

**THE ROLE OF NEWSPAPERS IN THE DISSEMINATION
OF CLIMATE CHANGE INFORMATION IN TANZANIA**

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EXTENDED ABSTRACT

Newspapers make an important communication channel for disseminating many kinds of information. However, there are concerns in many developing countries such as Tanzania that important developmental topics such as climate change are not often given adequate coverage and prominence; instead much attention is paid to topics such as politics, entertainments, crimes, and advertisements.

This study established the coverage of climate change information in Tanzanian newspapers for a span of 10 years. Specifically, it sought to determine the frequency of reportage given to climate change information in Tanzanian newspapers, determine the level of prominence given to climate change information by Tanzanian newspapers, establish the sources of information used by newspaper journalists to obtain climate change information, and assess the use of newspapers in accessing climate change information by selected peri-urban newspaper readers in Tanzania. Quantitative data were collected through content analysis and survey whereas qualitative data were collected through key informants interviews. The sample size of the study was 1,600 newspaper editions, 44 newspaper journalists, and 153 peri-urban newspaper readers. Purposive sampling technique was used to select newspapers, regions, and key informants. Snowball sampling technique was used to select peri-urban newspaper readers. Systematic and simple random sampling techniques were used to obtain newspaper editions and journalists. Quantitative data were analysed using IBM SPSS Statistics Version 20 whereas qualitative data were analysed using content analysis.

This thesis was developed in paper format. The first paper analysed the level of attention given to climate change information by Tanzanian newspapers. The results indicate that Tanzanian newspapers had very few (684; 0.84%) articles on climate change giving yearly

average of 68.4 articles. Chi-square test indicates a significant difference at 5 percent level of significance ($\chi^2 = 21,765$, $p\text{-value} < 2.2e^{-16}$) between the level of coverage of climate change articles and that of other topics in the selected newspapers. These findings suggest that Tanzanian newspapers do not pay adequate attention to climate change issues.

The second paper analysed the level of prominence given to climate change information by Tanzanian newspapers. The findings indicate that of the 684 climate change information articles published in 10 years, only 53 (7.6%) articles appeared on the front pages of the six Tanzanian newspapers, giving yearly average of five articles for all newspapers and only one article for each newspaper per year. Chi-square test shows a statistical significance at 5 percent level ($\chi^2 = 10.000$; $p\text{-value} < 0.002$) between placement of articles on the front and inside pages. These findings suggest that climate change information in Tanzanian newspapers is not given the required level of prominence.

The third paper assessed information sources used by Tanzanian newspaper journalists to collect climate change information. The findings indicate that 64 percent of climate change experts and 34.1 percent of daily events such as community meetings and other social gatherings were the main sources of climate change information consulted by newspaper journalists in Tanzania. Other sources of information were less consulted. These include libraries and information centres (2.3%); brochures, magazines, and bulletins (5.6%); journals (11.4%), books (14%), and internet websites (22.7%). Challenges such as abiding by journalistic norms to balance news in climate change (91%), low motivation (77.30%), lack of interest in climate change (75%), financial constraints (68.20%), lack of awareness on the available sources of information (63.64%) and limited knowledge on climate change (61.36%) prevented newspaper journalists from seeking and reporting climate change information.

The fourth paper assessed the use of newspapers by peri-urban newspaper readers in accessing climate change information. The findings show that newspapers (65%) are important sources used by peri-urban newspaper readers to access climate change information. Peri-urban newspaper readers experienced challenges such as inadequate coverage of climate change information (87%), unreliability of climate change information (84%), low prominence attached to climate change information (82%), cost barriers (78%), inadequate community information centres and public libraries (73%) in peri-urban areas. These were reported as constraints that impeded newspapers from accessing climate change information.

In view of the foregoing findings, it is concluded that coverage of climate change information in Tanzanian newspapers is very low. This is reflected by the few number of climate change articles in these newspapers. Similarly, the level of prominence attached to climate change articles is very low. This means that Tanzanian newspapers have not adequately played their role of reporting developmental issues including climate change. Increased coverage of climate change information in Tanzanian newspapers is necessary for the government and general public to direct their efforts to climate change adaptation, coping, and mitigation strategies. Furthermore, newspaper journalists prefer to consult interactive sources to obtain climate change information because they allow a two-way flow of information, they are easily accessible, and they use and provide instant responses. Likewise, climate change information consumers prefer to use newspapers written in Kiswahili which is understood by majority of readers and those which have high news coverage and circulation.

The following recommendations are made:

- (i) Government and private media houses should formulate and introduce clear guidelines and policies of ensuring that the levels of coverage and prominence of

developmental issues including climate change information in Tanzanian newspapers are increased.

- (ii) Government, private newspaper media houses, climate change researchers, organisations involved in the fight against climate change, and journalism colleges should collaborate and devise strategies aimed at building capacity to newspaper editors, journalists, and reporters of dealing with climate change information. This can be achieved by introducing climate change journalism course which will in turn lead to the acquisition of specialised skills and knowledge in writing and reporting evidence based scientific developmental issues findings including climate change in the print media such as newspapers.
- (iii) Newspaper media houses should overcome barriers that impede coverage and reportage of climate change information. One way of overcoming such barriers include the provision of adequate financial resources to newspaper journalists which will help them acquire necessary resources including ICTs and for meeting other necessary expenses such as travel and accommodation which in turn will enable them to participate in research works for increasing coverage of climate change information in the newspapers.
- (iv) Climate change information generators such as Tanzania Meteorological Agency should repackage and disseminate reliable climate change forecast that address the needs of the public through popular newspapers with national status.
- (v) National and local government authorities should provide adequate financial support to public libraries in establishing community information resource centres in peri-urban areas for enabling newspaper readers to access developmental information particularly climate change through Tanzanian newspapers at no or minimal costs.

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LIST OF PUBLICATIONS

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DECLARATION

I, Peter Onauphoo Siyao, do hereby declare to the Senate of Sokoine University of Agriculture that this thesis is my own original work done within the period of registration and has not been presented and will not be presented at any other University for a similar or any other Degree award.

Peter Onauphoo Siyao
(PhD Candidate)

Date

The above declaration is confirmed by:

Prof. Alfred Said Sife
(Supervisor)

Date

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AMB	-	African Media Barometer
AUMCA	-	Anglican Universities' Mission to Central Africa
CAS	-	Current Awareness Services
CR	-	Coefficient of Reliability
CRED	-	Centre for Research on Environmental Decisions
EWS	-	Early Warning Systems
GHG	-	Greenhouse Gases
GIOs	-	Government Information Officers
GKMC	-	Global Knowledge, Memory and Communication
HoD	-	Head of Department
ICT	-	Information and Communication Technology
IFLA	-	International Federation of Library Associations and Institutions
IPCC	-	Intergovernmental Panel on Climate Change
IRA	-	Institute of Resources Assessment
JET	-	Journalist Environmental Association of Tanzania
KIs	-	Key Informants
KIIs	-	Key Informant Interviews
MISA	-	Media Institute of Southern Africa
MoCU	-	Moshi Co-operative University
MSI	-	Media Sustainable Index
MU	-	Mzumbe University
NAPA	-	National Adaptation Programme of Action
NCCCS	-	National Climate Change Communication Strategy
NCMC	-	National Carbon Monitoring Centre
SAS	-	Social and Applied Sciences
SDI	-	Selective Dissemination of Information

SDG	-	Sustainable Development Goal
SNAL	-	Sokoine National Agricultural Library
SPSS	-	Statistical Package for the Social Sciences
SRECC	-	Stern Review on the Economics of Climate
SUA	-	Sokoine university of Agricultural
TaCCIRe	-	Tanzania Climate Change Information Repositories
TAFORI	-	Tanzania Forestry Research Institute
TMA	-	Tanzania Meteorological Agency
TANU	-	Tanzania African National Union
UNCCC	-	United Nations Climate Change Conference
URT	-	United Republic of Tanzania

CHAPTER ONE

1.0 INTRODUCTION

This thesis is developed in published papers format. The main objective of this study was to establish the coverage of climate change information in Tanzanian newspapers. To realise this objective, the thesis was split into three major areas that facilitated development of three published papers and one publishable manuscript all written by P.O Siyao and A.S Sife and published by the *Journal of Global Knowledge, Memory and Communication (GKMC)* © Emerald Publishing Limited 2514-9342, The *International and Federation of Library Association (IFLA) Journal* © SAGE Publishing and *East African Journal of Social and Applied Sciences (EAJ-SAS)* © Moshi Cooperative University (MoCU). The main agenda for the entire thesis was around the problem described in sections 1.1 and 1.2.

1.1 Background information

Climate change is a global phenomenon which results from increasing concentration of Greenhouse Gases (GHGs) in the atmosphere mainly from industrialization, deforestation, and increased use of fossil fuels. This in turn leads to an increase in temperatures, unreliable rain falls, unpredictable synchro mesh and storms, and the rise of sea level all of which have adverse effects on living organisms and on the environment (IPCC, 2007; Gross *et al.*, 2016). Climate change is one of the world's greatest challenges affecting both current and future generations, and thereby calling for concerted actions for the protection of fragile ecosystems, smooth implementation of development efforts, reduction of risks to public health, and successful implementation of poverty alleviation programs, among others (United Nations 2019; National Research Council, 2011; Weissbecker, 2011).

Generally, worldwide, no country which is free from the consequences of climate change, though there may be variation across countries on the levels of the effects of climate change (Schmidt *et al.*, 2013). Tanzania is one of the third world countries that is adversely affected by the impacts of climate change such as droughts, floods, erratic and unpredictable heavy rain falls, outbreak of diseases, low food crop production, death of animals and degradation of land resources among others (IPCC, 2007; URT, 2012). The intensity of the impacts of climate change have significant effects on agricultural productivity, water supply, food security, and human welfare (URT, 2007; Kangalawe, 2017). This is because the majority of the populations in the third world countries depend on climate sensitive natural resources; in addition, such countries have lower adaptive capacities (Ludwig *et al.*, 2007; IPCC, 2007).

Access to reliable and appropriate information is one of the important factors in adapting, coping and mitigating against the negative impacts of climate change. Policy makers, environmental activists, researchers, conservationists and ordinary citizens require access to high quality, timely and up to date information about climate change. Such information is necessary to raise people's awareness about the impacts of climate change on human and natural systems and to plan for adaptation strategies to combat climate change (Dinshaw *et al.*, 2012). Information on climate change also enables people to make informed decisions on the suitable adaptation, coping, and mitigation strategies (Giorgil *et al.*, 2009; Glantz *et al.*, 2009; Corner, 2011). Climate change information is an important pre-requisite for coping with and adapting to the negative impacts of climate change and for making informed decisions on planning for risk management and adaptation strategies that may help in preventing climate effects from becoming disasters that threaten livelihoods Srinivasan *et al.*, 2011; Jiri *et al.*, 2016). It is further claimed that an increased

access to information on climate change will further enhance people's awareness on climate change issues which will then result into better management of climate related risks (Debela *et al.*, 2015).

The dissemination of timely and accurate information on climate change increases resilience and adaptive capacity, and improves coping and mitigation strategies which are necessary withstanding the severity of the effects of changing climate (O'Brien, 2010). The dissemination of information on climate change also plays a critical role in providing Early Warning Systems (EWS) as well as increasing awareness for building the capacity and disaster preparedness to a changing climate (Cherotich *et al.*, 2012).

Information on climate change is generated at different levels, namely, community, and national levels. At the community level, information on climate change is often generated from best practices in pilot areas, community experiences on climate change adaptation, indigenous knowledge, and documented evidence of climate change affected sites. At the national level, information on climate change is generated through research, multilateral and bilateral environmental agreements, research reports, national and international meetings' reports, and government directives (URT,2012).

The generated information needs communication channels for its dissemination to the intended audience in a timely manner and in a clear unambiguous language for mobilizing decision making across communities to take actions in enhancing their capacity and willingness to adapt to the adverse impacts of climate change (Umunakwe *et al.*, 2014). Some of the channels include television, radio, and print media such as brochures, leaflets, newsletters, journals, and newspapers. These channels convey information and key conclusions generated through broadcasting and in publications formats (URT, 2012).

Newspapers play an important role in disseminating information on various issues because they are among the most widely-read periodicals that are available and accessible to the majority of people of all ages and walks of life (Antilla, 2005). Newspapers can be classified basing on the discernible criteria. Such criteria include frequency of publication (a newspaper can be published at various intervals but usually appears weekly or daily), time of publication, purpose, circulation, geographical location, method of production, and the intended audience. When compared to other media, newspapers have additional advantages of being in permanent form and make a longer impact on the minds of the readers, with more in-depth reporting and analysis. They can also provide sustained and prominent coverage to a particular subject (Boykoff and Boykoff, 2007; URT, 2012; Aiyesimoju and Awoniyi, 2012). Flexibility in reading is yet another important feature of newspapers as they can allow a reader to go back to it, refer to it, read, review, and study the materials at his/her own pace and convenient time (Dolsak and Houston, 2014). This means, unlike electronic media such as television and radio, newspapers produce information that can be interpreted by the readers at their own leisure and time without any constraints regarding to time and place. Furthermore, newspapers provide a deeper analysis than is often possible on radio and television. According to Jost (2013), dissemination of information through newspapers is considered as the best for reaching the public.

In Tanzania, climate change is seen as a growing serious concern which has significant impacts on the present and future generations (URT, 2015). Consequently, the government has made a number of initiatives in order to address the challenges of climate change. Some of these initiatives include the formulation and development of the National Adaptation Programme of Action (NAPA) in 2007 and launching of National Climate

Change Communication Strategy (NCCCS) in 2012 with the aim of raising people's awareness at all levels on the opportunities and threats brought about by climate change. This goal is in line with the Tanzania Development Vision 2025 and other sectorial policies (URT, 2007). Unfortunately, the level of awareness and understanding of climate change issues and the measures required to address the problem among stakeholders is still very low at all levels mainly because of the ineffective communication of climate change information (URT, 2007). Newspapers can thus play a vital role of raising awareness, educating and enlightening people and the governments on the necessary measures to be taken. In this regard, establishing the role of newspapers in the dissemination of climate change information in Tanzania is of particular importance as it enhances effective sharing and raising of public awareness.

1.1.1 Newspapers Landscape in Tanzania

The newspaper industry in Tanzania can be traced back to the year 1888 when the first newspaper named *Msimulizi* (The Storyteller) was published by the Anglican Universities' Mission to Central Africa (AUMCA) in Zanzibar (Sturmer, 1998). In 1957, *Sauti ya Tanganyika African National Union (TANU)* (the voice of TANU) newspaper which was owned by the political party known as Tanganyika African National Union (TANU) was founded and printed in Kiswahili. On the Tanganyika's Independence Day (9th December, 1961), a newly introduced paper known as *UHURU (Independence)* replaced *Sauti ya TANU*. In 1972, The *Daily News* and *Sunday News* became the English language government owned newspapers published daily and weekly respectively. It was in the same year TANU decided to establish a weekly newspaper known as *Mzalendo* (the Patriot). In 1990s, the media industry in Tanzania experienced dramatic changes leading to an increase in the number of newspapers (Murthy, 2011; Kweka, 2013). As of October

2015, there were 39 officially registered newspapers comprising 14 English and 25 Kiswahili language published newspapers (URT, 2016) with the majority of these being privately owned. Given this background, this study intended to establish the role played by Tanzanian newspapers in the dissemination of information on climate change.

1.1.2 Research Gap

There is a paucity of empirical evidence on the coverage of climate change information in Tanzanian newspapers. The few available studies (Elia, 2018; Elia, 2019b) focused on only two English published newspapers and they covered a very short period of time. These previous studies, therefore, may not yield sufficient evidence to comprehensively understand the subject as compared to a duration of 10 years that was covered in the present study.

1.2 Problem Statement and Justification of the Study

1.2.1 Problem Statement

Newspapers play a crucial role in informing the public and in shaping the opinion of the community and policy makers. It is believed that adequate coverage and prominence given to developmental topics such as climate change in newspapers leads to awareness creation. Awareness can be a recipe for public debate and understanding, which in turn, contribute to shaping and influencing public opinion and actions towards the benefits and adverse impacts of climate change (Ghazali and Azmi, 2013).

Therefore, increased coverage and prominence of climate change issues in Tanzanian newspapers may contribute to awareness raising, educating, and enlightening leading to

change of attitude among the people on the benefits and adverse impacts of climate change and thus enabling these people to take appropriate measures accordingly.

Despite the fact that newspapers make an important communication channel for disseminating information on climate change, among other things, there are concerns in many developing countries including Tanzania that important developmental topics are not often given adequate coverage and prominence in the newspapers, unlike topics such as politics, entertainments, crimes, and advertisements, which are given much attention (Shea *et al.*, 2020; Harbinson *et al.*, 2006; Shanahan, 2009; Diedong, 2013; Yadav and Rani, 2011; Kakonge, 2011; Tshabangu, 2013; Tagbo, 2010; Mare, 2011; Murthy, 2011; Tairo, 2013; Ogessa and Sife, 2017; Nkya, 2017). In Tanzania, much has not been done to establish why newspapers do not accord much attention and requisite prominence to developmental topics. It is against this background that this study was carried out, and whose focus was on the role played by Tanzanian newspapers in the dissemination of climate change information.

1.2.2 The justification of the study

The findings of this study have highlighted the importance of taking into account newspapers coverage of climate change information which can further be used for policy recommendations to improve the climate change information communication system through the use of newspapers and show the credibility of the newspapers in creating awareness of climate change in Tanzania.

The study has also generated information that might influence newspapers owners, journalists and news writers or reporters to give much attention and place climate change

information in the prominent position of the newspapers to enable easier communication of the information to the targeted audiences.

The findings of this study have identified the types and sources of obtaining climate change information in Tanzania. 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 may be used to equip Tanzanians and other climate change actors and decision makers engaged at the technical and policy level with timely and relevant information they can use in making informed decisions and choice.

This study has also contributed to the on-going discourses on climate change issues, influence attention and understanding of the issue and thus influencing the climate change adaptation, coping and mitigation strategies.

1.3 Objectives of the study and research questions

1.3.1 Overall objective

The study intended to establish the coverage of climate change information in Tanzanian newspapers for a span of 10 years.

1.3.2 Specific objectives

Specifically the study intended to:

- i. Determine the frequency of reportage given to climate change information in Tanzanian newspapers for a span of 10 years.

- ii. Determine the level of prominence given to climate change information by Tanzanian newspapers for a span of 10 years.
- iii. Establish the sources of information used by newspaper journalists in Tanzania to obtain climate change information for their newspapers coverage.
- iv. Assess the use of newspapers in accessing climate change information by the selected peri-urban newspaper readers in Tanzania.

1.3.3 Research questions

- i. What is the extent of reportage given to climate change information in Tanzanian newspapers for a span of 10 years?.
- ii. What is the level of prominence given to climate change information in Tanzanian newspapers for a span of 10 years?.
- iii. Where do journalists obtain climate change information for reporting in the Tanzanian newspapers?
- iv. To what extent do newspapers are used by the selected peri-urban newspaper readers in accessing climate change information in Tanzania?

1.3.4 Study limitations

Data collection depended upon on the ability of the coders and enumerators of recalling information. Generally, recall methods are prone to bias or response errors. Although the questionnaire and code book were translated into Kiswahili at the time of the interview and coding, communication errors caused by differences in the level of understanding between the enumerators and the respondents cannot be ruled out. However, efforts were made to ensure that correct information was collected after training of enumerators and coders before starting data collection. Furthermore, scanning the sampled newspapers for

climate change information and recording the results in the code sheet for the period of 10 years was a tedious and time consuming exercise which demanded researchers and coders to be extremely careful. Also it is possible that, the sampling strategy used might have led to the missing of some of the data that would have resulted into different conclusions about each newspaper's coverage of climate change information. However, the systematic sampling strategy was applied for a long period, that is, 40 months for each newspaper; and this increased the reliability and accuracy of the results and conclusions about the overall trends in each newspaper's coverage of climate change information. List of newspapers readers was not available; thus the researcher was forced to use non-probability sampling technique (snowball or chain-referral sampling technique). Newspapers readers were absent at their homes/offices during data collection and newspaper journalists were not also found in their offices during data collection something which necessitated the researcher to make several visits at their homes and offices. This somehow delayed data collection process at a specified period of time. However, together with all these limitations, the objectives of this study were met.

1.3.5 Theoretical and conceptual framework

1.3.5.1 Theoretical framework

This study is anchored around the Agenda-Setting Theory proposed by McCombs and Shaw (1972). This theory is concerned with the transfer of salience from the mass media pictures of the world to the pictures of how we think about an issue (McCombs, 2004). Coleman *et al.* (2009) pointed out that the agenda-setting is the process of the mass media presenting certain issues frequently and prominently with the result that large segment of the public come to perceive those issues as more important than others. In other words the Agenda –Setting Theory assumes that , the more the coverage and prominence an issue

receives, the more important it is to the people than other issues (Brosius and Kepplinger 1990; Miller, 2005; Coleman *et al.*, 2009). In this study, it is assumed that the amount of repeated attention to a story and its prominence which is highlighted by their coverage and placement have the most powerful influence on the public. Since the main purpose of this study was to establish the coverage of climate change information in Tanzanian newspapers, the Agenda-setting Theory of communication is important as it provides an insight on how the media in question can influence their audience to take appropriate measures such as climate change adaptation, coping, and mitigation. In this study, the theory was used to guide the study particularly in the formulation of research objectives and research questions and in the preparation of research instruments (code book).

Agenda-Setting Theory has some strengths and weaknesses. One of the strength of this theory is that besides its use in political issues, however, nowadays it has equally proved useful in many other issues such as in environmental, climate change, poverty and health issues among others (Coleman *et al.*, 2009; McDonald, 2009; Liu *et al.*, 2011). The theory also has its weaknesses, that is media users may not be as ideal as the theory assumes. People may not be well-informed, deeply engaged in public affairs and thoughtful because of the failure of the news media to set an agenda (Perloff, 1998). News media cannot create or conceal problems; they may only alter the awareness, priorities and salience people attached to a set of problems. Therefore to improve the effectiveness of the theory, the media should increase the understanding of the issues by reporting more detailed information.

1.3.5.2 Conceptual framework

The conceptual framework shows that newspapers are independent variables that act as the disseminators of climate change information (dependent variable) to the newspaper readers. In this framework, it is assumed that a newspaper becomes the disseminator of climate change information when this information is sourced out from the reliable sources and covered frequently and prominently; and it can also be accessed and used by newspaper readers without challenges for awareness creation about adaptation, coping and mitigation strategies required to combat the negative impacts of climate change.

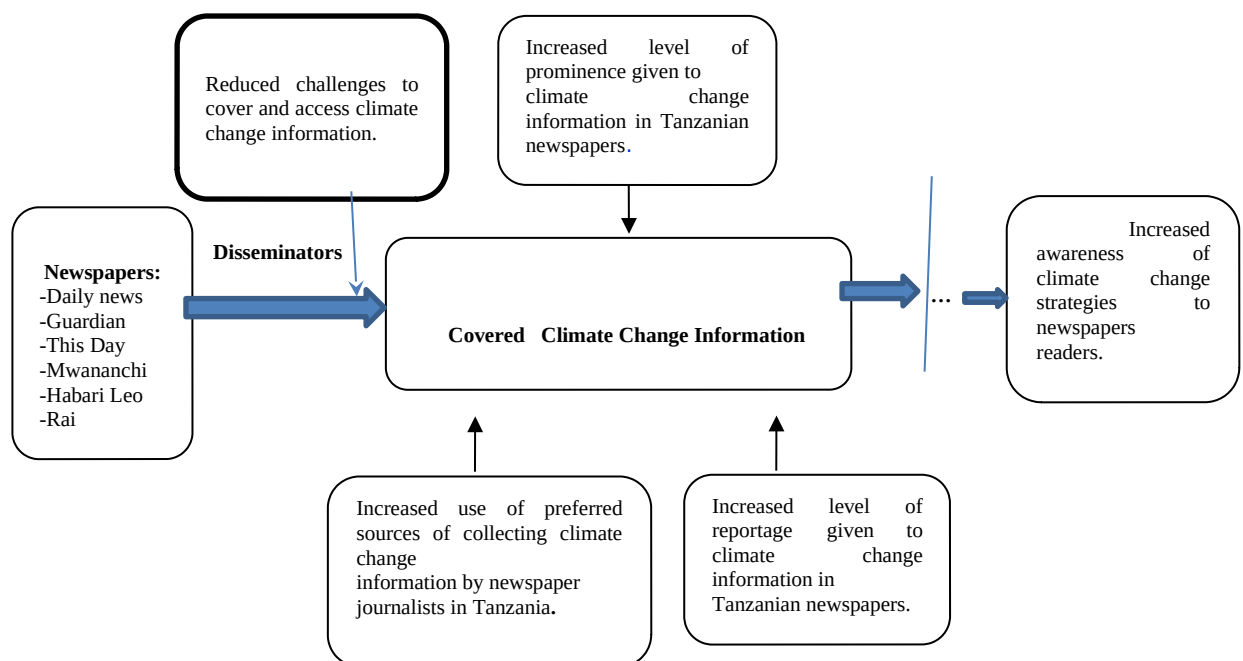


Figure 1. 1: Diagrammatic representation of conceptual framework showing that newspapers are the disseminators of climate change information to the newspaper readers.

Source : Researcher's Construct, 2015.

The vertical line at the side of the figure 1.1 above demarcates the end of the study. The dotted lines points to the subsequent results of disseminating climate change information through newspaper that is; increased awareness creation about climate change adaptation, coping and mitigation strategies as explained in the conceptual framework, which was however not examined as it was beyond the scope of this study.

1.4 General Methodology

The general methodology section describes the methodology for all published or published manuscript papers. Under this section, the following aspects are covered: research design and approaches, study population, unit of analysis, sampling techniques and sample size, data collection methods and instruments, data analysis, validity and reliability of instruments and data, and ethical consideration.

1.4.1 Research design

This study adopted a cross-sectional research design that enables data to be collected at a single point in time and allows for questionnaire survey (Sedgwick, 2014). Unlike other designs, a cross-sectional design was suitable based on the nature of this study as it required collection of data at once. The cross-sectional research design used both quantitative and qualitative research approaches, with the quantitative research assuming the dominant status. The key assumption for using a combination of quantitative and qualitative research approaches is that it provides a more comprehensive understanding of a research problem than when either of the approaches is used alone (Creswell, 2014). Therefore, quantitative and qualitative methods were used simultaneously to enable the analysis and output complement each other so as to reach the desired conclusions. Quantitative research approach employed descriptive survey and content analysis

methods. Content analysis is regarded as a research approach that systematically and objectively describes and quantifies phenomena such as communication content (Krippendorff, 2004). In this study, the definition of content analysis as provided by Berelson (1952:18) who conceptualized it as “*a research technique for the objective, systematic and quantitative description of the manifest content of communication*” was adopted. According to Riffe *et al.* (2019), content analysis is one of the most practical methods of studying media content. Content analysis plays the role of descriptive, inferential and predictive in media communication. The descriptive role provides insights into the messages and images in mass media whereas inferential and predictive roles of content analysis allow the researchers to go further and explore what media content says about a society and the potential effects mass media representations may have on the audience (Neuendorf, 2002). By using content analysis method in this study, newspapers were analysed on different aspects such as frequency of coverage and prominence from the contents of newspapers articles for the period of 10 years. The frequencies of coverage and prominence were quantified and further analysed through quantitative method. These concepts or categories enabled this study to condense and broadly describe and explain the text under the study (McNamara, 2005) to provide results that are capable of quantification (Holsti, 1963) and which do not rely on subjective perceptions (Kassed and Mustaffa, 2017).

Qualitative approach was used in this study because of its ability to provide in-depth information that fills the gaps left by quantitative design by giving more explanations. Qualitative approach was conducted using Key Informant Interviews (KIIs) whose information complemented quantitative findings.

1.4.2 Study population

Rahi (2017) as well as Creswell and Creswell (2017) describe a population as the entire group of people, events or things of interest that the researcher wishes to examine. Other scholars (e.g. Terre-Blenche *et al.*, 2006) opined that population is the larger pool from which sampling elements are drawn and to which findings are to be generalized. The population of this study comprised all registered newspapers published in Tanzania between January 2006 and December 2015, and all editors and journalists of all registered newspapers from the newspaper media houses between January 2006 and December 2015. The population of this study also comprised all peri-urban newspaper readers from Coast, Dar es Salaam, and Morogoro regions.

1.4.3 Unit of analysis

The unit of analysis is an important aspect of content analysis. Authors like Lewis-Beck *et al.* (2004) describe unit of analysis as the most basic element of scientific research project; that is the subject (the who or what) of study about which an analysis may generalize. The unit of analysis for this study included all newspapers articles or stories published by newspapers between 2006 and 2015 and which contained key terms associated with “climate change, global warming, or greenhouse gases” or “*mabadiliko ya tabia nchi, ongezeko la joto duniani au ongezeko la hewa ukaa*” in Kiswahili and many others which were translated and indigenized to reflect nationally used terms corresponding to English terms. Such terms include “drought (*ukame*), changes in rainfall patterns (*mabadiliko ya vipindi vya mvua*), floods (*mafuriko*), adaptation to climate change strategies (*mikakati ya kupambana na athari zinazotokana na mabadiliko ya tabia inchi*).

1.4.4 Sampling techniques and sample size

Sampling is the process of drawing a small number of important cases from a large population to yield the most information (Patton, 2015). This study used a combination of non-probability and probability sampling techniques, namely, purposive, snowballs or chain-referral sampling techniques, systematic and simple random sampling technique. In this study, purposive sampling technique was used to select six newspapers from a sampling frame of 39 newspapers for content analysis. These newspapers were purposively selected because they were information-rich subjects for the purpose of this study (Patton, 2015).

A purposive sampling technique based on inclusion and exclusion criteria was employed to select newspapers for this study. Inclusion criteria were national wide coverage and diversity of news, accessibility, and consistency in publishing issues, ownership type, language orientation and frequency of publication. Newspapers slanted on sensational issues, political and religious issues were excluded from the study. Newspapers which lack national wide coverage and diversity of news and are published in languages other than Kiswahili or English were also excluded from this study. To avoid double recording, if the same article was reported at the same time both in Habari Leo and in the Daily Newspaper which are the sister newspapers, only one article from either newspaper was selected for inclusion in the code book.

By the virtue of the archival quality of newspapers, the back issues of the newspapers under study were obtained from Mzumbe University Library (MU), Sokoine National Agricultural Library (SNAL), Dr. Wilbert Chagulla Library, Tanganyika National Library,

Morogoro Regional Library, and the National Archive. The names and the selection criteria of the newspapers under study are presented in Table 1. 1.

Table 1. 1: Selected newspapers

Newspapers	Selection Criteria						Circulation per day (copies)	
	Ownership		Language		Frequency			Publisher
	Private	Government	English	Kiswahili	Daily	Weekly		
Daily news		✓	✓		✓		TSN (Government)	50000
Guardian	✓		✓		✓		IPP Media (Private)	20000
Mwananchi	✓			✓	✓		MCL (Private)	40000
Habari Leo		✓		✓	✓		TSN (Government)	6500
Rai	✓			✓		✓	New Habari (Private)	1000
This Day	✓		✓			✓	IPP Media/Media Solutions (Private)	4000

Source: MSI, 2012; Simon and Ryan, 2013; MISA, 2017.

The study time frame between 2006 and 2015 was purposively selected because this is the time in which important national and international events and milestones were marked on climate change. National wide, from the year 2003 to 2011 Tanzania experienced a serious drought which had devastating impacts on the vulnerable sectors. In response to this, the government put in place a number of initiatives in order to address the challenges of climate change. Such initiatives include but not limited to the formulation of National Adaptation Programme of Action (NAPA) in 2007 (URT, 2007) and the launching of National Climate Change Communication Strategy (NCCCS) in 2012 (URT, 2012). The international events include the formulation of the Stern Review on the Economics of Climate Change (SRECC) in 2006 (Stern, 2008), the Kyoto Protocol which was revised in July 2006 and in March 2008 (Sampei and Aoyagi-Usui, 2009) and the United Nations Climate Change Conference (UNCCC) which was held in Copenhagen in 2009 (Cantley-Smith, 2010). This time frame of 10 years span was also purposively selected because it allowed for a broader insight into the coverage of climate change information in Tanzanian newspapers. Purposive sampling technique was used to select 10 newspaper editors from newspaper media houses and four journalists from Journalist Environmental Association of Tanzania (JET).

Purposive sampling technique was also used to select three regions which are Coast,

Dar es Salaam, and Morogoro and from each region, two districts were purposively selected making a total of six districts. These three regions were selected because they have access to newspapers from the nearby city of Dar es Salaam where most newspapers media houses are located. These regions also have relatively good road infrastructure which facilitates easy and timely newspapers distribution, which in turn leads to higher newspapers circulation and readership by peri-urban communities (AMB, 2015). In the

context of this study, peri-urban areas are the ones which are located in the urban peripheries and that serve as interface between the urban and the rural; and where urban and rural features and processes meet, intertwine and interact (Ricci, 2012). The six selected districts were Morogoro Urban and Mvomero from Morogoro region, Ubungo and Temeke from Dar es Salaam region, Kibaha and Bagamoyo from Coast region. These districts were selected because of having more peri-urban newspapers selling centres and they have more access to newspapers which are normally distributed in urban centres compared with other districts in the selected regions. Purposive sampling technique was also used to select two key informants (KIs) from each district making a total of 12 KIs.

Sampling frame of peri-urban newspaper readers does not exist leading to unknown size and boundaries of such population. Snowball or chain-referral sampling technique was therefore used to identify the cases for this study. According to Saunders *et al.* (2007); Dragan and Isaic-Maniu (2013) snowball sampling technique is used when it is difficult to identify members of the desired population. Newspaper vendors helped the researcher to identify up to three newspaper readers. The identified cases helped the researcher to identify other cases until the desired sample was researched. Due to financial and time constraints, the expected sample size for this study was 240 respondents. Other researchers in the social science had used a similar, or more or less sample size for example 240 respondents by Nyamba (2017), 254 respondents by Angello *et al.* (2014) and 300 respondents by Lunyelele *et al.* (2016). The technique was therefore used to obtain 153 newspaper readers from all six districts which is 63.75 percent response rate. According to Saunders *et al.* (2007) since it is not possible to achieve 100 percent response rate, the sample size needs to be large enough to ensure sufficient responses. This sample size of 153 respondents was therefore deemed sufficient for this study.

Simple random sampling technique (SRST) was employed to select journalists from each newspaper under study. To sample out the newspaper journalists, sampling frame was obtained from each newspaper media house. The probability proportion to size (PPS) was then used to select 30 newspaper journalists from a list of 51 journalists obtained from newspapers media houses.

Systematic random sampling technique was used to sample out newspapers editions. This technique enabled newspapers editions to be selected randomly as a starting point and thereafter followed by the selection of every n^{th} term from a randomly ordered target population of the newspapers which gave each item in the sample an equal opportunity of being selected (Creswell, 2014). To enable the selection of manageable number of daily and weekly newspaper editions for this study for 10 years, each year of the study was systematically divided into four quarters; each quarter comprising of three months. One month was randomly picked up from each quarter using lottery method which resulted into the selection of four months in each year. The research adopted composite sampling technique for data gathering. Two composite days, that is, Wednesdays and Saturdays were selected for each week in four months in a year. To obtain the estimated total number of newspaper editions for the study from the selected daily published newspapers, four daily newspapers were picked for 365 days in a year for a period of 10 years. This procedure yielded $(4 \times 365 \times 10 \text{ years} = 14,600)$ newspapers editions. On the other hand, two weekly newspapers were purposefully selected for four days in a month \times 12 months in a year \times 10 years = 960. Thus, the total estimated sample for both daily and weekly newspapers was $14,600 + 960 = 15,560$ newspaper editions. To get the final study sample, the following procedures were followed: For the daily published newspapers, two days were randomly selected by using lottery method in each week making a total of $(2 \text{ days} \times$

4 weeks x 4 newspapers x 4 months (quarters) x 10 years) = 1280 editions. For the two weekly published newspapers, one edition per each newspaper for each week was selected making a total of (2 newspapers x 4 weeks in a month x 4 months (quarters) x 10 years) =320 editions. The final study sample of the selected newspaper editions was therefore 1280 + 320 =1600 editions which is 10.3% of the total estimated population of 15,560 editions (Table 1. 2). A sample size of between 10% and 25% is acceptable when determining sample size in content analysis as recommended by Wimmer and Dominick, (2011).

Table 1. 2: Sample Tabulation

Newspapers' category	No. of newspapers	Estimated total no. of editions for all 10 years.	Sampled no. of editions per year	Total no. of editions selected for all 10 years
Dailies	4	4 newspapers x365 days x 12 months x10 years =14,600	4 newspapers x 2 days x 4 weeks x4 quarters =128	128 x10= 1280
Weeklies	2	2 newspapers x4 days x 12 months x 10 years =960	2 newspapers x4 days x4 quarters =32	32x10 =320
Total	6	15,560	160	1600

1.4.5 Data collection methods and instruments

Data for this study were collected using various methods of data collection (Triangulation). Survey method using questionnaires and Key Informant Interviews (KIIs) were employed to collect data for the survey research from April 2017 to July 2018. Content analysis method was employed to collect data for content analysis from the newspapers by using code book which is the most appropriate tool for analysing manifest contents of messages and information. Data for content analysis were manually collected through reading newspapers contents. The collected data were quantified and further analysed through quantitative method to get descriptive statistics such as frequencies and percentages and inferential statistics such as Chi-square. The methodologies outlined by Lynch and Peer (2002) and that of Di Gregorio *et al.* (2012) which are based on a predefined code book (Fig.1. 2) were followed. Data were collected from November 2016 to April 2017.

Identification particulars	Coders' name	.....
	Newspapers' name	.....
Publication date	Date	.....
	Day	.....
	Month	.....
	Year	.....
Published articles on various topics	Climate change	.....
	Politics	.....
	Crime	.....
	Entertainment	.....
	Advertisement	.....
	Business	.....
	Miscellaneous	.....
Total number of all published articles in the newspaper.		.....

Figure 1. 2: Code book adapted from Lynch and Peer (2002) and Di Gregorio *et al.* (2012)

This study used more than one method in data collection (triangulation) so as to ensure that quality data are collected and research findings are cross-checked (Bryman, 2004).

Triangulation helps to use the strengths of each of the procedures while overcoming their weaknesses. In this study, a combination of content analysis, questionnaires, and interviews methods were used as different methods of data collection. In this respect, this thesis triangulates between content analysis (quantitative), survey (quantitative), and in-depth interview (qualitative) methods.

1.4.6 Data analysis

Quantitative data collected from the newspapers contents and data gathered from the survey (questionnaires) were analysed using IBM SPSS Statistics Version 20 based on descriptive statistics such as frequencies, percentages as well as inferential statistics such as Chi-square. Interview data were qualitatively analysed by subjecting them to content analysis whereby KIIs were recorded and transcribed into practical themes for discussion. Phrases and issues that commonly recurred during discussion were sorted out for establishing themes that captured important things about the data in relation to the research objectives as suggested by Braun and Clarke (2006).

1.4.7 Validity and reliability of instruments and data

In any content analysis study, it is essential that the components of validity and reliability are taken into considerations in the study design.

1.4.7.1 Validity

Validity is the ability of an instrument to measure what it is supposed to measure (Blumberg *et al.*, 2014; Creswell, 2014). Validity tests are categorized into four types including content validity, face validity, construct validity, and criterion related validity. The current study opted for content validity which refers to the extent to which

measurement questions actually measure the presence of those constructs which are intended to be measured (Saunders *et al.*, 2012). To ensure the validity of the data collected, the code sheet and a questionnaire were pre-tested to see if they were related to the research topic and also whether they actually addressed the research questions raised in the study. Furthermore, the pre-testing was done in order to test the data collection instruments, to assess time for data collection, to check availability of the study population, to see how research team works together, to test procedures for data processing and analysis, and to check if the findings were relevant.

1.4.7.2 Reliability

To avoid subjective judgment that would result from a single individual to perform the task of coding in content analysis studies, two coders who are qualified in Bachelor Degree in library and information studies were trained on how to use a code book to record the coverage and prominence of climate change information. To ensure that coding sheet instrument was reliable, pilot test and code book review were conducted. Intercoder reliability test which determined the degree of agreement between the researcher and research assistants in the coding process was also conducted. Holsti's coefficient was calculated by dividing the total number of occurrences or agreed on values for each variable into the sum of the responses of each coder for the same variable and thus an acceptable intercoder reliability which fall between 0.75 and 0.80 was achieved as supported by Holsti (1969) and Neuendorf (2002). Holsti's (1969) coefficient of reliability (C. R.) provides a formula for calculating percentage as follows,

$$C R = \frac{2M}{N1 + N2}$$

Where:

CR = Coefficient of Reliability

M = number of coder decisions agreed on

N_1 = total number of coding decisions made by the 1st coder

N_2 = total number of coding decisions made by the 2nd coder

1.4.8 Ethical Issues

The study sought an informed consent from the participants by writing to them a consent letter. The participants were not induced in any way to participate and they were also informed of their willingness to withdraw from the study at any time if they wished to do so. The respondents' answers were kept confidential and/or anonymous. In this study, privacy was also maintained by not attaching participant's names to the information. The study also avoided improper data analysis which could result into publishing false or misleading conclusions. As necessary as required, the researcher observed SUA research guidelines and postgraduate guidelines. Research clearance was granted by SUA which enabled the researcher to obtain the research permit for data collection from various organizations.

1.5 Organization of the Thesis

This thesis is organised into chapters and presented in the form of published papers or publishable manuscript chronologically. The whole thesis comprises of three chapters starting with chapter one, which covers introduction, problem statement, study justification, research objectives and questions, limitations of the study, the theoretical and conceptual framework and general methodology of the study. Chapter two which forms paper-based chapter includes three published papers and one publishable manuscript addressing one of the specific objectives of the study. The first published paper analysed

the level of attention given to climate change information by Tanzanian newspapers for the period of 10 years between 2006 and 2015. This is followed by the publishable manuscript which analysed the degree of prominence that Tanzanian newspapers accorded to information on climate change. The second published paper assessed the information sources used by journalists from Tanzanian newspapers to obtain information on climate change. The third published paper assessed the use of newspapers in accessing information on climate change by the selected peri-urban newspaper readers in Tanzania. Chapter three presents the general conclusion that consists of a summary of the major findings from the papers, recommendations, and areas for further research.

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CHAPTER TWO

PAPER ONE

COVERAGE OF CLIMATE CHANGE INFORMATION IN TANZANIAN
NEWSPAPERS**Global Knowledge, Memory and Communication**

Coverage of climate change information in Tanzanian newspapers

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Coverage of climate change information in Tanzanian newspapers

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Climate
change
information

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Abstract

Purpose – This study was conducted to analyse the extent at which Tanzanian newspapers paid attention to climate change information over the period of 10 years between January 2006 and December 2015.

Design/methodology/approach – Six Tanzanian newspapers were quantitatively content analysed for frequencies of coverage to climate change information.

Findings – The results indicate that of total six Tanzanian newspapers had very few (684; 0.84 per cent) articles on climate change which is an average of 68.4 articles per year. Much attention was given to entertainment (24,331; 30 per cent) followed by miscellaneous (19,413; 24.0 per cent) and advertisements (18,112; 22.3 per cent). The Pearson's chi-square test indicates that there was a significant difference in $\chi^2 = 21,765$, p -value $< 2.2e^{-16}$ between the level of coverage of climate change articles on other topics in the selected newspapers.

Research limitations/implications – Scanning the sampled six newspapers for climate change information and recording the results in the code sheet for the period of 10 years was a tedious and time-consuming exercise which demanded researchers and coders to be extremely careful. Also it is possible that the sampling strategy used led to missing some data that would have resulted into different conclusions about each newspaper's coverage on climate change. However, the systematic sampling strategy was applied for a long period, that is, 40 months for each newspaper that increased the reliability and accuracy of the results and conclusions about the overall trends in each newspaper's coverage of climate change information.

Practical implications – These findings imply that, as the disseminators of information, Tanzanian newspapers did not pay adequate attention to climate change issues. The study concludes that contrary to the fact that climate change is among the threatening phenomena in Tanzania that would commensurate a significant attention in the media, the findings of this study indicate that the volume of coverage devoted to climate change by the newspapers in Tanzania is very low and disproportionate to the level of threat. This leaves a question on the Tanzanian newspapers' dedication to reporting climate change information. It is therefore recommended that newspapers' media owners, editors and journalists should be environmental nationalistic enough to frequently report climate change information, and the scope of the government-owned newspapers should be revisited to ensure more coverage of climate change information in their publication which can be done by having a section specifically dedicated for climate change issue.

Originality/value – This study has therefore contributed to the growing body of analytical research knowledge on the role of newspapers in the dissemination of climate change information in Tanzania. This study has also highlighted the importance of taking into account newspapers coverage of climate change information which can further be used for policy recommendations to improve the climate change information communication system through the use of newspapers and show the credibility of the newspapers in creating awareness of climate change in Tanzania.

Keywords Content analysis, Tanzania, Newspapers, Coverage, Climate change, Attention

Paper type Research paper



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Introduction

Climate change is a global threatening phenomenon caused by various activities such as deforestation, industrialization, transportation, electricity production and agriculture. These activities lead to the production of greenhouse gases that contribute to increased temperatures which in turn lead to global changes in climatic conditions (IPCC, 2007). Generally, all countries face the consequences of climate change, though they may be affected at different levels. Tanzania has felt the impacts of climate change such as recurrent and prolonged droughts, floods and erratic heavy rainfalls. These have in turn resulted into disease outbreaks, destruction of settlements and infrastructure, deaths of people and animals and land resources degradation, among many other effects (IPCC, 2007; URT, 2012; URT, 2013). As a result, climate change has received attention by various actors including governments, non-governmental organizations (NGOs), politicians, researchers and scientists, particularly on how to establish adaptation and mitigation strategies.

Access to reliable, timely and up-to-date information on climate change is necessary for raising awareness about the impacts of climate change, planning for adaptation and mitigation strategies (Cruce, 2007; GLCA, 2009; Dinshaw *et al.*, 2012) and better management of climate change related risks (Debela *et al.*, 2015). Dissemination of information on climate change is necessary to enable the understanding of the scope of climate change, its impact on the socio-economic and environmental stability and adaptation and mitigation strategies to be used (Comer, 2011; Jiyane and Fairer-Wessels, 2012). Appropriate communication channels are therefore needed to disseminate this kind of information to various groups of audiences. Some of such channels include television, radio, mobile phones, Web services and print media such as brochures, leaflets, newsletters and newspapers.

Newspapers are print or online publications that are issued at regular intervals usually daily or weekly, and they contain articles on various subjects. They are among the most widely-read periodicals that are available and accessible to many people who use them as a tool for expressing ideas and exchanging information (Wilson, 1995; Antilla, 2005; URT, 2015). Newspapers can play a central role in raising awareness, informing, educating and influencing behavioural change in people and communities (Schmidt *et al.*, 2013; Chand, 2017). When compared to other popular media such as radio and television, print newspapers have additional advantages of providing flexibility in reading as they can allow a reader to go back to it, refer to it, read, review and study the material at his/her own pace and convenient time (Dolsak and Houston, 2014). They can also provide sustained and prominent coverage to a particular subject (Boykoff and Boykoff, 2007; URT, 2012; Aiyesimoju and Awoniyi, 2010). It is therefore expected that the attention given to climate change information by newspapers may influence readers' understanding and behaviours towards climate change and promote adaptation and mitigation practices (Myhre *et al.*, 2013).

In the context of this study, attention refers to the number of times the media publish pieces of news items on a given issue which provides a cumulative volume of attention given to an issue (Kioussis, 2004; Schäfer *et al.*, 2014). This dimension of media is often measured by the total number of stories containing particular topic which appear anywhere in the newspapers during specific periods (Lim, 2010). Attention is a basic media quantitative measure where more attention or high frequencies signify that the issue is relevant or very important, and this affects the awareness of the general public and the priority given to an issue (Schmidt *et al.*, 2013). On the other hand, few and infrequent covered stories can cause the subject to be ignored by the audience thinking that the issue is not very important to them (Dotson *et al.*, 2012).

In Tanzania, the newspaper industry can be traced back to the year 1888 when the first newspaper named *Msimulizi* (the storyteller) was published by the Anglican Universities' Mission to Central Africa in Zanzibar (Sturmer, 1998). In 1957, *Sauti ya TANU* (the voice of TANU) newspaper which was owned by a political party known as Tanganyika African National Union (TANU) was founded and was printed in Kiswahili. On the Tanganyika's Independence Day (9 December 1961), *UHURU* (independence) newspaper replaced *Sauti ya TANU*. In 1972, the *Daily News* and *Sunday News* became the English language government-owned newspapers which were published daily and weekly, respectively. It was in the same year that TANU decided to establish a weekly newspaper known as *Mzalendo* (the patriot). In 1990s, the media industry in Tanzania experienced dramatic changes leading to an increase in the number of newspapers (Murthy, 2011; Kweka, 2013). By October 2015, there were 39 registered newspapers comprising 14 English and 25 Kiswahili language published newspapers (URT, 2015).

Despite the fact that newspapers make an important communication channel for disseminating information, there are concerns in many countries that important developmental topics such as climate change are often given inadequate coverage and attention (Harbinson *et al.*, 2006; Shanahan, 2009; Schäfer *et al.*, 2014; Anderson, 2009; Diedong, 2013; Yadav and Rani, 2011; Kakonge, 2011; Tshabangu, 2013; Tagbo, 2010; Mare, 2011; Murthy, 2011; Tairo, 2013). In Tanzania, the level of importance attached to climate change information by newspapers is not documented. This study was therefore conducted to analyse the level of attention given to climate change information by Tanzanian newspapers in the period of 10 years between 2006 and 2015. Specifically, this paper focusses on the level of attention given to different topics, climate change articles by each newspaper, number of climate change articles for each year and various climate change themes covered.

Methods

This study used content analysis method to systematically analyse the occurrences of climate change issues and how these occurrences were distributed in six Tanzanian newspapers. Attention was then calculated as the number of articles mentioning climate change as a proportion of the absolute number of articles published in a given newspaper for all 10 years. The population of this study was 39 newspapers published in Tanzania between January 2006 and December 2015. The units of analysis were climate change articles that contained key terms associated with "climate change" or "mabadiliko ya tabia nchi" in Kiswahili, and many other terms which were translated and indigenised to reflect climate change.

Purposive sampling technique was used to select six newspapers out of 39 registered newspapers for content analysis. The newspapers were selected based on characteristics such as nation-wide coverage, reach and countrywide circulation, existence for at least 10 years and consistency in publishing their editions (Table I). The duration from 2006 to 2015 was purposively selected because this is the time in which important national and international events on climate change were marked. Such events include but are not limited to National Adaptation Strategy and Action Plan in 2009, an Inconvenient Truth and The Stern Review on the Economics of Climate Change in 2006, the United Nations Climate Change Conference held in Copenhagen in 2009 and National Climate Change Communication Strategy in 2012.

To obtain the number of newspapers for the study, a month was randomly picked up from each quarter in a year, leading to 40 months (1,200 days) in 10 years. For the daily published newspapers, two days were randomly selected by using lottery method in each

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Newspapers	Ownership		Selection criteria				Publisher	Circulation per day (copies)
	Private	Government	Language	English	Kiswahili	Frequency		
Daily news		✓	✓			✓	TSN (Government)	50,000
The Guardian	✓		✓			✓	IPP media (private)	20,000
Mwananchi	✓				✓	✓	MCL (private)	40,000
Habari Leo		✓			✓	✓	TSN (Government)	6,500
Rai	✓				✓		New Habari (private)	1,000
This Day	✓		✓			✓	IPP media/media solutions (private)	4,000

Table I.
Selected newspapers Source: MSI (2012); Simon and Ryan (2013); MISA (2017)

week making a total of 1,280 editions for all four daily newspapers. For each weekly published newspaper, one edition per each week was picked up making a total of 160 editions for 10 years. The final study sample of the selected newspaper editions was therefore $1280 + 320 = 1,600$ editions which is 10.41 per cent of the total estimated population of 15,360 editions (Table II). A sample size between 10 per cent and 25 per cent is recommended as acceptable when determining sample size in content analysis (Wimmer and Dominick, 2011). Data for this study were collected between November 2016 and April 2017.

Analysis of climate change articles in Tanzanian newspapers followed the methodology outlined by Di Gregorio *et al.* (2012) which is based on a predefined code book in which newspapers contents were manually collected through reading newspapers (Figure 1).

To avoid subjective judgment that would result from a single researcher to perform the task of coding in content analysis studies, two coders with a qualification in library and information studies were trained, and they used a code book to record the coverage of climate change information. To ensure that coding sheet instrument was reliable, pilot test and code book review were conducted. Intercoder reliability test which determined the

Newspapers' category	No. of newspapers	Estimated total number of editions for 10 years	Sampled number of editions per year	Total number of editions selected for 10 years
Dailies	4	$4 \times 30 \times 12 \times 10 = 14,400$	$2 \times 4 \times 4 \times 4 = 128$	$128 \times 10 = 1,280$
Weeklies	2	$2 \times 4 \times 12 \times 10 = 960$	$2 \times 4 \times 4 = 32$	$32 \times 10 = 320$
<i>Total</i>	<i>6</i>	<i>15,360</i>	<i>160</i>	<i>1,600</i>

Table II.
Sample tabulation

Figure 1.
Code book adapted from Di Gregorio *et al.* (2012)

		Article identification				Position of an article				Article type							
Coders' name	Newspapers' name	Date	Day	Month	Year	Article on climate change (key words)	Number of articles	Front page (Lead)	Front page (Others)	Center page	Others	Back page	News	Feature	News summary	Editorial	Others

degree of agreement between the researcher and research assistants in the coding process was also conducted. Holsti's coefficient was calculated by dividing the total number of occurrences or agreed on values for each variable into the sum of the responses of each coder for the same variable (Holsti, 1969), and thus, an acceptable intercoder reliability which fall between 0.75 and 0.80 was achieved (Neuendorf, 2002). Statistical data analysis was done using IBM SPSS Statistics and excel spreadsheet. Descriptive statistics such as mean and frequencies and inferential statistics such as ANOVA, chi-square test and correlation were used in analysis.

Results and discussion

The study findings in Table III indicate that there were a total of 81,162 articles in all six newspapers for 10 years. *The Guardian* had the highest (24,816; 30.57 per cent) proportion of all articles followed by *Daily News* (22,234; 27.39 per cent) and *Mwananchi* (18,297; 22.54 per cent). *This Day* had the lowest (623; 0.77 per cent) number of articles followed by *Rai* (556; 0.68 per cent). The results indicate that these six Tanzanian newspapers had very few (684; 0.84 per cent) articles on climate change which is an average of 68.4 articles per year. Much attention was given to entertainment (24,331; 30 per cent) followed by miscellaneous issues such as environment and socio-economic issues (19,413; 24.0 per cent) and advertisements (18,112; 22.3 per cent). The Pearson's chi-square test indicates that there was a significant difference in $\chi^2 = 21,765$, p -value $< 2.2e - 16$ between the level of coverage of climate change articles on other topics in the selected newspapers. These findings show that Tanzanian newspapers did not pay adequate attention to climate change issues. That is to say, Tanzanian newspapers did not effectively play their role of informing, educating and enlightening people about climate change.

The findings indicate further that the newspapers with higher total number of articles had high proportions of climate change articles. These are *The Guardian* (157; 0.19 per cent), *Mwananchi* (139; 0.17 per cent), *Daily News* (138; 0.17 per cent) and *Habari Leo* (132; 0.16 per cent). On the other hand, newspapers with lower total number of articles had relatively low proportions of climate change articles. The newspapers are *Rai* (26; 0.03 per cent) followed by *This Day* (92; 0.11 per cent) (Table III). This suggests that there is more coverage of articles on climate change in newspapers that produce many articles and low coverage in the newspapers that produce few number of articles.

Comparisons were made on the level of attention given to climate change information by the newspapers with respect to language, frequency of publication, ownership type and years of publication. The results in Figure 2 indicate that the three English published newspapers covered 57 per cent of all climate change articles for 10 years. On an average, *The Guardian* had 23 per cent of all climate change articles followed by *Daily News* (20 per cent) and *This Day* (14 per cent). On the other hand, the three Kiswahili newspapers had 43 per cent of all articles on climate change. *Mwananchi* had 20 per cent of all articles followed by *Habari Leo* (19 per cent) and *Rai* (4 per cent). English published newspapers in this study were broadsheets with larger carrying capacities, whereas Kiswahili published newspapers were tabloids whose measures were 11 × 17 inches narrower than broadsheet newspapers. The findings in this study however were contrary to those of Henry and Gordon (2001) and Schäfer *et al.* (2014) who observed that the carrying capacity of newspapers is sometimes limited because of limited numbers of pages which make the newspapers to give attention to small number of some issues at any point in time.

With respect to newspapers ownership, the study results in Figure 2 indicate that the government-owned newspapers covered only 39 per cent of all climate change articles, whereas the privately owned newspapers covered 61 per cent of all climate change articles.

Table III.
Level of attention
given to different
topics in Tanzanian
newspapers

Newspaper	Climate change	Politics	No. of articles (n = 81,162)					Advertisement	Business	Miscellaneous	Total no. of articles	(%)
			Crime	Entertainment	Advertisement	Business	Miscellaneous					
The Guardian	157	402	489	8,140	5,834	4,980	4,814	24,816	30.57			
Daily News	138	250	270	4,335	5,358	6,412	5,471	22,234	27.39			
Mwananchi	139	359	314	5,945	4,333	2,684	4,523	18,297	22.54			
Habari Leo	132	315	484	5,723	2,391	1,205	4,386	14,636	18.03			
This Day	92	85	99	84	84	78	101	623	0.77			
Rai	26	143	53	104	112	0	118	556	0.68			
Total	684	1,554	1,709	24,331	18,112	15,359	19,413	81,162	100			
(%)	0.84	2	2.1	30	22.3	18.9	24	100				

Climate change information

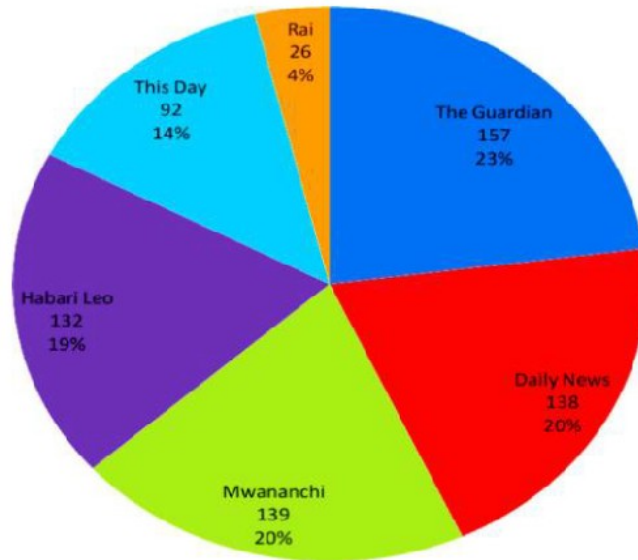


Figure 2. Proportion of climate change information articles per each newspaper

Government-owned newspapers are somehow service-oriented, and it was therefore expected that they take a lead as disseminators of developmental information including that on climate change. According to Tagbo (2010) and Gicheru (2014), government-owned newspapers are often obsequious to what is known as development journalism which is the kind of reporting whose sole aim is to promote development issues.

With regard to the frequency at which the newspapers are published, the results in Figure 2 indicate that daily newspapers covered 82 per cent, whereas their counterparts' weekly published newspapers covered only 18 per cent of articles on climate change. The findings suggest that daily published newspapers have more articles, whereas observations found that weekly published newspapers have reported fewer but detailed articles. These results are similar to the findings reported by Lacy *et al.* (2012) which indicate that newspapers with daily printing provided the most consistent coverage compared to weekly published newspapers.

Comparison on the level of coverage given to climate change information by the newspapers per year was made. Results in Figure 3 which shows the combined total

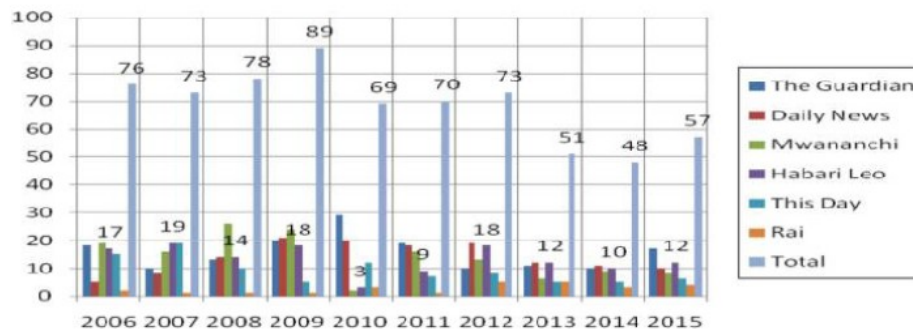


Figure 3. Coverage of climate change information per year

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frequencies of articles in the six newspapers indicate that the number of articles on climate change was high in the year 2009 followed by 2008 and 2006. Less number of articles were published in the year 2014 followed by 2013. As pointed out earlier, the high coverage may be associated with the occurrence of national and international events and milestones on climate change. This suggests that whenever there are such events, the newspapers tend to cover more articles, and fewer articles are covered in the non-existence of such events.

Table IV indicates different themes associated with climate change issues that were reported in Tanzanian newspapers for the period of 10 years. Change in the state of climate had 25.4 per cent of all climate change articles followed by floods (23 per cent), rains (15.5 per cent) and drought (14 per cent). Adaptation strategies reported only 7.9 per cent of all articles. These results suggest that over the period of 10 years, Tanzanian newspapers concentrated much in reporting the climate change themes, whereas low reportage was attached to adaptation strategies theme which might be more relevant for raising awareness and educating the public on how to adapt to the adverse impacts of climate change. These results are in agreement with that of Takahashi and Martinez (2017) who reported that climate change information receives greater attention in the media when disasters like heavy rainfalls, floods and droughts strike, but adaptation strategies are not consistently reported which is an indication of the low priority given to climate change reporting.

Conclusion and recommendations

Based on the premise that media play a crucial role in the dissemination of information, research was carried out to analysis the level of attention given to climate change information by Tanzanian newspapers between 2006 and 2015. Despite the fact that climate change is among the threatening phenomena in Tanzania that would commensurate a significant attention in the media, the findings of this study indicate that the volume of coverage devoted to climate change by the newspapers in Tanzania is very low and disproportionate to the level of threat. This leaves a question on the Tanzanian newspapers' dedication to reporting climate change information.

It is therefore recommended that despite the fact that print media houses are independent business enterprises which cannot be compelled to cover certain information, as it may infringe the right to freedom of expression; newspapers media owners, editors and journalists should however be environmental nationalistic enough to frequently report climate change information. The environmental citizenship spirit will enable the newspapers to consider playing an important role in providing the right amount of information on climate change in Tanzania without biasness and largely being events oriented. The study recommends more readerships of the daily published newspapers than their counterparts' weekly published newspapers. Daily published newspapers can frequently disseminate climate change information to the intended audiences, as opposed to weekly newspapers that publish this aspect irregularly but in a more detailed manner. Furthermore, as the United Republic of Tanzania's Government is committed to fight against the menace brought about by the climate change, the scope of the government-owned newspapers should be revisited to ensure more coverage of climate change information in their publication. More emphasis should also be placed in Kiswahili published newspapers which can be done by having a section specifically dedicated for climate change issues. Kiswahili is a national language in Tanzania, and thus, more coverage of climate change in these newspapers will ensure that the climate change information reaches majority of the consumers.

Newspaper	Change in the state of the climate				Themes of climate change issues (<i>n</i> = 684)										Climate change conferences	Total
	Drought	Rains	Adaptation strategies	Floods	Kyoto Protocol	Heat stress	Global warming	Greenhouse gases	Eli Niño	Winds	Climate bills	Climate change conferences				
Mwananchi	16	34	18	32	2	3	0	2	0	2	0	4	139			
Daily News	54	14	1	42	1	1	7	1	0	1	1	0	138			
The Guardian	48	20	0	36	0	2	9	5	0	5	4	3	157			
Habari Leo	30	22	9	26	0	2	5	6	3	6	0	1	132			
This Day	21	10	19	18	0	0	2	5	0	1	0	0	92			
Rai	5	6	7	3	0	0	1	1	0	0	0	0	26			
<i>Total</i>	<i>174</i>	<i>106</i>	<i>54</i>	<i>157</i>	<i>3</i>	<i>8</i>	<i>24</i>	<i>20</i>	<i>3</i>	<i>26</i>	<i>5</i>	<i>6</i>	<i>684</i>			

Climate
change
information

Table IV.
Occurrence of
climate change
issues by each
newspaper

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PAPER TWO

PROMINENCE OF OCCURRENCE ACCORDED TO CLIMATE CHANGE INFORMATION IN TANZANIAN NEWSPAPERS

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Abstract

Study was conducted to analyse degree of prominence that Tanzanian newspapers accorded to climate change information. We argue that the level of prominence accorded to climate change information by Tanzanian newspapers is inadequate. Prioritising the coverage of climate change information in newspapers is important for facilitating its access, promotion and dissemination for awareness creation. Content analysis and in-depth interview method approaches and a sample size of 1600 newspaper editions drawn from six Tanzanian newspapers for a span of 10 years were used. Newspaper editions were content analysed and the frequencies at which climate change information articles were placed at the various parts of the newspapers were analysed. Findings indicate that a total of 81,162 articles were published. Of this total, only 684 (0.84%) articles covered climate change information. Furthermore, findings indicate that, of the total 684 climate change

information articles, only 53 (7.6%) were placed in the front pages of the six Tanzanian newspapers for all 10 years, giving a yearly average of five articles for all newspapers and only one article for each newspaper per year, whereas the majority (631, 92.25%) of articles in climate change were randomly placed in the inside pages. The Chi-square test ($\chi^2 = 10.000$; $p\text{-value} < 0.002$) shows that significant differences exist between the locations of number of articles in front pages and inside pages. The findings suggest that climate change information in Tanzanian newspapers was not given the necessary level of prominence. The paper recommends that government and private media houses should formulate and introduce clear guidelines and policies of ensuring that the levels of coverage and prominence of developmental issues including climate change information in Tanzanian newspapers are increased. This paper also recommends the need for the provision of specialised trainings such as climate change journalism to news editors, journalists and reporters for equipping them with the good writing styles and skills that will enable them to produce more appealing climate change stories that will attract its front page placement status for setting an agenda in the direction of climate change adaptation, coping and mitigation mechanisms in Tanzania.

Key words: Climate change, content analysis, newspapers, prominence, Tanzania

2.0 Introduction

Climate change is a serious challenge affecting all countries around the world. The negative impacts of climate change such as drought, floods, low food production, erratic heavy rainfalls, biodiversity loss and land degradation have been experienced at different intensities in many countries including Tanzania (IPCC, 2007; URT, 2012). As such, various adaptation, coping and mitigation strategies have been developed over time to combat the impacts of climate change. This in turn calls for the creation of awareness

about the negative effects of climate change and the necessary strategies against such effects.

Information is an important ingredient when assessing the impacts of climate change and developing suitable adaptation, coping and mitigation strategies. Timely access to trustworthy, relevant and current climate change information is necessary for increased awareness about the impacts of climate change, adaptation, coping and mitigation mechanisms as well as better management of climate change related hazards (Kropp and Scholze, 2009; Dinshaw et al., 2012; Debela *et al.*, 2015). According to Tall *et al.* (2014), access to the right climate change information at the right time and through right channels enables communities to make informed decisions and prepare themselves for the adverse climatic conditions, thereby improving their productivity and profitability while managing risks. Since climate change is unobtrusive and complex issue that most people are unable to grasp (Schäfer and Schlichting, 2014), thus they mostly learn about it by receiving information from media such as newspapers, television and radio (Arlt *et al.*, 2011; Anderson, 2011; Schäfer, 2012).

Newspapers have for a long time, played a crucial role as vehicles of information dissemination on various subjects such as climate change for awareness creation, informing, enabling sharing of experiences, educating and influencing behavioural change (Falaki and Adegbija, 2013; Schmidt et al., 2013; Chand, 2017; Harris, 2017; Gadzekpo, Gilbert and Segtub, 2018). Newspapers have additional advantages when compared to other mass media as they can be easily stored for longer time for future reference. In African context in particular, single newspaper can often be shared by many readers. Furthermore, newspapers provide flexibility in reading them as readers can study and

review the contents at their own appropriate place and relevant time, and they can also provide prominent coverage to a particular subject (Boykoff and Boykoff, 2007; Salathong, 2007; Aiyesimoju and Awoniyi, 2010; Nelson, 2011; URT, 2012; Dolsak and Houston, 2014). Newspapers are also relatively less expensive as compared to other media such as television and radio. According to McCombs (1977), Boykoff (2010) and Culloty et al. (2019) print publications such as newspapers are assumed to have a stronger agenda-setting impact than broadcast media such as television and radio news for the public and policy makers. Besides, newspapers offer a simpler means of methodically collecting and analysing data (Schmidt et al., 2013).

The history of newspaper landscape in Tanzania can be traced back when Tanganyika (the then Tanzania Mainland) was still under Germany colonial rule. According to Sturmer (1998), the first newspaper named *Msimulizi* (the storyteller) was published by the Anglican Universities' Mission to Central Africa (AUMCA) in Zanzibar in the year 1888. In 1957, the Kiswahili published newspaper known as *Sauti ya TANU* (the voice of TANU) which was privately owned by one political party known as Tanganyika African National Union (TANU) was established. *UHURU* (Independence) newspaper was established on the Tanganyika's Independence Day (9 December 1961) to replace the Voice of TANU newspaper. In 1972, the Daily News and Sunday News became the English language government-owned newspapers which were published daily and weekly respectively. In the same year, TANU established her weekly newspaper known as *Mzalendo* (the patriot). As a result of commercialisation of media industry, the newspaper industry in Tanzania started to experience dramatic changes in 1990s which led to increased number of newspapers (Murthy, 2011; Kweka, 2013). Until 2015, there were 39 registered newspapers comprising of 14 English and 25 Kiswahili language published

newspapers and most of them were privately owned (URT, 2016; African Media Barometer, 2015).

Prioritising the coverage of information in climate change in the newspapers is important as it facilitates easy access, promotion and dissemination of such information. News placement on the front pages of newspapers has a greater impact as it can be easily seen by readers (Granner *et al.*, 2010) and be used by other media outlets such as news commentary programs in television and radio for more dissemination (Salathong, 2007). This means that, if newspapers place climate change articles on their front pages, there are more chances of raising the issues of climate change into the wider public discourse. This in turn, may contribute to building appropriate behaviours towards climate change matters.

In the context of this paper, the concept of prominence refers to a priority that information is given in the newspapers' pages. It is the positioning of an article or story within the prominent pages of the newspapers to communicate its importance. It is also operationalized as the extent at which articles appear on the front page section of the newspaper (Schooler *et al.*, 1996). Prominence plays a crucial role in shaping media salience whereby the placement of the news is likely to draw more or less audience attention. Prominence is measured by counting the total number of articles containing a particular issue appearing on the front page of a newspaper against the total number of articles containing the same issue appearing in other pages in the newspapers (Carol and McComb, 2003; Lim, 2010).

It has been repeatedly reported that newspapers attach inadequate priority in publishing developmental and scientific issues as compared to political and social issues (Bacon,

2013; Narayana and Kumar, 2009; Okarie and Oyedepo, 2011; Tagbo, 2010; Mudombi, Muchie and Nhamo 2014; Ogessa and Sife, 2017; Elia, 2018 and Nkya, 2017). Bacon (2013) reported an overall inadequacy of publishing stories about climate change science prominently in the Australian newspapers. In India, Narayana and Kumar (2009) reported that newspapers tend to prioritise advertisements, politics, entertainment, and crime events while ignoring developmental topics such as climate change. A study carried out in Nigeria revealed that the degree of prominence accorded to agriculture by newspapers was as low as 4.8% (Okarie and Oyedepo, 2011). Tagbo (2010) argues that although climate change news may have so many dimensions that can raise public awareness, yet they are still not given front page coverage in the newspapers. In Zimbabwe, Mudombi *et al.* (2014) reported that climate change issues covered in the Zimbabwean media were not prominently presented.

In Tanzania, Ogessa and Sife (2017) reported that only 4.9% of agricultural articles were placed on the front pages of the newspapers that were published in the four daily newspapers in five years between 2010 and 2015. Elia (2018) observed a low trend of Tanzanian newspaper to publishing climate change information in front pages in two Tanzanian newspapers. Similarly, Nkya (2017) reported that developmental news affecting the lives of the average Tanzanian citizens hardly receive prominence in the news reported in the media of national status. Since prominence of climate change information in newspapers facilitates easy access, promotion and dissemination of such information, it is important to document how often climate change articles appear in the Tanzanian newspapers prominently.

The present study was conducted to analyse the level of prominence given to climate change information by six Tanzanian newspapers published for a span of 10 years between 2006 and 2015. In this context, climate change information includes various aspects of climate change phenomenon such as change of rainfall and temperature patterns, frequency and intensity of weather events such as droughts and floods as well as their effects, warning signals for extreme events, seasonal forecast and all other information related to the consequences of climate change, climate change education and awareness, and mechanisms for climate change adaptation, coping and mitigation (IPCC, 2007; Nzeadibe *et al.*, 2011; Mudombi *et al.*, 2014). Other scholars (e.g. Carvalho and Burgess, 2005), Schäfer, Ivanova and Schmidt (2013) have considered extreme weather conditions as particularly relevant because they have high news value due to the potential damage they cause to the countries vulnerable to the consequences of climate change and because they are often connected to climate change through news media for creating awareness. Specifically, this paper focuses on the level of prominence accorded to climate change articles by Tanzanian newspapers based on their ownership type and language orientation, challenges that impede prioritization of climate change information in Tanzania newspapers, and the trend of priority accorded to climate change information in Tanzanian newspapers.

2.1 Theoretical framework

This study was anchored around the Agenda Setting Theory. According to Wagner and Payne (2017), agenda setting refers to the idea that media such as newspapers can create public awareness and concern for particular issues by focusing attention on them. The theory was originally proposed by McCombs and Shaw (1972) whose effects were mainly related to political issues. However, nowadays the effects of the theory in question are also

related in many other issues including climate change (Liu *et al*, 2011; McDonald, 2009). This theory assumes that by giving a prominent treatment to an issue such as climate change which is highlighted by its placement in the newspapers, the audiences will attach an importance to that issue and start to think on that direction. According to Brosius and Kepplinger (1990), Schooler *et al.* (1996), Lim (2010) and Granner *et al.* (2010), if articles are presented prominently, that is, by placing them on the front page of a section and in the first section of the newspaper, they can attract more readers than do articles presented less prominently as those at the inside parts of the newspaper. Since the main purpose of this study was to analyse the degree of prominence that climate change information is accorded in the Tanzanian newspapers, the Agenda-setting Theory is appropriate. The theory was used to guide the study in the formulation of research objectives, research questions and preparation of research instrument (code book).

2.2 Methods

This study used a triangulation of both content analysis and in-depth interview methods. Newspapers were content analysed for a prominence aspect of newspapers articles for a period of 10 years. Content analysis is a research approach that systematically and objectively describes and quantifies phenomena; especially manifest communication content (Krippendorff, 2004). This study adopted a definition of content analysis provided by Berelson (1952:18) who conceptualized it as “*a research technique for the objective, systematic and quantitative description of the manifest content of communication*”. The content analysis was supported by in-depth interviews with newspapers’ editors and journalists. The unit of analysis was climate change articles published in the newspapers which explicitly mentioned terms associated to “climate change”, global warming or greenhouse gases” or *mabadiliko ya tabia nchi, ongezeko la joto duniani au ongezeko la*

hewa ukaa” in Kiswahili. The key terms used include “adaptation, coping and mitigation strategies to climate change” (*mikakati ya kukabiliana na mabadiliko ya tabia nchi*), key terms related to the impacts of climate such as changes in rainfall patterns (*mabadiliko ya vipindi vya mvua*), drought (*ukame*), and floods (*mafuriko*). The level of prominence was determined by the specific positions or placements of articles referring to climate change on the pages of a newspaper. Climate change articles that appeared on the front pages were regarded as the most prominently presented as compared to those appeared on the inside and back pages. The level of prominence attached to the newspapers was then measured by calculating the percentage of climate change articles which appeared in the front pages against the total number of articles containing climate change information in the all pages of newspapers.

The study population comprised of 39 registered newspapers (URT, 2016) published in Tanzania between January 2006 and December 2015. It also comprised of newspapers editors and journalists. Six registered newspapers, six news editors and six journalists were purposefully selected for the study. The newspapers were selected based on their mixed news coverage, reach and countrywide circulation, existence for at least 10 years (between January 2006 and December 2015), and consistency in publishing their editions. Newspapers were also considered for selection based on the ownership type, language orientation, and frequency of publication and publishing companies (Table 1) so as to minimise biases. Newspapers slanted completely on religious, politics and sensational issues were not considered for this study.

Table 2. 1: Selected newspapers

Newspapers	Selection Criteria						
	Ownership		Language		Frequency		Publishers
	Government	Private	English	Kiswahili	Daily	Weekly	
Daily News	x		x		x		Tanzania Standard News
Guardian		x	x		x		IPP Media
Habari Leo	x			x	x		Tanzania Standard News
Mwananchi		x		x	x		Mwananchi Communication Limited
Rai		x		x		x	New Habari Corporation
This Day		x	x			x	IPP/ Media Solutions

The referenced time period from 2006 through 2015 was purposively selected because this is the period in which milestone achievements and important national and international events were marked on climate change. Such events include but not limited to the formulation of National Programme of Action (NAPA) in 2007 (URT, 2007) which calls for identification of immediate and urgent climate change adaptation actions that are geared toward long-term sustainable development, the launching of National Climate Change Communication Strategy (NCCCS) in 2012 (URT, 2012), the Review on the Economics of Climate Change (SRECC) in 2006 (Stern, 2008), the Kyoto Protocol which was revised in July 2006 and in March 2008 (Sampei and Aoyagi-Usui, 2009), the United Nations Climate Change Conference (UNCCC) which was held in Copenhagen in 2009 (Cantley-Smith, 2010), release of IPCC reports in 2007 (Barkemeyer *et al.*, 2017) and signing of Paris accord in 2015 Conference of Parties (UNFCCC, 2020).

To obtain the total number of newspaper editions for both selected daily and weekly published newspapers, firstly, four daily newspapers were picked for 365 days in a year for a period of 10 years giving a total of 14,600 newspaper editions. Secondly, two weekly newspapers were purposefully selected for four days from each month for 10 years giving 960 editions. Therefore, the total sample size for both daily and weekly newspapers was 15,560 editions. To obtain the final study sample for all four daily newspapers, the study

adopted a composite sampling in which a year was divided into four quarters. Composite sampling technique is a method in content analysis studies whereby the researcher constructs a composite week/month in the sample (Wimmer and Dominick, 2013). One month was then randomly selected from each quarter by using lottery method making a total of four months for each year. Two composite days that is Wednesdays and Saturdays were selected from each week in four months in a year. This procedure yielded a total of 1,280 editions from four newspapers for the period of 10 years (Table 2). For weekly published newspapers, one edition per each newspaper for each week was used making a total of 320 editions. The final study sample of the selected newspaper editions was therefore 1600 editions which is 10.3% of the total population of 15,560 editions (Table 2). According to Wimmer and Dominick (2011), a sample size between 10 per cent and 25 per cent is recommended as acceptable when determining sample size in content analysis.

Table 2. 2: Study sample

Newspapers	No. of newspapers	Estimated total Nb. of newspaper editions for all 10 years.	Sampled Nb. of newspaper editions per year	Total No. of newspaper editions selected for all 10 years
Daily News	1	365 days x 10 years =3650	2 days x 4 weeks x 4 quarters = 32	32 x 10 = 320
Guardian	1	365days x 10 years =3650	2 days x 4 weeks x 4 quarters = 32	32 x 10 = 320
Habari Leo	1	365 days x 10 years =3650	2 days x 4 weeks x 4 quarters = 32	32 x 10 = 320
Mwananchi	1	365 days x 10 years =3650	2 days x 4 weeks x 4 quarters = 32	32 x 10 = 320
Rai	1	4 days x 12 months x 10 years =480	4 days x 4 quarters = 16	16 x 10 = 160
This Day	1	4 days x 12 months x 10 years = 480	4 days x 4 quarters = 16	16 x 10 = 160
Total	6	15560	160	1600

Data were collected from November 2016 to April 2017 through manual coding scheme adapted from Lynch and Peer (2002) and that of Di Gregorio *et al.* (2012) which are based on a predefined code book. The code book included information about identification

particulars, publication dates, title of articles and position of articles (Fig.1). By the virtue of the archival quality of newspapers, the back issues of the print newspapers were obtained from Mzumbe University Library (MU), Sokoine National Agricultural Library (SNAL), Dr. Wilbert Chagulla Library, Tanganyika National Library, Morogoro Regional Library and the National Archives. The protocol consisted of manual scanning of each page of the selected newspaper editions for headlines containing key words related to climate change information.

Identification particulars	Coders' name	.....
	Newspapers' name	.....
Publication date	Date of publication	.....
	Day of publication	.....
	Month of publication	.....
	Year of publication	.....
		Total number of articles
Published articles on climate change	.....	.....
Position of article :	Front page...	.....
	Inside page ...	.....
	Back page: ...	.....

Figure 1: Code book adapted from Lynch and Peer (2002) and Di Gregorio *et al.* (2012).

To avoid subjective judgment that would result from a single individual to perform the task of coding, the content analysis was completed by two coders with a qualification in library and information science who reviewed hard copies of selected newspaper issues. To ensure that coding sheet instrument was reliable, content analysis pilot test for 30 newspapers editions and code book review were performed by coders and the researcher. Inter-coder reliability test which determined the degree of agreement between the researcher and research assistants in the coding process was also conducted. Holsti's coefficient was calculated by dividing the total number of occurrences or agreed on values for each variable into the sum of the responses of each coder for the same variable and

thus an acceptable intercoder reliability which fall between 0.75 and 0.80 was achieved as supported by Holsti (1969) and Neuendorf (2002). Quantitative data were analysed based on descriptive statistics including frequencies, means, percentages and inferential statistics such as Chi-square test. Qualitative data were subjected to content analysis.

2.3 Results and discussions

2.3.1 Level of prominence accorded to climate change information in Tanzanian newspapers

A total of 1600 newspaper editions were analysed yielding a total of 81,162 articles. The study found that 30% of all published articles were on entertainment, followed by articles on miscellaneous issues (24%), advertisements (22.3%) and business (19%). Only (0.84% of all published articles covered information on climate change (Table 3) suggesting that climate change information was poorly covered in the Tanzanian newspapers.

Table 2. 3: Number of different articles published in Tanzanian newspapers

Newspaper	No. of articles (N= 81162)							Total
	Advertisement	Business	Climate change	Crime	Entertainment	Miscellaneous	Politics	
Daily News	5349	6434	138	270	4327	5466	250	22234
Guardian	5834	4980	157	489	8140	4814	402	24816
Habari Leo	2391	1205	132	484	5723	4386	315	14636
Mwananchi	4333	2684	139	314	5945	4523	359	18297
Rai	112	0	26	53	104	118	143	556
This Day	84	78	92	99	84	101	85	623
Total	18103	15381	684	1709	24323	19408	1554	81162
%	22.30	19.00	0.84	2.11	30.00	24.00	2.00	100

Results indicate further that of the 684 articles on climate change, only 53 (7.6%) articles were placed in the front pages of the newspapers. This gives a yearly average of five articles for all newspapers and only one article for each newspaper per year whereas the majority (631, 92.25%) articles in climate change were randomly placed in the inside pages (Fig.2). Chi-square test was used to determine if significant differences existed

between the locations of number of articles in front pages and inside pages (Table 4). The test ($\chi^2 = 10.000$; $df = 1$; $p = 0.002$) was significant, which means that significant differences exist.

Table 2. 4: Test of difference between the locations of number of articles

Locations	Ranks		Friedman Test		
	Mean Rank	N	Chi-Square	df	Asymp. Sig.
Front pages	1	10	10.000	1	0.002*
Inside pages	2				

*Significant at 5% level of significance

These findings suggest that climate change information was not given the necessary priority in the Tanzanian newspapers as most of the articles were largely confined to the inside pages of the newspapers. It implies that Tanzanian newspapers attached a low level of prominence in the coverage of climate change information for the period under study. This failure to accord the necessary prominence to climate change information suggests that Tanzanian newspapers did not effectively play their role of publishing climate change information conspicuously for informing, educating and enlightening people about climate change related issues.

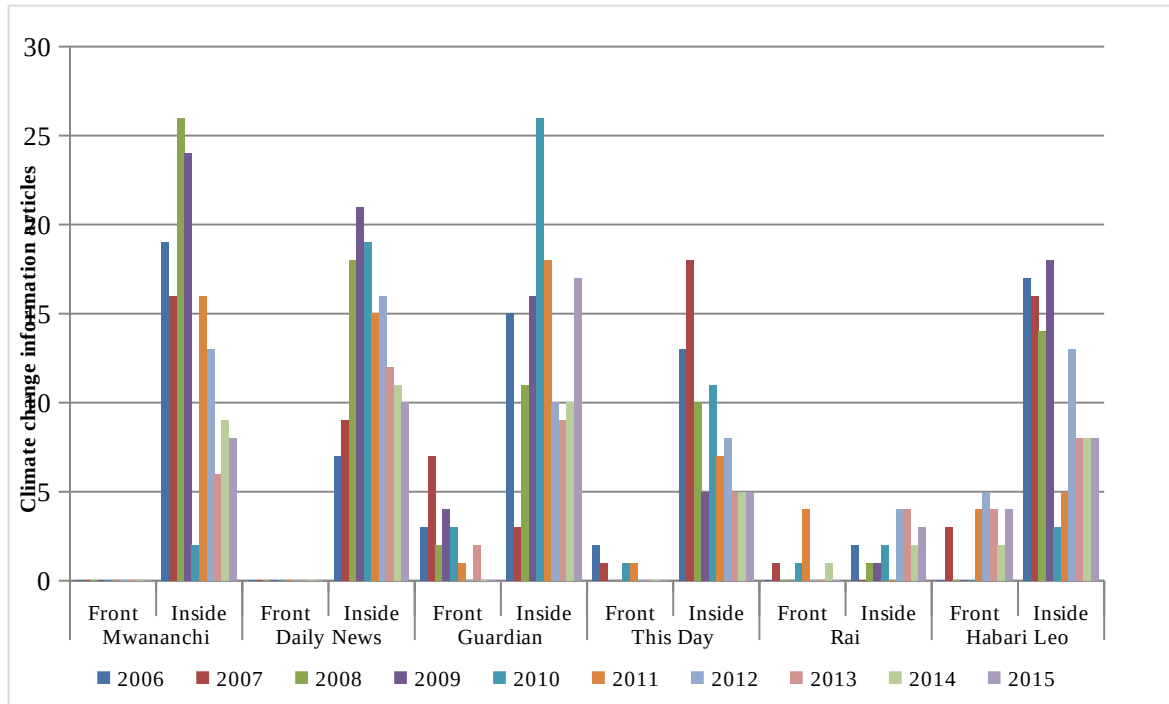


Figure 2: Front and inside pages' placement of climate change articles in Tanzanian newspapers

With regards to language orientation, the findings of this study indicate that Kiswahili published newspapers (Mwananchi, Habari Leo and Rai) placed 26 (3.8%) articles on climate change in their front pages. Habari Leo had 22 (3.2%) and Rai had 4 (0.6%) articles. On the other hand, English published newspapers (Daily News, Guardian and This Day) placed 26 (3.8%) articles in their front pages. Guardian had 22 (3.2%) and This Day had 4 (0.6%) articles (Fig. 2). Though English newspapers in this study were expected to have placed more articles in their front pages because they are broad sheets with larger carrying capacities than their counterparts Kiswahili newspapers, results indicate that climate change was not a prominent topic in both Kiswahili and English newspapers. Furthermore, observations indicate that Daily News and Mwananchi which are popular newspapers in Tanzania did not place any article slanted to climate change in their front pages in all 10 years.

Based on the ownership type, the findings indicate that government owned newspapers (Daily News and Habari Leo) placed 22 (3.2%) articles in climate change in their front pages (Fig.2). Despite the fact that both Daily News and Habari Leo papers are expected to be used by government officials for giving prominence to government press releases and various policies related to climate change issues. This was however not the case, because the government –owned newspapers are loyal to the government and thus they may find it extremely difficult to give prominence especially on things that are not going well in the government departments in relation to developmental issues (Nkya,2017) and instead such information is restricted for public use on the grounds of information secrecy without further justifications (Kabata and Garaba, 2020).Inadequate prominence of climate change information in the government- owned newspapers is also associated with the lack of professional trainings on climate change subject matter(Nkya, 2017). These findings are contrary to MSI (2012) which argues that public media such as newspapers fill gaps left by private newspapers by providing more information that the private media often ignore. On the other hand, privately owned newspapers had 30 (4.4%) articles positioned in the front pages. The Guardian had 22 (3.2 %) articles, Rai 4 (0.6%) and This Day 4 (0.6%) articles while Mwananchi did not post any article in climate change in her front page.

2.3.2 Challenges in presenting climate change information prominently in

Tanzanian newspapers

The findings from in-depth interviews with newspaper journalists and editors show that the prominence of climate change information in Tanzanian newspapers was affected by newspaper editors' attitude, low understanding of climate change issue, the need to gain revenue, lack of a clear editorial policy as well as time and financial constraints. The

decision to publish or not to publish articles submitted in the news rooms depends on the news editorial teams' attitude about the climate change articles submitted in the news rooms. One newspaper editor opined that ... *"I normally decide which news to cover and which ones to ignore"*. This corroborates the findings in the studies by Ogessa and Sife (2017) and Ochieng (2009) who reported that lack of prominence attached to developmental information is associated to the attitudes of newspaper editors and owners who consider climate change as less important enough to attract the readers.

Poor placement of climate change articles in the front pages of the Tanzanian newspapers is attributed to the lack of understanding of climate change issues. This is mainly due to lack of relevant subject matter specialization among journalists and editors. Scholars such as Wilson (2000), Ochieng (2009), Tagbo (2010), Painter (2010) and Corner (2011) argue that lack of understanding of climate change results into shallow, inaccurate and unattractive reporting of climate change articles that cannot be placed in the most prominent parts of the newspapers for attracting readership. Similarly, Nkya (2017) reported that the low prominence of developmental information in Tanzanian newspapers is associated with professional training challenges facing the majority of media outlets in the country.

With regard to the revenue issue, one newspaper editor commented that... *"The newspapers media industry cannot survive without operating as business enterprise whose intention is to make revenue. We create revenue from what we publish. As a news editor I always try to place the most attractive articles in the most visible parts of the newspaper that make our newspaper editions to attract buyers"*.

According to Mugwisi (2015), media houses are seen as profit-driven entities and thus editors need to prominently place more attractive articles in order to sale their newspapers.

Lack of a clear editorial policy can affect placement of climate change information covered in the print media. In one of the interviews, a journalist pointed out that ...”*I may cover stories in climate change but I find it very difficult to get my stories published because of unclear media’s policy issues*”. This is also confirmed by Elia (2019) who reported that news media lack specific editorial policies on climate change coverage. It is the newspaper editors who in most cases make decisions on which news to be published as front page stories. In the absence of editorial policy, newspaper editors make biased decisions because the criterion used to allow or reject articles to be accorded the prominence remains unclear.

Lack of prominence of climate change information in Tanzanian newspapers is also associated with time and financial constraints. Newspaper journalists revealed that because of the shortage of time they fail to seek, cover and cross-check properly for all sources of their stories for ascertaining the quality of information they collected because of working in deadlines. Inadequate financial resources inhibit newspaper journalists to move out of their offices to cover climate change information from various sources. Such complaints about time and financial constraints have also been reported by other scholars (e.g Harbinson *et al.*, 2006; and Mare, 2011).

2.3.3 Trend of priority accorded to climate change information in Tanzanian newspapers

Fig. 2 shows an overall Tanzanian newspapers fluctuating trend in prioritizing climate change information. The findings indicate that the trend of prioritising climate change articles had a sharp rise in the year 2006 and reaching the peak in 2007. The findings further indicate that the priority attached to climate change articles experienced a

downward trend in the year 2008 and then there was a rising trend in the year 2009 followed by a falling trend in 2010 and then there was rising trend to 2013. The trend of priority accorded to climate change is attributed to the occurrence of both national and international events and milestones achievements on the context of climate change. Nationally, the years 2006 and 2007 is the period when severe drought hit many parts of Tanzania and the introduction of NAPA in 2007 (URT, 2007; Hepworth, 2010; Hassan et al., 2014; Salanga, 2017). Additionally, the launching of National Climate Change Communication Strategy was done in 2012 (NCCCS) (URT, 2012). Internationally, the rising trend in prioritising climate change in Tanzanian newspapers for the year 2006 and 2007 may be associated with the Stern Review on the Economics of Climate Change (SRECC) in 2006 (Stern, 2008) and the call for international conference which led to the revision of Kyoto Protocol in 2006 (Sampei & Aoyagi-Usui, 2009) and release of IPCC reports in 2007 (Barkemeyer et al., 2017). Rising trend in priority in the year 2014/2015 is also attributed to the signing of the Paris accord at 21 Conference of Parties (COP) in Paris on 12 December 2015 (UNFCCC, 2020). Furthermore, the findings show that there was a falling trend of prioritising coverage of climate change information in Tanzania newspapers for the year 2014 and 2015 which may have been attributed to the political activities in the country. In one of the key informant interview, one newspaper editor pointed out that... *“In the year 2014 there was a local government election, constitutional referendum which was then followed by the general election in 2015, thus most of the journalists were involved in covering and reporting political issues”*.

2.4 Conclusions and Recommendations

Front pages are generally important sections in the newspaper which can be used to set agenda for the public. In spite of the fact that climate change is a newsworthy, it did not

however feature prominently in the Tanzanian newspapers for a period of ten years between January 2006 to December 2015. This is evident as a large proportion of climate change articles were positioned in the inside pages leaving front pages with a very minimal prominence. This inadequacy of prominence accorded to climate change information in the Tanzanian newspapers raises a concern when viewed against their abilities as one of the disseminators of information in their reportage.

The study recommends that newspaper media houses should have a clear editorial policy that will ensure that they have a responsibility of reporting developmental issues including climate change information in the prominent parts of their newspapers for a much wider public access and dissemination. It is recommended further that, there is a need for the provision of specialised trainings such as climate change journalism to news editors, journalists and reporters. Such knowledge will not only ensure the availability of specialised editors, journalists and reporters in climate change science but also equip them with the writing styles and skills for enabling them to produce more appealing climate change stories that will attract its front page placement status for setting an agenda in the direction of climate change adaptation, coping and mitigation mechanisms. It is also recommended that whereas newspaper media houses need to attach high prominence to news that drive revenue for them to survive, they should also realize with keen interests the threat brought about by climate change to humankind and thus give it the level of prominence it deserves. This can be a driving force for the newspaper editors to motivate journalists by encouraging them to submit articles in climate change journalism.

2.5 Contribution of the Study

This study has generated information that may influence newspapers owners, journalists and news writers or reporters to cover and place climate change information in the prominent positions of their newspapers to enable easier communication of the information to the targeted audiences. Thus, by giving more prominence to climate change information in the print media, particularly newspapers can contribute to agenda-setting for public discussions in respect to climate change adaptation, coping and mitigation mechanisms in Tanzania.

2.6 Avenues for Future Research

The research for this study was limited to six Tanzanian newspapers whose results may lack generalization for other media outlets and information; hence, there is a need for further researches. A Study to analyse the prominence of other developmental information issues such as health and agriculture in Tanzanian newspapers and in other media outlets such as television and radio among others are of potential interests. A qualitative study that will come up with reasons as to why Tanzanian newspapers do not prioritise coverage of climate change information is also of potential interest.

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PAPER THREE

Original Articles



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 (Comer, 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; Tagho, 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. Nicholas 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*, *Mwanania*, *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.

Newspaper	Circulation per day	Publisher	Selection criteria					
			Ownership		Language		Frequency of publication	
			Government	Private	Kiswahili	English	Daily	Weekly
<i>Business Times</i>	15,000	Business Times Limited		x		x		x
<i>Daily News</i>	50,000	Tanzania Standard Newspapers	x			x	x	
<i>The Guardian</i>	20,000	IPP Media		x		x	x	
<i>Habari Leo</i>	40,000	Tanzania Standard Newspapers	x		x		x	
<i>Majira</i>	10,000	Business Times Limited		x	x		x	
<i>Mtanzania</i>	15,000	New Habari Corporation		x	x		x	
<i>Mwananchi</i>	40,000	Mwananchi Communication Limited		x	x		x	
<i>Nipashe</i>	15,000	IPP Media		x	x		x	
<i>Rai</i>	1000	New Habari Corporation		x	x			x
<i>This Day</i>	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
<i>Business Times</i>	5	3
<i>Daily News</i>	6	4
<i>The Guardian</i>	5	3
<i>Habari Leo</i>	6	4
<i>Majira</i>	4	2
<i>Mtanzania</i>	5	3
<i>Mwananchi</i>	7	4
<i>Nipashe</i>	5	3
<i>Rai</i>	4	2
<i>This Day</i>	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 Iiiles 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 (Werna, 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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PAPER FOUR



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ACCESS TO AND USE OF CLIMATE CHANGE INFORMATION COVERED IN TANZANIAN NEWSPAPERS: A CASE OF SELECTED PERI-URBAN NEWSPAPER READERS IN TANZANIA

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ABSTRACT

Access to and use of climate change information is essential for raising people's awareness about adaptation, coping and mitigation strategies in the face of changing climatic condition. This paper assessed the use of newspapers in accessing climate change information by selected peri-urban newspaper readers in Tanzania. Cross-sectional research design was employed with a total of 153 respondents. Data were collected using questionnaire and key informant interviews and were analysed using IBM SPSS Statistics software and content analysis. About two-thirds (65%) of the respondents reported that newspapers were important communication sources in accessing climate change information. However, peri-urban newspaper readers experienced challenges such as inadequate coverage of climate change information (87%), unreliable climate change information (84%), low prominence attached to climate change information (82%), cost barriers (78%), lack of community information centres and public libraries (73%). These impede full access to newspapers for climate change and other developmental information. It is concluded that peri-urban newspaper readers prefer newspapers written in Kiswahili and those with high news coverage. It is recommended that climate change information generators such as TMA should repackage and disseminate reliable forecast information that addresses the needs of the general public through popular and newspapers with national status. It is also recommended that national and local government authorities should provide support to public libraries and to establish community information resource centres in peri-urban areas for enabling newspaper readers to access developmental information including climate change information.

Key words: climate change information, newspapers, newspaper readers, peri urban, Tanzania

Paper type: Research paper

Type of Review: Peer Review

1. INTRODUCTION

Access to and use of climate change information is essential for raising people's awareness about adaptation, coping and mitigation strategies in the face of changing climatic condition. According to Srinivasan *et al.* (2011) and Jiri *et al.* (2016), access to climate change information is an important pre-condition for adapting, coping, and mitigating the negative impacts of climate change and for informed decision making. Similarly, Noble *et al.* (2014) argued that successful implementation of adaptation, coping and mitigation measures depends upon the

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availability and accessibility of information. This implies that people can successfully adapt and cope to climate change and especially on its mitigation if they have access to information and knowledge about the various aspects of climate change. Such aspects include information on its causes, effects, and on ways of responding to it such as early warning signals, seasonal forecasts, food aid distributions, emergency guidelines, and financial supports. It also encompasses other aspects such as biodiversity conservation, water management, food security, sensitisation of communities, donors, governments and all other information related to climate change adaptation, coping and mitigation mechanisms (IPCC, 2007; Mudombi *et al.*, 2014). According to CRFD (2009), it is indispensable for the people to know that there are solutions to the problems of climate change and that they can be part of those solutions for improving their livelihood. People can effectively access climate change information for adaptation, coping and mitigation strategies if that information is disseminated through channels which are accessible and user-friendly (Cherotich *et al.*, 2012).

Essential climate change information for planning and decision making is often generated by researchers, agencies, ministries, research institutions and universities. Such information should be disseminated to and accessed by all targeted individuals so that these individuals can benefit from this information. Dissemination of climate change information can be made by different channels such as newspapers, radio, television, journals, books, pamphlets, brochures, posters and the internet. For effective information dissemination to the general public, selection of appropriate dissemination channels through which information flows ought to be made. Such channels will influence access and use of climate change information to enable people and communities to build adequate adaptive capabilities. In other words, each dissemination channel has its own advantages and disadvantages. According to Schmidt *et al.* (2013) and Chand (2017), newspapers play a central role in raising awareness, informing, educating and influencing behavioural change in people and communities they serve. Pacoma (2019) adds that newspapers play the most important role in addressing the problem of climate change especially when they cover and represent climate change information as a way of creating public awareness among news consumers. Newspapers have additional advantages when compared to other communication channels such as radio and television. Such advantages include, being permanent and references can be made for future use after many years and also a reader can review and study the materials at his/her own pace and convenient time (Dolsak and Houston, 2014).

Although newspapers are important vehicles of information dissemination in Tanzania, there are distresses that people do not yet effectively use them to access developmental information including climate change information (Lunyelele *et al.*, 2016). Lack of access to information on climate change may in turn lead to low awareness about potential impacts of climate change and thus leading to low adaptive capacity (Williamson *et al.*, 2010; Amdu *et al.*, 2013; Giordano, 2014). Besides, challenges which impede peri-urban newspaper readers to access newspapers for climate change information are not also well known and documented. This study assessed the use of newspapers in accessing climate change information by peri-urban newspaper readers in Coast, Dar es Salaam and Morogoro regions in Tanzania. The study which resulted into this paper was conducted among peri-urban newspaper readers because they have access to newspapers which are mostly disseminated in the urban centres. They also require climate change information for their agriculture and related activities. Agriculture in these areas is more vulnerable to climate change because it is mainly rain-fed dependant. In peri urban areas there are people who perform agriculture as their primary or secondary activity. Thus, the assessment of the use of newspapers in accessing climate change information by peri-urban newspaper readers in Tanzania is necessary for raising their awareness about the available options in climate change adaptation, coping and mitigation strategies. This paper is a part of a wider study which focused on the role played by newspapers in the dissemination of climate change information in Tanzania. Specifically, this paper presents the extent at which peri-urban newspaper readers used newspapers to access climate change information, the types and use of climate change information accessed through newspapers by peri-urban newspaper readers, newspaper reader's perception on the usefulness of climate change information covered in

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Tanzanian newspapers and examined the challenges facing peri-urban newspaper readers when accessing newspapers for climate change information in Tanzania.

1.1 Conceptual framework

The conceptual framework used in this paper was adapted with a modification from (Cherotich *et al.*, 2012) based on the theoretical and empirical review of literature. Fig.1 presents the conceptual framework adapted in this study. The framework shows the hypothesised flow of climate change information from the newspapers to the newspaper readers. In this study it is assumed that newspaper readers can effectively access information on climate change from the newspapers for awareness creation if the impediments to access such information are alleviated.

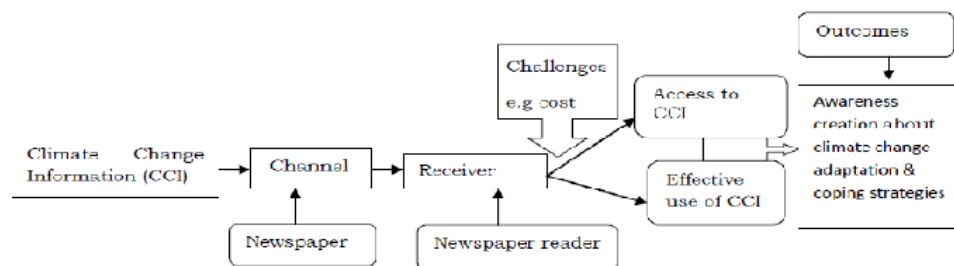


Figure 1: Conceptual framework modified from Cherotich *et al.*, 2012

2. METHODOLOGY

This paper is based on a study conducted in peri-urban areas of Coast, Dar es Salaam and Morogoro regions. All these three regions are located on the Eastern side of Tanzania Mainland. The peri-urban areas in these three regions were selected because they have access to newspapers from the nearby city of Dar es Salaam where most newspapers media houses are located. The peri-urban areas in these regions also have relatively good road infrastructure which facilitates easy and timely newspapers penetrations which in turn leads to higher newspaper's circulation and readership by peri-urban communities (AMB, 2015). In the context of this study, peri-urban areas are the ones which are located in the urban peripheries and that serve as interface between the urban and the rural; and where urban and rural features and processes meet, intertwine and interact (Ricci, 2012).

The study adopted a cross-sectional research design using both qualitative and quantitative research approaches. The key assumption for combining qualitative and quantitative approaches is that it provides a more comprehensive understanding of a research problem than when either of the approaches is used alone (Creswell, 2014). Qualitative and quantitative approaches were therefore combined to enable the analysis and output to complement each other so as to reach the desired conclusions. According to Sedgwick (2014), cross-sectional research design enables data to be collected at a single point in time to capture important aspects and allows for questionnaire survey. The design is also considered appropriate for descriptive analysis and for generalisation of findings. Purposive sampling technique was used to select three regions comprising of six districts. Two districts were selected from each region. Purposively selected districts were Morogoro Urban and Mvomero from Morogoro region, Ubungo and Temeke from Dar es Salaam region, Kibaha and Bagamoyo from Coast region. These districts were selected on the basis of having more peri-urban newspapers selling centres as compared with other districts in the selected regions. From each district, two wards which have urban and rural mixed characteristics were selected making a total of 12 wards from all three regions. The selected wards are Bwilinga and Dunda (Bagamoyo), Mlandizi and Kilangalanga (Kibaha), Buza and Chamazi (Temeke), Kibamba and Kwembe (Ubungo). Others are Kingolwira and Kihonda (Morogoro Urban), and Mzumbe and Melela (Mvomero). Purposive sampling technique was also used to select two key informants (KIs) from each district making a total of 12 community members who comprised of famous readers and long term buyers of

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newspapers in the area. To obtain KIs, researcher made a visit to the newspapers selling centres in each ward. With an assistance of newspapers vendors, one famous newspapers reader was identified from each ward. Purposive sampling technique was also used to select six registered Tanzanian newspapers based on the criteria such as national wide coverage and diversity of news, accessibility, and consistency in publishing their editions with diversity of news coverage, ownership type, language orientation, and frequency of publication. Newspapers that focus on religious, political, and sensational news; lack of national wide coverage, lack of diversity of news coverage as well as those which were published in languages other than Kiswahili or English were excluded. Purposive sampling technique was used to select cases that answered the research questions in order to meet the objectives of the research. According to Newman (2000), purposive sampling technique is often used when a researcher wishes to select cases that are particularly informative.

Snowball or chain-referral sampling technique was used to identify the respondents for this study. The technique was used because the sampling frame of peri-urban newspaper readers does not exist leading to unknown size and boundaries of such population. According to Saunders *et al.* (2007) and Dragan and Isaic-Maniu (2013), snowball sampling technique is used when it is difficult to identify members of desired population. This technique required the researcher to have a contact with newspaper vendors who in turn helped to identify up to three newspaper readers. The identified cases helped the researcher to further identify other cases until the desired sample of 153 readers was researched.

Quantitative data resulting from survey research were collected using questionnaire whereas qualitative data were obtained using key informant interviews (KIIs). A total of seven KIIs were administered. Data for this study were collected from April to December 2017. Quantitative data were analysed using IBM Statistical Package for Social Sciences (SPSS) Statistics software Version 20 based on descriptive statistics including frequencies, means and percentages. Qualitative data were analysed using content analysis by carefully studying and interpreting data gathered by tape recorder; transcribed for analysis and by note taking in order to establish meaningful qualitative information.

3. FINDINGS AND DISCUSSIONS

3.1 Demographic information

Demographic characteristics of the respondents in this study include sex, education, occupation and age. Such characteristics are important as they influence the choice of sources of information used by peri-urban community members to get information about climate change. Of the 153 respondents, majority (87%) were males whereas only (13%) were females. This low proportion of women is attributed to the fact that in most cases women are overwhelmed by the domestic chores and thus they lack time to read newspapers as compared to their male counterparts. Slightly more than a quarter (28.8%) of respondents had a bachelor degrees and above level of education followed by those with ordinary and advanced level secondary school education (28.1%) and those with primary school education qualification (26.8%). Majority (73.3%) of respondents had education above primary school level which implies high literacy level in the study area. Furthermore, 41.8% of respondents comprised of business persons followed by farmers (17%), extension officers (15%) and other civil servants (15%). The mean age of respondents was 42 years old (Table 1).

The findings in Table 2 show the distribution of respondents in the selected peri-urban areas. The results show that Dar es Salaam region had 71 (46.4%) respondents followed by Morogoro (44; 28.75%) and Coast region (38; 24.75%). There are more peri urban newspaper readers in Dar es Salaam and Morogoro perhaps because there are more newspaper sales centres and the presence of libraries services where peri-urban newspaper readers can access newspapers.

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Table 1: Demographic characteristics of peri-urban newspaper readers (n=153)

Category	Frequency	Percent (%)
Sex		
Males	133	87.0
Females	20	13.0
Education		
Primary education	41	26.8
Ordinary and advanced level secondary education	43	28.1
Certificate	1	0.7
Diploma	24	15.7
Bachelor degree and above	44	28.8
Occupation		
Farmers	26	17.0
Business Persons	64	41.8
Students	2	1.3
Pastoralists	5	3.3
Researchers	6	4.0
Extension Officers	23	15.0
Forestry Officers	2	1.3
Other civil servants	23	15.0

Table 2: Distribution of respondents

		N = 153					
Region	District	Males		Females		Total	
		Freq.	%	Freq.	%	Freq.	%
Coast Region	Bagamoyo	17	11.11	2	1.30	19	12.41
	Kibaha	16	10.46	3	2.00	19	12.41
Dar es Salaam	Temeke	26	17.00	5	3.27	31	20.26
	Ubungo	34	22.22	6	4.00	40	26.14
Morogoro	Morogoro Urban	24	16.00	3	2.00	27	17.64
	Mvomero	16	10.46	1	0.65	17	11.11
Total		133	87.00	20	13.00	153	100

3.2 Awareness about climate change

Respondents were asked to indicate the level of awareness so as to ascertain the extent at which they understand the concept about climate change. More than one third (36%) of respondents indicated that they were aware and nearly two thirds (62%) were moderately aware. Though in different degree of awareness, generally these findings show that majority of participants were aware about climate change. Awareness about climate change by the majority of respondents is perhaps associated with high literacy level which in turn enables them to read various sources of information including newspapers. Similarly, Lunyelele *et al.* (2016) reported that more peri-urban communities in Dar es Salaam are aware about climate change. Despite the fact that awareness about the climate change does not promise action to adapt, cope and mitigate, these findings suggest that, perhaps those community members who are aware about climate change will consider to engage on adaptation, coping and mitigation strategies on the potential impacts of climate change for enabling them to plan for their activities accordingly.

3.3 Channels used by peri-urban newspaper readers to access climate change information

The paper sought to establish the extent at which peri-urban newspaper readers use various channels to access climate change information. The findings in Table 3 indicate that 65% of respondents show that they highly used newspapers to access climate change information. Nearly one fifth (21%) of the respondents used the newspapers moderately. These findings signify that newspapers are among important channels for accessing climate change information among peri-urban newspaper readers. The findings are in conformity to that of Kabir *et al.* (2016) who reported that newspapers are important sources of information about climate change. According to Shrestha (2002), Falaki and Adegbiya (2013), Schmidt *et al.* (2013), Chand (2017) and Harris (2017), readers can use newspapers for raising their awareness and influencing behavioural change about climate change. This is perhaps attributed to the fact that, when compared to other mass media channels such as radio and television, the information covered in the newspapers can be easily stored for much longer time for reading and future use, shared by readers, they provide flexibility in reading them as they can allow readers to review and study the materials at their own appropriate places, suitable and relevant time and they can also provide prominent coverage to a particular subject (Boykoff and Boykoff, 2007; Salathong, 2007; Aiyesimoju and Awoniyi, 2010; Nelson, 2011; URI, 2012; Dolsak and Houston, 2014). Apart from newspapers, peri urban newspaper readers were asked to list other communication channels they use for accessing information on climate change. The respondents listed channels such as television (56%), radio (53%), community outreach (40%), extension workers (35%) and researchers (27%).

Table 3: Channels used by peri-urban newspaper readers for accessing climate change information

Communication channel	n	Highly used		Moderately used		Least used		Not used	
		No.	%	No.	%	No.	%	No.	%
Newspapers	151	98	65	32	21	18	12	3	2
Other channels									
Radio news	147	78	53	30	20	19	13	20	13.6
Television news	145	82	56	30	21	26	18	7	4.8
Community outreach	144	57	40	43	30	23	16	21	14.7
Researchers	143	39	27	29	20.3	19	14	37	26
Extension workers	141	49	35	34	24	32	22.4	26	18

Respondents were asked to indicate the most preferred newspapers for accessing climate change information. The findings indicate that Mwananchi is the most used newspaper followed by Habari Leo and Daily Newspaper (Table 4). When asked to give the reasons for their higher usage of Mwananchi newspaper, nearly three quarters (71%) of the respondents said that Mwananchi covers various type of information including climate change without biases, 65.3% said that it covers a mixture of news from all parts of the country and 62.8% said that the newspaper is published in Kiswahili. Kiswahili is a language which is spoken and understood by the majority of the Tanzanians. Furthermore, 55.4% of respondents said that they prefer reading Mwananchi newspaper to other newspapers because of its higher circulation level. This suggests that owing to her level of coverage, circulation and the language of publication, Mwananchi newspaper may be highly used to access information on climate change for awareness creation among its audiences.

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Habari Leo is another frequently used newspaper. The newspaper preference by the peri-urban newspaper readers may be associated with the fact that it is a government-owned newspaper which is trusted for covering policies and guidelines related to numerous types of information including climate change information provided by the government (Elia,2018) and it is also published in Kiswahili. Furthermore, Siyao and Sife (2018) and Ogessa and Sife (2018) reported that government-owned newspapers in Tanzania are somehow service-oriented that they are expected to take a lead as disseminators of developmental information such as climate change. This suggests that Habari Leo newspaper attracts many readers including government officials such as extension officers, researchers, agricultural officers, forestry officers and other civil servants who may get it from their offices for accessing information that meets their needs.

Table 4: Mostly used newspapers for climate change information

Newspaper	Frequency of use							
	Daily		Thrice per week		Twice per week		Once per week	
	No	%	No	%	No	%	No	%
Daily News	17	14	14	11	15	12	13	10
Habari Leo	34	25	29	23	13	10	9	7
Guardian	13	10	11	9	17	14	13	10
Mwananchi	95	75	11	9	6	5	6	5
Rai	5	4	20	16	8	6	13	10
This Day	2	2	4	3	9	7	20	16

3.4 Types and use of climate change information accessed through newspapers

Table 5 indicates the types of information associated to climate change accessed by peri urban newspaper readers. Such types of information include rainfall information (67%), drought-tolerant crops (57%), occurrence of climate change (57%), how to reduce vulnerability (56%), crops planting (53%), rain-water harvesting techniques (49%), seed varieties (48%), information on land use (47%) and crops diseases (44%). Other types of information reported include the general information on climate change (43%), effects of climate change (41%), available response to climate change (28%) and the process of climate change (12%).

With regard to the use of the above mentioned types of information, the peri-urban newspaper readers required information about rainfall for planning and carrying out farming activities. This is necessary because of high dependency on rain- led agriculture which may be performed as a primary or secondary activity by peri-urban newspaper readers. Knowing when the rain will start for example can determine when crops are planted and harvested. Information on the amount of rainfall in a season is also essential for guiding decisions to grow drought-tolerant crops like sorghum, cassava and millet which are suitable for areas with a little amount of rainfalls. This finding is similar to that of Lunyelele (2018) who reported that cultivation of crop-tolerant crops is essential for increasing resilience of farmers against the impacts of droughts.

Information about the causes of climate change helps readers to plan ahead and make decisions on how to deal with the negative impacts of climate change and how to reduce vulnerability. Vulnerability can be reduced by conducting vulnerability assessments. Such assessments will become effective if there is an access to credible scientific climate change information by newspaper audiences and all the people because a collective effort by all the stakeholders of climate change is required. Such information will create public awareness about the potential effects of climate change for enabling people to take precautionary measures. Information on the crops planting is needed by newspaper readers as it can be used for guiding decision making whether or not to buy early-maturing crops and seeds, and what is the appropriate moment to plant them. Information on the rain-water harvesting techniques is important for helping people to reduce the problem of water resource scarcity.

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Furthermore, the need to get information about land use is helpful for understanding the appropriate and sustainable ways of using their land; that means good land use practices.

The findings also show that respondents indicated that they obtained information about the available responses to climate change from the newspapers. Such information will motivate people to participate on climate change adaptation, coping and mitigation mechanisms. This demonstrates that the goal of accessing climate change information from the media such as newspapers is to create awareness about causes and effects of climate change, enhance adaptation capabilities and hence to improve peoples' livelihoods. These findings imply that peri-urban newspaper readers need the aforementioned types of information as one of the measures to cope and adapt to the potential impacts of climate change in their areas of localities. Similarly, Tizale (2007) reported that people with information on climate change coping and the adaptation mechanisms at their disposal are able to make use of this information to change their practices in response to changing climatic conditions for improving their livelihoods.

Table 5: Types of information on climate change accessed by peri-urban newspaper readers

Types of information	Frequency	Percent (%)
Rainfall	102	67
Drought-tolerant crops	87	57
Occurrence of climate change	87	57
How to reduce vulnerability	86	56
Timely planting of crops	81	53
Rain-water harvesting techniques	75	49
Seed varieties	73	48
Land use	72	47
Crops diseases	67	44
General information about climate change	66	43
Severe effects of climate change	62	41
Available response to climate change	43	28
Process of climate change	19	12

3.5 Perceived usefulness of information on climate change covered in Tanzania newspapers

Respondents were asked to indicate as to what extent climate change information they read from the newspapers was useful to them. The findings in Fig. 2 indicate that nearly three quarters (70%) of the respondents found the information to be very useful.

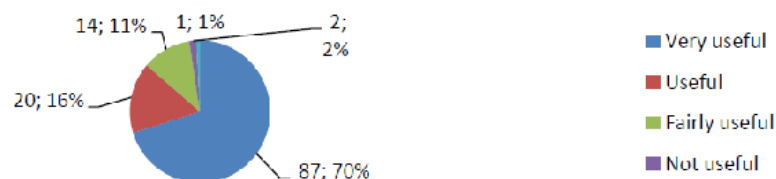


Figure 2: Perceived usefulness of climate change information covered in the newspapers

Climate change information obtained from the newspapers was perceived useful to the peri-urban newspaper readers in different ways as indicated in Table 6. Findings indicate that the information obtained from the newspapers was useful for increasing awareness (83%). Awareness on adaptation, coping and mitigation strategies to the impacts of climate change is a forward step towards addressing the impacts of climate change. Ekpoh and Ekpoh (2011) and Adebayo *et al.* (2012) have reported that awareness creation is a key to address the

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impacts of climate change in order to build a more adaptive capacity among communities. The findings also indicate that the information obtained from newspapers was perceived useful for helping peri-urban newspaper readers to make various decisions on the matters related to the impacts of climate change (67.3%). Similar findings are reported by Mishra (2012) that an access to climate change information enhances decision making for adaptation to climate change. The results were also confirmed by one key informant who pointed out that:

"...Newspaper reading provides me with the current news about the impacts of climate change that will enable me to make informed decisions on the suitable adaptation, coping and mitigation strategies to be employed..." (Key Informant, Chamazi).

Furthermore, respondents had a perception that the information they obtained from newspapers about climate change is useful for providing them with early-warning information such as prior information about the occurrence of drought (64%). Provision of earlier forecast information about drought helps farmers to plan for adaptation measures such as planting drought-tolerant and early maturing crops. Findings further indicate that peri urban newspaper readers had a perception that the climate change information covered in the newspapers can play the role of sensitising communities that are vulnerable to the impacts of climate change, donors and to help in pulling the necessary resources for climate change adaptation, coping and mitigation mechanisms (48%). Climate change information published in the newspapers can attract climate change stakeholders to direct their resources such as human and financial resources towards climate change adaptation, coping and mitigation strategies. Similar findings are reported by scholars like Tairo (2013) who reported that the print media such as newspapers have a major role to play in sensitising vulnerable communities, donor agencies and African governments in Sub-Saharan region including Tanzania so as to help in pulling resources that will help to reduce the effects of climate change.

Besides, respondents had a perception that the information they obtained from the newspapers can influence attitudes and behaviours of members of the public on the climate change related issues (41.2%). Change of attitudes and behaviours among people and communities is important in understanding the causes, effects and how to deal with the potential impacts of climate change. According to Myhre *et al.* (2013), changing behaviour and attitude towards climate change can promote communities' participation in adaptation, coping and mitigation strategies.

Table 6: Perceived usefulness of climate change information obtained by the newspaper readers

Perceived usefulness of climate change information	Frequency	Percent (%)
Increases awareness	127	83.0
Decision making	103	67.3
Provide early warning	98	64.0
Sensitizing vulnerable communities	74	48.4
Influencing attitudes and behaviour change	63	41.2
Reducing information insufficiency	58	38.0
Education and enlightenment	50	33.0
Others	5	3.3

3.6 Challenges encountered by peri-urban newspaper readers when accessing newspapers for climate change information in Tanzania.

The most outstanding challenges that encounter peri urban newspaper readers in an attempt to access newspapers for climate change information in Tanzania are presented in Table 7. The findings indicate that the limited coverage of climate change information in newspapers is one of the big challenges facing peri-urban

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newspaper readers (87%). Low coverage of information on climate change in Tanzanian newspapers is attributed to low attention given to climate change by Tanzanian newspapers. Climate change information is irregularly covered in Tanzanian newspapers and in most cases no specific pages or special supplements are provided as compared with other information such as advertisements, entertainments, politics and crimes. These findings are also similar to the studies by Siyao and Sife (2018) who reported that Tanzanian newspapers ignore coverage of developmental information while much importance is given to other topics.

Furthermore, respondents pointed out that another challenge is associated with the unreliability of climate change information (84%). Perhaps this is because sometimes the information about rainfall patterns forecast provided in the newspapers by the Tanzania Meteorological Agency (TMA) is not always reliable and it is not also timely received. In one of the KII at Melela Village at Mvomero, one villager opined that ...

“...Sometimes we receive wrong information about the amount of rainfalls, when they will start and stop raining from newspapers. With a great surprise, we do not necessarily experience the predicted amount of rainfalls and they do not start as according to the predictions. These kinds of information make us feel that we are misled and thus resulting into mistrust of rainfall predictions information obtained from the newspapers...” (Key informant interview, Mzumbe Ward).

This finding is supported by Muenia *et al.* (2018) who reported that lack of trust and unreliability of the climate information services are the main hindrances to the utilisation of climate information services. The finding is also in resonance with that of Elia (2014) who reported that sometimes farmers tend to criticize the truthfulness of the information they receive from the TMA for not being explicit on the rainfall distribution in a given geographical locations and seasons. This suggests the need for the people to be provided with reliable, trusted and understandable information on climate change for utilising it to adapt cope and mitigate against climate change.

Table 7: Challenges encountered by peri-urban newspaper readers when accessing newspapers for climate change information

Challenges	n	Rating (Number & Percentage)					
		Agree		Disagree		Neutral	
	No.	%	No.	%	No.	%	
Limited coverage of climate change information	148	133	87.0	14	9.2	1	0.7
Unreliability of climate change information	143	128	84.0	12	7.8	3	2.0
Inadequate prominence of climate change information	150	126	82.0	22	14.4	2	1.3
Cost barriers	149	122	78.0	23	15.0	2	1.3
Inadequate journalist's knowledge of climate change issues	144	112	73.0	26	17.0	6	4.0
Shortage of information centres and public libraries	138	111	72.5	23	15.0	4	3.0
Language barrier	145	77	50.0	63	42.2	5	3.33
Other challenges	98	54	35.3	40	26.0	4	3.0

The low prominence of climate change information attached to Tanzanian newspapers was also reported as an important challenge (82%). This is attributed to the fact that climate change information is not often given the priority it deserves in the Tanzanian newspapers. Only few climate change articles are placed in the front pages of the Tanzanian newspapers. In one of the key informant interview one respondent commented that...

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"... Most of the newspapers readers assemble in the newspapers selling centres struggling to read the headlines in the front pages of the newspapers in which most of the time they don't get the detailed information..." (Key informant interview, Mzumbe Ward).

These findings are also similar to the studies by Elia (2018) and Siyao and Sife (2020) who reported a low prominence attached to climate change information in Tanzanian newspapers.

Respondents indicate that they were not able to access newspapers for climate change information because of cost barriers (78%). When asked to indicate the means through which they accessed newspapers, majority (80.3%) of respondents showed that the only means of getting the newspapers was through cash purchase followed by those who could borrow newspapers from friends or neighbours (21.31%). Proper understanding of climate change related information published in the newspapers needs one to consistently buy the newspapers that publish articles with such information. According to Lunyelele *et al.* (2016), access to information in the newspapers has the direct cost of buying a copy. This may be a barrier for the readers who do not have a stable income to buy sensible newspapers whose prices range from Tzs 1000 to 2000. In one of the KIIs, a participant pointed out that ...

"...I like reading newspapers but I have a low income that is not enough for me to buy the entire sensible daily or weekly newspapers editions. I can only afford to buy newspapers inclined to sensational information such as Mwanasport and Udaku which are normally sold at very low prices ranging from Tzs 100 to 200..." (Key informant, Kingolwira Ward, Morogoro).

This is an indication that low income hinders peri-urban newspaper readers to buy newspapers for enabling them to access climate change information. This corroborates the findings by Yohanna *et al.* (2014) who reported that most of the relevant climate change information in the newspapers may not reach the audiences because of the costs barriers. The findings imply that low purchasing power may be a barrier for the peri-urban newspaper readers to access climate change information with regard to adaptation, coping and mitigation strategies published in the newspapers.

Inadequate journalists' knowledge of climate change issues was another challenge cited by peri-urban newspaper readers (73%). Scholars like Diso (2005) have argued that, journalists have the responsibility of producing primary or reproducing secondary information and disseminating it to the general public for consumption. However, peri-urban newspaper readers in this study pointed out that newspaper journalists have inadequate knowledge about climate change science which in turn limits them to cover climate change issues in their newspapers, thus leading to low coverage of climate change information. According to Rioba (2012) and MCT (2017), inadequate journalistic skills and knowledge by Tanzanian journalists tends to affect the critical analysis and coverage of issues including climate change in the newspapers. In one of the KIIs, one respondent who identified himself as a retired journalist commented that...

"...Low coverage and prominence which is given to climate change information in Tanzanian newspapers is caused by lack of training on subject matter specialization among newspaper journalists. If newspaper journalists are given the training on climate change subject matter, coverage and prominence of such information on the newspapers would increase..." (Key informant, Mkundi (Kihonda) Ward, Morogoro).

Respondents indicated that there are no community information centres and public libraries in their areas of vicinity (73%). The presence of public libraries and community information centres could be one of the points at which the readers may access the newspapers at a minimal or no cost at all. These findings therefore suggest

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that, lack of libraries and information centres in the peri-urban community member's localities may act as one of the constraints in accessing climate change information in the newspapers. Lund (2019) and Agyemang (2017) have also reported that libraries are scarce in the most developing countries. In one of KIIs, one respondent commented that...

"Libraries and information centres are rarely found in our localities. Nevertheless nowadays some of us have smart phones that are able to access internet networks which can enable us to read newspapers online. The only problem is that the contents of some of the newspapers are limited into few headlines..." (Key Informant, Mlandizi).

These comments suggest the need for the digitization of all the contents of the newspapers in Tanzania for allowing those who are technologically able to access climate change information online.

Slightly more than half (57.0%) of respondents comprising of 25.5% of those with primary level of education followed by Secondary education (23.5%), Diploma (4.6%) and Bachelor degree and above (3.3%) agreed that language barrier particularly the use of jargons or difficult concepts in explaining climate change issues in the newspapers is yet another challenge. This is perhaps attributed to the fact that sometimes climate change information is written and expressed in technical terms that are difficult for the common people to understand. Lusino *et al.* (2003) reported that climate change information communicated in official and business languages at the expenses of respecting the dominant culture over that of minority groups may not easily be understood by local communities due to the technical complexity of information content and use of technical terms and terminologies. These findings are also in tandem with that of Ndhlovu and Mpofu (2016) who reported that one of the challenges faced by news readers when using media such as newspapers in efforts to get climate change information is rooted in communicating language misunderstanding which is associated with poor translation of climate change issues (Chukwuji *et al.*, 2019). In one of the key informant interviews one pastoralist responded in a complaining manner that ...

"...All the newspapers we get here are written in Kiswahili and English languages. I have never seen the newspapers written in our local language for enabling us to understand climate change issues in our vernacular language such as Maasai Language..." (Key Informant, Dunda, Bagamoyo).

These findings demonstrate that there is a dire need of having community newspapers written in other local languages to enhance access and more usage of the information in climate change for those who are not acquainted with alien languages. According to Mubofu and Elia (2017) the use of local languages can enable the effective utilisation of information by farmers.

On the other hand the findings indicate that 42.2% of peri-urban readers comprising of 5.2% of those with Primary level of education followed by Secondary education (8%), Diploma (13.1%) and Bachelor degree and above (16%) disagreed that language is not a barrier for them to access climate change information from Tanzanian newspapers. Perhaps this is associated with the fact that most newspapers are written in Kiswahili which is a common language to many Tanzanians.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The findings of this study demonstrate that newspapers are important communication channels used by peri-urban newspaper readers to access climate change information for awareness creation and influencing behavioural change about climate change. The mostly used newspapers by the surveyed newspaper readers were *Mwananchi* followed by *Habari Leo*. These newspapers are written in Swahili language which is understood by the majority of readers and also they have high news coverage and circulation. The climate change information obtained from these newspapers was regarded as useful for making informed decisions on adaptation, coping and mitigation measures. However inadequate coverage and low prominence attached to

Siyaq, P. O. & Sife, A. S. (2020). Access to and use of climate change information covered in Tanzanian newspapers: A case of selected peri-urban newspaper readers in Tanzania. climate change information, cost barriers, shortage of community information centres and public libraries, inadequate journalist's knowledge of climate change issues and language barriers are the challenges that impede full access to newspapers for climate change and other developmental information by peri-urban community members.

The study concludes that peri-urban newspaper readers prefer to use newspapers written in Swahili language and those with high news coverage. These newspapers enable timely access to information on climate change for awareness creation and influencing behavioural change among peri-urban newspapers readers as a pre-requisite for finding solutions posed by potential impacts of climate change. Nevertheless, the challenges that impede full access to newspapers for climate change information by peri-urban newspaper readers in Tanzania should be overcome.

It is therefore recommended that climate change information generators such as TMA should repackage and disseminate reliable forecast information that addresses the needs of the general public through popular and newspapers with national status. Besides, national and local government authorities in Tanzania should provide support to public libraries and to establish community information resource centres in peri-urban areas for enabling newspaper readers to access climate change and other developmental information.

Although the study was limited to the assessment of the use of newspapers in accessing climate change information by the selected peri-urban newspaper readers in Tanzania, the outcome of the study has shed more light on the challenges of providing climate change information through newspapers in Tanzania.

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CHAPTER THREE

3.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The main objective of this study was to establish the coverage of climate change information in Tanzanian newspapers. Since the thesis was developed in published papers or publishable manuscript, of which each paper presented its own findings, the general conclusion and recommendations section is organized according to the published or publishable manuscript. Thus the section presents a summary of major findings, conclusions, recommendations, and contributions of the study to the body of knowledge, theory and areas for further research.

3.1 Summary of the Major Findings and Conclusions

The summary of major findings section starts with the first published paper that analysed the level of attention given to climate change information by Tanzanian newspapers for the period of 10 years between 2006 and 2015, the publishable manuscript was on the prominence of the occurrence accorded to climate change information in Tanzanian newspapers, published paper two assessed the information sources used by Tanzanian newspaper journalists to obtain climate change information and published paper three assessed the use of newspapers in accessing climate change information by the selected peri-urban newspaper readers in Tanzania.

3.1.1 Paper One: Coverage of Climate Change Information in Tanzanian Newspapers

The paper sought to analyse the level of attention given to climate change information by Tanzanian newspapers for the period of 10 years between 2006 and 2015. The results

indicate that the six Tanzanian newspapers covered very few articles on climate change. Much attention was given to entertainment followed by miscellaneous issues such as environment and socio-economic issues and advertisements. The Pearson's chi-square test indicates that there was a significant difference $\chi^2 = 21,765$, $p\text{-value} < 2.2e^{-16}$ between the level of coverage of climate change articles on other topics in the selected newspapers. These findings show that Tanzanian newspapers did not pay adequate attention to climate change issues. That is to say, Tanzanian newspapers did not effectively play their role of informing, educating, and enlightening people about climate change.

Based on these findings it is concluded that, despite that climate change is among the threatening phenomena in Tanzania deserving much attention in the media, the study findings indicate that the level of coverage devoted to climate change by the newspapers in Tanzania is very low and disproportionate to the level of threat of the effects of climate change. This implies that articles on climate change information are considered to be less important by the Tanzanian newspapers and thus did not receive adequate attention. This leaves a question on the Tanzanian newspapers' dedication to reporting climate change information.

3.1.2 Publishable manuscript one: Prominence of Occurrence Accorded to Climate Change Information on in Tanzanian Newspapers

The paper sought to analyse the level of prominence given to information on climate change by six Tanzanian newspapers published for a span of 10 years between 2006 and 2015. The findings indicate that only 53 (7.6%) articles appeared on the front pages of the six Tanzanian newspapers for all 10 years, giving a yearly average of five articles for all newspapers and only one article for each newspaper per year, whereas the majority (631;

92.25%) of the articles on climate change appeared randomly on the inside pages of the paper. The Chi-square test ($\chi^2 = 10.000$; $df=1$; $p\text{-value} < 0.002$) showed significant differences between the locations of the number of articles on the front and on the inside pages. These findings suggest that information on climate change in Tanzanian newspapers was not given the necessary prominence.

Furthermore, the findings indicate that the prominence of climate change information in Tanzanian newspapers was affected by the attitude of newspaper editors on climate change articles submitted in the news rooms, low understanding of climate change issues, and the need for regenerating revenue. Others include, lack of a clear editorial policy and time and financial constraints.

Based on these findings it is concluded that, despite the fact that climate change is a newsworthy theme, it did not feature prominently in the Tanzanian newspapers for a period of ten years from January 2006 to December 2015. This implies that, articles on climate change information were not found worthy of appearing on the front pages of the newspapers studied. This inadequacy of prominence accorded to information on climate change in the Tanzanian newspapers raises questions on the abilities of these newspaper reportage as one of the disseminators of pertinent themes including climate change.

3.1.3 Paper Two: Sources of Climate Change Information Used by Newspaper Journalists in Tanzania

This paper assessed the information sources used by journalists of Tanzanian newspapers to obtain information on climate change. Specifically, the study examined the sources of climate change information used by newspaper journalists to write matters on climate

change. The study also examined challenges encountered by newspaper journalists when covering information on climate change in Tanzanian newspapers. The findings indicate that climate change experts and daily events such as community meetings and other relevant gatherings are the main sources of climate change information accessed by newspaper journalists in Tanzania. The findings indicate further that there is a deficit in the use of other potential sources of information such as libraries and information resource centres and printed materials such as brochures, journals, books, and websites.

The findings indicate further that newspaper journalists experience overarching challenges that limit them from covering and reporting information on climate change. Such challenges include abiding by journalistic norms such as balancing of the news on climate change, low motivation, and lack of interest on climate change, inadequate financial resources and time constraints. Others include, lack of awareness on the available sources of information, limited knowledge on climate change and reluctance of GIOs to share information with journalists.

Based on these findings it is concluded that climate change experts and daily events such as community meetings and other relevant gatherings are the main sources of climate change information consulted by newspaper journalists in Tanzania. The listed sources are largely used because they are thought to be interactive – enabling journalists to obtain climate change information- and they are easily accessible, and they use and provide instant responses. Furthermore, the study established that deficient use of other potential sources of information such as libraries, printed materials such as 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 on climate change.

3.1.4 Paper Three: Access to and Use of Climate Change Information Covered in Tanzanian Newspapers: A Case of Selected Peri-Urban Newspaper Readers in Tanzania

The findings of this study demonstrate that newspapers are important sources used by peri-urban newspaper readers to access climate change information for awareness creation and influencing behavioural change. The mostly used newspapers by the surveyed newspaper readers were Mwananchi followed by Habari Leo. These newspapers are written in Kiswahili language which is understood by the majority of readers have high news coverage and circulation. The information obtained from these newspapers was regarded as useful for making informed decisions on adaptation, coping and mitigation measures. The findings indicate further that inadequate coverage of climate change information, lack of reliability of climate change information, low prominence attached to climate change information, cost barriers, inadequate journalist's knowledge of climate change issues, inadequate community information centres and public libraries and language barriers are constraining factors that impede full utilisation of newspapers for accessing climate change information by peri-urban community members.

Based on these findings, it is concluded that peri-urban newspaper readers prefer to use newspapers written in Kiswahili which is understood by the majority of readers and which have high news coverage and circulation. These newspapers enable timely access to information on climate change for awareness creation and influencing behavioural change among peri-urban newspapers readers as a pre-requisite for finding solutions posed by potential impacts of climate change.

3.2 General Recommendations

Based on the conclusions of this study, the following recommendations are made:

- (i) Government and private newspaper media houses should formulate and introduce clear guidelines and policies to ensure increased levels of coverage and prominence of developmental issues including climate change information in Tanzanian newspapers.
- (ii) Government, private newspaper media houses, climate change researchers, and all organisations involved in the fight against climate change, and journalism colleges should collaborate and devise strategies aimed at building capacity of newspaper editors, journalists, and reporters in daily activities. This can be achieved by introducing climate change journalism course which in turn will lead to the acquisition of specialised skills and knowledge in writing and reporting evidence based scientific developmental issues including climate change in the print media such as newspapers.
- (iii) Newspaper media houses should overcome barriers that impede coverage and reportage of climate change information. One way of overcoming such barriers include the provision of adequate financial resources to newspaper journalists which will help them to acquire necessary resources including ICTs and to meet other necessary expenses such as travel and accommodation which in turn will enable them to participate in research works for increasing coverage of climate change information in the newspapers.
- (iv) Newspaper journalists should collaborate with library professionals who will facilitate programs on the user education training for newspaper journalists. User education training will provide newspaper journalists with information on the multiple new available sources and skills on how to search, locate, and retrieve

information effectively from these sources for improving the quality and quantity of information on climate change covered in the newspapers.

- (v) To ensure that, information on climate change is disseminated through the channels preferred by the newspaper journalists, this study recommends that information providers should evaluate journalists' information sources preferences before using them to disseminate information.
- (vi) Generators of Climate change information such as TMA should repackage and disseminate reliable climate change forecast information that address the needs of the public through popular media including high reputed newspapers with national status .
- (vii) National and local government authorities should provide adequate financial support to public libraries and establish community information resource centres in peri-urban areas to enable newspaper readers to access developmental information particularly climate change through Tanzanian newspapers at no or minimal costs.

3.2.1 Contributions of the Study to the Body of Knowledge

This study is relevant in many ways. Firstly, there is a limited number of studies that have examined the role of newspapers in the dissemination of climate change information in Tanzania, particularly those applying content analysis of newspapers articles as an analytical research method. The study has therefore contributed to the growing body of knowledge on analytical research on the role of newspapers in the dissemination of climate change information in Tanzania.

Secondly, this study has contributed to the on-going discourses on climate change issues, has influence attention and understanding of the impacts of climate change and thus has

provided invaluable inputs on climate change adaptation, coping and mitigation strategies. Thus, this study is in line with Sustainable Development Goals (SDGs), particularly goal number 13.3 which insists on taking urgent and concerted actions in combating climate change and its impacts. Thus, interventions for adaptation, coping and mitigation of climate change are required. Accordingly, the coverage and prominence of climate change information in the newspapers for awareness creation is one of the interventions in combating climate change and its impacts.

Thirdly, newspapers coverage and prominence of climate change information are one of the avenues through which the public, policy makers, and reporters can get research information about real-life implications of how people and places are affected by climate change and what needs to be done to promote adaptation, coping, and mitigation strategies.

Fourthly, the study is important in that it has identified the sources of extracting information on climate change preferred by newspapers journalists in Tanzania. This may be used to equip Tanzanians, decision makers, and all other climate change actors at the technical and policy levels access timely and relevant information on climate change that would help them make informed decisions and choice. Fifthly, the study is also significant because it has shed more light on the challenges of providing climate change information through newspapers in Tanzania.

The study has also contributed to the Tanzanian Government initiatives on National Climate Change Communication Strategy (NCCCS) whose aim is to raise public awareness at all levels on the opportunities and threats resulting from climate change. This

study has therefore highlighted the importance of taking into account newspapers coverage of climate change information which can further be used for policy recommendations to improve the communication system of climate change information through the use of newspapers and show the credibility of newspapers in creating awareness of climate change in Tanzania.

Researcher has published three papers in the peer- reviewed and international recognised journals. The published papers can be used as a source of literature review for other researchers working in the same or related research issue. Additionally, the researcher is intending to collaborate with media houses, editors and journalists so that a policy brief can be written down.

3.2. 2 Contribution to the Theory

The study has shown that there is a close relationship between news media and agenda-setting theory in that by giving more coverage and prominence to climate change information in the print media, particularly newspapers can contribute to agenda-setting for public discussions in respect to climate change adaptation, coping and mitigation mechanisms in Tanzania. Thus, newspapers coverage and prominence of climate change information has an agenda- setting effect.

3.2. 3 Areas for Further Research

- (i) A study of this kind (content analysis of newspaper coverage) needs to be undertaken in other sectors of developmental such as health and agriculture among others to justify generalisation of the findings on the poor attention and prominence given to the developmental news by the Tanzanian newspapers.

- (ii) Study on the coverage of climate change in the electronic media such as radio and TV will be an interesting area in exploring the effectiveness of these media in the dissemination of developmental messages including climate change in Tanzania.

- (iii) Besides, this study recommends for new qualitative study to investigate the reasons as to why Tanzanian newspapers do not prioritise coverage of climate change.

APPENDICES

Appendix 1: Comprehensive code book for collecting climate change information

Climate Change Information Articles																
Coders' Name	Newspapers' Name	Article Identification					Position of an article					Article Type				
		Date	Day	Year	Climate change Information Articles (Key words)	Number of	Front Page (Lead)	Front Page	Centre Page	Others	Back Page	News	Feature	News Summary	Editorial	Others

Appendix 2: Questionnaire for newspapers journalists in Tanzania

Introduction

My name is Peter O. Siyao– a PhD student at Sokoine University of Agriculture (SUA), Tanzania. As part of the requirements towards the fulfilment of my PhD programme, I am required to carry out research. My research is about the Role of Newspapers in the Dissemination of Climate Change Information in Tanzania. Among others, the study focuses on the journalists of the following newspapers: Business Times, The Guardian, Daily News, Majira, Mtanzania, Mwananchi, Nipashe, This Day, Habari Leo, and Rai.

I kindly request for your participation in this study. Information provided in the questionnaire will be treated in utmost confidence and only the researcher will have access to the information collected. Your name will not appear in the thesis, publications or oral presentations made. Should you require any additional information or clarifications regarding the research, please do not hesitate to contact the researcher.

Contact details are:

Peter O. Siyao (Researcher)

Mobile: 0784386194

E-mails: posiyao@mzumbe.ac.tz or siyaopeter@yahoo.com

To establish the sources of information used by journalists for reporting climate change information in the newspapers.

1. Age (Years)
2. Gender.....
3. Educational level:..
4. Name of the newspaper covered.....
5. Experience in the field of journalism..... (Years)
6. Do you normally cover information about climate change in the newspaper (s) you report:
 1. Yes
 2. No
6. Have you ever attended any training on how to report information about climate change?
 1. Yes
 2. No
7. What are your regular sources of information that you use to cover news about climate change. Use table 1 below to rank them according to their importance by marking them with number 1, 2, 3.....

Sources of information of climate change information	Rank
National meteorological services	
Daily events	
Library and documented literature	
Researchers	
Newspapers	
Climate change experts	
Extension workers	
Television	
Internet websites	
Radio	

Posters	
Press releases	
News conferences	
Public relation officers	
Professional society meetings	
Books	
scientific journals	
Others sources (specify)	
.....	

8.0 What factors influence the coverage of climate change information in Tanzanian newspapers? Please tick the appropriate answers in the list of challenges with multiple responses provided in the Table below.

S / N	Factors that influence the coverage of climate change information in Tanzanian news paper	Strongly	Agree	Strongly	Disagree	Undecided
1	General attitudes: I normally decide which news to cover and which ones to ignore.					
2	I always abide with journalistic norms such as balancing of news.					
3	Lack of awareness of the variety of available sources of information on climate change and the limitations of each source.					
4	Lack of journalist's knowledge of climate change issues which may result into limited information reportage					
5	Limited coverage of climate change information in Tanzanian newspapers may be caused by the lack of interest by both journalists and the public.					
6	Lack of incentives : Journalists are poorly paid					
7	Most of the journalists are not employed but they rather work as freelancers.					
8	Government information officers are reluctant to share information with journalists under the umbrella of information restrictions.					
9	Others: please specify.....					

9. Please give any other important information deemed to be important for the purpose of this study.....

Thank you very much for your participation

**Appendix 3: Questionnaire for the Consumers of Climate Change Information
in Tanzania**

Introduction

My name is Peter O. Siyao– a PhD student at Sokoine University of Agriculture (SUA), Tanzania. As part of the requirements towards the fulfilment of my PhD Degree, I am required to carry out research. My research is about the Role of Newspapers in the Dissemination of Climate Change Information in Tanzania. Among others, the study focuses on the consumers of climate change information, namely: peri-urban farmers, pastoralists, agricultural extension officers, researchers and forestry officers in Morogoro, Coastal Region and Dar es Salaam regions.

I kindly request for your participation in this study. Information provided in the questionnaire will be treated in utmost confidence and only the researcher will have access to the information collected. Your name will not appear in the dissertation, publications or oral presentations made. Should you require any additional information or clarification regarding the research, please do not hesitate to contact the researcher.

Contact details are:

Peter O. Siyao (Researcher)

Mobile: 0784386194

E-mails :posiyao@mzumbe.ac.tz or siyaopeter@yahoo.com

Specific Objective 4: To assess the use of newspapers in accessing climate change information by the selected peri-urban newspaper readers in Tanzania.

A. Demographic Information

1.0 Sex:

1. Male
2. Female

2.0 Age:Years

3.0 Educational qualification:

1. Primary Education
2. Secondary Education:
 - i. Ordinary Level
 - ii. Advanced Level
3. Certificate
4. Diploma
5. Higher Diploma
6. University Education

4.0 Occupation:

1. Farmer
2. Civil servant
3. Business person
4. Student
5. Pastoralist
6. Researcher
7. Extension Officer
8. Forestry Officer .

Level of Awareness of Climate Change Issues

6.0 What is your level of awareness about climate change issues? Tick all that are

Applicable:

1. Not at all aware
2. Slightly aware
3. Somewhat aware

4. Moderately aware

5. Extremely aware

Sources of Climate Change Information

5.0 On the scale shown below, how would you rate the following as your sources of information about climate change? 5 indicate Very Important Sources, 4 indicates Important Sources, 3 indicates Moderately Important Sources, 2 indicates Little Important sources and 1 indicates Unimportant Sources. Use ✓ Mark to select the appropriate answers.

Multiple responses

	Very Important	Important	Moderately Important	Little Important	Unimportant
Sources of information	5	4	3	2	1
Television news					
Radio news					
Newspapers					
Web services					
Extension workers					
Researches					
Fellow farmers					
Fellow pastoralists					
Forestry Officers					
Brochures					
Community outreach					
Workshops					
Meetings					

6. Do you read newspapers?

1. Yes

2. No

7. If the answer for question 6 is yes. Which ones among the following newspapers do

you normally read. Use table 1 below to rank them by marking them with number 1, 2, 3...

Table 1

Newspapers	Ranks
Mwananchi	
Guardian	
Daily News	
This Day	
Rai	
Habari Leo	

8. Give the reasons for the three most commonly used newspapers you have ranked in table 2 above:

1. Higher level of circulation
2. Frequency of publication
3. Wider coverage of news
4. Use national language
5. Privately Owned
6. Government Owned
7. Not biased
8. Others: Please specify

9. What is the level of readership for the following newspapers? Put √ Mark on the appropriate answers.

Newspapers	Frequency of newspapers reading			
	Every day	Three times a week	At least once a week	At least once a month
Daily News				
The Guardian				
Mwananchi				
Habari Leo				
This Day				
Rai				

10. Which of the above newspapers would you consider your three most important sources of climate change information? Rank them in order of importance:

- 1.....
- 2.....
- 3

Dissemination of Climate Change Information Through Newspapers

11. Do the newspapers you read most give significant attention to climate change information in Tanzania such as causes of climate change, impacts and measures to curb the impacts of Climate change?

1. Yes
2. No

12.0 In your own opinion, how useful is the information on climate change disseminated to you through Tanzanian Newspapers:

1. Very useful
2. Useful
3. Fairly useful
4. Not useful at all
5. Neutral

13.0 What types of climate change information are you most interested in the newspapers: Tick the appropriate option (s)

- i. How likely or severe the effects of climate change will be
- ii. Things you can do to adapt to climate change or reduce vulnerability to climate change
- iii. General information about climate change such as occurrence of drought, change of rainfall patterns, change of temperature, causes of disappearance of animal and

vegetation species, causes of occurrence of floods, outbreak of diseases such as Malaria

- iv. Available responses to the effects of climate change
- v. The process of climate change

14.0 Where do you get the newspapers that you normally read?

- a. You buy your own copy (s)
- b. You borrow from your neighbours / friends
- c. From the community information centre
- d. From the nearby library
- e. In the office/ department/ section where I work
- f. Sales points/centres

15.0 Please tick the type/kind of information on climate change disseminated to you through Tanzanian newspapers?

- a. Seasonal forecast information such as timely planting
- b. Type of crop to grow, seed variety (late or early maturing varieties)
- c. Drought resistant crops ,
- d. Early warning information
- e. Rainfall pattern
- f. Crop rotation
- g. Type of fertilizers to apply
- h. Soil characteristics)

16. What type of information on climate change you need to fulfil your activities in relation to adaptation measures in Tanzania?. Tick the most appropriate options.

- a. Timely access of seasonal rainfall information
- b. Crop diseases
- c. Timely planting

- d. Drought resistant crops
- e. Type and quantity of fertilizer to apply
- f. Seed variety to grow
- g. Type of crop to grow
- h. Crop rotation
- i. Soil characteristics
- j. Institute proper land use
- k. Shifting to higher ground to avoid floods
- l. Abandoning the most hit areas
- m. Rainwater harvesting techniques, planting trees, reducing animal numbers, setting aside grazing areas, introducing zero grazing
- n. Afforestation on the damaged watershed

Usefulness of climate change information accessed through the newspapers

17.0 What is the usefulness of climate change information that you access through Tanzanian newspapers? You may tick more than one option.

- 1. Increases awareness raising about the impacts of climate change that will enable to make informed decisions on the suitable adaptation and mitigation strategies .
- 2. Provides early-warming information and adaptation measures such as plating drought resistant and early maturing crops .
- 3. Helps in mobilizing decision making across the communities to take actions that will enhance your capacity and willingness to adapt to the adverse impacts of climate change .
- 4. Educate and enlightenment about the sustainable agricultural and pastoral activities .
- 5. The newspapers through their coverage of climate change information can play the role of sensitizing vulnerable communities, donors and government to help in pulling the necessary resources that will reduce the effects of climate change .
- 6. Can influence attitudes and behaviours of members of the public on the climate change related issues .
- 7. The use of newspapers in the dissemination of climate change information may help people to reduce information insufficiency

8. Others: Specify please

18.0 What are the challenges you normally face in accessing climate change information in Tanzanian newspapers?

S/n	Challenges you normally face in accessing climate change information in Tanzanian newspapers	Strongly Agree	Agree	Strongly Disagree	Disagree	Undecided
1	Cost barrier: Low income for buying the newspapers					
2	Language barrier: Newspapers that mostly cover climate change information are written in alien language that I can't follow					
3	Climate change information is not written in the prominent positions of the newspapers					
4	Lack of information centre in the area of your locality					
5	Lack of library in the area of your locality					
6	Lack of journalist's knowledge of climate change issues which results into limited information reportage					
7	Climate change issues are explained through concepts that I am not familiar with in my local language					
8	Climate change information is rarely covered in the newspapers					
9	Others: Specify please.....					

Thank you Very Much for Your Participation

QUESTIONNAIRE FOR NEWSPAPER EDITORS IN TANZANIA

- Age (Years). Option
- Gender.....
- Name of the Newspaper covered.....
- Experience in the field of journalism..... (Years)
- Do you have journalists who are specialized in climate change journalism: Yes ...
No...
- How many are they
- Are they enough
- Do you provide training on how to cover/report climate change issues to your journalist: Yes..... No.....

9. What kind of training: Short term training such as workshops, seminars, conference and in house training or long term training such as certificate, Diploma, Bachelor Degree and above.

10. Climate change is a pressing environmental issue in Tanzania. Do you normally encourage journalists to write articles about climate change issues? and how?
11. Do you provide enough facilities to enable journalist to cover climate issues?.....

12. Are there any challenges that act as barriers in the coverage and reportage of climate change information in your newspapers?. If Yes, please list them according to their level of importance.....

13. What do you think could be the solutions to the above mentioned challenges?

14. Any other comments that you deem worth sharing will be appreciated

Thank you very much for your participation


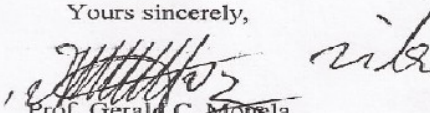
Appendix 4: Checklist questions for interview:

- Do you prioritize publication of development information in your newspaper?
- Is there any policy that guides prioritization of developmental news such as climate change information?
- Who makes decision on which information should be given priority in your newspaper?
- Are there any barriers that hinder prioritization of climate change information?

Checklist questions for newspaper journalists and for peri-urban newspaper readers

- Probing questions on the sources of information in climate change mostly used by newspaper journalists and the challenges encountered
- Probing questions on the newspaper readership by peri-urban newspaper readers, types of information on climate change obtained from the newspapers, perceived usefulness of climate change information and the challenges encountered by newspaper readers when accessing climate change information.

Appendix 5: Research clearance letter

CLEARANCE PERMIT FOR CONDUCTING RESEARCH IN TANZANIA	
	SOKOINE UNIVERSITY OF AGRICULTURE OFFICE OF THE VICE-CHANCELLOR P.O. Box 3000, MOROGORO, TANZANIA Phone: 023-2604523/2603511-4; Fax: 023-2604651
Our Ref. SUA/ADM/R.1/8/	Date: 31 st October 2016
Vice Chancellor Mzumbe University P.O. Box 1 MZUMBE	
Re: UNIVERSITY STAFF, STUDENTS AND RESEARCHERS CLEARANCE	
<p>The Sokoine University of Agriculture was established by Universities Act No.7 of 2005 and SUA Charter of 2007 which became operational on 1st January 2007 repealing Act No.6 of 1984. One of the mission objectives of the University is to generate and apply knowledge through research. For this reason the staff, students and researchers undertake research activities from time to time.</p> <p>To facilitate the research function, the Vice-Chancellor of the Sokoine University of Agriculture (SUA) is empowered under the provisions of SUA Charter to issue research clearance to both, staff, students and researchers of SUA.</p> <p>The purpose of this letter is to introduce to you Mr. Peter Onauphoo Siyao a bonafide PhD (SNAL) student with registration number PLS/D/2015/0001 of SUA. By this letter Mr. Peter has been granted clearance to conduct research in the country. The title of the research in question is “The role of newspapers in dissemination of climate change information in Tanzania”.</p> <p>The period for which this permission has been granted is from September to April 2017. The research will be conducted in Mzumbe University.</p> <p>Should some of these areas/institutions/offices be restricted, you are requested to kindly advice the researcher(s) on alternative areas/institutions/offices which could be visited. In case you may require further information on the researcher please contact me.</p> <p>We thank you in advance for your cooperation and facilitation of this research activity.</p>	
Yours sincerely,  Prof. Gerald C. Momba VICE-CHANCELLOR	
VICE CHANCELLOR SOKOINE UNIVERSITY OF AGRICULTURE P. O. Box 3000 MOROGORO, TANZANIA	
Copy to: Student – Mr. Peter Onauphoo Siyao	

CLEARANCE PERMIT FOR CONDUCTING RESEARCH IN TANZANIA

SOKOINE UNIVERSITY OF AGRICULTURE
OFFICE OF THE VICE-CHANCELLOR
 P.O. Box 3000, MOROGORO, TANZANIA

Phone: 023-2604523/2603511-4; Fax: 023-2604651

Our Ref. SUA/ADM/R.1/8/

Date: 29th March, 2017

Institute of Resources Assessment
 P.O. Box 35097
 DAR ES SALAAM

Re: UNIVERSITY STAFF, STUDENTS AND RESEARCHERS CLEARANCE

The Sokoine University of Agriculture was established by Universities Act No.7 of 2005 and SUA Charter of 2007 which became operational on 1st January 2007 repealing Act No.6 of 1984. One of the mission objectives of the University is to generate and apply knowledge through research. For this reason the staff, students and researchers undertake research activities from time to time.

To facilitate the research function, the Vice-Chancellor of the Sokoine University of Agriculture (SUA) is empowered under the provisions of SUA Charter to issue research clearance to both, staff, students and researchers of SUA.

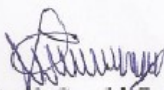
The purpose of this letter is to introduce to you **Mr. Peter Onauphoo Siyao** a bonafide PhD (SNAL) student with registration number PLS/D/2015/0001 of SUA. By this letter **Mr. Peter** has been granted clearance to conduct research in the country. The title of the research in question is "The role of newspapers in the dissemination of climate change information in Tanzania".

The period for which this permission has been granted is from **April to October 2017**. The research will be conducted in **Institute of Resources Assessment**.

Should some of these areas/institutions/offices be restricted, you are requested to kindly advise the researcher(s) on alternative areas/institutions/offices which could be visited. In case you may require further information on the researcher please contact me.

We thank you in advance for your cooperation and facilitation of this research activity.

Yours sincerely,


 Prof. Gerald C. Monela
 VICE-CHANCELLOR

VICE CHANCELLOR
 SOKOINE UNIVERSITY OF AGRICULTURE
 P. O. Box 3000
 MOROGORO, TANZANIA

Copy to: Student – **Mr. Peter Onauphoo Siyao**

CLEARANCE PERMIT FOR CONDUCTING RESEARCH IN TANZANIA



SOKOINE UNIVERSITY OF AGRICULTURE (SUA)
OFFICE OF THE VICE CHANCELLOR
P.O. 3000 MOROGORO, TANZANIA
 TELEPHONE: +255 023 4523/2603511-4 FAX: 023- 2604651

Our Ref. DRPGS/R/126/15

Date: 20th July, 2018

Editor,
 Tanzania Standard Newspapers (TSN),
 P.O. Box 9033
DAR ES SALAAM

Re: UNIVERSITY STAFF, STUDENTS AND RESEARCHERS CLEARANCE

The Sokoine University of Agriculture was established by University Act Number 7 of 2005 and SUA Charter of 2007 which became operational on 1st January 2007 repealing Act Number 6 of 1984. One of the mission objectives is to generate and apply knowledge through research. For this reason the staff and researchers undertake research activities from time to time.

To facilitate the research function, the Vice-Chancellor of the Sokoine University of Agriculture (SUA) is empowered to issue research clearance to both staff, students and researchers of SUA on behalf of the Government of Tanzania and the Tanzania Commission for Science and Technology.

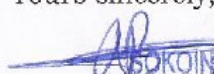
The purpose of this letter is to introduce to you **Mr. Peter O. Siyao** a bonafide PhD Student with Reg. No. **PLS/D/2015/0001** of SUA. By this letter **Mr. Peter O. Siyao** has been granted clearance to conduct research in the country. The title of the research is: ***"The Role of Newspapers in Dissemination of Climate Change in Tanzania"***.

The period for which this permission has been granted is from **July, 2018 to September, 2018**. The research will be conducted in **Dar es salaam Region**.

Should some of these areas/institutions, offices be restricted, you are requested to kindly advise the researchers on alternatives areas, institutions/offices which could be visited. In case you may require further information on the researchers please contact the University.

We thank you in advance for your cooperation and facilitation of this research activity.

Yours sincerely,

 VICE CHANCELLOR
 SOKOINE UNIVERSITY OF AGRICULTURE

Prof. Peter R. Gillah P. O. Box 3000

FOR: VICE-CHANCELLOR MOROGORO, TANZANIA

Copy to: **Mr. Peter O. Siyao - Researcher**

CLEARANCE PERMIT FOR CONDUCTING RESEARCH IN TANZANIA



SOKOINE UNIVERSITY OF AGRICULTURE (SUA)
OFFICE OF THE VICE CHANCELLOR
P.O. 3000 MOROGORO, TANZANIA
TELEPHONE: +255 023 4523/2603511-4 FAX: 023- 2604651

Our Ref. DRPGS/R/126/16

Date: 20th July, 2018

Editor,
 The Guardian Newspapers,
 P.O. Box 31042
DAR ES SALAAM

Re: UNIVERSITY STAFF, STUDENTS AND RESEARCHERS CLEARANCE

The Sokoine University of Agriculture was established by University Act Number 7 of 2005 and SUA Charter of 2007 which became operational on 1st January 2007 repealing Act Number 6 of 1984. One of the mission objectives is to generate and apply knowledge through research. For this reason the staff and researchers undertake research activities from time to time.

To facilitate the research function, the Vice-Chancellor of the Sokoine University of Agriculture (SUA) is empowered to issue research clearance to both staff, students and researchers of SUA on behalf of the Government of Tanzania and the Tanzania Commission for Science and Technology.


The purpose of this letter is to introduce to you **Mr. Peter O. Siyao** a bonafide PhD Student with Reg. No. **PLS/D/2015/0001** of SUA. By this letter **Mr. Peter O. Siyao** has been granted clearance to conduct research in the country. The title of the research is: "*The Role of Newspapers in Dissemination of Climate Change in Tanzania*".

The period for which this permission has been granted is from **July, 2018 to September, 2018**. The research will be conducted in **Dar es Salaam Region**.

Should some of these areas/institutions, offices be restricted, you are requested to kindly advice the researchers on alternatives areas, institutions/offices which could be visited. In case you may require further information on the researchers please contact the University.

We thank you in advance for your cooperation and facilitation of this research activity.

Yours sincerely,


 VICE CHANCELLOR
 SOKOINE UNIVERSITY OF AGRICULTURE
 Prof. Peter R. Gillah P. O. Box 3000
FOR: VICE-CHANCELLOR MOROGORO, TANZANIA

Copy to: **Mr. Peter O. Siyao - Researcher**

CLEARANCE PERMIT FOR CONDUCTING RESEARCH IN TANZANIA



SOKOINE UNIVERSITY OF AGRICULTURE (SUA)
OFFICE OF THE VICE CHANCELLOR
P.O. 3000 MOROGORO, TANZANIA
 TELEPHONE: +255 023 4523/2603511-4 FAX: 023- 2604651

Our Ref. DRPGS/R/126/14

Date: 20th July, 2018

Editor,,
 Mwananchi Communication Limited,
 P.O. Box 19754
DAR ES SALAAM

Re: UNIVERSITY STAFF, STUDENTS AND RESEARCHERS CLEARANCE

The Sokoine University of Agriculture was established by University Act Number 7 of 2005 and SUA Charter of 2007 which became operational on 1st January 2007 repealing Act Number 6 of 1984. One of the mission objectives is to generate and apply knowledge through research. For this reason the staff and researchers undertake research activities from time to time.

To facilitate the research function, the Vice-Chancellor of the Sokoine University of Agriculture (SUA) is empowered to issue research clearance to both staff, students and researchers of SUA on behalf of the Government of Tanzania and the Tanzania Commission for Science and Technology.

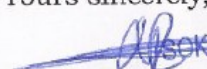
The purpose of this letter is to introduce to you **Mr. Peter O. Siyao** a bonafide PhD Student with Reg. No. **PLS/D/2015/0001** of SUA. By this letter **Mr. Peter O. Silayo** has been granted clearance to conduct research in the country. The title of the research is: "**The Role of Newspapers in Dissemination of Climate Change in Tanzania**".

The period for which this permission has been granted is from **July, 2018 to September, 2018**. The research will be conducted in **Dar es Salaam Region**.

Should some of these areas/institutions, offices be restricted, you are requested to kindly advice the researchers on alternatives areas, institutions/offices which could be visited. In case you may require further information on the researchers please contact the University.

We thank you in advance for your cooperation and facilitation of this research activity.

Yours sincerely,


 Prof. Peter R. Gillah
FOR: VICE-CHANCELLOR

VICE CHANCELLOR
SOKOINE UNIVERSITY OF AGRICULTURE
 P. O. Box 3000
 MOROGORO, TANZANIA

Copy to: - **Mr. Peter O. Siyao - Researcher**

CLEARANCE PERMIT FOR CONDUCTING RESEARCH IN TANZANIA



SOKOINE UNIVERSITY OF AGRICULTURE (SUA)
OFFICE OF THE VICE CHANCELLOR
P.O. 3000 MOROGORO, TANZANIA
 TELEPHONE: +255 023 4523/2603511-4 FAX: 023- 2604651

Our Ref. DRPGS/R/126/13

Date: 20th July, 2018

Manager,
 Tanzania Meteorological Agency (TMA),
 Easter Zone,
 P.O. Box 89
MOROGORO

Re: UNIVERSITY STAFF, STUDENTS AND RESEARCHERS CLEARANCE

The Sokoine University of Agriculture was established by University Act Number 7 of 2005 and SUA Charter of 2007 which became operational on 1st January 2007 repealing Act Number 6 of 1984. One of the mission objectives is to generate and apply knowledge through research. For this reason the staff and researchers undertake research activities from time to time.

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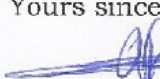
The purpose of this letter is to introduce to you **Mr. Peter O. Siyao** a bonafide PhD Student with Reg. No. **PLS/D/2015/0001** of SUA. By this letter **Mr. Peter O. Silayo** has been granted clearance to conduct research in the country. The title of the research is: *"The Role of Newspapers in Dissemination of Climate Change in Tanzania"*.

The period for which this permission has been granted is from **July, 2018 to September, 2018**. The research will be conducted in **Morogoro Region**.

Should some of these areas/institutions, offices be restricted, you are requested to kindly advise the researchers on alternatives areas, institutions/offices which could be visited. In case you may require further information on the researchers please contact the University.

We thank you in advance for your cooperation and facilitation of this research activity.

Yours sincerely,


 VICE CHANCELLOR
 SOKOINE UNIVERSITY OF AGRICULTURE
 P. O. Box 3000
 MOROGORO, TANZANIA
FOR: VICE-CHANCELLOR

Copy to: **Mr. Peter O. Siyao - Researcher**

CLEARANCE PERMIT FOR CONDUCTING RESEARCH IN TANZANIA



SOKOINE UNIVERSITY OF AGRICULTURE (SUA)
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Our Ref. SUA/ADM/R.1/8VOL/129

Date: 16th June 2017

The Regional Administrative Secretary,
P.O. Box 5429,
DAR ES SALAAM.

Re: UNIVERSITY STAFF, STUDENTS AND RESEARCHERS CLEARANCE

The Sokoine University of Agriculture was established by Universities Act No.7 of 2005 and SUA Charter of 2007 which became operational on 1st January 2007 repealing Act No.6 of 1984. One of the mission objectives of the University is to generate and apply knowledge through research. For this reason the staff, students and researchers undertake research activities from time to time.

To facilitate the research function, the Vice-Chancellor of the Sokoine University of Agriculture (SUA) is empowered under the provisions of SUA Charter to issue research clearance to both, staff, students and researchers of SUA.

The purpose of this letter is to introduce to you **Mr. Peter Onauphoo Siyao** a bonafide PhD. student with registration number **PLS/D/2015/0001** of SUA. By this letter **Mr. Siyao** has been granted clearance to conduct research in the country. The title of the research in question is "**The Role of Newspapers in the Dissemination of Climate Change Information in Tanzania**"

The duration for this permission is from **June to October 2017**. The research will be conducted in **Dar es Salaam Region**.

Should some of these areas/institutions/offices be restricted, you are requested to kindly advise the researcher(s) on alternative areas/institutions/offices which could be visited. In case you may require further information on the researcher please contact the University.

We thank you in advance for your cooperation and facilitation of this research activity.

Yours sincerely,


 Prof. Raphael T. Chibunda
 VICE-CHANCELLOR

Copy to: Student – Mr. Peter Onauphoo Siyao

VICE CHANCELLOR
 SOKOINE UNIVERSITY OF AGRICULTURE
 P. O. Box 3000
 MOROGORO, TANZANIA