

Effectiveness of Web Accessibility Policy Implementation in Online Healthcare Information

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Abstract. UN have recommended the adoption of Web Content Accessibility Guidelines (WCAG) version 2.0 from W3C to guarantee that web content is more accessible to everyone. This study aims to evaluate the effectiveness of WCAG 2.0 implementation by comparing the country with and without WCAG2.0 policy adoption. The objective is to compare the impact of adopting the WCAG 2.0 standard in health information provision by analyzing the differences between countries that adopted the WCAG 2.0 standard and those that did not, specifically for health information related to the elderly. To this end, searches were performed on the Google search engine for online health websites with the keyword “Alzheimer” and the specific country settings for Indonesia and UK, in the local language of each country. Website evaluations were performed for ten websites found with this search by using the WCAG 2.0 measurement tool Axe. Statistical analysis using descriptive and Mann-Whitney analysis to measure the impact of the WCAG 2.0 showed a predominance of low violation occurrences in the UK with 40% from selected websites compared to 80% medium violation occurrences and no low violation occurrences in Indonesia. Although the country with WCAG 2.0 implementation had a lower frequency of violation, no significant differences were found between countries and the media type in WCAG 2.0 evaluation, implying the need to improve the effectiveness of policy implementation.

Keywords. Web Accessibility, Alzheimer, Policy, Online, Information

1. Introduction

Seeking health information online has become the most popular Internet activity among patients [1] and mobile phone users [2]. Previous studies have shown that the majority of people used commercial websites (71.8%), followed by search engines (11.6%), while only 5.5% use government websites for health information [3]. In addition, users with serious health problems and/or disabilities were more enthusiastic about online health information regarding their own health condition [4][5]. Previous studies have suggested that older people use the Internet the least due to many determinants such as age, physical limitation, education, social economic situation and social situation [6].

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Proper accessibility of online information related to health is a necessity for individuals who seek out health-related information due to their physical conditions.

Meanwhile, the World Wide Web Consortium (W3C) have designed the Web Content Accessibility Guidelines (WCAG) in collaboration with international figures and institutions to create international general standard of web accessibility that is suitable with any institutions, public and governments [7]. The guidelines have targeted web developers, web authoring tool developers, web accessibility evaluation tool developers, and others (individuals, decision makers, administrators, scholars. etc.) [7]. WCAG 2.0 has been approved as an ISO standard (ISO/IEC 40500:2012). WCAG2.0 encompasses web pages, web applications, mobile device applications, phones and tablets, digital TVs, wearables, devices in car dashboards and airplane seatbacks, household equipment, and other Internet of Things (IoT) [7], [8]. WCAG 2.0 have four accessibility principles: perceivable, operable, understandable, and robust, which must be fulfilled to avoid violations [9]. These principles have their own success criteria that determine the type and number of violations. The perceivable principle has 22 success criteria, the operable principle has 20, the understandable principle has 17, and the robust principle has 2. The UN prioritized web accessibility in resolution 61/106, and the standards have been implemented in their system [10]. With the resolution, access to information and communication technology have become basic human rights [11]. WCAG2.0 of W3C are the only internationally recognized standards [10]. Therefore some countries have ratified the standards following this UN recognition [12], [13].

This study aims to evaluate the effectiveness of the implementation of WCAG 2.0 in country with and without policy implementation. The study compared country that adopt the WCAG 2.0 standard in health information provision with the one that do not adopt the WCAG 2.0 standard to study the particularly of policy implementation on Alzheimer Disease (AD). To reach the aim, the study addressed two research questions (1) What is the level of web accessibility of AD-related information online both in the UK and Indonesia? (2) What are the similarities or differences in the information available online for AD between the two countries, one with a policy of accessibility (UK) and one without (Indonesia)?

2. Materials and Methods

Two countries were chosen for this case study. The United Kingdom was chosen for being a country that has adopted the WCAG2.0 standard [13], [14], and Indonesia was selected as a country that has not adopted the WCAG 2.0 standard. The selected countries were chosen also based on the first author language capacity. In addition, the idea to measure the difference have become consideration to choose the countries that are very contrasting based on their economy level besides the policy adoption. Web selection was based on the inclusion criteria of local language content: Bahasa Indonesia for Indonesia and English for the UK. It is important to note that the same word "Alzheimer" is used in both local languages to refer to AD [15]. The first ten websites from each country were picked based on their rank on the Google search engine list. The method for selecting the first ten websites has been previously used [16]. Google was first set up to the country-specific language, and a search was performed using the keyword "Alzheimer", due to its high frequent used among individuals searching for information related to AD [9], and it is known that AD affects cognition and memory [17], as consequences better accessibility of online information

is required. Among the obtained results, the website should be in a webpage format, and information from the same source will be excluded. The websites should have content related to AD, and the websites should not be from a journal publisher, university, or scientific research institution with the reason they are usually for academic community.

Website evaluations were performed for ten public online health information pages using the WCAG 2.0 evaluation tool recommended by W3C "Axe" [14]. In addition, Axe tool evaluate the website compliance to WCAG 2.0 with respect to WAI-ARIA (Web Accessibility Initiative-Accessible Rich Internet Application) 1.0 that is for assistive technology such as screen reader [18]. Based on the number of violations found, the website was assigned to one of four levels: low (0–20 violations), medium (21–50 violations), high (51–100 violations), and very high (above 100 violations). The term of violation means the unfulfilled WCAG2.0 criteria for accessibility for all. Statistical analysis was carried out using SPSS version 25. Descriptive and Mann-Whitney *U* tests were used to measure the differences between the two countries with and without WCAG 2.0.

3. Results

Entering the keyword "Alzheimer" for Indonesia and UK searches yielded 153,000,000 and 232,000,000 results, respectively. Using Axe tool analysis on the 20 websites (10 per country search), 17 types of violations were found. These were the violations found: (1) ARIA roles used must conform to valid values, (2) Elements must only use allowed ARIA attributes, (3) hidden ARIA element must not contain focusable elements, (4) Certain ARIA roles must contain particular children, (5) ARIA attributes must conform to valid values, (6) Buttons must have discernible text, (7) Element must have sufficient color contrast, (8) IDs used in ARIA and labels must unique, (9) ID attribute values must be unique, (10) Frames must have title attribute, (11) Html must have language attribute, (12) Image must have alternate text, (13) Form elements must have labels, (14) Links must have discernible text, (15) "ul" and "ol" must only directly contain li, script or template elements (16) Zooming and scaling must not be disabled, and (17) Timed refresh must not exist. Most website violations in the UK-specific search were under the low level category, whereas none of the violations in the Indonesia-specific search were of low level. Most of the tested websites in the Indonesia-specific search were found to have medium-level violations.

In addition, the 20 selected websites could be categorized into four types: non-government organization (NGO) websites (*n* = 5), medical related company websites (*n* = 4), newspaper-type websites (*n* = 10), and government agency websites (*n* = 1) (Figure 1 below).

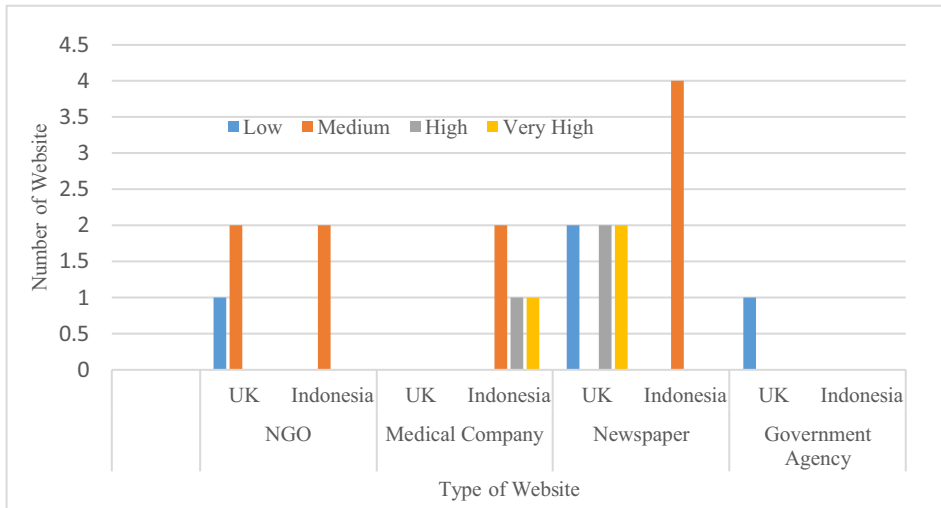


Figure 1. Violation Occurrences Based on Website Type

NGO and government websites in the UK showed good compliance. Newspaper-type websites were the most common type of website for both countries. In the UK, two of the six newspaper-type websites with AD information showed good compliance with the standard and two showed a very high level of violation. On the other hand, all four online news websites in Indonesia showed medium-level violations.

The Mann-Whitney test revealed no significant differences between countries with and without WCAG 2.0 standard implementation. In addition, the most dominant type of violations found for both countries was “element must have sufficient color contrast” and “links must have discernible text.” Furthermore, “ID attribute value must be unique” was the third most violated standard in UK webpages while “image must have alternate text” was the third most violated standard in Indonesian webpages. A similar result was found when comparing newspaper-type websites and other website types.

4. Discussion

Implementing web accessibility policy globally continues to be a challenge. Despite national regulations, for example the United States Section 508 regulations requires every government agency to comply with web accessibility, accessibility problems persist [19]. In addition, the WCAG 2.0 policy has no impact outside government agencies [20]. Even within the municipal government, there are many issues such as national support and close collaboration across local administrators and external parties, citizen and other rules [21]. For example, although in the UK better accessibility was on the health administration agencies, only NGOs have slightly implemented better accessibility. Meanwhile, online newspapers were found to be the worst online channel in terms of adopting the WCAG2.0 standard.

The complexity in deploying WCAG 2.0 is elaborate, e.g., lack of law enforcement, no report or certification of WCAG 2.0 compliance, limited resources, policy content, lack of responsibility, and unclear guidelines from the department that

released the regulation [21], [19], [20]. The study revealed that the most common mistakes that should be easy to be understood, such as alternate text and color contrast in webpages still exist means whether web developers have reluctance to comply or excessive working load with short time due to particular business characteristic.

Another factor that might influence the evaluation is the richness of website content. It is known that the richer of the website content the more potential violation might exist.

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