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Sources of climate change information used by newspaper journalists in Tanzania

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Abstract
This article assesses the information sources used by Tanzanian newspaper journalists to collect climate change information. The main sources of climate change information consulted by newspaper journalists in Tanzania are climate change experts and daily events, such as community meetings and other relevant social gatherings. These sources are interactive – enabling journalists to obtain climate change information – and easily accessible, and use and provide instant responses. It was also found that deficient use of other potential sources of information, such as libraries, printed materials and Internet websites, coupled with overarching challenges that limit newspaper journalists from seeking, covering and reporting information on climate change, may affect the quality and quantity of climate change information published in Tanzanian newspapers. All the stakeholders involved in the fight against climate change and journalism colleges should collaborate and devise strategies aimed at building the capacity of newspaper journalists, editors and reporters in their daily activities.

Keywords
Information sources, climate change information, journalists, newspapers, Tanzania

Introduction
Climate change is one of the most pressing global environmental problems caused by natural and anthropogenic factors (Gadzekpo et al., 2018; Lund, 2019). Although all countries experience the challenges caused by climate change, developing countries such as Tanzania are the most negatively impacted because the majority of their population depends on climate-sensitive natural resources and they have low adaptive capacities (Intergovernmental Panel on Climate Change, 2007; Ludwig et al., 2007). The negative impacts of climate change include erratic and unreliable rainfalls, extreme temperatures, droughts, floods, low food production, the death of animals and land degradation (United Republic of Tanzania, 2012).

The acquisition and use of information about climate change is necessary for assessing the impacts of climate change on human and natural systems, and in planning for climate change adaptation, coping and mitigation strategies (Giorgil et al., 2009). Access to reliable, timely and up-to-date information on climate change is also necessary for raising public awareness about the impacts of climate change, as well as for better management of climate-change-related risks (Debela et al., 2015; Dinshaw et al., 2012). It is also necessary for understanding the scope of climate change, as well as its impact on socio-economic and environmental stability (Corner, 2011; Jiyane and Fairer-Wessels, 2012). Climate change is an unobtrusive and complex issue, which most people must learn about from communication media such as newspapers, television and radio (Arlt et al., 2011; Boykoff, 2011; Schäfer and Schlichting, 2014).

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The Tanzanian media industry consists of several newspapers and television and radio stations, which operate under a legal framework that requires registration for compliance. As such, there has been a fluctuation in the number of registered newspapers and television and radio stations. A 2015 report by the Ministry of Information, Culture, Arts and Sports Statistics indicated that the number of registered newspaper was 39 (United Republic of Tanzania, 2016). According to Bazira et al. (2019), in October 2017 there were 109 registered newspapers, where 85 were relicensed to continue with operations while the other 24 were newly licensed.

Newspapers can play a crucial role in disseminating information on climate change to their target audiences, which, in turn, contributes to their ability to adapt, cope and mitigate climate change conditions. The effectiveness of newspapers in the dissemination of information depends on, among other factors, the ability of journalists to collect information from authentic sources. Hence, a journalist is a person who plays an active role in the process of collecting, analysing and reporting facts accurately and in a timely manner for public consumption (Boykoff and Roberts, 2007; Ochieng, 2009; Tagbo, 2010). In order to get relevant information on climate change for their own consumption and dissemination, newspaper journalists are expected to identify, choose and use the most reliable and convenient sources of information (Ansari and Zuberi, 2012; Hossain and Islam, 2012; Takahashi et al., 2016). Sources of information can be people, letters, books, files, films or tapes – in fact, anything which journalists use to put news stories together (Ingram and Estate, 2008). Freeman (2016) adds that sources of information are important elements in shaping coverage patterns in communication media such as newspapers. Such information sources are expected to be relevant, timely, accurate, accessible, cost-effective, reliable, usable and exhaustive (Das, 2012; Statrasts, 2004).

In this respect, journalists serve as a bridge between the sources and consumers of climate change information. Since journalists are always interested in presenting stories that are current, relevant and interesting to readers (Irwansyah, 2016), they should be familiar with authentic sources and use them to meet their information needs (Ansari and Zuberi, 2012; Mahajan and Kumar, 2017; Watson and Cavanah, 2015). Journalists should use multiple sources of information when covering and reporting information on climate change in order to get diverse points of view, strengthen their stories and make them authentic (Lulagambi et al., 2011; Nicholaus and Martin, 1997). However, care should be taken, as sometimes diverse sources may generate contradicting information (Zakar, 2005). For example, to avoid the dissemination of misleading information, information from the contrarians or deniers of climate change cannot be combined with information from those who advocate that climate change is real. Thus, it is important for newspaper journalists to select and use non-contradicting climate change information sources or make a thorough synthesis of information from diverse sources.

The ability to select and use various sources of information depends on factors such as the amount of time and effort required to locate, contact and interact with such sources (Wilson, 1997). The different kinds of effort or costs involved when using information sources include physical effort, which is needed to travel to the sources; intellectual effort in evaluating the sources; and psychological effort, which is needed to deal with the quality of the sources. At the cognitive level, an individual selects sources that they consider to be the most accessible and likely to provide relevant, usable and helpful information (Choo, 2001). Other influencing factors include a person's socio-economic background, social capital, economic resources, affordability of the information, information-seeking behaviours, existing knowledge of the issue, information needs and purpose of using the information (Lim, 2010; Zakar, 2005).

Literature review

News media are fundamental sources of information on climate change. Depending on the level of the information infrastructure, people use different sources to gather information on climate change. Studies have found that television, newspapers, radio and Internet websites are the primary sources of information in the most developed countries (Kohut et al., 2012). A study by Luganda (2005) revealed that radio has been a primary channel through which climate change news is communicated in the least developed countries, particularly in rural areas.

There are various studies on the information sources used by journalists for news-making, and the challenges they encounter when using such sources. Poteet (2000) conducted research on the use of online sources and the influence of attitude on use patterns among American newspaper journalists. The findings reveal that all the surveyed journalists used the Internet. These journalists learnt about the existence of online information sources from their colleagues. They used these sources for background information, fact-finding, reading other news media and identifying other sources of information.

Anwar et al. (2004) conducted an in-depth study based on quantitative data collected by a questionnaire to examine the information-source preferences of 92 Kuwaiti newspaper journalists, their level of satisfaction with the sources used, their use of electronic resources, their level of information-use skills, and problems they faced while seeking information. The results indicate that the journalists used information sources for fact-checking and background information. Both informal and formal sources of information were used, and the Internet was highly ranked as the main source of information. With regard to the problems faced, the study found that the information-searching skills of the print media journalists in Kuwait were lacking, and they thus would have a dire need for training if it were provided.

Ansari and Zuberi (2012) carried out a study on the use of various information channels, the awareness of the existence of information sources, ways used for disseminating information and the use of libraries among mass-media professionals in Karachi, Pakistan. The findings indicate that print sources such as research reports, encyclopaedias, journals and annual reports were mostly used for seeking factual information. Because of time constraints, the journalists sought selective information.

Mahapatra and Panda's (2001) study on the state of the information-seeking and information-searching behaviour of working journalists in Orissa indicated that journalists gave first priority to current periodicals, seminars or conference proceedings, and newspapers. This study also found that journalists experienced time constraints, as they did not find time to read or look for information, the library was not automated, there were inadequate reference and referral services, and reading materials were poorly organized. Earlier, Mahalik (1998) indicated that journalists visited their parent library system to acquire information. However, most of the newspaper organizations did not possess a library and these journalists also lacked the time to read or look for information.

Singh and Sharma (2013) conducted a study on the information-seeking behaviour of newspaper journalists in Delhi, India, which aimed to identify the types of information sources consulted by various categories of journalists and the various difficulties encountered by different categories of journalists in their information-seeking activities. It was found that the journalists most frequently used periodicals, news magazines, current issues of newspapers, newspaper-clipping files and dictionaries or biographical dictionaries as sources for the purpose of seeking specific information. The main difficulties faced by the journalists were the lack of modern communication gadgets, information scattered in many sources, the lack of time to look for or read information, information not being readily available, and inadequate library services and sources. Similar challenges were also reported by Doddamani and Naik (2018).

Hossain and Islam (2012) reported that the main problems encountered by most of the journalists in their study were the lack of sufficient time to seek information, lack of training, the information explosion and lack of cooperation from library staff. Nicholaus and Martin (1997) reported that journalists faced the challenge of a lack of time, inadequate resources, and lack of training in information sources such as libraries, databases and the Internet.

Amu and Agwu (2012) conducted a study to examine print media journalists' attitudes towards coverage of climate change news in Nigeria. Specifically, the study sought to identify journalists' information sources about climate change. In this study, it was revealed that a greater proportion of the respondents perceived the Internet as the most important information source, followed by government sources such as the Ministry of Environment, scientific journals, newspapers and television. One of the challenges faced by these journalists was a lack of training in the coverage of climate change news, and this probably resulted in their lack of interest in reporting climate change stories.

In Kenya, Sasaka et al. (2017) reported that media professionals preferred official records, past publications, past broadcasts and government officials as sources of information. It was further reported that media professionals were not adequately skilled in the electronic information-search-and-retrieval environment. A study by Elia (2019c) indicates that conferences and researchers were the information sources mostly consulted by the general category of journalists in Tanzania when accessing climate change information. It was also found that the key challenges faced by these journalists when accessing and using climate change information were journalists' insufficient analytical skills, lack of coordination, language barrier, poor reading culture, inadequate training and insufficient information-searching skills.

Despite the fact that newspaper journalists play an important role in making climate change information accessible, in Tanzania little is known about the information sources used by newspaper journalists to extract such information. The little knowledge of the sources from which newspaper journalists extract climate change information leads to the low coverage of this kind of information in Tanzanian newspapers, which, in turn, impedes its

dissemination (Siyao and Sife, 2018). There is also a scarcity of scientific literature on the challenges encountered by newspaper journalists when covering climate change information in Tanzania. The little literature that is available is mostly on the coverage of climate change information in Tanzanian newspapers and the challenges encountered by the general category of journalists when covering information in their media (Elia, 2019a, 2019b, 2019c; Siyao and Sife, 2018; Tairo, 2013). Knowledge of such sources helps the generators of climate change information to know the reliable and accessible channels through which they can direct this information for further dissemination. This, in turn, improves communication of climate change information from the sources to the media and from the media to the general public. This study therefore assessed the sources of climate change information used by newspaper journalists and examined the challenges encountered when covering such information.

Research questions

The study was guided by the following research questions:

1. What sources of climate change information are frequently used by newspaper journalists?
2. What are the challenges encountered by newspaper journalists when covering information on climate change in Tanzania?

Methodology

This study employed a cross-sectional research design, which enables data to be collected at a single point in time. Both quantitative and qualitative approaches were used as data collection methods. This article is part of a wider study focusing on the role played by newspapers in the dissemination of climate change information in Tanzania, which started in 2015 and had a population of 39 newspapers that had full registration. For consistency, the present article used the same population of 39 newspapers. A purposive sampling technique based on inclusion and exclusion criteria was employed to guide the selection of newspapers for this study. The inclusion criteria were their nationwide coverage and diversity of news, accessibility, consistency in publishing issues, ownership type, language used and frequency of publication (see Table 1). The excluded newspapers were those which focus largely on politics, religion and sensational issues. Newspapers that lack nationwide coverage and diversity of news and are published in languages other than Kiswahili or English were also excluded. A purposive sampling technique and the inclusion criteria led to the selection of 10 newspapers – namely, *Daily News*, *The Guardian*, *Habari Leo*, *Mwananchi*, *Rai*, *Nipashe*, *Majira*, *Mtanzania*, *Business Times* and *This Day*.

The sampling frame included all newspaper journalists who write about climate change matters drawn from the 10 selected newspapers' media houses. A total of 51 names of journalists who write about climate change was obtained from the 10 newspapers' media houses, and 30 newspaper journalists were randomly selected for the study. A sample size of 30 or more is believed to result in a sampling distribution that is very close to the normal distribution (Saunders et al., 2007). To obtain the number of journalists from each newspaper's media house, probability proportional to size sampling was used (see Table 2).

Furthermore, four journalists were purposively selected from the Journalists Environmental Association of Tanzania. Members of the Association include experienced and veteran journalists who cover and report on climate change issues in newspapers. A purposive sampling technique was also used to select 10 editors – one editor was chosen from each of the selected newspapers. The selection of newspaper editors was with the aim of obtaining information from different media professionals. The final sample size was 44 newspaper journalists and editors. Similar studies (Anwar et al., 2004; Attfield and Dowell, 2003) have a higher or lower sample size.

The data was collected between March and July 2018 using structured questionnaires and applying a drop-off/pick-up design method. The structured questionnaires for the journalists and editors were written in both English and Kiswahili to give them the freedom of responding through the language of their choice (see Supplementary Material online). Qualitative data was obtained from five key informants, comprising the chairperson of the Journalists Environmental Association of Tanzania, senior journalists and chief editors. The quantitative data was analysed based on descriptive statistics. The qualitative data was subjected to content analysis, whereby the key informant interviews were recorded and transcribed into practical themes by the researcher for discussion. Phrases and issues that commonly recurred during the discussions were sorted to establish themes that captured something important about the data in relation to the research objectives (see Braun and Clarke, 2006).

Table 1. Selected newspapers.

Selection criteria								
			Ownership		Language		Frequency of publication	
Newspaper	Circulation per day	Publisher	Government	Private	Kiswahili	English	Daily	Weekly
Business Times	15,000	Business Times Limited		x		x		x
Daily News	50,000	Tanzania Standard Newspapers	x			x	x	
The Guardian	20,000	IPP Media		x		x	x	
Habari Leo	40,000	Tanzania Standard Newspapers	x		x		x	
Majira	10,000	Business Times Limited		x	x		x	
Mtanzania	15,000	New Habari Corporation		x	x		x	
Mwananchi	40,000	Mwananchi Communication Limited		x	x		x	
Nipashe	15,000	IPP Media		x	x		x	
Rai	1000	New Habari Corporation		x	x			x
This Day	4000	IPP Media/Media Solutions		x		x		x
Total			**2**	**8**	**6**	**4**	**7**	**3**

Source: Muthee and Mhando (2006); Media Sustainability Index (2012); Simon and Ryan (2013).

Table 2. Selected newspaper journalists.

Newspaper	Number of journalists	Selected journalists based on probability proportional to size
Business Times	5	3
Daily News	6	4
The Guardian	5	3
Habari Leo	6	4
Majira	4	2
Mtanzania	5	3
Mwananchi	7	4
Nipashe	5	3
Rai	4	2
This Day	4	2
Total	**51**	**30**

Results and discussion

Demographic profile of the respondents

The study findings show that most (77.3%) of the journalists were male, suggesting that journalism, like many other professions, is male-dominated. Slightly more than a quarter (27.27%) of the journalists were aged between 41 and 45 years, which was followed by those aged between 36 and 40 years (20.45%); the mean age of the respondents was 38 years. With regard to the level of education, one-third (34.1%) of the newspaper journalists had a Bachelor's degree and the rest had diplomas and certificates (see Table 3). These findings demonstrate that these newspaper journalists were within the active labour force age range and their literacy level was good. Other scholars (e.g. Aoyagi-Usui, 2008; Aoyagi-Usui et al., 2003; Ester et al., 2003) have opined that the extent of understanding climate change issues depends on, among other things, individual characteristics, such as educational level, age, gender and occupation experience. Two-thirds (66%) of the newspaper journalists had work experience of 10 or more years. The majority (72.7%) of the respondents reported that they had covered and reported on climate change issues in their newspapers.

When asked whether or not they had received any formal training on climate change issues, less than half (45%) of the respondents admitted to having attended such training sessions (Table 3). According to Menezes (2018) and Shanahan (2011), training on climate change is necessary because it enhances journalists' ability to identify new sources, content, knowledge and skills with regard to climate change. These findings imply that despite the fact that the newspaper journalists had good level of experience in the field of journalism, they reported on climate change information in their newspapers without having had specialized training – something that may affect the quality of the climate change information published in their newspapers.

Sources of information used by the journalists

The respondents were asked to name and rank the sources of information on climate change they mostly used when searching for and preparing news for their

Table 3. Demographic profile of the respondents.

Category	Frequency	%
Sex		
Male	34	77.3
Female	10	22.7
Age		
25–30	8	18.18
31–35	5	11.36
36–40	9	20.45
41–45	12	27.27
46–50	7	15.90
51–55	3	6.81
Education level		
Certificate	12	27.3
Diploma	17	38.6
Bachelor's degree	15	34.1
Years of work experience		
≤ 9	15	34.0
10–15	24	54.6
16–20	5	11.4

newspapers. The findings in Table 4 indicate the sources of information on climate change used by the newspaper journalists in order of priority.

The findings indicate that 64% of the newspaper journalists consulted climate change experts from government agencies and research institutions such as the Tanzania Meteorological Agency (TMA), the University of Dar es Salaam, Sokoine University of Agriculture, Ardhi University and the Tanzania Forestry Research Institute as sources of information. Climate change experts in these institutions generate information through research activities. A climate change expert is an interpersonal source of information, and this requires one to have the interpersonal skills necessary to source information through interactions. This resonates with Hiles and Hinnant (2014), who posit that climate change is a complex subject that is reported by older and veteran journalists who may have developed interactional knowledge of sourcing information through many years of experience.

The TMA is the agency that is entrusted with the task of collecting, archiving and disseminating climate change and other related information generated by its experts. The agency uses different channels, such as broadcast media, print media, Internet websites and social media, to disseminate such information. The newspaper journalists indicated a high preference for sourcing climate change information from the TMA experts, mainly because this is a government agency, which is likely to provide reliable information. In one of the key informant interviews conducted in Dar es Salaam, a journalist opined: 'Whenever there are issues about climate change to be communicated to the general public, TMA has the culture of inviting us for news coverage of it in our newspapers' (Key informant, Dar es Salaam, 17 March 2018). This finding confirms the findings in the studies by Lumosi and McGahey (2016), Ochieng (2009) and Singh et al. (2018), who reported that government agencies such as meteorological agencies play an important role in generating and disseminating information on climate change in their countries. Similarly, Future Climate for Africa (2016) and Chang'a et al. (2010) reported that the TMA is a key source, which provides current information on climate change to the general public and decision-makers in Tanzania.

Climate change experts from research institutions such as the National Carbon Monitoring Centre at Sokoine University of Agriculture, the Institute of Resources Assessment at the University of Dar es Salaam, Ardhi University and the Tanzania Forestry Research Institute were also regarded as important sources of scientific climate change information among the newspaper journalists. The newspaper journalists indicated a high preference for obtaining scientific information from climate change experts from the government agency and research institutions mentioned above because they are particularly engaged in climate research work. Scholars (e.g. Shanahan et al., 2013) suggest that newspaper journalists should contact experts for credible and verifiable climate change facts and predictions. Information verification can promote adaptation by making the climate change agenda more visible through clear frameworks which can be understood by the public. A proper understanding of climate change issues helps journalists to make clear frameworks. Similarly, in one of the key informant interviews, a newspaper journalist indicated his preference for using climate change experts as a source of information:

> Although they are very few in number, I prefer seeking information from climate change experts because they are so flexible; they can become resource persons in seminars, conferences and workshops, and I can freely consult them at any time when preparing news for my newspaper. (Key informant, Dar es Salaam, 17 March 2018)

This finding suggests that by attending seminars, conferences and workshops facilitated by experts on matters related to climate change, and by taking the initiative to consult these experts, newspaper journalists can easily and freely obtain scientific knowledge on climate change issues. Seminars, workshops and

Table 4. Sources of information on climate change used by the newspaper journalists.

Sources of information (N = 44)	Usage	
	Frequency	%
Climate change experts from the Tanzania Meteorological Agency and research institutions	28	64.0
Daily events	15	34.1
Radio	11	25.0
Internet websites	10	22.7
Newspapers	9	22.5
Television	9	22.5
Books	6	14.0
Scientific journals	5	11.4
Brochures, magazines, bulletins	2	5.6
Library and information resource centres	1	2.3
Other sources	1	2.3

conferences are short-term training that can expose journalists to more understanding of climate change matters through face-to-face interactions with climate change experts (Ochieng, 2009; UNESCO, 2019; Wihbey and Ward, 2016), promote sources of information, and enhance their effective usage for increasing access to and coverage of climate change information.

About a third (34.10%) of the newspaper journalists indicated that they preferred events such as community meetings and social gathering as sources of information on climate change. Community meetings and other relevant social gatherings provide forums through which information can be easily and quickly shared among community members by talking, asking questions and getting clarification on the questions raised (United Republic of Tanzania, 2012). Community meetings enable newspaper journalists to collect information on how the community uses indigenous knowledge – for example, seasonal weather predictions and adaptations. In Tanzanian context, however, scientific knowledge and indigenous knowledge should complement each other as both have their own strengths and weaknesses (Elia, 2013). Furthermore, the newspaper journalists admitted to having quickly and freely acquired knowledge on various issues of climate change from speeches by politicians, professional groups and other relevant gatherings. This finding is in agreement with those of Chang'a et al. (2010) and Egeru (2016), who reported that community meetings are a participatory approach to information dissemination.

Traditional mass media are important sources used by newspaper journalists for covering and reporting on the most current information in climate change. According to Gunho (2005), mass-media sources help newspaper journalists to follow what is reported by other journalists in other media outlets, which in turn promotes inter-media agenda-setting. However, the findings of this study indicate that only a quarter (25%) of the newspaper journalists used radio as a source of climate change information, and less than a quarter (22.5%) used television and newspapers. This implies that these traditional electronic media were used less by the newspaper journalists for news-making.

The findings indicate further that less than a quarter (22.7%) of the newspaper journalists used Internet websites as a source of climate change information. This low usage of Internet websites by the newspaper journalists may be associated with technological barriers, particularly with how to use computers to search for information from Internet websites; a low awareness of the important websites where they can locate information about climate change, such as data banks and the official websites and portals of international organizations; and the high cost of Internet service subscriptions (Elia, 2019c; Mansour, 2018; Sharif and Medvecky, 2018; Singh and Sharma, 2013). This finding is in contrast to the reality that Internet websites are possibly the most popular means of online communication. Internet websites can potentially enable newspaper journalists to access and share huge amounts of information on climate change from different sources, thus reducing the cost of searching for, gathering, and sharing current and relevant information (e.g. see Elia, 2019b; Harbinson et al., 2006; Hossain and Islam, 2012; Mahajan and Kumar, 2017). Interesting further discussions with upcountry newspaper journalists indicated that these journalists mostly used Internet services such as email to communicate their news to newsrooms, but did not mostly use Internet services as a search facility for climate change information. Aziz (2014) is of the opinion that the use of Internet websites in Tanzania is inevitable, and it will change journalists' traditional ways of gathering, producing and processing information for further dissemination in the news media.

With regard to printed materials, the findings show that very few of the respondents used brochures, magazines and bulletins (5.6%), scientific journals (11.4%) or books (14%) as sources of information on climate change. The low usage of printed materials may be attributed to a number of factors, including a poor reading culture. It has been reported that many journalists in Tanzania have a poor reading culture (Bazira et al., 2019). Such a culture needs to be cultivated to make it a daily activity, promoting

individuals' lifelong learning skills when they apply critical thinking and problem-solving skills (Wema, 2018). Other factors include the high cost of scholarly publications and the limited budgets of many libraries for buying and subscribing to the relevant printed materials (Lund, 2019). One journalist made the following comments during a personal interview: 'I prefer to cover stories that do not entail much usage of reference materials such as books and journals because such materials may not be available in the libraries for meeting information needs' (Key informant, 15 July 2018). This implies that the high cost of print materials and the limited budgets for libraries impede the availability of relevant reference materials for newspaper journalists in libraries.

The findings indicate that only 2.3% of the respondents used libraries and information resource centres for information on climate change. The low preference of libraries and information resource centres is attributed to the fact that media houses do not have their own libraries and information resource centres. The low preference is also attributed to the poor usage of the available academic and public libraries. Journalists find it difficult to use academic libraries because these libraries are meant for the students, academic staff and other workers in the academic institution. The lack of relevant reading materials is another hindrance to the usage of public libraries by newspaper journalists. In one of the key informant interviews, a newspaper journalist made the following comment: 'Quick use of libraries is not possible because our media houses do not have libraries and information resource centres where we can get reference materials easily' (Key informant, Dar es Salaam, 27 June 2018). This finding is contrary to the studies by Sasaka et al. (2017) and Hossain and Islam (2012), who reported that media libraries and information resource centres are important sources of information and provide both current and retrospective information through current awareness services, the selective dissemination of information, and reference services for journalists. Of the many advantages, the use of libraries such as the Sokoine National Agricultural Library and the University of Dar es Salaam Library may enable newspaper journalists in Tanzania to access information on climate change that is published in newspapers and make this information available to the public. In addition, through using these libraries, newspaper journalists can access the Tanzania Climate Change Information Repository, which provides access to research information on climate change resources generated by the Climate Change Impacts, Adaptation and Mitigation programme and other sources relevant to Tanzania.

Challenges encountered by the journalists

The respondents were provided with a list of challenges encountered when covering climate change information (see Table 5). The overwhelming majority (91%) of the newspaper journalists admitted that abiding by journalistic norms such as the balancing of news impeded them from covering and reporting on climate change issues in their newspapers. Adherence to the balanced norm necessitates that impartial reporting must give approximately equal space to both sides of the climate change story. These norms may sometimes lead to biased coverage of news on climate change by journalists because undue weight may be given to other topical issues raised by the contrarians, amplifying their uncertainties about the causes and risks caused by climate change (Anderson, 2017; Boykoff and Boykoff, 2004; Sunband et al., 2009). Since climate change is a science-based subject, newspaper journalists' adherence to the norm of balance may affect the quality and quantity of the coverage of climate change information, which, in turn, becomes an impediment to the improved communication of scientific climate change information in newspapers (Boykoff and Boykoff, 2007).

More than three-quarters (77.3%) of the journalists reported not having employment contracts with media houses, and they were thus working as freelance journalists. Similar findings are reported by the African Media Barometer (2015), which revealed that newspaper owners sometimes hire journalists on a freelance basis. The lack of employment contracts leads to low motivation, which, in turn, inhibits journalists' productivity in seeking and reporting on development news such as information on climate change. Low motivation is probably associated with low incentives, such as poor payment, and insufficient journalistic training, which hinders freelance journalists from dedicating much of their time and skills to the coverage of climate change issues; instead, they opt for the coverage of other news, such as crime and sensational news stories that have immediate gratification for them. Baglo (2008) and Powell (2017) similarly reported that lack of motivation – as a result of journalists' poor working conditions, lack of job security, lack of incentives and poor payment packages – led to the poor performance of newspaper journalists in reporting developmental information, including climate change.

The findings indicate that three-quarters (75%) of the newspaper journalists agreed that lack of interest in the subject was one of the challenges facing them when it came to the coverage of climate change issues. This means that a lack of interest in climate

Table 5. Challenges in the coverage of climate change information in newspapers.

Serial Number	Challenge (N = 44)	Response					
		Agree		Disagree		Undecided	
		Frequency	%	Frequency	%	Frequency	%
1	Abiding by journalistic norms such as the balancing of news on climate change	40	91.00	1	2.30	3	6.80
2	Lack of employment contracts	34	77.30	3	6.80	7	15.90
3	Lack of interest in climate change	33	75.00	7	15.90	4	9.09
4	Inadequate financial resources and time constraints	30	68.20	6	13.64	8	18.18
5	Lack of awareness of the available sources of information	28	63.64	9	20.45	7	15.91
6	Limited knowledge of climate change	26	61.36	10	22.73	8	18.18
7	Reluctance of government information officers to share information with journalists	24	54.55	9	20.45	11	25.00
8	Other challenges	15	34.00	10	22.70	19	43.20

change leads to the low coverage of information on climate change in Tanzanian newspapers. Harbinson et al. (2006) and Lyytimäki (2012) have also reported that diminishing coverage of information on climate change in newspapers is caused by a decrease in the interest of journalists and editors. Lack of interest in reporting climate change information is further associated with a lack of specialized training in climate change subject matter (Amu and Agwu, 2012) and a belief that climate change is not an attractive topic, particularly for climate change contrarians. However, contrary to the popular beliefs of the climate change deniers, Shanahan et al. (2013) are of the view that climate change is an attractive topic that is full of issues which can attract many news audiences in print media, such as newspaper journalists.

Over two-thirds (68.2%) of the newspaper journalists agreed that coverage and reportage of developmental news such as climate change was constrained by inadequate financial resources and time. The journalists reported having operated on meagre budgets. This implies that the budgets allocated to newspaper journalists are not enough to cover transportation, food, accommodation, and the acquisition of proper information and communications technology equipment – such as cameras, recorders and laptops – which is required for covering the already available information in climate change. Further, inadequate financial resources inhibit newspaper journalists from engaging in research activities. When journalists are given enough financial resources, they can participate in research activities, which, in turn, can help them cover and write about climate change, and publish about it in their newspapers. For example, to report on adaptation measures, journalists may need to travel to rural settings to find stories about what climatic threats people are facing and how they are adapting (Shanahan et al., 2013).

The newspaper journalists in this study further revealed that a shortage of time was another challenge, which hindered them in seeking, covering and cross-checking all the sources of their stories, and ascertaining the quality of the information received. Time constraints make newspaper journalists rely on limited sources for information on climate change, which, in turn, can limit their ability to understand and hence communicate climate change issues through their newspapers. This finding tallies with the findings in other studies (e.g. Anderson, 2017; Boykoff and Roberts, 2007; Harbinson et al., 2006; Mwita, 2018; Osifelo and Honiara, 2017; Shanahan, 2009; Sharif and Medvecky, 2018; Singh and Sharma, 2013; Tairo, 2013), which reported that inadequate financial and time resources made journalists shift their priorities from real development issues to reports that provided immediate gratification for the reporters. Hence, adequate coverage and niche, high-quality reporting, based on in-depth and sound research, facts and statistics on climate change, are not achieved.

Furthermore, 63.64% of the newspaper journalists agreed that they lacked awareness of the available credible sources from which they could get information on climate change. This implies that a lack of awareness of the variety of available new sources of information on climate change and the limitations of each source hinders newspaper journalists in searching for and covering information on climate change. Similarly, Tologbonse et al. (2008) and Elia (2019c) reported that a lack of awareness of the existence of information sources acts as a barrier to

meeting information needs. One journalist strongly suggested the following in an interview:

> One of the hindrances to have a quick access to climate change issues is that sometimes I don't know the varieties of sources which I can use to make news. Any attempt to help to be aware of the sources would be helpful to newspaper journalists. (Key informant, Dar es Salaam, 11 June 2018)

This demonstrates that there is a dire need for the newspaper journalists to receive information on the varieties of sources from other information professionals to enable them to produce accurate accounts of climate change.

Pertaining to knowledge, 61.4% of the respondents agreed that they did not have sufficient knowledge about climate change. Journalists' insufficient knowledge about climate change results in poor information-search strategies, poor coverage, and inaccurate and limited information reportage in newspapers. Insufficient knowledge is perhaps associated with a lack of climate-change-relevant subject matter specialization and a lack of access to timely, clear and understandable information on climate change, coupled with the language barrier, which together make journalists regard climate change as a difficult subject for media such as newspapers (similar results were reported by Bazira et al., 2019; Elia, 2019c; Harbinson et al., 2006; Painter and Bundy, 2010). The accurate and reliable reportage of matters on climate change in newspapers requires that media professionals have professional ability and enthusiasm. According to Boykoff and Boykoff (2007), the possession of climate change knowledge, experience and competence will enable journalists to perform better and more professionally in covering and reporting information on climate change in newspapers. This suggests that possession of clear knowledge of climate change subject matter helps journalists to identify and enhance the effective use of reliable information sources for their own understanding of climate change before reporting on it in newspapers to create public awareness. This resonates with Lulagambi et al. (2011), who reported that if journalists understand the issue they are covering, their audience will be better informed. Furthermore, possession of specialized knowledge, skills and dedication with regard to climate change may encourage journalists to cover more information related to climate change.

Lastly, 54.6% of the newspaper journalists revealed that coverage and reportage of climate change information in Tanzanian newspapers was constrained by the reluctance of some government information officers to share important information with journalists. This finding agrees with Nkya (2017), who reported that sometimes it is extremely difficult to obtain information from government information officers, especially on things that are not going well in relation to developmental issues. Government information officers are the custodians of information in different government departments. However, sometimes they restrict access to such information for public use on the grounds of information secrecy, without further justifications (Kabata and Garaba, 2020). Thus, newspaper journalists cannot make use of the information held by government information officers to write a story about climate change issues. This finding is contrary to the right of access to information that is under the control of information holders (Bussiek, 2015; United Nations Environmental Programme, 2006).

Conclusion and recommendations

The main sources of climate change information consulted by newspaper journalists in Tanzania are climate change experts and daily events such as community meetings and other relevant social gatherings. These sources are interactive – enabling journalists to obtain climate change information – and easily accessible, and use and provide instant responses. Furthermore, the study established that deficient use of other potential sources of information, such as libraries, printed materials (brochures, magazines, bulletins, journals, books) and Internet websites, coupled with overarching challenges that limit newspaper journalists from covering and reporting information on climate change, may affect the quality and quantity of information published in Tanzanian newspapers for raising public awareness of climate change.

Based on these findings, several recommendations are made. The government, private newspaper media houses, climate change researchers, all of the organizations involved in the fight against climate change and journalism colleges should collaborate and devise strategies aimed at building the capacity of newspaper journalists, editors and reporters in their daily activities. This can be achieved by introducing journalism courses on climate change, which, in turn, will lead to the acquisition of specialized skills and knowledge in writing and reporting on evidence-based scientific developmental issues, including climate change, in print media such as newspapers.

Newspaper media houses should overcome the barriers that impede the coverage and reportage of climate change information. One way of overcoming such barriers is the provision of adequate financial

resources to newspaper journalists, which will help them acquire the necessary resources, including information and communications technology equipment; they should also meet other necessary expenses, such as travel and accommodation, which, in turn, will enable journalists to participate in research and increase the coverage of climate change information in newspapers.

With regard to media professionals, newspaper journalists should collaborate with library professionals who facilitate programmes on user education training for newspaper journalists. User education training will provide newspaper journalists with information on multiple new available sources and the skills of how to search, locate and effectively retrieve information from these sources; this will improve the quality and quantity of information on climate change covered in newspapers, and create awareness of the issues.

One of the major obstacles in this study was that the newspaper journalists could not be easily found in their offices during data collection; this necessitated making several appointments to meet them outside their offices. This delayed the data collection exercise within a reasonable set time. However, the objectives of the study were met.

The research for this study was limited to newspaper journalists in Tanzania and the results may therefore lack generalizability to other media outlets and information. There is hence a need for further research. Potential areas of research that would complement this study include studies to assess the sources used by journalists in Tanzanian electronic media (television and radio) to extract information on climate change and other developmental issues such as health and agriculture. Furthermore, research is needed on information literacy programmes for journalists or user education programmes for all categories of journalists in Tanzania. Studies are also needed on the information needs and information-seeking behaviour of different categories of journalists with respect to developmental information such as climate change.

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