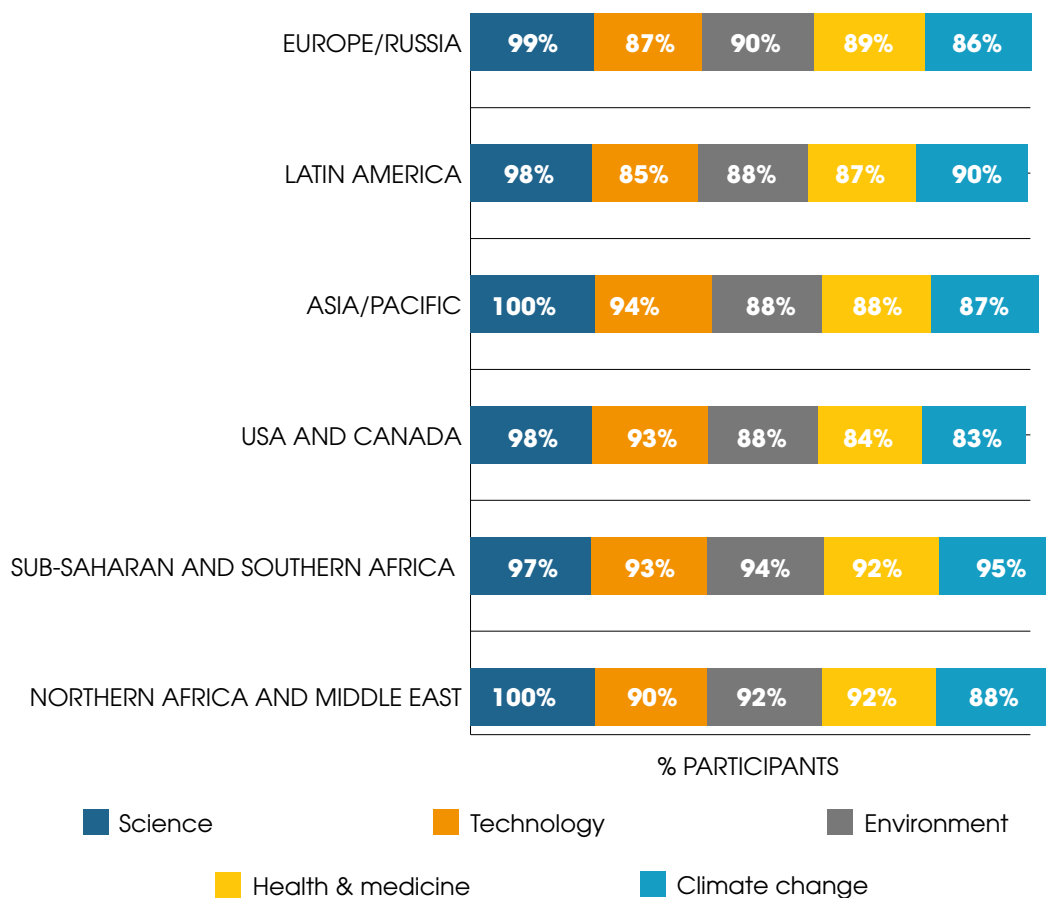


Figure 7: Top five most covered topics by region

Table 1: Media outlets where journalists' work appears

Media outlets used in work	Percentage ("Mainly" and "Occasionally" summed)	Total n
Web story/website	91	511
Social media – Facebook	84	494
Online news operation	83	492
Social media – Twitter	81	493
Blog	58	454
Monthly journal (general audience)	57	448
Social media – Instagram	56	463
Daily newspaper	54	472
Social media – other	50	433
Radio	50	443
Podcast	47	443
Academic/institutional press releases	46	459
Weekly magazine	46	446
Book	45	456
News agency	39	441
Television	35	433
No-profit press release/outlet	34	440
Scholarly journal	34	430
Science museum/exhibition/event	28	445
Video podcast	28	427
Corporate press releases	26	440
Other	15	162

Note: The question was worded as follows: "In which of these media does your work appear? Please rate all."

The internet is the main media for disseminating the work of science journalists (Table 1). Websites (91%; n = 511), Facebook (84%; n = 494), online news operations (83%; n = 492) and Twitter (81%; n = 493) are most frequently mentioned. On the other hand, corporate press releases, video podcast, science museum/exhibition/event, scholarly journal and television are the least used media. In all regions there is a predominance of the internet. The so-called traditional media ranks fifth in the USA and Canada (weekly magazine), Asia/Pacific (daily newspaper), Europe/Russia (monthly journal) and Sub-Saharan and Southern Africa (daily newspaper).

3.3.2 Receiving feedback on stories

The general, wider public is considered the main audience for 75% of the participants (n = 526). A special interest public and a scientific audience were selected by 50% and 38% respectively. The private sector is the priority audience for only 11% of respondents (for this question, respondents could select more than one option). Occasional letters/comments from the audience and clickstream ratings from the internet continue to be the most common form of feedback (Table 2). The first alternative is proportionally larger in Sub-Saharan Africa than in other regions. Clickstream ratings are relatively more frequent in Latin America.

Table 2: Reaching audiences: ranked types of feedback received

Type of feedback	Percentage respondents
Occasional letters/comments from audience members	37
Clickstream ratings from internet	25
From friends and family	17
Regular evaluation research of my work unit	13
Other	5
I have no feedback at all	4

Note: The question was worded as follows: “How do you know about your audiences and whether you reach them? Please mark all that apply.”

3.3.3 Use of social media

Social media is considered very important to the work of 62% of 561 respondents. Considering the answers that attribute some usefulness to social media (“very useful”, “sometimes useful” and a “loss of time, but sometimes useful”), this index reaches 97%. Only 3% answered that they need to learn more about social media, answered that it is a useless loss of time or did not know how to respond. The majority of respondents from Africa and Latin America consider social media to be very useful: 89% in Sub-Saharan and Southern Africa, 82% in Latin America and 77% in Northern Africa and Middle East. This percentage is low in the other regions: 48% in the USA and Canada, 50% in Asia/Pacific and 52% in Europe/Russia.

Facebook is the social network where science journalists are most present. LinkedIn, Twitter and Instagram appear next. This is the pattern in all regions. Tumblr, professional blogs, personal blogs and personal pages on a website are the least used by the participants.

3.4 The ethos of science journalism

Informing (41%), translating complex material (26%) and educating (17%) are considered the three roles that best define the ethos of science journalists (n = 525) (Figure 8). In African countries, the educational role appears ahead of the translation role. Entertainment is the role that describes the ethos of these professionals least well. When comparing the regions, a greater proportion of respondents from Latin America and Northern Africa and Middle East consider mobilizing the public to be their main role. The role of being a public watchdog is rated slightly higher in Europe than in other locations. Respondents also mention other motives, such as promoting science literacy, exposing complexity, motivating change, rebuilding trust in science, verifying information, making science the key element of public debate and engaging the public on scientific issues.

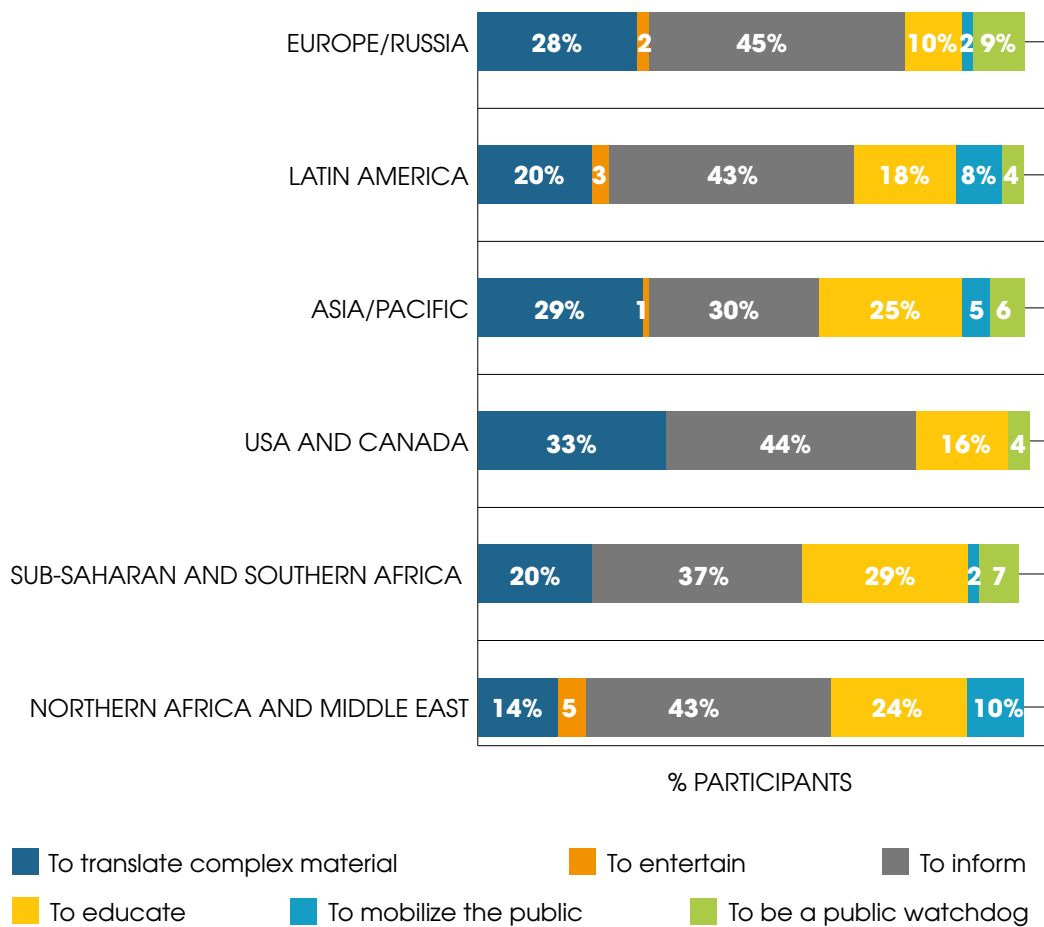


Figure 8: Roles that best define the ethos of science journalists

Note: The question was worded as follows: “How would you define your role as science journalist vis-à-vis your audience? Tick only the ONE that BEST describes your ethos.”

Of the 494 respondents to the question about the characteristics that define a “good science journalist”, 99% consider it important (the sum of “very important” and “important”) to report the facts accurately. Great importance is also attached to having reasonable numeracy skills and a good grasp of statistics (91%; n = 496) and being passionate about science (86%; n = 497). In North America and Southern African countries, all respondents consider it important to correctly report the facts. The latter also rate the importance of a passion for science most highly. On the other hand, the characteristic considered least important (the sum of “totally unimportant” and “unimportant”) is possessing a university degree in a scientific discipline (22%; n = 495), being proportionally higher in the USA and Canada.

In another set of characteristics presented to the participants, independence is considered the most important by 94% of the 484 professionals who answered the question. This perception is similar among regions, but it is noted that, in the USA and Canada, 100% of respondents consider it important. The ability to follow instructions (88%) and training in science journalism also score highly (87%). The first is deemed to be important by all respondents from Sub-Saharan and Southern Africa. The second appears more prominently among respondents from Latin America, Africa and the Middle East.

It is also observed that, in Latin American and Southern African countries, greater importance is attributed to training for radio and TV compared to other regions. None of the characteristics

presented in this set is identified as unimportant at high levels. The highest index is reached by training for the print media, identified as unimportant by 7% of the 496 respondents. However, in Northern Africa and Middle East it is considered unimportant by 26% of science journalists.

3.5 Professional satisfaction as science journalists

Most respondents (79%; n = 521) say they are satisfied with their work as a science journalist (the sum of "completely satisfied" and "satisfied"). Northern Africa and Middle East and Sub-Saharan and Southern Africa are the places with the most satisfied professionals (85% and 83% respectively), followed by Europe/Russia (81%), the USA and Canada (80%), Latin America (77%) and Asia/Pacific (74%). Dissatisfaction (the sum of "completely dissatisfied" and "dissatisfied") amounts to 7%, and is slightly higher in Latin America. In Sub-Saharan and Southern Africa, none of the respondents say they are dissatisfied. Finally, 11% are neither satisfied nor dissatisfied.

We also question how happy science journalists are in general with their jobs today. Of the 526 who responded, 46% say they are happy ("very happy" and "quite happy" options) and 42% say they are not ("very unhappy" and "not so happy"). The places where workers declare themselves to be happiest are Sub-Saharan and Southern Africa (56%) and Latin America (51%). The proportion is slightly lower in the USA and Canada (47%), Northern Africa and Middle East (45%), Asia/Pacific (44%) and Europe/Russia (42%). On the other hand, Northern Africa and Middle East have the highest proportion of unhappy workers (50%), followed by Europe/Russia (50%), Asia Pacific (41%), Latin America (38%), Sub-Saharan and Southern Africa (37%) and the USA and Canada (29%).

Asked about the level of satisfaction relating to different aspects in their respective countries, the participants are most satisfied (the sum of "completely satisfied", "very satisfied" and "satisfied") with access to scientists as sources (75%; n = 511) (Figure 9) and more dissatisfied (the sum of "completely dissatisfied", "very dissatisfied" and "dissatisfied") with access to information from government agencies (46%; n = 509) (Figure 10). The level of satisfaction is also higher than the level of dissatisfaction regarding the freedom of the press/freedom of expression (55%; n = 518) and personal safety in the discharge of their duties as communicators (60%; n = 511).

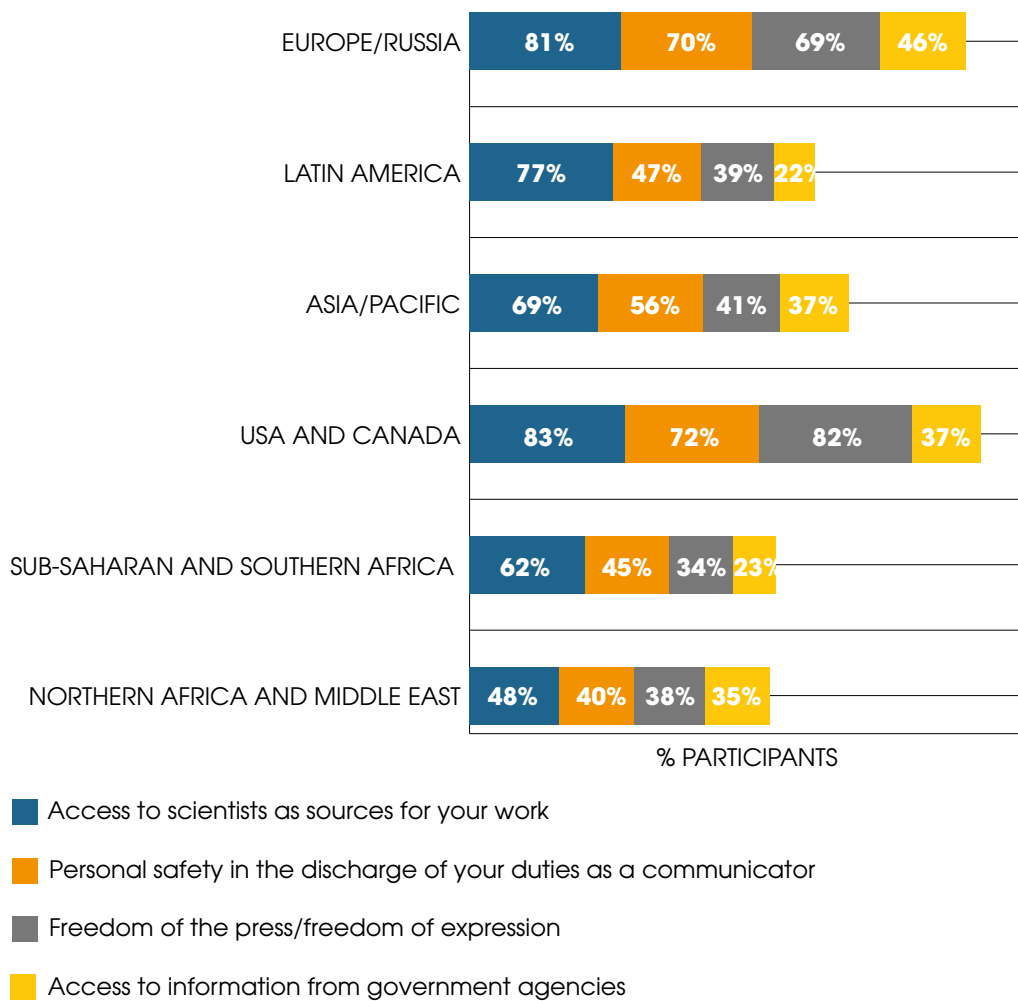


Figure 9: Satisfaction with different aspects of the work

Note: The question was worded as follows: “To what extent are you satisfied or dissatisfied with the situation in your country regarding: [options]”

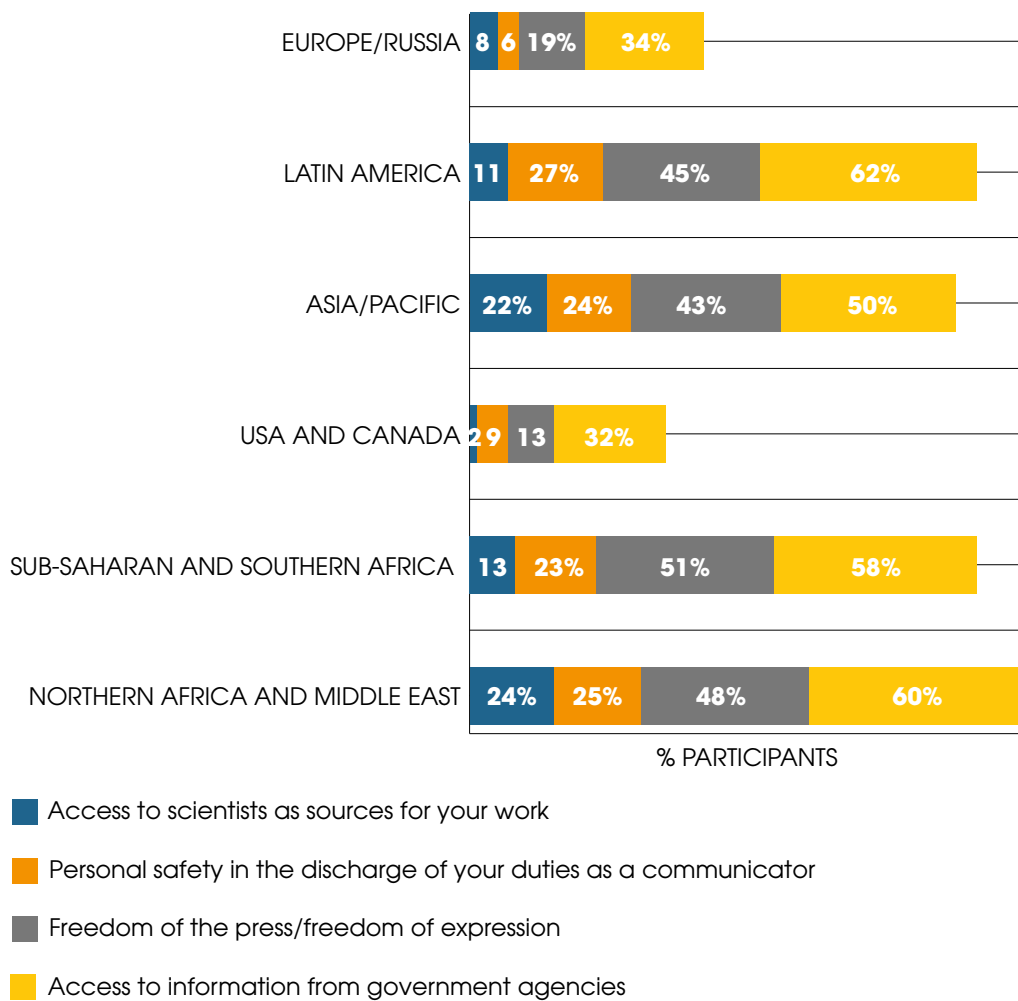


Figure 10: Dissatisfaction with different aspects of the work

Note: The question was worded as follows: “To what extent are you satisfied or dissatisfied with the situation in your country regarding: [options]”

The USA, Canada and European countries generally show higher levels of satisfaction in all aspects. In other regions, journalists are more dissatisfied with freedom of the press and access to information from government agencies.

Most science journalists would encourage a young student to pursue a career in science journalism. Of 501 respondents, 80% would certainly or likely recommend it. In Sub-Saharan and Southern Africa, this percentage reaches 95%; it is also high in the rest of Africa, in the Middle East and in Latin America. In Europe and Asia, in comparison with other regions, a higher proportion of professionals would certainly or probably not recommend a career to a young student. If we compare these 2021 results with those of 2013, we see fewer “Yes, certainly” responses and more “Yes, probably” responses in all regions, but also slightly more “Probably not” responses. This indicates a considerable amount of caution (Figure 11).

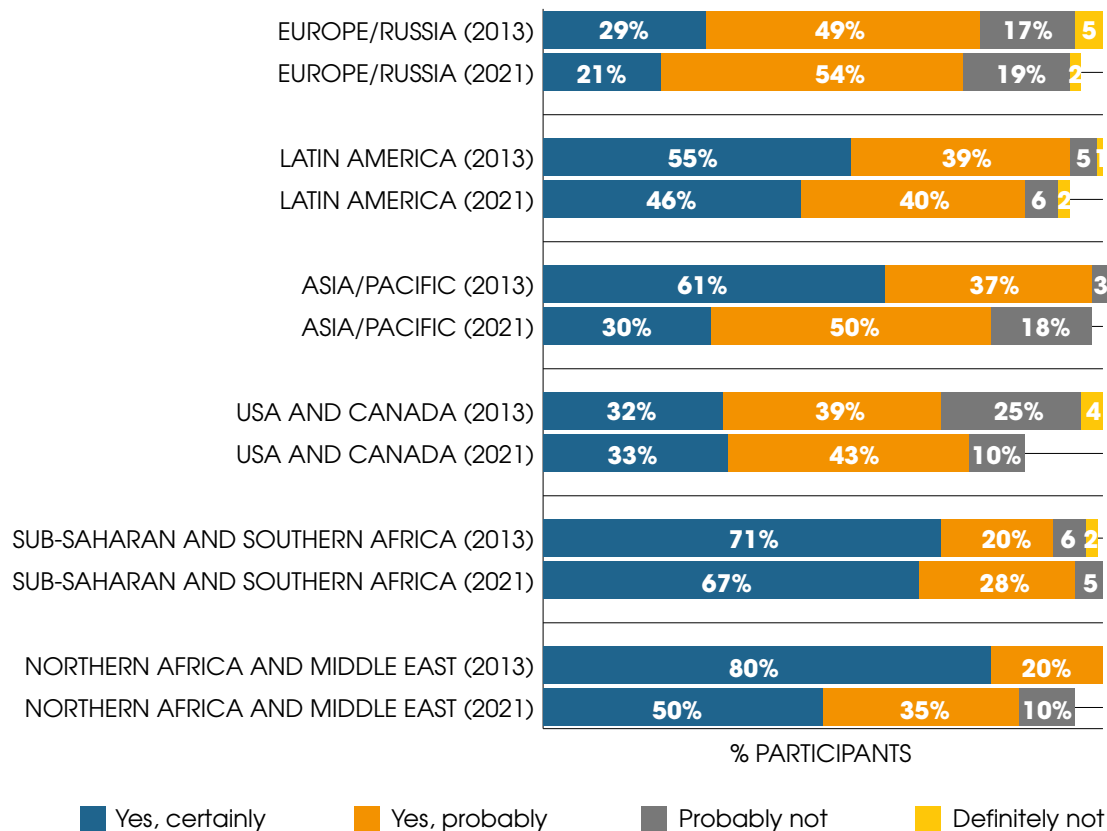


Figure 11: Career advice for a young person

Note: The question was worded as follows: “On balance, would you recommend a career in science journalism to a young student?”

3.5.1 Reduced or continued sense of crisis?

We ask participants to indicate whether they agree with a series of statements about the future of science journalism, considering the context in which they work. There is evident agreement (the sum of “totally agree” and “agree”) that too few people are reporting on the process of science as opposed to reporting on the results of scientific research (71%; n = 481). The agreement rate is also relatively high (over 60%) regarding the following aspects: as science and technology get more interesting, so does science journalism; science communication is a high-quality product; and the proliferation of press releases from journals, universities and researchers, combined with budget cuts in the newsroom, leads to mass production that is not of good quality (Table 3).

The most significant opinion (the sum of “totally disagree” and “disagree”) concerns the statement “science journalism is a dying profession”. Of the 487 participants who answered the question, 73% disagree; in 2013 this was slightly more decisive (78%). This disagreement is slightly greater in Latin America. Another 51% (n = 476) disagree that science journalism is primarily “cut, paste and translate” from US and UK science outlets. Only 33% reject the idea that “science journalism is in crisis”; in 2013, 47% rejected this idea.

Table 3: The future of science journalism 2021 (in brackets: 2013 results)

Future of science journalism	Percentage (disagree and totally disagree)	Total n
Science journalism is a dying profession	73 [78]	487 [591]
Science journalism is primarily "cut, paste and translate" from US and UK science outlets	51 [68]	476 [592]
Physical threats or libel suits against science journalists are increasingly common and make it a risky activity	36 [52]	483 [592]
Science journalism is in crisis	33 [47]	482 [592]
Stories are now considered stale if they are more than a few days old	32	476
Science communication needs to get more journalistic, i.e. more society and less science	30	476
Science journalism is unpopular among editors and publishers	24	478
Science journalism is the most exciting field in journalism	12	477
Science public relations is driving science news and reportage	11 [17]	481 [592]
The proliferation of press releases from journals, universities and researchers, combined with budget cuts in newsrooms, leads to mass production that is not of good quality	11	478
Science communicators' pay rates favour people without financial commitments	10	473
Too few people are reporting on the process of science as opposed to reporting on the results of scientific research	10	481
As science and technology get more interesting, so does science journalism	10	477
Profits and jobs are moving from general outlets to more specialized publications	8	472
Science communication is a high-quality product	5 [11]	480 [592]

Note: The question was worded as follows: "The following statements are made about the future of science journalism. Please indicate for each of them whether you agree or disagree with them considering the context you are working in."

The optimism demonstrated regarding the profession is also reflected in perspectives regarding continuing to work as a science journalist. About 81% of respondents say they believe they will certainly, or probably, be working in the field in the next five years (n = 503) (compare this to 88% in 2013). In Sub-Saharan and Southern Africa, 90% of professionals make this statement. Northern Africa and Middle East has the highest proportion of respondents who believe they will not be working as a science journalist in the next five years (20%) (Figure 12).

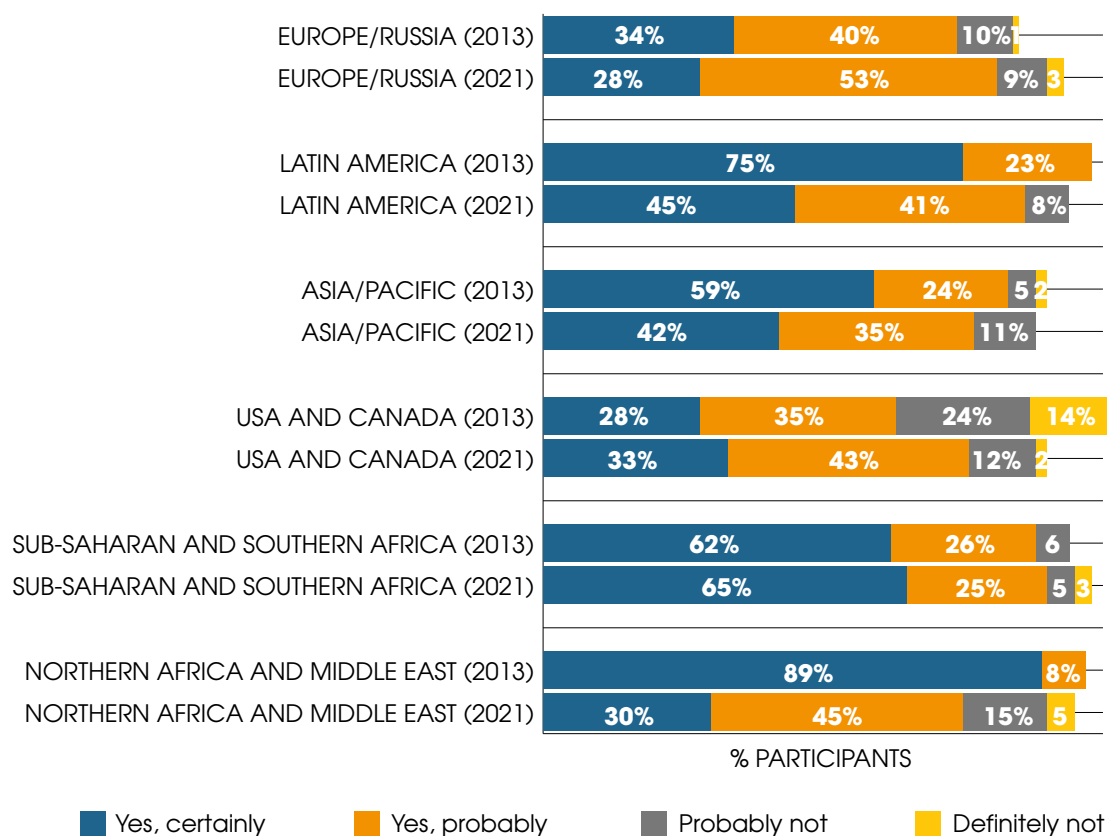


Figure 12: Career expectation in five years' time

Note: The question was worded as follows: “Do you believe you will be working as a science journalist in five years' time?”

For 55% of respondents (n = 488), working pressures are harming the quality of science journalism. Another 17% believe the pressures are just changing; 10% believe they are not harming the profession. Among the regions, the perception of harm is much more pronounced for professionals from Northern Africa and Middle East (84%), and lower for professionals from the USA and Canada (43%). In Asia/Pacific, the proportion of workers who believe pressures do not harm the quality of science journalism is higher (22%).

Furthermore, for 43% of participants (n = 484), science journalism is on the right track. However, 38% say they do not know, and 17% think science journalism is on the wrong track. The greatest optimism is verified in Africa and the Middle East, where more than 70% of the participants chose the first option. Europe is the region with the highest proportion of science journalists who believe the profession is moving down the wrong track. In the USA and Canada, Asia/Pacific and Europe/Russia, the proportion of professionals who cannot answer the question is higher than for the other options.

3.5.2 Interest in continuing education

We also verify the search for, and interest in, qualifications. Of 486 respondents, 54% affirm they regularly participate in continuing education/lifelong learning about science, science communication and science journalism (at least once every year). Another 23% say they engage in it whenever they can (every two to three years). This is the most prevalent reality in

Latin America, and less common in Northern Africa and Middle East. In contrast, 18% of the participants declare they participate in continuing education rarely or have only done it once.

Moreover, there is great interest in these programmes. Of the 485 respondents, 80% declare they would like to participate in more continuing education programmes about science, science communication and science journalism. Interest is also high concerning research projects in the area. Of 480 respondents, 68% state they would like to participate in projects like this. In both cases – education and research – greater interest is shown by professionals from Africa, Latin America and Asia/Pacific.

3.6 Views on science journalism

3.6.1 Perspectives by gender, age and working experience

For a broader understanding of the situation of science journalists worldwide, we have made some cross-tabulations based on the variables of gender, age and working time. For the last two variables, we associate the responses into two extracts: for age, we roughly divide between younger professionals (up to the age of 44) and older professionals (aged 45 and above); for working time, we divide between less experienced professionals (up to 10 years of experience) and the more experienced professionals (11 years of experience and above). For the cross-tab analysis, we select questions relating to the participants' views on science journalism: whether the situation has improved or worsened in recent years; their satisfaction in their work; their happiness with their jobs; the ability to recommend the career to a young student; and their sensation of the death and crisis of science journalism.

Although the dependency calculations between the variables were not statistically significant, the results give us some clues.

- Although the situation in recent years has improved more for men and they are more satisfied with their work as a science journalist, they are less happy with their jobs and most agree that science journalism is in crisis. The proportion of male professionals who would not recommend the career to a young student is also higher than the proportion of female professionals
- For women, the situation has worsened in recent years, and they are more dissatisfied than men. Still, they are happier with their jobs and disagree that science journalism is dying or in crisis. Female professionals would most recommend the career to a young student
- Overall, the situation has improved for younger, less experienced men and worsened for older, more experienced women
- The situation has worsened most for older and more experienced male participants from the USA and Canada. They are also the ones who most agree that science journalism is in crisis
- For participants from Northern Africa and Middle East, the situation has improved, especially for younger professionals with fewer years of work. There is also a high rate of satisfaction with the work in the region. The level of happiness with the job is lower among less experienced men. This is also the region where older and more experienced men believe science journalism is a dying profession
- There has also been an improvement in the situation for women in Sub-Saharan and Southern Africa, which also has the highest proportion of happier young women

professionals. Young and less experienced men from this region would most recommend the career to a young student

- Women with fewer years of work in Latin America are more dissatisfied with their work. However, they disagree that science journalism is a dying profession, especially older women who have spent less time in the profession
- Older professionals from Europe/Russia consider themselves less happy with their jobs. Male participants with more years of work would least recommend the career to a young student

3.7 The effects of the COVID-19 pandemic on science journalism

The COVID-19 pandemic, officially declared by the World Health Organization in March 2020, imposed severe social isolation measures on a global scale. Journalism, especially journalism dedicated to scientific issues, suffered from the effects of the health crisis; at the same time, it has had to respond to a growing demand for trustful information. Therefore, this survey is also an opportunity to verify the impacts of the pandemic on the work of science journalists worldwide, taking into account the fact that science itself has needed to accelerate the process of sharing its results, which is often done through pre-print articles.

3.7.1 Information sources during the pandemic

Peer-reviewed scientific articles, scientists from a journalist's own country and official institutions are the sources participants have used the most. Scientists from other countries, medical doctors and scientific articles that have not been peer-reviewed are used in smaller quantities. This pattern is only different in African and Middle Eastern countries. The most-used sources in Sub-Saharan and Southern Africa are official institutions followed by scientists from other countries, and the most-used sources in Northern Africa and Middle East are doctors.

More than half (55%; $n = 465$) of journalists say they use, or have used, pre-print articles in their stories, against 45% who have not. The regions that comprise African and Middle Eastern countries are the only ones where this result is reversed. Participants are able to justify their negative answer and, in many cases, there is a notion that this type of publication may contain provisional results, which may change after peer-review.

Of the 384 who responded that they use, or have used, pre-print articles, we ask if they have adopted any procedures that are different from when they usually cover science topics. Most say yes (59%); 41% say no. In general, the most adopted procedures are consulting other sources and providing a warning that the study has not been peer-reviewed. This care is also verified in relation to false news: 64% ($n = 465$) affirm they take false news into account when producing their stories. The trend is similar among regions, with more evidence in the USA and Canada (85%), followed by Sub-Saharan and Southern Africa (71%), Asia/Pacific (65%), Northern Africa and Middle East (63%) and Europe/Russia (63%). In Latin America, just over half of respondents (51%) declare they take false news into account; the other half does not (50%).

3.7.2 Relationships with information sources

We also look at how journalists' relationships with their sources take place during the COVID-19 pandemic. For almost half of the 464 respondents (49%), scientists are more easily available to talk to than in normal years. For 31%, there is no difference; for 21%, it is more difficult. Only the USA and Canada present a different situation. Most journalists from these countries say there is no difference in access to scientists, and the proportion of those who consider that scientists have become more difficult to access slightly surpasses those who believe they have become more accessible.

Still from this perspective, 37% of participants (n = 455) affirm that, due to the pandemic, scientists are more open and talkative than in previous years. An almost equal portion (37%) assess that there is no difference in the approachability of scientists; 27% think scientists are more cautious than in normal times. In North America and Europe, most respondents find no difference; in Sub-Saharan Africa, most see sources as more cautious; and in Latin America and North Africa, sources appear to be more talkative and open during COVID-19.

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Appendix

Respondents by region

	N	%
1 USA and Canada	68	11%
2 Asia/Pacific	95	15%
3 Europe/Russia	233	37%
4 Latin America	138	22%
5 Northern Africa and Middle East	29	5%
6 Sub-Saharan and Southern Africa	48	8%
99 Missing	22	4%
	633	100%

List of respondents per country

Italy	47
USA	46
Brazil	45
France	40
UK	35
Germany	31
Spain	31
Mexico	29
Canada	22
India	21
Australia	17
Colombia	15
Egypt	13
Nigeria	13
China	11
Chile	10
Japan	10
Philippines	10
Switzerland	10
Argentina	7
Finland	7
Kenya	6
Peru	6
Portugal	6
South Africa	6
Bolivia	5
Costa Rica	5
Ecuador	5
Uganda	5
Venezuela	5
Belgium	4
Ghana	4
Denmark	3
Indonesia	3
Israel	3
Liberia	3
Morocco	3
New Zealand	3
Norway	3
Pakistan	3
Russian Federation	3
Slovenia	3
Sri Lanka	3

Sudan	3
Taiwan	3
Turkey	3
Bangladesh	2
Cuba	2
Greece	2
Iraq	2
Jordan	2
Madagascar	2
Malaysia	2
Netherlands	2
Romania	2
Somalia	2
Tunisia	2
Tanzania	2
Viet Nam	2
Albania	1
Algeria	1
Bahrain	1
Bosnia and Herzegovina	1
Cameroon	1
El Salvador	1
Guatemala	1
Jamaica	1
Lithuania	1
Malawi	1
Mongolia	1
Montenegro	1
Paraguay	1
Poland	1
Qatar	1
Moldova	1
Rwanda	1
Saudi Arabia	1
Serbia	1
Singapore	1
Sweden	1
Macedonia (former Rep.)	1
Yemen	1
Zambia	1
Zimbabwe	1
Total	620
Missing	13
Total	633



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