Web Accessibility Status of Open Access Journals in Africa: A 2024 Snapshot

Stan dostępności stron internetowych czasopism z otwartym dostępem w Afryce: przegląd na rok 2024

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Abstract

Open access journals (OAJs) allow access to scientific articles free of charge worldwide. Therefore, OAJs plays an important role in disseminating scientific knowledge to the world. The access to OAJs is primarily via the Web, which still present barriers to persons with disabilities. Currently, 16% of the world's population lives with some form of disability and cannot enjoy equal access to the Web. Access to the Web is a human right under the Convention on the Rights of Persons with Disabilities (CRPD) and a key aspect of achieving the Sustainable Development Goals. In Africa, approximately 80 million people with disabilities face barriers to equal access to the Web. Despite the potential benefits of the adoption of OAJs in developing countries, there are not a lot of studies on their accessibility by persons with disabilities. The purpose of this study is to evaluate the Web accessibility of OAJs in Africa against the Web Content Accessibility Guidelines (WCAG). A selection of OAJs, from the Directory of Open Access Journals (DOAJ), is evaluated against WCAG 2.1 using three automated web accessibility evaluation tools (AWAETs): Mauve++, Lighthouse and WAVE. The results show that African OAJ websites are not fully compliant to WCAG 2.1. Although in average, the performance is good, further improvements are needed to ensure equal access to all, by reducing errors and increasing the implementation of Accessible Rich Internet Applications (ARIA).

Keywords: web accessibility; open access journals; Africa; WCAG

Streszczenie

Czasopisma o otwartym dostępie (OAJ) umożliwiają bezpłatny dostęp do artykułów naukowych na całym świecie. Dlatego OAJ odgrywają ważną rolę w rozpowszechnianiu wiedzy naukowej na świecie. Dostęp do OAJ odbywa się przede wszystkim za pośrednictwem Internetu, co w dalszym ciągu stanowi barierę dla osób niepełnosprawnych. Obecnie 16% światowej populacji cierpi na jakąś formę niepełnosprawności i nie może cieszyć się równym dostępem do sieci. Dostęp do sieci jest prawem człowieka na mocy Konwencji o prawach osób niepełnosprawnych (CRPD) i kluczowym aspektem osiągnięcia Celów Zrównoważonego Rozwoju. W Afryce około 80 milionów osób niepełnosprawnych napotyka bariery w równym dostępie do sieci. Pomimo potencjalnych korzyści płynących z przyjęcia OAJ w krajach rozwijających się, nie ma zbyt wielu badań dotyczących ich dostępności dla osób niepełnosprawnych. Celem tego badania jest ocena dostępności sieci OAJ w Afryce w porównaniu z wytycznymi dotyczącymi dostępności treści internetowych (WCAG). OAJ z Directory of Open Access Journals (DOAJ) są oceniane pod kątem zgodności z WCAG 2.1 przy użyciu trzech automatycznych narzędzi oceny dostępności sieci (AWAET): Mauve++, Lighthouse i WAVE. Wyniki pokazują, że strony internetowe afrykańskiego OAJ nie są w pełni zgodne z WCAG 2.1. Chociaż średnia wydajność jest dobra, potrzebne są dalsze ulepszenia, aby zapewnić wszystkim równy dostęp poprzez ograniczenie błędów i zwiększenie liczby zastosowań dostępnych bogatych aplikacji internetowych (ARIA).

Słowa kluczowe: dostępność stron internetowych; czasopisma z otwartym dostępem; Afryka; WCAG

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1. Introduction

The Web makes Open Access (OA) publications freely available worldwide, but not everyone has equal access to the Web, as persons with disabilities still face barriers to using the Web. Having the Web resources accessible to everyone remains a challenge.

The Convention on the Rights of Persons with Disabilities (CRPD), in its Article 9, considers web accessibility as a fundamental human right [1]. Many African countries have ratified the CRPD and should therefore follow its recommendations. However, most African countries still do not have legally enforced web accessibility. This situation is in contrast to the European Union [2], the United States of America [3] and Canada [4], to name a few.

The World Health Organization (WHO) [5] reports that 16% of the world's population lives with some form of disability. Persons with disabilities face barriers to using the Web and this remains a challenge. In an effort to make the Web accessible for persons with disabilities, the World Wide Web Consortium (W3C) [6] publishes

Web Content Accessibility Guidelines (WCAG), which is now in its version 2.2.

Non-compliance with web accessibility regulations has led to lawsuits in some countries [7], [8]. The number of lawsuits related to web inaccessibility is growing every year in United States of America [9], which demonstrates the importance of making the Web accessible to everyone.

United Nations has set 17 Sustainable Development Goals (SDGs), of which quality education is one of them [10]. OA contributes to quality education by making research collections freely available and ensuring web accessibility so that everyone can use them equally.

The Open Access Movement (OAM) aims to eliminate the cost of subscribing to journals, and today, access to information through research collections is a reality, with many journals publishing in OA mode. Statistics from the Directory of Open Access Journals (DOAJ) [11] show that Africa is catching up with OAM, although it lags behind other continents due to the fact that authors in Africa tend to publish in higher quality journals behind a paywall [12].

Africa comprises 54 countries and some of them have Open Access Journals (OAJs). The main objective of this research is to assess the web accessibility compliance status of African OAJs against the WCAG, version 2.1 [6] . This main objective is subdivided into the following objectives:

- To determine the web accessibility score of the homepages of OAJ portals from African countries using the WCAG 2.1.
- Check for web accessibility errors, contrast errors and the level of implementation of Accessible Rich Internet Applications (ARIA) [13].

The final aim is to help raise awareness of the need to ensure inclusivity in access to OA research collections. We hope that the results of this research will help stakeholders to consider the barriers that people with disabilities face in accessing African OAJs and to take action accordingly.

The rest of this article is structured as follows. Section 2 describes the state of the art on web accessibility in OAJs, providing background information on what has been done and highlighting the gaps that remain to be filled. The scope of the description ranges from the global level to the regional level of Africa. Section 3 presents the methodology used to collect information on the web accessibility of OAJs in Africa. Section 4 presents the results of the web accessibility assessment of selected OAJs. Section 5 discusses the results obtained after analysis. Finally, section 6 presents the conclusions, highlighting possible future work that could be derived from this study.

2. Related works

Web accessibility in general has been studied in many aspects, as the Web has become the main form of consuming digital resources in the information society era. Therefore, there have been many studies that have tried to determine the accessibility of websites in healthcare, tourism, finance, and education, to name a few [14], [15]. However, the geographical scope of these studies has not been able to cover all regions.

The impact of barriers that make the Web inaccessible varies across regions, in part due to local regulation. Good regulation can promote the adoption and compliance with WCAG, making websites more accessible [16], [17].

The need to reduce barriers to web access has also proved beneficial in situations such as the COVID-19 pandemic, where a lockdown was imposed in many countries and the main source of social interaction was through the Web. This situation particularly affected the education sector, and many universities in Africa, America, Asia, Europe and Oceania faced difficulties in continuing their duties without the Web [18].

Quality education is a key issue for the 2030 Agenda, and Open Educational Resources (OER) such as OAJs contribute to achieving this goal by providing universal access to scientific literature. However, OER still face accessibility challenges [19]. One of the reasons for the accessibility barriers in OER is the lack of awareness among creators about the measures that need to be taken to ensure accessibility [20].

Hallo et al. [21] performed evaluation of accessibility of OAJs of Latin America. The study shows that most of the top page of the websites analysed do not meet web accessibility standards.

After reviewing many articles from Scopus, Web of Sciences and Google Scholar, it is found that there is a gap in studies related to web accessibility of OAJs in general and OAJs of Africa, in particular. This study, which is an extension of a previous one [22], attempts to fill this gap by conducting a cross-sectional study that shows the web accessibility status of OAJs from African countries.

3. Materials and methods

3.1. Review bibliography on web accessibility of OAJs

We conducted a comprehensive bibliographic review of research related to web accessibility of OAJs. We started with a global scope and later narrowed it down to African countries. The search included bibliographic sources such as Scopus, Web of Science and Google Scholar. The aim of this review was to find out what has been done and what aspects still need to be addressed. Only articles published between 2017 and 2024 were considered relevant to this study, as they were more recent.

3.2. Phase 2: Select OAJs from African countries from the DOAJ

The DOAJ was the main source of OAJs for this study. The selection criteria consisted of searching by country of publisher and then filtering by most recently updated. The maximum number of journals per country was set at 10 if the country had more.

3.3. Phase 3: Choose the automated web accessibility evaluation tool to be used

In this study we used automated web accessibility evaluation tools (AWAETs), specifically Mauve++, Lighthouse and WAVE. The web accessibility score was the average of the scores obtained from both tools Mauve++ and Lighthouse, to increase accuracy, as AWAETs are not able to evaluate all web accessibility issues. The WAVE tool was chosen for its ability to ARIA issues. All these tools were chosen because they are freely available online and because they are accurate and compliant with WCAG 2.1.

3.4. Phase 4: Perform web accessibility evaluation of selected OAJs

The web accessibility evaluation of selected OAJs with AWAETs mentioned in Phase 3 took place in May and June 2024. Web accessibility data was collected and kept in a spreadsheet for later analysis.

3.5. Phase 5: Analyse and discuss obtained results

The results obtained in phase 4 were analysed using a statistical tool called Tableau Public and later discussed in relation to the objectives of this research. In order to improve the readability of the results presented, the results were aggregated by four regions: Central Africa, Eastern Africa, Southern Africa and Western Africa.

3.6. Phase 6: Establish conclusions and recommend future works

In this final section, we drew conclusions in relation to the objectives of this study and suggestions for future work that could be derived.
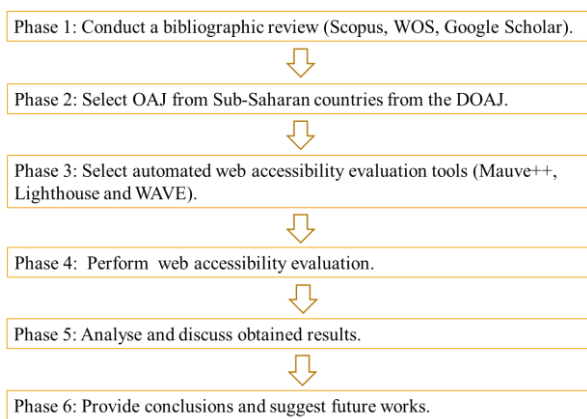

Figure 1: Methodology of the study.

4. Results

The OAJs evaluated in this study are those indexed in the DOAJ, which covers 20,443 journals from 134 countries in 80 languages. However, only 22 of the 54 African countries are represented in the DOAJ, as shown in blue in Figure 2.

Figure 2: Map of countries that contribute to this study with OAJs in DOAJ.

The search for OAJs in DOAJ was performed by country of publisher and filtered by the most recently updated journals, as shown in Figure 3. A total of 107 OAJs were selected after carrying out phase 2 of the methodology adopted for this study.
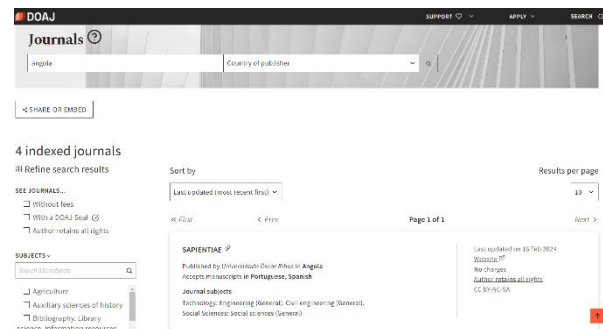

Figure 3: Search form of DOAJ.

The results of Phase 4 of the methodology adopted for this study are presented below. These results are aggregated by African region: Central Africa, Eastern Africa, Southern Africa and Western Africa. Web accessibility scores equal to or above 80 are considered good accessibility and those below are considered poor accessibility.

In terms of errors, lower is better as it means fewer barriers to web accessibility. For ARIA, higher is better as it means that the website is robust and can interact with assistive technologies used by people with disabilities.

Figure 4 shows the web accessibility performance of OAJs in Africa in the form of a box plot. Southern Africa has the highest median (89), followed by Central Africa (85), Western Africa (84), Northern Africa (77) and Eastern Africa (75). Thus, in three of the five regions, half of the sites score above 80, which is the threshold for good accessibility.
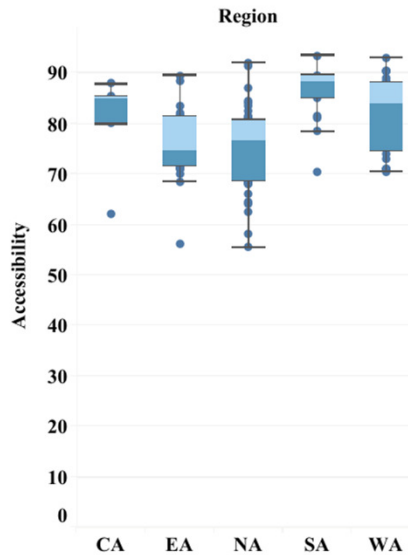
Figure 4: Box plot representing the performance of accessibility score by regions of Africa, by Mauve++ and Lighthouse.

Figure 5 represents the median, quartiles and atypical values of web accessibility average of evaluated OAJs, in the form of box plot graphic. The median of the sample; hence, half of the webpages from the sample score equal or higher than 80, which is considered as a good accessibility. Also, 25% of OAJs scores higher than 86, which is the third quartile. However, there are some OAJs that scores lower than 60, although in a very small number.
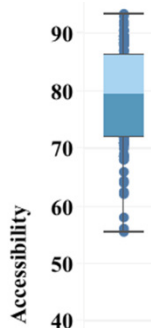

Figure 5: Box plot of web accessibility scores of OAJs from Africa.

Figure 6 shows, in the form of a bar chart, the average web accessibility score derived from the evaluation of OAJs with Mauve++ and Lighthouse, aggregated by region of Africa. The regions are represented by two letters, CA for Central Africa, EA for Eastern Africa, NA for Northern Africa, SA for Southern Africa and WA for Western Africa. Southern Africa has the highest average web accessibility score (86), followed by Western Africa (82), Central Africa (80), Eastern Africa (76) and Northern Africa (75).

Table 1 shows the average values of ARIA, contrast errors and general web accessibility errors aggregated by region of Africa. Central Africa performs best on ARIA, followed by Western Africa, Eastern Africa, Northern and Southern Africa. In terms of low contrast errors, Southern Africa performs best, followed by Western

Africa, Northern Africa, Eastern Africa and Central Africa. Finally, in relation to general web accessibility errors such as empty button, empty heading, empty link, empty form label, missing alternative text and others, it is found that Central Africa performs best, followed by Western Africa, Northern Africa, Eastern Africa and Southern Africa regions respectively.
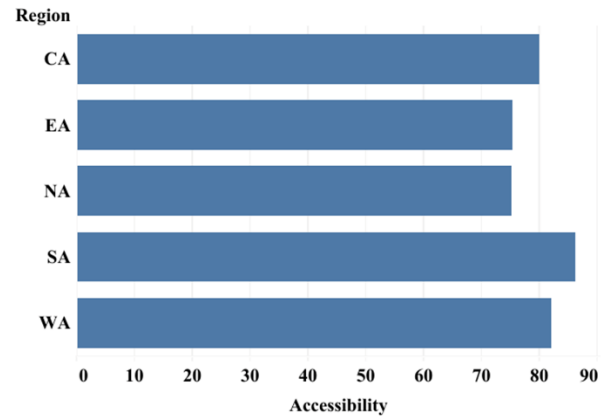

Figure 6: Average accessibility score by regions of Africa: Mauve++ and Lighthouse.

Table 1: Average accessibility errors, contrast errors and ARIA by regions of Africa: WAVE

Region	ARIA	Contrast	Errors
Central Africa (CA)	92	20	4
Eastern Africa (EA)	37	20	16
Northern Africa (NA)	32	16	9
Southern Africa (SA)	32	5	19
Western Africa (WA)	43	16	4

5. Discussions

On average, the OAJs of Africa perform well in terms of web accessibility, as the median web accessibility score of three of the five regions is above 80, which is the threshold for good accessibility. Only the Eastern and Northern regions have a median score below the threshold of 80. The reason for this good performance could be the use of updated software for online OAJs, the Open Journal System (https://pkp.sfu.ca/software/ojs), which is the standard for OAJs, although further studies could be carried out to verify it.

Low contrast errors are higher than the rest of web accessibility errors in all regions, except Southern Africa. This indicates that persons with visual impairments still encounter barriers to enjoying OAJs from African.

From another perspective, there are differences in web accessibility performance between regions of Africa in terms of ARIA and web accessibility errors. Central Africa performs best in ARIA, suggesting that OAJs for this region are more compatible with assistive technologies for people with disabilities. Southern Africa performs best in low-contrast errors, so their OAJs have fewer web accessibility barriers for people with visual impairments. Finally, in terms of general web accessibility errors, Central and Western Africa performs better than the other regions. This may indicate that staff in charge of OAJs in the Central and Western Africa regions are taking the necessary steps to eliminate web accessibility barriers, while other regions may need more awareness and regulation on web accessibility.

6. Conclusions

The websites of African OAJs still present barriers for people with disabilities, although their average performance is acceptable; therefore, more efforts need to be made to make African OAJs fully compliant with WCAG 2.1.

In all regions, the number of low-contrast errors is higher than the sum of general web accessibility errors, confirming what was reported in ″The 2024 report on the accessibility of the top 1,000,000 home pages″ [23]. The prevalence of low-contrast errors means that people with visual impairments are most likely to experience barriers to accessing African OAJs. Therefore, stakeholders should take the necessary measures to reverse this situation.

This study can be extended by adding more academic journals from Africa and improving the accuracy of the results by conducting a hybrid evaluation, combining automated tools and manual evaluation by experts.

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