JCOM

Science journalism in the Kingdom of Saudi Arabia: news sources engagement and [lack of] science accountability

Abdullah Alhuntushi and Jairo Lugo-Ocando

Abstract

In this article we explore normative professional expectations around science journalists in Saudi Arabia (KSA) and how news reporters do access, engage with, and use news sources. Against broader and more universal normative expectations, we found that journalists in that country used a low diversity of sources in science news reporting and depended on official and public relations sources. These findings point to a current lack of criticality in science media reporting in KSA and limited ability for media to hold science to account. In so doing, we offer explanations for the divergence and gaps.

Keywords

Representations of science and technology; Science and media; Science communication: theory and models

DOI

https://doi.org/10.22323/2.23050204

Submitted: 29th May 2023
Accepted: 11th May 2024
Published: 15th July 2024

Introduction

Out of all the media formats used to communicate science to the public, science journalism remains the most comprehensive at underpinning these efforts [Al-Qafari, 2009; Bauer, 2013] because it is capable of informing, educating and making issues relevant and interesting for the broadest audience [Al-Qafari, 2009; Nguyen & McIlwaine, 2011]. It does this by comprehensively and critically assessing key aspects of science while, at the same time, disseminating accurate science information and ideas across large segments of the public [Bennett, Calman, Curtis & Fischbacher-Smith, 2010; Fonseca & Russo, 2010; Maran, Cominsky & Marschall, 2000].

This is because science news reporting continues to be widely present in homes and, researchers argue that it plays a central role in popularizing science [Molek-Kozakowska, 2017; Scheufele & Krause, 2019], contributing to public understanding of science and enhancing public engagement with science [El-Awady, 2009; Molek-Kozakowska, 2017]. In this sense scholars agree that science journalism has a central role in disseminating scientific content and promoting activities that support science engagement, while contributing

decisively to setting an agenda that influences both policy and allocation of resources [Nguyen & McIlwaine, 2011; Nguyen & Tran, 2019].

The other normative function of science journalism is to scrutinize science itself in terms of its ethics and relevance to society [Alhuntushi & Lugo-Ocando, 2023; Lublinski et al., 2014]. Thus, highlighting concerns around issues in science is important because it affects issues of public benefit, such as public health and people's general attitudes towards science itself.

To be sure, in most societies, journalists not only play the role of disseminators but also perform as watchdogs to the power of the scientific establishment itself. Illustrative examples include the exposé of the Tuskegee Study, where members of the Afro-American community in the United States of America were allowed to die in order to carry out scientific observations of the effect of syphilis [Jones, 1993; Reverby, 2005] and the case of the stories produced by Chicago Tribune reporter John Crewdson, who uncovered how Dr Robert Gallo, director of research for the National Institutes of Health in the US had altered records to falsely claim that it was his team, and not that of Luc Montagnier and other researchers at the Pasteur Institute, who first isolated the AIDS virus [Crewdson, 2002; Cohen, 1992].

Consequently, normative expectations around the role of news reporters in science communication are clear and succinct; to help disseminate scientific knowledge and to make science and scientists themselves more accountable to the public. This, at least, is the broad agreement in most liberal societies; those that are anchored to notions of objectivity, impartiality and fairness as well as being underpinned by the ability to exercise authorial control and professional autonomy when producing the news [McNair, 1998; Mellado, 2015; Mellor, 2010; Waisbord, 2013].

Having said that, not all normative aspirations can be achieved everywhere. Particularly, when we refer to societies that do not enjoy the degree of institutional robustness — marked by the separation of powers — and independence offered by liberal political systems in other parts of the world. So, the question remains: is it is possible to reconcile universal assumptions around science reporting with the reality on the ground in societies ruled by illiberal systems?

This is a broad question that goes beyond this article but one that can be addressed, at least partially, by understanding the relationship between journalists and news in the context of science reporting in different countries. By exploring the nature and characteristics of this relationship, we try to understand their significance in particular national contexts. In this study, we assess levels of professional autonomy, independence, and criticality among journalists who report on science in the Kingdom of Saudi Arabia (KSA) by examining how they engage with, and use, news sources.

Expectations against reality

In the Middle East and North Africa (MENA) region, journalists have historically lacked sufficient professional autonomy and have not enjoyed sufficient independence [Mellado, 2015; Mellor, 2010; Waisbord, 2013]. Hence, in relation to science reporting one can ask if it is possible for them to perform both the roles of science disseminators and watchdogs at the same time. This is because the prevalent journalistic culture in the region is of non-adversarial reporting.

Journalists do confront or challenge power but rather focus on disseminating official information [Abdelmoula, 2015; Mellado, 2015; Mellor, 2005]. The professional autonomy and ability to exercise authorial control of the news content are limited [Davey-Quantick, 2016; Martin, Martins & Wood, 2016; Shishkina & Issaev, 2018].

In addition to this, these reporters tend to lack sufficient expertise to engage comprehensively and critically with scientific sources [Lublinski et al., 2014]. Nor do they have opportune and non-mediated access to scientists and expert sources as most are managed by officials who send press releases or organize very staged media events [Mellor, 2024]. The overall impact of these issues related to journalistic autonomy and independence is further exacerbated by constraints upon the ability of these journalists to apply critical interpretation and produce original content around what the sources say. This is on top of limitations imposed by the lack of resources (e.g., few newsrooms can access academic journals unless they are under open-source agreements) while managing pressing deadlines. To this list of impediments, we need to add organizational cultures that tend to downplay initiatives to develop distinctive agendas to those decided from above [Mellor, 2010, 2024]. Added to these impediments is a lack of public engagement with science, which in turn reflects the poor state of science journalism in the region. This lack of appetite from audiences towards science news and information in general [Alhuntushi & Lugo-Ocando, 2022, 2023] is perhaps one of the greatest challenges for countries that are looking to diversify their economies and transform societies.

Having said that, Arab countries are now starting to catch up with the West in terms of investment in research and development [Determann, 2015]. For example, the Kingdom of Saudi Arabia (KSA) seeks to modernize and transform its society and economy. The country has pledged to increase its investment in science and technology to 2.9% of its GDP by 2040, while its universities already ranks top in the region for STEM subjects. Hence, for the KSA, engagement with science is indeed crucial to help it achieve its plans for modernization and economic diversification, set out in the Saudi Vision 2030; a strategic framework to reduce Saudi Arabia's dependence on oil, diversify its economy, and develop public service sectors such as health, education, infrastructure, recreation, and tourism.

Media in KSA

The KSA's media outlets operate under a press system that provides political-editorial guidelines set by the central government [Alnajrani, Bajnaid, Elyas & Masa'deh, 2018; Rugh, 2004, p. 6]. The main role of the press, accordingly, is to support national unity and the well-being of society. Article 39 of the Kingdom's Basic Law of Governance states that the media is prohibited from committing acts leading to disorder and division, affecting the security of the state and its public relations, or undermining human dignity and rights. This places the media system within the descriptions set by scholars in which authorities have ample discretion to act.

One of the key distinctive aspects of the news cultures in KSA relates to the limited professional autonomy, which has an impact on authorial control. This is perhaps one of the most important dimensions of journalism as a political institution in

relation to the production of independent news in any context [McNair, 1998; Waisbord, 2013].

Having said that, the limitations mentioned above do not tend to apply equally in all areas and newsbeats. The idea that journalism in KSA is a monolithic closed entity completely subordinated to power does not reflect the reality on the ground. Some topics are far more sensitive than others. Fashion and sport, for example, are not subject to the same external pressures. Journalists working in these subject areas are given additional leeway to debate around certain topics. Some even go on to generate sufficient controversy and debate about particular issues to engage readers and viewers. Science, however, sits somewhere in between given its nature and the socio-cultural context of the KSA.

One case in point is that of the theory of evolution, a subject that is officially banned from being taught in schools in many countries in MENA [Alassiri, 2020]. However, as Jörg Matthias Determann [2015], points out, despite official prohibition, research on biological evolution has flourished, due in large part to the development of academic and professional networks. This means that journalists do write about these issues when covering some of the lines of research being carried out. Indeed, weekly newspapers and other media outlets in Saudi Arabia carry stories on dinosaur embryos, new evolutionary discoveries or even a whole feature article on the 'stolen' Charles Darwin notebooks that were mysteriously returned, an article that was published in most newspapers as recently as April 5, 2022.

Overall, the KSA's media systems are fundamentally different to what we find in the West [Hafez, 2014; Kraidy, 2011]. News media operate under a licence and news reporters need to obtain an official accreditation. In addition to this, appointment of key editorial positions in the key mainstream media outlets are often consulted with authorities [Richter & Kozman, 2021].

Self-limitations to professional autonomy are not circumscribed to general practices within the newsrooms, but also reflect a wider news culture that displays restrictions and limitations at different levels. Science journalism does not escape this and reporters working in this news beat also face limitations when trying to access news sources. As Mahmood [2008] pointed out some years ago, finding science sources in that region has proved to be one of the most difficult tasks faced by journalists; something that has not changed since then.

The lack of professional autonomy impacts decisions that are carried out in the daily work of media organizations and raises questions about the effect of these journalistic practices on media content [Garcés Prettel & Arroyave Cabrera, 2017; Weaver & Willnat, 2012]. For example, in some cases, including in the West, reporters have been found to rely on news sources that have their own agenda and are all too keen to disseminate official versions or promote corporate products [Hallin & Briggs, 2015]. In this research, we took the diversity of sources as an indicator of journalistic independence and autonomy when gathering stories. This is because the over-dependency on official sources weakens the professional independence of journalists and restricts their ability to provide challenging and even contradicting worldviews to those offered by those in power.

Based on this discussion, our main research question asks: how is the relationship between journalists and scientific news sources characterized in the context of Saudi Arabia? A related sub-question asks: how do journalists consider their relationship with news sources to be affecting their ability to make science accountable to society?

Methodology

To explore these questions, the researchers used a mixed-methods research design combining two sources of data because this approach provides a better understanding of the research problem compared with using one form of data alone [Creswell, 2013, p. 2]. We combined the content analysis of the sources used in news stores, with data collected from 12 semi-structured interviews with journalists in KSA. We interviewed journalists because we wanted to assess the degree of agency and autonomy these professionals perceived themselves as having when dealing with sources.

One researcher carried out the data collection at the KSA National Library. In 2021, in the months of January, May, September, and December, they collected a total of 174 news articles about health and technology from the most influential media outlets in the country, in terms of circulation and history. These newspapers: Riyadh, Oqaz and Alwatan are among those with the most accessible and reliable archives, which also allows for historical research. Online media outlets were excluded from this study given that few have reliable archives, nor do they have licences to operate in the KSA. We focussed on news stories about health and technology because these are two areas that are well reported on in KSA and provided a robust-enough sample for the content analysis. Because COVID-19 was an atypical subject, we excluded health stories that focused on that subject.

The coding approach was simple and straightforward; identifying the type and frequency of sources used as an indicator of diversity and plurality in the reporting of science news. The content analysis focused on the number of news sources used and their nature. This is because the number and type of sources used in a particular news item can be considered indicative of diversity. When one examines their nature, for example, looking at how many are government sources as opposed to non-government ones, this can give an indication of journalistic autonomy and independence. One researcher coded the sample and no intercoder reliability assessments were carried out, given the simplicity of the coding task.

The quantitative findings derived from coding the news articles for news sources were supplemented by an analysis of the qualitative semi-structured interviews conducted with journalists working in KSA. These interviews were carried out following ethical standards set by the researchers' respective universities. This meant that the identity of participants was anonymized, and each individual provided informed consent and was made aware of their right to withdraw at any time. The interviews were carried out in Arabic and English, but all were transcribed and then translated into English. Interviewees were identified and selected based on the sample of newspaper articles that we coded for sources, which included the by-lines of the journalists. These reporters were all professionals, Saudi and had been to university. Their degrees were all in arts, humanities, and social science with one exception who had a degree in natural

science. The interviews allowed us to address explanatory aspects relating to how the stories were gathered and later produced.

Results and discussion

Overall, the data suggest that news media outlets tend to reproduce official and corporate voices. In the case of health there was a particular over-reliance on government sources — something already noted by other authors studying the region in the broader spectrum of other news beats [Harb, 2019; Mellor, Ayish, Dajani & Rinnawi, 2011]. However, in the sample that refers to technology news stories, official sources accounted for far fewer of the total number sampled, as shown in Table 1,

Table 1. Types of science news cross-tabulated with the sources $N = 174$. (Source: authors' data.)

			Official source	*Non-official source*	*Unknown*
Newsbeat	Health	% within the type of science news	69.7%	17.6%	12.7%
	Technology	% within the type of science news	12.6%	57.4%	30%

However, the use of non-official sources should not be interpreted as an indicator of greater autonomy. It is rather an indication that technology is instead dominated by corporate interests. Therefore, news is gathered from voices supplied by the private sector through either companies or private corporate guilds, something that again has also been noted in other countries by a diversity of studies [Guenther & Ruhrmann, 2013; Mazur, 1984]. The fact remains that in our sample, 95% of the news stories had only one news source.

In addition, it is very important to identify who speaks about science to the media. The inclusion of expert voices in the news media signals importance and authority [Shine, 2022] as they are specialists in the matter and consequently can produced better informed opinion and judgment as well as relate to science and facts. In this sense, scientific expert voices came first in this category with 36% of all the sources, representing more than one-third of the sources in science news (we took the first and most mentioned source as the main source in cases where there were more than one). Nevertheless, it is worth noting that Saudi universities and research centres, similar to most of their counterparts around the world, manage their relationship with the mainstream media by means of communication professionals and their communication offices. So, we can argue that these expert voices have been mediated by officials and by professional communicators (e.g., PR departments).

Contrary to the West, where the contact between journalists and experts comes as the result of initiatives taken by the journalists [Albæk, 2011], Saudi Arabia is instead a place where this contact is initiated by the sources under instructions from, and managed by, officials to disseminate content following pre-set agendas. This is in addition to 17% of the news sources being from the government and 29% not being mentioned. Sources that are not explicitly identified often indicates that the news story comes from a press release in which the source is not identified but nevertheless it is published because it comes directly from officials, (as we can see in Table 2),

Table 2. News sources $N = 174$. (Source: authors' data.)

		Per cent
Valid	Government source	17%
	Scientific source (science, Research Lab, HEI)	36%
	Private sector (companies, corporations)	14%
	Third Sector (NGOs, activists)	5%
	News source not mentioned	29%
	Total	100%

Only in 5% of the stories could we see end-users of science being interviewed by journalists or putting forward their views on a particular issue on health or technology. This picture is indicative of a low level of accountability as most of the stories, narratives and agenda are set by officials and experts but with little contribution from stakeholders. These results are very relevant to the question of autonomy because this is happening in a context in which 95% of the news stories quoted one single source, hence the sample suggests that there is almost no triangulation with a small number of alternative views that could bring about accountability to science and policy.

In fact, a very important aspect of assessing the use of, and engagement with, news sources relates to the number of sources accessed to produce a story. This is because triangulating to check content, assess data and contrast versions of events from different sources is considered to be part of the vital routines so as to achieve transparency [Berkowitz & Beach, 1993; Manning, 2001]. Having multiple sources allows for critical comparisons of sources' views and perspectives while offering a more comprehensive picture of what is being reported [Franklin & Carlson, 2010; Nölleke, Grimmer & Horky, 2017].

Only health stories had three or more sources while there was not a single news story about technology with more than one. Hence, even though technology stories relied less on government and official sources, the case was that the sources of information were more monopolized by a few expert voices, mostly from the corporate sector. The great majority of stories in the sample tend to use one news source.

Reasons for this reliance on one news source include contexts, practices, and approaches that account for the over-dependency on one source. Some of these factors correspond to rationales around news cultures — e.g. the deference to official and expert sources — but others seem to be more mundane. For example, the fact that health stories tend to be awarded more space by editors can explain the use of additional sources given the possibility and necessity of filling that space. There is in fact an important rationale that needs to be discussed in relation to the correlation between the length of the stories and the number of sources used. Longer stories often represent those feature articles or human-interest stories that incorporate a diversity of voices, including stakeholders, while shorter ones tend to be presented under the genre of hard news.

The association between the number of sources and the length of the article (.189**) is an important indicator of how priority and resources are assigned in the

newsroom. It also suggests that reporters would have been given additional time to finish these stories and resources to contact the sources. The great majority of stories in the sample tend to use one news source (see Table 3),

Table 3. The numbers of sources when mentioned — $N = 174$. (Source: authors' data.)

		Per cent
Valid	One source	95.0
	Two sources	4
	More than two sources	1
	Total	100.0

Finally, only five articles out of whole sample had two or more sources. This suggests that there is a systemic problem that is affecting science reporting and that undermines accountability and criticality in the reporting of this newsbeat. Relying on one source goes against widely accepted editorial conventions that require journalists, editors, and producers to test "the information against known facts or other sources" [Frost, 2015, p. 69].

Interviews from journalists

The data from the interviews suggests that journalists do not talk directly to scientists. Instead, they do so through a mediated process in which the intermediaries are professional communication specialists from areas such as public relations and strategic communication. This is not surprising, given that it is also the case in other parts of the world where the communication between journalists and scientists is also mediated by public relation specialists, press officials and authorities [Ashwell, 2016; Nguyen & McIlwaine, 2011]. However, as described by some of the interviewees, there are some direct contacts between scientists and journalists, but not at the levels one might expect or desire, for example,

> *Even when we talk to scientists, the conversation is arranged by an official who sets it up. The way they see it is that journalists need help with the information because otherwise we will make mistakes. I think that press officials are worried about us publishing something that can create unnecessary alarm. I don't think this is a bad thing, I see that the spokesman is there to cooperate with me. To provide me with information because this is their role. In the past it was difficult but now I see this is a lot easier. There used to be a delay in information being delivered but it now arrives the same day, so we have a guide to write the story* [IN004].

This indicates a symbiotic relationship between reporters and press officials. However, not all of the journalists tend to rely only on official sources. Some journalists working in media cite other sources, as said by one interviewee,

> *We do talk to other people. In my family there are several doctors and scientists. I ask them about a particular topic, and they indicate to me who is the best expert in this field. Sometimes someone gives me a tip about a good story. I had in the past interviewed a few people, who gave me interesting things to write* [IN002].

The suggestion is that journalists do talk to other sources besides the one offered to them by officials but they are mostly used as a reference or to provide explanation and context but are not cited.

Interviewees agreed that freely accessing science experts is not easy. For them, this is the reason as to why few news stories in their field have several news sources triangulated. Lack of access also explains why most stories rely upon official accounts provided by one source. These limitations, in terms of securing access to sources, are ever more pressing, given the deadlines that they face. Therefore, for the journalists it is the accepted norm to interview officials and to secure the necessary information and data on time, for example,

> *It is also a way of meeting the deadline. At times it is very difficult to reach some sources in Saudi Arabia because everyone assumes that they need permission to speak with the media. A scientist who is working in his lab and who has their own deadline has no time for us or to go all the way to the top to ask for permission. Therefore, it takes too long to make the deadline, so I almost always have to go back to official government sources. At least I know they will always have something for me to publish* [IN006].

These individuals did claim that they often do one-to-one exchanges with scientists. Although, the content analysis says otherwise, indicating instead very particular circumstances and events where this happens. However, even in those cases the exchanges are rushed and improvised to the extent that a journalist has little time to prepare and read about the topic beyond very basic pointers. To be sure, the interviewees claimed to find it extremely difficult to identify experts and engage with them. As one of the reporters highlighted,

> *There is no culture here of scientists speaking with the press unless they are in a press conference or events where they are a panel member. It is difficult to know who is working on a particular topic. Research centres do not tend to have a list of experts for us to contact directly and everything has to go through their press officers. Some are helpful but even they find it difficult to get hold of their own specialists* [IN007].

In relation to the normative aspiration of bringing accountability to science and policy, the interviewees said that in KSA the expectations are different, as pointed out by a reporter,

> *I don't see myself questioning a scientist. They are the experts, and they know what they are talking about. These are people who have studied these issues, they are doctors. Who am I to say this or that? Besides, the information has been reviewed by others, so it is accurate* [IN011].

In this case, it suggests that the journalist sees their role as translating and making accessible what scientists say and not about bringing accountable and critical perspectives to the story. They feel this would be an unnecessary intrusion given their own lack of expertise. In other words, they defer the narrative to authority. This is a general pattern in the KSA as the relationship between journalists and their sources is characterized by a news culture that is non-adversarial and, at times, deferential [Awad, 2010; Mellor, 2010]. The conclusion here is that news reporters are disseminators, rather than watchdogs, of science.

Reporters in Saudi Arabian media additionally face persistent difficulties in obtaining secondary information and accessing data. Many news reporters

covering science have no opportunity or independent access to databases or statistics relating to health and technology. As a reporter pointed out,

> *We have to wait until the data is sent to us. This takes time because the officials have to make sure that it is accurate and precise. However, this can mean months before we get access and even a few weeks after that to get the green light to publish it* [IN012].

Instead, a lot of the data used by journalists come from abroad, even when some of the stories were local, for example,

> *I just go to the websites of institutions such the World Health Organization (WHO) or simply contact the WHO Regional Office for the Eastern Mediterranean, which are very diligent in providing data. If I went through my ministry, it would take longer. I am under a deadline, and I need this data quickly* [IN008].

Journalists also tend to use news pieces from foreign news agencies or simply reproduce press releases provided to them by officials or press officers that contain that data. This is because journalists, at times, are unable to find suitable local sources that can help explain, clarify or critically analyse a particular issue in science and technology, for example,

> *There is simply not the culture among scientists themselves of speaking to the media here. Yes, in the past I took the initiative to contact a professor or a specialist, but they referred me to the official in charge. Sometimes, the official was not happy that I had not gone to them directly. I learned my lesson and now I ask them for the information or wait until they send me the information* [IN002].

In addition to these limitations, we should also acknowledge that reporters working in the traditional news media in KSA, as in most of the world, also face decreasing resources and rising workloads in the newsroom. This has further compromised their ability to engage with primary sources and spend the necessary time to explore sufficiently issues and aspects of science, as underlined by an interviewee,

> *I just don't have the time. I often write three, even four stories in a day. When am I going to find the time to go to a university at the other side of town, speak with two or three scientists call another source and write the whole thing? It is just not doable* [IN005].

As a result, journalists rather tend to rely on official sources that are more widely available to them or that are provided by officials. Several interviewees admitted that they even got press releases with the quotations that they could use for the story. This means that the work of reporters will tend to reflect the official version of the events.

From these interviews, we could establish that there are several other reasons for the lack of diversity in the use of sources. To cite, a lot of the content is not created but rather 'processed' or 'assembled' in the KSA. That is, journalists use news

pieces from foreign news agencies or simply reproduce press releases provided to them by officials or press officers. Other reasons provided by the interviewees include the fact that in many cases journalists are unable to find a suitable local source that can help explain, clarify, or critically analyse a particular issue in science and technology. Few reporters whom we interviewed had built a portfolio of sources who could act as expert voices. Instead, they were rather dependent on officials or institutions to provide these sources. All the interviewees called for more direct and timely access to scientists.

Conclusion

Overall, our analysis suggests a strong dependency by journalists in our study on official sources, meaning that science news in the KSA is mediated by officials and public relations professionals. This dependency on official sources underlines the low diversity in terms of sources, which translates to uncritical media reporting of science, and therefore a lack of scientific accountability. Moreover, the data from the interviews and content analysis indicates that journalists themselves have little say in terms of setting their own news agenda around science.

The main conclusion is that reporters are highly dependent on specific official organizations and institutions to provide 'expert voices' in the construction of science news. This hardly allows for comprehensive criticality when presenting science news, something that undermines stakeholder engagement as it is difficult to establish broader connections with society in those stories. With that in mind, it would be difficult to argue that reporters in KSA can fulfil both roles of being disseminators of science and watchdogs to scientific wrongdoings at the same time.

Reporters working in the science beat enjoy more professional autonomy that others. Nevertheless, they face similar prevalent news cultures and organizational dynamics as their peers in other news beats. After all, newsrooms in KSA are also embedded in the broader media system of that country. Hence, rather than taking advantage of these spaces of relative autonomy that science offers and pushing for a more creative news agenda in science that promotes greater and more critical engagement with these topics, they remain in the same space as that given to the rest.

Further research is necessary to create the type of grounded knowledge that can help policy-makers make better decisions. This includes widening the scope of science media research to include other media outlets and different types of newsrooms as well as understanding better the news audiences for science in that country. Many of the interviewees highlighted that they do not always encounter receptivity for their stories. They claimed that their own indicators and statistics suggested a low level of engagement with science on the part of the public. That is, however, an aspect that is beyond the scope of this study but is something that urgently needs to be explored.

In any case, for now it is important to note that if the KSA wants to achieve its 2030 Vision, then science news reporting cannot be just about reproducing and translating science information. Instead, it needs to start asking relevant and pertinent questions that interrogate the role of science in society. Science reporting in KSA needs to re-work itself as an engaging way of informed storytelling that makes science appealing, relevant and pertinent to all. However, this will only

happen if there is a fundamental change in the relationship between journalists and scientists — one that needs to be far more direct and open.

Limitations of this study

We recognise that our findings should not be extrapolated to the entire field of science journalism in KSA nor necessarily reflect the entire region. Therefore, these findings should not be extrapolated to the rest of the region, nor should we derive from them any universal assumptions. Despite common assumptions, the MENA region is extremely diverse at all levels and its societies, economies and media systems are different, despite some commonalities. We do believe, nevertheless, that the data presented here certainly provide insightful and indicative elements about larger trends in the region. What we learn from the KSA, can also shed light on other corners of the planet and on how the KSA can help promote PES and PUS, even when their political media systems are far from the liberal models of Europe or North America. The validity of these results apply to the time frame recent to this study. Consequently, further studies, could incorporate additionally editors and scientists to explore professional autonomy among these other actors. These are, in our view, the next steps of this research project.

References

Abdelmoula, E. (2015). *Al Jazeera and democratization: the rise of the Arab public sphere*. doi:10.4324/9781315720272

Alassiri, M. (2020). Evolution is the disguised friend of Islam. *Nature Human Behaviour 4* (2), 122. doi:10.1038/s41562-019-0771-7

Albæk, E. (2011). The interaction between experts and journalists in news journalism. *Journalism 12* (3), 335–348. doi:10.1177/1464884910392851

Alhuntushi, A. & Lugo-Ocando, J. (2022). Articulating statistics in science news in Arab newspapers: the cases of Egypt, Kuwait and Saudi Arabia. *Journalism Practice 16* (4), 702–718. doi:10.1080/17512786.2020.1808857

Alhuntushi, A. & Lugo-Ocando, J. (2023). *Science journalism in the Arab world: the quest for 'ilm' and truth*. doi:10.1007/978-3-031-14252-9

Alnajrani, H., Bajnaid, A., Elyas, T. & Masa'deh, R. (2018). Exploring the transitional era in Saudi Arabia journalism discourse and the path towards the right to freedom of expression. *Modern Applied Science 12* (10), 1–12. doi:10.5539/mas.v12n10p1

Ashwell, D. J. (2016). The challenges of science journalism: the perspectives of scientists, science communication advisors and journalists from New Zealand. *Public Understanding of Science 25* (3), 379–393. doi:10.1177/0963662514556144

Awad, T. (2010). *The Saudi press and the Internet: how Saudi journalists and media decision makers at the Ministry of Culture and Information evaluate censorship in the presence of the Internet as a news and information medium* (Ph.D. Thesis, The University of Sheffield).

El-Awady, N. (2009). Science journalism: the Arab boom. *Nature 459* (7250), 1057. doi:10.1038/4591057a

Bauer, M. W. (2013). The knowledge society favours science communication, but puts science journalism into a clinch. In P. Baranger & B. Schiele (Eds.), *Science communication today: international perspectives, issues and strategies* (pp. 145–166). Paris, France: CNRS Éditions.

Bennett, P., Calman, K., Curtis, S. & Fischbacher-Smith, D. (Eds.) (2010). *Risk communication and public health*. doi:10.1093/acprof:oso/9780199562848.001.0001

Berkowitz, D. & Beach, D. W. (1993). News sources and news context: the effect of routine news, conflict and proximity. *Journalism & Mass Communication Quarterly 70* (1), 4–12. doi:10.1177/107769909307000102

Cohen, J. (1992). Response: coverage of the "Gallo case". *Science 255* (5040), 11–12. doi:10.1126/science.255.5040.11

Creswell, J. W. (2013). *Research design: qualitative, quantitative, and mixed methods approaches*. Thousand Oaks, CA, U.S.A.: SAGE Publications.

Crewdson, J. (2002). *Science fictions: a scientific mystery, a massive cover-up, and the dark legacy of Robert Gallo*. Boston, MA, U.S.A.: Little, Brown & Co.

Davey-Quantick, J. (2016). Censorship in the Islamic world, through the eyes of journalist Jessica Davey-Quantick [Podcast episode]. Retrieved from https://open.spotify.com/episode/2FA1XVGFixhntNAlua5PJl

Determann, J. M. (2015). *Researching biology and evolution in the Gulf states: networks of science in the Middle East*. doi:10.5040/9780755609000

Fonseca, R. B. & Russo, P. (2010). Astronomy and space science in Portuguese popular newspapers at the end of the 20th century. *CAPjournal 8*, 30–33. Retrieved from https://www.capjournal.org/issues/08/08_30.pdf

Franklin, B. & Carlson, M. (Eds.) (2010). *Journalists, sources, and credibility: new perspectives*. doi:10.4324/9780203835708

Frost, C. (2015). *Journalism ethics and regulation*. doi:10.4324/9781315757810

Garcés Prettel, M. E. & Arroyave Cabrera, J. (2017). Autonomía profesional y riesgos de seguridad de los periodistas en Colombia. *Perfiles Latinoamericanos 25* (49), 35–53. doi:10.18504/pl2549-002-2017

Guenther, L. & Ruhrmann, G. (2013). Science journalists' selection criteria and depiction of nanotechnology in German media. *JCOM 12* (03), A01. doi:10.22323/2.12030201

Hafez, K. (2014). Arab and Western media systems typologies. In L. Hudson, A. Iskandar & M. Kirk (Eds.), *Media evolution on the eve of the Arab Spring* (pp. 235–250). doi:10.1057/9781137403155_15

Hallin, D. C. & Briggs, C. L. (2015). Transcending the medical/media opposition in research on news coverage of health and medicine. *Media, Culture & Society 37* (1), 85–100. doi:10.1177/0163443714549090

Harb, Z. (2019). Challenges facing Arab journalism, freedom, safety and economic security. *Journalism 20* (1), 110–113. doi:10.1177/1464884918807356

Jones, J. H. (1993). *Bad blood: the Tuskegee syphilis experiment*. New York, NY, U.S.A.: Free Press.

Kraidy, M. M. (2011). The rise of transnational media systems. In D. C. Hallin & P. Mancini (Eds.), *Comparing media systems beyond the Western world* (pp. 177–200). doi:10.1017/CBO9781139005098.011

Lublinski, J., Reichert, I., Denis, A., Fleury, J.-M., Labassi, O. & Spurk, C. (2014). Advances in African and Arab science journalism: capacity building and new newsroom structures through digital peer-to-peer support. *Ecquid Novi: African Journalism Studies 35* (2), 4–22. doi:10.1080/02560054.2014.919945

Mahmood, S. (2008). *Scientific media*. Alfagar Publishing.

Manning, P. (2001). *News and news sources: a critical introduction*. doi:10.4135/9781446218082

Maran, S. P., Cominsky, L. R. & Marschall, L. A. (2000). Astronomy and the news media. In A. Heck (Ed.), *Information handling in astronomy* (pp. 13–24). doi:10.1007/978-94-011-4345-5_2

Martin, J. D., Martins, R. J. & Wood, R. (2016). Desire for cultural preservation as a predictor of support for entertainment media censorship in Saudi Arabia, Qatar, and the United Arab Emirates. *International Journal of Communication 10*, 3400–3422. Retrieved from https://ijoc.org/index.php/ijoc/article/view/5315

Mazur, A. (1984). The journalists and technology: reporting about Love Canal and Three Mile Island. *Minerva 22* (1), 45–66. doi:10.1007/bf02207556

McNair, B. (1998). *The sociology of journalism*. London, U.K.: Oxford University Press.

Mellado, C. (2015). Professional roles in news content: six dimensions of journalistic role performance. *Journalism Studies 16* (4), 596–614. doi:10.1080/1461670x.2014.922276

Mellor, N. (2005). *The making of Arab news*. Lanham, MD, U.S.A.: Rowman & Littlefield Publishers.

Mellor, N. (2010). More than a parrot. The case of Saudi women journalists. *Journal of Arab & Muslim Media Research 3* (3), 207–222. doi:10.1386/jammr.3.3.207_1

Mellor, N. (2024). Science journalism in the Arab region: perennial problems and potential solutions. *Journalism Studies 25* (5), 559–565. doi:10.1080/1461670x.2023.2293838

Mellor, N., Ayish, M., Dajani, N. & Rinnawi, K. (2011). *Arab media: globalization and emerging media industries*. Cambridge, U.K.: Polity Press.

Molek-Kozakowska, K. (2017). Journalistic practices of science popularization in the context of users' agenda: a case study of "New Scientist". *Acta Universitatis Lodziensis. Folia Litteraria Polonica 43* (5), 93–109. doi:10.18778/1505-9057.43.07

Nguyen, A. & McIlwaine, S. (2011). Who wants a voice in science issues — and why? A survey of European citizens and its implications for science journalism. *Journalism Practice 5* (2), 210–226. doi:10.1080/17512786.2010.527544

Nguyen, A. & Tran, M. (2019). Science journalism for development in the Global South: a systematic literature review of issues and challenges. *Public Understanding of Science 28* (8), 973–990. doi:10.1177/0963662519875447

Nölleke, D., Grimmer, C. G. & Horky, T. (2017). News sources and follow-up communication: facets of complementarity between sports journalism and social media. *Journalism Practice 11* (4), 509–526. doi:10.1080/17512786.2015.1125761

Al-Qafari, A. (2009). *Science media in Saudi journalism*. King Abdul-Aziz City for Science and Technology (KACST).

Reverby, S. M. (2005). "Misrepresentations of the Tuskegee Study" — Distortion of analysis and facts? *Journal of the National Medical Association 97* (8), 1180–1181.

Richter, C. & Kozman, C. (Eds.) (2021). *Arab media systems*. doi:10.11647/OBP.0238

Rugh, W. A. (2004). *Arab mass media: newspapers, radio, and television in Arab politics*. Westport, CT, U.S.A.: Praeger Publishers.

Scheufele, D. A. & Krause, N. M. (2019). Science audiences, misinformation, and fake news. *Proceedings of the National Academy of Sciences 116* (16), 7662–7669. doi:10.1073/pnas.1805871115

Shine, K. (2022). Willing but wary: Australian women experts' attitudes to engaging with the news media. *Journalism 23* (11), 2364–2379. doi:10.1177/14648849211007038

Shishkina, A. & Issaev, L. (2018). Internet censorship in Arab countries: religious and moral aspects. *Religions 9* (11), 358. doi:10.3390/rel9110358

Waisbord, S. (2013). *Reinventing professionalism: journalism and news in global perspective*. Cambridge, U.K.: Polity Press.

Weaver, D. H. & Willnat, L. (Eds.) (2012). *The global journalist in the 21st century*. doi:10.4324/9781003070740

Authors

Abdullah Alhuntushi, Ph.D. is an assistant professor at King Khalid Military Academy in the Kingdom of Saudi Arabia.

alhntoshi@gmail.com

Jairo Lugo-Ocando, Ph.D. is a Professor of Journalism Studies and Dean of the College of Communication at the University of Sharjah in the U.A.E.

jlugoocando@sharjah.ac.ae

How to cite

Alhuntushi, A. and Lugo-Ocando, J. (2024). 'Science journalism in the Kingdom of Saudi Arabia: news sources engagement and [lack of] science accountability'. *JCOM* 23 (05), A04. https://doi.org/10.22323/2.23050204.

ISSN 1824-2049. Published by SISSA Medialab. jcom.sissa.it