

Health sciences faculty perception and practices on OA scholarly communication

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Abstract

This study sought to investigate the faculty's awareness, attitudes and use of open scholarly communication in Tanzanian health sciences universities. Based on a questionnaire survey, 415 faculty members were selected through a stratified random sampling from a population of 679 in all eight health sciences universities in Tanzania. The response rate was 71.1%. The study found a high level of engagement with scholarly publishing, where senior members were more likely to participate in scholarly communication as journal authors, referee and editors. The majority of respondents were aware about open access (OA) issues; however, a small proportion of faculty's research materials was made available in OA. Senior faculty with more proficient technical skills are more likely to use OA than junior faculty. Major barriers to OA usage were related to ICT infrastructure, awareness, skills, journal author pay model, and copyright and plagiarism concerns. This study recommends the following: universities to improve information and communication technology infrastructure, and develop institutional repositories and policies, and librarians to create awareness about OA, conduct information literacy programmes, and provide information services on copyright management issues and other related OA aspects. This is first comprehensive and detailed study focusing on the health sciences faculty use behaviour of OA initiatives in Tanzania, and reveals findings that are useful for planning and implementing OA initiatives in other institutions with similar conditions.

Keywords: OA, scholarly communication, health sciences, faculty, Tanzania, Africa

1. Introduction

Health scientists in developing countries have a critical role to play in disseminating their research outputs to optimize access and use of such scholarly information and reduce global disparities in health. The scholarly communication is ensured only when scholars make their work visible to the rest of the scholarly community and are able to access scholarly work from their peers. The open access (OA) movement has changed how researchers conduct and share research, primarily by increasing the reach of scholarly communication across the world, including Africa. OA provides free access to online research publications through OA journals ("gold OA") that makes peer-reviewed articles freely available online, or self-archiving ("green OA"). OA journals recover their publishing costs in a different way from traditional journals. Usually the costs are covered by research grants or authors' institutions (Harnad, 2007). On the other hand, the Green OA road allows authors to publish in a non-OA journal, but also

self-archive their peer-reviewed articles in an institutional or other kind of repository with free access.

OA articles reach more readers than subscription access publishing. A recent study showed that OA articles were associated with 89% more full text downloads than subscription access articles in the first six months after publication (Davis et al., 2008). Evidence also shows that OA articles in general receive more citations by 25%–250% or higher and thus it increases research impact over the impact already gained through the subscription access system (Swan, 2010). The advantage of OA articles has been found in all fields including medicine, where the research impact was found to increase by 300%–450% (Swan, 2010). It is obvious that potential access and usage of research can be denied, and research impact can be lost by not making the research OA.

Faculty publications in OA venues are crucial to the success of OA even though several studies show that the uptake of OA scholarly communication in Africa including Tanzania however is low (De Beer, 2006; Dulle et al., 2010; Lwoga et al., 2006; Southern African Regional Universities Association, 2008). In Tanzania, previous studies have investigated similar topics, although most have focused on the attitudes of faculty in a single university (Lwoga et al., 2006), or from a number of multi-disciplinary universities (Dulle et al., 2010; Southern African Regional Universities Association, 2008). Therefore, this aspect is inadequately explored, especially on the use of OA in health sciences universities including public and private health sciences universities in Tanzania. This study therefore sought to assess the level of awareness, perception and contribution of faculty in OA venues for effective scholarly communication in Tanzanian health sciences universities. The specific objectives of the study to investigate faculty's awareness and usage of OA approaches; to determine the faculty's perceptions about self-archiving scientific information into institutional repositories, and to determine barriers that inhibit faculty to disseminate their research findings through OA approaches.

2. Literature review

OA has been instrumental in increasing global access to research outputs. Gold OA publishing is growing at a high rate across the world. By January 2013, an estimated 957,958 OA articles were published in 8,537 journals (Directory of OA Journals, 2013). An increasing number of journals are adopting an OA distribution model. Research shows that approximately 17% of the 1.66 million articles published during 2011 and indexed in the most comprehensive article-level index of scholarly articles (Scopus) are available as OA through journal publishers (Laakso and Björk, 2012). Statistics also show that about 67 percent of 1,184 of the larger scientific publishers formally allow some form of self-archiving (SHERPA/RoMEO, 2012). On the other hand, OA repositories and their contents are also growing. Statistics show that there are 2,251 institutional repositories (IRs) worldwide (as of 12 January 2013) (Directory of OA Repositories, 2013). A number of faculty and end-user surveys regarding OA have also been conducted over the years.

Studies on OA adoption and self-archiving practices indicate that awareness of general OA issues among the research community is gradually growing. A recent longitudinal study of research on OA journals since 1990s revealed that the rate of authors who were not aware about OA was as high as around 50% in the 1990s, but dropped to below 15% by 2007 (Xia, 2010).

Similar observations were made among 28 authors of British Medical Journals (Schroter et al., 2005). African studies also show that the awareness of OA is increasing among academics. Earlier studies which were conducted prior to 2007 in the Sub-Saharan Africa region indicated less than 60% of the respondents were aware of OA (De Beer, 2006; Lwoga et al., 2006). The awareness of OA has been reported to increase in the recent studies across the region, where majority of faculty were aware of OA for over 60 percent (Dulle, 2010; Fullard, 2007; Southern African Regional Universities Association, 2008).

Other studies actually show that faculty are not familiar with specific OA issues such as self-archiving practices or the existence of institutional repositories (IR) in their institutions. A survey study of 1296 authors indicated that a substantial proportion of authors were unaware of the possibility of providing OA to their work by self-archiving (Swan and Brown, 2005). Other studies have also indicated a high level of awareness about current debates on OA, however a majority of researchers still did not know if their universities had an institutional repository, such as in USA (Kim, 2010; Mischo and Schlembach, 2011), and Australia (Kennan, 2007). Similar findings were revealed in the developing countries that faculty were not familiar with self-archiving opportunities, such as in Malaysia (Abrizah, 2012; Singeh et al., 2012), Cuba (Sánchez-Tarragó and Fernández-Molina, 2010). Faculty use other kinds of repositories, such as subject-based repositories due to the lack of familiarity with IR. A survey of University of Cornell faculty revealed that faculty had little knowledge of and little motivation to use their University IR made faculty to use other types of repositories and websites such as personal Web pages and disciplinary repositories (Davis and Connolly, 2007).

Literature shows that low percentage of authors publish in Gold OA journals. A recent longitudinal study indicated a trend of gradual increase in the number of scholars who publish in OA journals over the years, but the publishing rate did not reach a high level by the end of the sequence of observations (Xia, 2010). Various studies have also indicated that faculty do not extensively publish in author paid Gold journals, such as in UK (Creaser et al., 2010), USA (Mischo and Schlembach, 2011). On the other hand, other studies have shown that an increasing number of researchers are being involved in Gold OA publishing. A study of OA publishing (SOAP) of 38,358 researchers from 162 countries indicated that a significant population is already involved in Gold OA publishing, where 52% of authors had published at least one OA article (Dallmeier-Tiessen et al., 2011).

The faculty self-archiving practices are also reported to be low across the world. Research shows that only 15 percent of the estimated 2.5 million peer-reviewed journal articles are being self-archived by their authors every year (Green OA) (Swan and Brown, 2005). Various studies in the developed world also found a similar trend of low uptake rate for depositing research outputs in IR (Creaser et al., 2010; Kennan, 2007; Swan and Brown, 2005). Other studies in developing countries also found a low faculty participation in self-archiving practices (Dulle, 2010; Lwoga et al., 2006; Sánchez-Tarragó and Fernández-Molina, 2010; Singeh et al., 2012). Therefore, awareness remains higher than participation, especially in Green OA. There is thus a strong need to publicize IRs and to encourage self-archiving practices in research institutions. Instead of depositing into IR, studies show that faculty are consistently and comfortably placing full-text research content into personal, departmental or research group Web sites (Covey, 2009; Creaser

et al., 2010; Kim, 2010; Mischo and Schlembach, 2011). Studies also show that faculty self-archive journal articles more than any other publication type, such as in USA (Covey, 2009; Creaser et al., 2010).

Various studies have identified reasons why OA publishing and self-archiving in IRs have gained so little uptake. These barriers are related to research misconception and fear related to violating publishers' copyrights, concern with plagiarism, the learning curve, time and effort involved in depositing in IRs, and lack of awareness about OA benefits (Abrizah, 2012; Creaser et al., 2010; Davis and Connolly, 2007; Dulle, 2010; Kim, 2010; Kleinman, 2011; Singeh et al., 2012; Swan, 2010). Other factors that inhibit OA uptake are related to concerns about the quality of OA venues, such as the perceived low prestige of OA journals, concerns over the peer review process of OA journals, lack of peer review in IR, the piecemeal nature of local IRs, and a perceived lack of impact factor in OA publishing (Dallmeier-Tiessen et al., 2011; Dulle, 2010; Mischo and Schlembach, 2011; Singeh et al., 2012). Gold model was criticized on the grounds of the lack of awareness of which journals publish with OA, and the author charges (Schroter et al., 2005). Other barriers identified from developing countries are related to funding issues, fundamental problem of the digital divide, lack of institutional policies for OA; and strong institutional infrastructures (Christian, 2008; Dulle, 2010; Lwoga and Chilimo, 2006). It is thus important to consider all these barriers when conducting a study in the African setting.

Challenges faced in OA are not so much related to the technical implementation, but to the cultural change necessary for faculty to adopt OA scholarly communication. Policy mandates have been introduced to require researchers to self-archive their final, peer-reviewed drafts in a freely accessible central or institutional repository. Evidence shows an increase of content items for more than half of the repositories after a policy mandate has been in place (Xia et al., 2012). Mandatory policies however, cannot positively effect on the rate of repository content accumulation without the further awareness creation programmes on OA issues and development of strategies for effective implementation of mandate policies. A recent review of OA policies reported that mandate policies had not positively affected a certain percentage of repositories (Xia et al., 2012). The reasons for low OA uptake lie not in the technical barriers, but in instilling a self-archiving culture among researchers as a fundamental part of their academic carrier. However, other challenges regarding digital divide also play a key role, especially in the African setting.

3. Methodology

The study was conducted in all eight health sciences universities in Tanzania, which included Muhimbili University of Health and Allied Sciences (MUHAS), International Medical and Technological University (IMTU), St. Francis University College for Health and Allied Sciences – St Augustine University (SFUCHAS), Kilimanjaro Christian Medical University College (KCMUC), Dodoma University, Aga Khan University, Catholic University of Health & Allied Sciences - Bugando (CUHAS), and Kairuki Memorial University. Stratified random sampling procedure was used to select a sample of faculty (n=415) from a total population of 679 by using Kish formula for cross-sectional studies (Kish, 1965). This sample was calculated at 95% confidence interval of estimate and margin of error in the estimate equal to 3. The response rate

was 71.1%. The study was approved by the Muhimbili University of Health and Allied Sciences (MUHAS) Ethical Review Board.

A structured questionnaire was used to collect data, where survey questions were developed based on the existing, tested and verified instruments (Dulle, 2010; Kim, 2010; Singeh et al., 2012; Swan and Brown, 2005). The questionnaire consisted of the following five sections:

- (1) Demographic data: gender, age, professional rank, highest academic qualification, discipline, technical skills, and publishing role,
- (2) Awareness of OA issues: level of awareness about initiatives and terms related to the OA movement; and sources for faculty OA awareness
- (3) Utilization of OA scholarly communication: frequency and percentage of faculty's work disseminated via OA venue; experience in OA publishing; and type of depositors in OA venue
- (4) Faculty perceptions on OA practices: attitude towards OA approaches; management of IR; need for peer review system in IR; types of IR content; and acceptable use of IR
- (5) Factors that inhibit faculty to make available their research in OA venues.

The questionnaire was first pre-tested with a small pilot group of 30 academics from the University of Dar es salaam. The questionnaire was therefore refined and corrected according to the data that emerged from the pilot study. The researchers personally administered the questionnaires, which were physically distributed to respondents. Descriptive statistics were performed by using Statistical Package for the Social Sciences Program (SPSS) version 16. A Chi-squared test was used to assess the association between demographic variables and behavioural usage of OA. The statistical significance was defined as p-value < 0.05. Cramer's V correlations were used to determine the strength of the association between the demographic variables and OA usage.

4. Results

The demographical information including gender, age, academic qualification, rank, discipline, institution and technical skills of 295 study participants is presented in Table 1 and 2. In this study, more male respondents (64.1%; n=189) participated in the study than female respondents (35.9%; n=106). The average age was 43. Slightly less than half of the respondents had a masters degree (47.8%;n=141), while 31.5% (n=93) had a PhD degree. The disciplines from which respondents were drawn comprised a reasonable cross-section of health sciences, whereby the largest group came from the medical and nursing sub-fields. One-third (35.6%; n=100)of respondents had used internet for more than eleven years, while 29.9% (n=71) had used internet between six and ten years.

Table 1: Demographic details

		Frequencies	Percentages
Gender	Male	189	64.1
	Female	106	35.9
Age	35 and below	59	20
	36-45	118	40
	46-55	89	30.2

Academic qualification	56 and above	29	9.8
	PhD	93	31.5
	Masters	141	47.8
	Postgraduate Diploma	18	6.1
Professional rank	Bachelor/Doctor of Medicine/Dentistry	43	14.6
	Professor	15	5.1
	Associate Professor	26	8.8
	Senior Lecturer	83	28.1
	Lecturer	68	23.1
	Assistant Lecturer	60	20.3
	Tutorial Assistant	43	14.6
Discipline	Medicine	137	46.4
	Nursing	40	13.6
	Biological sciences	36	12.2
	Pharmacy	30	10.2
	Public Health and Allied Sciences	33	11.2
	Allied health sciences	9	3.1
	Dentistry	10	3.4

Faculty awareness of OA scholarly communication

The majority of respondents (93.5%; n=276) in this study were aware of OA issues. Among those 93.5% respondents, most faculty were familiar with OA journals (78.3%; n=216). Other terms that faculty were familiar with were IR (36.6%; n=101), self-archiving (20.7%; n=57) and the Budapest OA initiative (8.3%; n=23). The main sources of OA awareness to faculty were colleagues (54.9%; n=147), followed by workshops/seminars (32.1%; n=86), and other Universities' authorities (28.7%; n=77) (see Table 2). Other sources of awareness as identified by faculty in the "other" category included the following: ICT staff, and undergraduate and postgraduate training within the country.

Table 2: Sources of Faculty OA awareness (N=268)

	Frequencies	Percentages
Colleagues	147	54.9
During workshops/seminars	86	32.1
Another university authority told me about OA	77	28.7
Publishers promotion	74	27.6
Librarians' presentation at departmental and/or faculty meetings	63	23.5
By chance while surfing the internet	59	22.0
During postgraduate training abroad	53	19.8
University/ library website	49	18.3
Read about OA in campus newspapers	32	11.9
Reading a book	29	10.8
Library staff contacted me	28	10.4
The Dean of my school told faculty about the OA	22	8.2
University staff email list	21	7.8

Utilization of OA approaches for scholarly communication

Most academics used OA venues for accessing scientific works that are freely available on the web more than publishing their own research outputs. The study results indicated that the majority of faculty (84.7%; n=250) accessed OA content, while two thirds (64.4%; n=190) of respondents reported to have used OA venues to disseminate their research materials.

A chi-square test was performed to analyse if there were any relationship between the demographic variables and OA usage. The findings indicated that there was a significant relationship between technical skills (that is, creating and editing the web, and designing a personal website), age, professional rank and the behavioural usage of OA (see Table 3). The technical skills, in particular creating or editing a web ($X^2= 39.406$, $p =0.000$) had the greatest relationship with behavioural usage of OA. The faculty's technical skills, in particular creating or editing the web and designing a personal website had a larger relationship ($V= 0.369$ and $V= 0.350$) to the behavioural usage of OA, more than the effect of faculty's professional rank and age. There were no significant differences on the behavioural usage of OA by gender, and discipline.

Table 3: Effects of individual characteristics and behavioural usage of OA

		OA usage No (%)	Chi- square test value (X^2)	Sample size (N)	Cramer's V value	P value	
Professional rank	Tutorial Assistant	16 (5.4)	21.727	295	0.271	0.001	
	Assistant lecturer	34 (11.5)					
	Lecturer	49 (16.6)					
	Senior lecturer	60 (20.3)					
	Associate professor	20 (6.8)					
Age	Professor	11 (3.7)	8.338	295	0.168	0.04	
	Below 35	29 (9.8)					
	36-45	78 (26.4)					
	46-55	64 (21.7)					
Technical skills	56 and above	19 (6.4)	3.735	291	0.113	0.443	
	Using spread-sheet or database program	No knowledge					25 (8.9)
	Less knowledge	29 (10)					
	Average	35 (12)					
	Knowledgeable	53 (18.2)					
Send and receive emails	Expert user	46 (15.8)	9.678	291	0.182	0.046	
	No knowledge	6 (2.1)					
	Less knowledge	9 (3.1)					
	Average	7 (2.4)					
Searching information on the internet	Knowledgeable	45 (15.5)	3.889	290	0.116	0.421	
	Expert user	122 (41.9)					
	No knowledge	11 (3.8)					
	Less knowledge	10 (3.4)					
Create or edit a World Wide Web site	Average	19 (6.6)	39.406	290	0.369	0.000	
	Knowledgeable	55 (19)					
	Expert user	93 (32.1)					
	No knowledge	35 (12.1)					
Designing my Personal	Less knowledge	18 (6.2)	39.406	290	0.369	0.000	
	Average	41 (14.1)					
	Knowledgeable	42 (14.5)					
	Expert user	52 (17.9)					
Designing my Personal	No knowledge	78 (26.8)	13.7	(40)			
	Less knowledge	13.7 (40)					

website	Average	28 (9.6)	35.712	291	0.350	0.000
	Knowledgeable	22 (7.6)				
Using word processing program	Expert user	21 (7.2)	12.715	291	0.209	0.013
	No knowledge	14 (4.8)				
	Less knowledge	6 (2.1)				
	Average	15 (5.2)				
	Knowledgeable	49 (16.8)				
	Expert user	105 (36.1)				

Frequency of disseminating OA research content

The study findings further indicated that a small proportion of faculty's research materials was made available in OA venues. In general, faculty had published not more than 38.9% (n=74) of their journal articles, and they had self-archived not more than 26.8% (n=51) of their book chapters in the last five years (Table 4).

Table 4: Percentage of faculty work produced in the last five years that have been made publicly accessible on the internet (N=190)

	None		1-25%		26-50%		51-75%		76-10%	
	No	%	No	%	No	%	No	%	No	%
Journal articles	57	30%	25	13.2%	34	17.9%	50	26.3%	24	12.6%
Book chapters	77	40.5%	22	11.6%	40	21.1%	34	17.9%	17	8.9%
Publishers PDF versions of refereed articles	76	40%	30	15.8%	37	19.5%	31	16.3%	16	8.4%
Post-print	96	50.5%	28	14.7%	31	16.3%	20	10.5%	15	7.9%
Data sets	114	60%	19	10%	17	8.9%	25	13.2%	15	7.9%
Un-refereed articles	87	45.8%	32	16.8%	31	16.3%	28	14.7%	12	6.3%
Books	100	52.6%	22	11.6%	27	14.2%	29	15.3%	12	6.3%
Pre-print, pre-refereed	100	52.6%	20	10.5%	36	18.9%	23	12.1%	11	5.8%

To ascertain on who was involved in disseminating research outputs of faculty in OA venues, 53.2% (n=157) respondents responded to the question. The findings showed that over half of faculty members actually deposited their research outputs themselves (58.6%; n=92). Collaborators also played a key role in assistant faculty to publish their research work in OA venues, accounting for 53.5% (n=84). Other department staff (9.5%, n=22), student assistants (8.7%, n=20), and librarians (5.6%, n=13) self-archived for faculty less frequently. Faculty also identified other people who posted content online for them including ICT staff, publishers, Phd/Masters supervisors, and conference organizers.

Researchers' general perspectives about OA

The findings indicate that most respondents supported the OA approaches to research outputs, with a score of (51.7%; n=149) and (34.4%; n=99) in strongly agree and agree categories. It was also evident that the majority of the respondents agreed and strongly agreed to use the OA in the future as indicated in all the provided statements. All three statements were positively rated by more than 70% of the respondents, implying that they intend to adopt and use OA (Table 5).

Table 5: Behavioural intention on OA usage (N=282)

	Strongly disagree		Disagree		Undecided		Agree		Strongly agree	
	No	%	No	%	No	%	No	%	No	%
I intend to publish my research outputs in OA venues in the next one month	11	3.9%	13	4.6%	34	12.1%	107	37.9%	117	41.5%
I predict I would publish my research outputs in OA venues in the next 6 months	9	3.2%	8	2.8%	44	15.6%	112	39.7%	109	38.7%
I intend to publish my research outputs in OA venues in the next one month	8	2.8%	11	3.9%	40	14.2%	120	42.6%	103	36.5%

Researchers' perceptions on institutional OA repositories

Most faculty members indicated that it was a major problem to disseminate their research outputs, as indicated in both categories as a “problem” (31%; n=87) and “very big problem” (22.4%; n=63). About 13.5% (n=38) were undecided, while 21%(n=59) indicated it as “not a problem”, and 12.1% (n=34) indicated it as “not a very big problem”. Faculty were further asked to indicate the importance of establishing institutional repositories as a strategy to improve dissemination of research outputs in their universities. Most faculty members considered the establishment of repositories important, accounting for 40.8% (n=116) and (29.2% (n=83) in the very important and important categories respectively.

To find out who should be responsible to manage the IR, two thirds (61.6%; n=151) of 245 respondents indicated that the IR be managed by a University library. Only 45.3% (n=111) preferred the IR to be managed by a University ICT unit, while a low number of faculty preferred the IR to be managed by schools/faculties/institutes/directorates (17.6%; n=43) and University wide research coordination unit (15.9%; n=39).

Faculty were mainly willing to deposit, in order of priority, thesis and dissertations (81.3%; n=213), teaching materials (70.6%; n=185), conference papers (70.2%; n=184), publishers PDF files of referred articles (64.9%; n=170), books (64.1%; n=164) and book chapters (62.6%; n=164). The least frequent type of materials to be contributed by the researchers was found to be technical reports (59.9%; n=157), preprints (55%; n=144), datasets 50.4%; n=132), and annual institutional reports (42.9%; n=117). Although their rate of OA uptake in terms of contributing to OA venues was low, this factor did not affect their interest to contribute to IR.

On the acceptable use of IR materials, about two thirds of respondents (64%, n=162) preferred the IR content to be properly acknowledged upon its use. Other acceptable use of IR that were important to faculty were related to free access to IR content (60.5%), registration of users before using deposited works (43.5%), and provision of web links to associated metadata (e.g. referenced articles, data sets etc) (43.1%; n=109). The provision that readers should be allowed to leave their comments to the deposited work was rated low (21.3%; n=54).

Using a five point scale, faculty were asked to rate the importance of reviewing the publications before they are deposited into the IR. Majority of respondents indicated that the content in IR should be peer reviewed before being deposited in the institutional repository, in the categories

of very important (48.5%; n=133), and important (21.2; n=58). About 15.3% (n=42) of respondents were neutral on whether the IR should have a peer review system or not, while a few respondents considered the peer review system in IR as not important, with a score of 8.4% (n=23) and 6.6% (n=18) in the categories of not important and not very important respectively. Further, the majority of respondents (66.3%; n=177) preferred the specialists from each field to be part of the team to review the content. Other findings are as follows: 36.3% (n=97) preferred a review team from each school/faculty; 31.8% (n=85) preferred a university-wide committee, 28.1% (n=85) preferred the selected reviewers or the university technical team; and 25.1% (n=67) chose external experts.

Barriers to OA scholarly communication adoption

About two-thirds (67%; n=177) indicated slow internet connectivity as a major barrier towards publishing in OA venues as indicated in Table 6. Other barriers that inhibited faculty to use OA were lack of awareness about OA publishing (58%; n=154), inadequate skills to publish in OA venues (53%; n=141). Other barriers of importance were lack of reliable electricity, the OA journals author pay model, fear to violate publishers' copyright policies, and plagiarism.

Table 6: Challenges for OA scholarly communication adoption (N=264)

	Frequency	Percentage
Slow internet connectivity	177	67.0
Not familiar with OA	154	58.3
Inadequate skills to publish in OA	141	53.4
Lack reliable electricity	124	47.0
OA journals require authors to pay publishing costs	121	45.8
Fear to violate publishers copyright	112	42.4
Lack of access to a computer	103	39.0
OA publications are likely to be misused or plagiarised	103	39.0
Lack time to publish in OA venues	97	36.7
Inadequate funds to conduct research and publish my outputs	90	34.1
My contribution to IR does not count toward my tenure/promotion	80	30.3
OA is not compatible with existing scholarly communication practice	65	24.6
OA journals are not peer-reviewed	63	23.9
Lack of mandatory policies for depositing in OA venues	60	22.7
Long term availability of OA content is not guaranteed	53	20.1

5. Discussion of study findings

Similar to previous studies conducted in Africa and elsewhere (Dulle, 2010; Fullard, 2007; Schroter et al., 2005; Southern African Regional Universities Association, 2008; Xia, 2010), the study found that most faculty members were familiar about general OA issues. Most respondents in the surveyed universities were more aware with OA journal as compared to other OA initiatives. This finding was found to be similar to the results revealed by another study in Tanzania (Dulle, 2010). Inadequate knowledge and understanding of self-archiving practices

necessitate a need for more extensive awareness creation programmes to enhance OA uptake at the universities.

Faculty mainly learnt about OA issues through their colleagues, workshops/seminars and other university's authorities. Other studies have also reported several sources of awareness about OA to faculty, including colleagues, health profession-related literature, publicity on a university/library website, and campus newspaper, contact from the IR staff or librarian, faculty advisory board for the IR, by chance while surfing the internet, institutions emails and e-forums, seminars/workshops, brochures/leaflet, conferences, mass media (Dulle, 2010; Hulela, 2010; Kim, 2010; Sánchez-Tarragó and Fernández-Molina, 2010). Librarians and OA advocates and administrators can therefore use a combination of different approaches to educate faculty, as the study findings indicated that faculty use different means to become familiar with OA issues.

It was evident that health sciences faculty predominantly used OA venues to access information more than to disseminate their research materials. Similar findings are also reported by other studies that researchers mainly used OA to access information as opposed to disseminating their scholarly content, such as in Tanzania (Dulle, 2010) and other developed countries (Deoghuria and Roy, 2007; Schroter et al., 2005). Individual characteristics were found to play a great role in influencing faculty participation in OA scholarly communication. On one hand, individual traits such as professional rank, technical skills, and age were found to influence OA usage in the surveyed study. The study findings revealed that senior faculty with proficient technical skills are more likely to use OA than those faculty members at the lower professional levels. The results corroborate with the earlier findings that senior faculty are more likely to participate in OA scholarly communications than younger ones (Dulle, 2010; University of California & Greenhouse Associates, 2007). The study findings contradict those of Kim's (2010) study that professors with more proficient technical skills and younger professors are more involved in self-archiving practices. Further, the study findings indicated that the research discipline of faculty members had no significant effects on the OA usage among surveyed respondents. In contrast other studies have reported significant disciplinary differences in self-archiving practices, (Hulela, 2010; Kim, 2010; Swan and Brown, 2005; University of California & Greenhouse Associates, 2007). This study only surveyed health sciences faculty, and thus no much differences in terms of OA publishing and self-archiving practices could be ascertained according to disciplines.

The study findings showed that faculty made a low proportion of their publications in OA venues in the last five years. Similar to previous studies (Kim, 2010; Swan and Brown, 2005), the study findings indicate that faculty prefer to self-archive pre-referred articles because their quality was assured by peers. In this study, the low uptake of OA publishing and self-archiving practices is largely contributed by the fact that only one institution had established the institution repository and OA journal. Despite the low rate of faculty's participation in self-archiving practices, an interesting finding was that over half of the respondents had deposited the research outputs themselves on the OA venues.

Faculty were positive and supported the OA approaches to research outputs, which was similar to the findings revealed in other studies (Kim, 2010; Schroter and Tite, 2006; Swan and Brown, 2005). The most respondents were willing to use OA in the future, and they considered the

establishment of IR important. Faculty preferred to deposit these/dissertations, teaching materials, conference papers and refereed articles. Non-peer reviewed articles were least preferred to be included in the repository. This finding was consistent to previous studies that faculty prefer to self-archive peer-reviewed articles as compared to non-refereed articles (Dulle, 2010; Lwoga et al., 2006; Swan and Brown, 2005). This finding also shows that faculty prefer to self-archive peer-reviewed articles to ensure the quality of content in IR.

Most academics preferred the IR content to be peer reviewed before being deposited in the institutional repository. The preferred peer reviewed system as suggested by the respondents corroborate with the earlier recommendations made by Dulle and Minishi-Majanja (2010). The study findings further showed that respondents preferred the specialists from each field to be part of the team to review the content. This means that users are willing to participate in self-archiving practices, but they also want the content to be reviewed by a selected group of peers.

On the acceptable use of IR, faculty mainly preferred the IR content to be properly acknowledged upon its use. Other acceptable use of IR that were important to faculty were related to free access to IR content, and registration of users before using deposited works. Similar findings were reported by another study in Tanzania (Dulle, 2010). In this study, the majority of respondents acknowledged that the established IR should be managed by a University librarian, which is also similar to the results revealed in other studies in Africa (De Beer, 2006; Dulle, 2010). The finding suggests that the library is considered to be a strong unit for the management of the IR

In this study, faculty major constraints to use OA venues were related to poor ICT infrastructure, lack of awareness about OA issues, lack of online publishing skills, journal author pay model, and researcher fear and misconceptions about publishers' copyright issues and plagiarism. These findings are consistent with those reported by previous studies (Christian, 2008; Dulle, 2010; Lwoga and Chilimo, 2006). Most researchers are not aware that a growing number of publishers allow archiving of pre or post print articles into repositories prior to their publication. Authors are not familiar with the Sherpa/RoMEO service that provides researchers with information regarding publishers' self-archiving policies and the permissions they grant to authors to disseminate different versions of a published article (Creaser et al., 2010). Therefore, for the OA to take its effects in Africa, challenges related to technological infrastructure, policies and awareness need to be addressed first.

6. Conclusions and recommendations

The study findings provided the current state of OA scholarly communication in African health sciences higher learning institutions, with a particular focus on Tanzania. Faculty play a key role in publishing, which shows the significance they attach to scholarly communication. Faculty were mainly involved in scholarly communication as journal authors, where senior members were more likely to participate in scholarly communication as journal authors, referee and editors. The majority of respondents were aware about general OA (OA) issues, however, most faculty members used OA venues to access research content as compared to disseminating their own research outputs. Further, a small proportion of faculty's research materials was made

available in OA venues. Over half of the respondents self-archived their research outputs themselves or through their research collaborators, which shows that faculty knew how to post their research materials to the publicly accessible websites. Individual traits such as professional rank, technical skills, age and number of publications were found to influence OA usage in the surveyed study. In other words, senior faculty with more proficient technical skills are more likely to disseminate their research outputs in OA venues. Faculty were positive and supported the OA approaches to research outputs. Major barriers to use OA venues were related to poor ICT infrastructure, lack of awareness about OA issues, lack of online publishing skills, journal author pay model, and researcher fear and misconceptions about publishers' copyright issues and plagiarism.

Given that the OA uptake was still low, especially the self-archiving practices, this study recommends the following:

- Universities and other research institutions should consider establishing institutional repositories and mandate policies, with appropriate quality assurance measures, to improve the dissemination of research output emanating from these institutions. They should also improve the ICT infrastructure by looking into ways to increase the internet bandwidth, access to computers and alternative sources of power. The librarians should foster the establishment of repositories and conversion of local print journals to online OA journals in their institutions.
- University libraries should promote the awareness and use of OA through workshops, participation in university meetings, public lectures, print materials and electronic communication
- University librarians should conduct information literacy training to faculty in order to improve their skills on access and use of OA venues and University libraries should provide information services that focus on OA issues, such as copyright management in order to assist researchers to understand the legal implications of self-archiving their research outputs

7. Research limitations/implications

Although previous studies assessed the self-archiving behaviour of faculty by searching and extracting depositors' data from institutional and discipline repositories, this study assessed the actual use of OA venues by depending on faculty members self-reports. Further, unlike previous studies that assessed use of OA among faculty from various disciplines, this study focused on health sciences discipline to ascertain the factors that enhance utilization of OA across the discipline. Further, longitudinal and mixed research studies are required to assess the factors that enhance use of OA venues, especially self-archiving behaviour among faculty in developing countries.

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Biography

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