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Accessibility Analysis of Disdukcapil Websites for Persons With Disabilities Using WCAG 2.2

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Abstract: The rapid development of information technology has encouraged governments to adopt digital systems to improve the quality of public services, particularly through the implementation of e-Government at the Department of Population and Civil Registration (Disdukcapil) of West Java Province. However, the effectiveness of digital services is not only determined by the availability of information but also by the level of accessibility that ensures equality for all users, including persons with disabilities. This study aims to evaluate the accessibility of Disdukcapil websites across 18 regencies and cities in West Java using Site Analyzer and AudioEye tools, based on the Web Content Accessibility Guidelines (WCAG) 2.2 standards. The findings reveal that most websites fall into the moderate category in terms of design and accessibility, but remain weak in search engine optimization and content quality. The AudioEye audit identified recurring accessibility issues, including unlabeled links and buttons, missing skip links, unlabeled form fields, disordered headings, and interactive elements without proper identification. These violations not only create technical barriers but also have psychological impacts on users with disabilities, such as frustration, mental fatigue, anxiety, and feelings of exclusion in digital interactions. The study underscores that failure to meet accessibility standards is not merely a technical issue but also reflects a form of social exclusion that re-duces the quality of life for vulnerable groups. Therefore, the development of Disdukcapil websites must prioritize the gradual implementation of WCAG 2.2, improve navigation structures, and provide consistent labeling to realize inclusive, effective, and sustainable digital public services.

Keywords: Web Accessibility, WCAG 2.2, e-Government, Disdukcapil

INTRODUCTION

The advancement of technology across various aspects of life has encouraged society to continuously adapt and utilize digital resources to meet both personal and professional needs (Mohamad Sudi, 2019). This transformation has reshaped patterns of social interaction and how the public obtains and accesses essential services (Mokobombang et al., 2023). In response to these developments, the Indonesian government has implemented the Electronic-Based

Government System (Sistem Pemerintahan Berbasis Elektronik/SPBE) or e-government as an effort to enhance the effectiveness, efficiency, and quality of public services through digital technology (Legi et al., 2020; Wirawan, 2020).

However, the success of e-government is not solely determined by the availability of infrastructure and information. It also relies heavily on the accessibility of digital services (Asmuddin, 2025; Setiawan et al., 2023). Accessibility is a critical aspect ensuring that all users, including persons with disabilities, can access public services equitably (Choirunnisa et al., 2023). Persons with disabilities encompass individuals with diverse functional characteristics, including visual, auditory, cognitive, and motor impairments, which may create barriers in daily activities and require specific accommodations to optimize their capabilities (Agustina & Valentina, 2023; Bibeca et al., 2018; Hasanah et al., 2019; Rama et al., 2024; Rusli et al., 2025). Therefore, websites designed with accessibility principles not only foster inclusivity but also provide a better overall user experience.

Neglecting digital accessibility principles can widen service disparities, perpetuate discrimination, and contradict the principles of inclusion mandated by Law No. 8 of 2016 on Persons with Disabilities, particularly Articles 122–124 concerning access to information and communication (Yuli Santri Isma et al., 2025). Prior studies revealed that 34 provincial government websites contained a total of 2,088 accessibility violations across 24 types of errors categorized into three major issue groups (Amaliah et al., 2023). These findings highlight that the implementation of digital accessibility remains a significant challenge within the public sector.

In West Java, the Department of Population and Civil Registration (Disdukcapil) has provided online services to communities across various regions (Fika Nurtivanny & Nurhayati Nurhayati, 2023). Nevertheless, the extent to which these websites comply with accessibility standards has yet to be comprehensively evaluated (Amaliah et al., 2023). Beyond supporting inclusivity, the implementation of accessibility principles also offers strategic advantages for search engine optimization (SEO), as well-structured content is more easily indexed by search algorithms (Ayuningrum & Sulthony, 2024; Indriyatmoko et al., 2024).

One of the international guidelines widely adopted for ensuring web accessibility is the Web Content Accessibility Guidelines (WCAG) 2.2, developed by the World Wide Web Consortium (W3C). These guidelines provide technical standards to ensure that web content is accessible to a broad range of users, including those with visual, auditory, motor, or intellectual disabilities. Evaluations based on WCAG 2.2 serve as a strategic approach to ensuring that population administration services are accessible to all citizens, including vulnerable groups. Given this urgency, the present study aims to evaluate the accessibility levels of Disdukcapil websites across 18 regencies and municipalities in West Java using two auditing tools, Site Analyzer and AudioEye, and to examine the implications of accessibility violations on the psychological experiences of users with disabilities. The findings are expected to offer practical recommendations for developing more inclusive and sustainable digital public services. Therefore, web designers and developers must prioritize accessibility in every stage of the design process and ensure that websites are usable by all segments of society, including persons with disabilities (Amaliah et al., 2023).

METHOD

This study employs a descriptive quantitative approach focusing on the evaluation of accessibility across the Disdukcapil (Department of Population and Civil Registration) websites of regencies and municipalities in West Java, based on the Web Content Accessibility Guidelines (WCAG) 2.2 (Valtolina & Fratus, 2022). Out of 27 regencies/municipalities, only 18 websites were included in the analysis as they met the eligibility criteria: publicly accessible without login, active and error-free, containing a homepage with public service information,

and confirmed as official Disdukcapil websites. Nine websites were excluded due to inactivity, lack of content, or incompatibility with the audit tools.

Data collection was conducted through several stages, beginning with the identification and validation of Disdukcapil website URLs using official regional government portals and manual searches. Each site was accessed directly to ensure that the homepage could be loaded without technical issues. The analysis focused on the homepage, as it serves as the primary entry point for users and broadly represents the navigation structure and content elements of the site. Subsequently, the homepage was scanned using two automated auditing tools: Site Analyzer and AudioEye. Although the analysis centered on the homepage, the audit tools also read underlying elements such as scripts, navigation structures, and interactive components that contribute to the evaluation outcomes.

Site Analyzer was used to assess five key aspects: Search Engine Optimization (SEO), content quality, design, performance, and accessibility (Fithriyaningrum et al., 2021; Indriyatmoko et al., 2024; Ramadiyana, 2021). Each aspect receives a score ranging from 0 to 100, which is then categorized as good (75–100), moderate (50–74), or poor (0–49). Meanwhile, AudioEye was used to detect accessibility violations such as missing skip links, unlabeled buttons and form fields, non-sequential headings, and interactive elements lacking appropriate roles or descriptions. The identified issues were classified according to severity (high, medium, low) and the number of violations categorized into low (1–10), moderate (11–80), and high (>80) levels of accessibility risk.

Data analysis involved processing the Site Analyzer scores to identify the weakest aspects, examining the patterns of violations detected by AudioEye, and grouping the findings according to the four WCAG principles: perceivable, operable, understandable, and robust (Lestari, 2024; Ouaziz et al., 2024). The technical findings were then interpreted in relation to existing literature on the psychological impacts experienced by persons with disabilities, providing a more comprehensive understanding of the consequences of accessibility barriers (Amaliah et al., 2023; Filipe et al., 2023). The final analysis was used to draw conclusions regarding the overall accessibility level of Disdukcapil websites in West Java and to provide a broader overview of the quality of digital public services from an inclusivity perspective (Evaluation et al., 2025; Koeswara et al., 2024).

RESULTS AND DISCUSSION

Data on website usability and accessibility were collected using Site Analyzer and AudioEye. The primary goal of the search engine evaluation within Site Analyzer is to determine how easily a website can be discovered by users through search engines.

1. Site Analyzer

The following are the results of the Disdukcapil website analysis using Site Analyzer.

Table 1. Site Analyzer Assessment Results

| No | Region | Average Score | SEO | Content | Design | Performance | Accessibility |
|----|----------------------|---------------|------|---------|--------|-------------|---------------|
| 1. | Kabupaten Majalengka | 67,1 | 59,8 | 59,3 | 67,4 | 61,0 | 51,3 |
| 2. | Kota Bekasi | 66,3 | 56,5 | 49,4 | 71,0 | 61,0 | 68,8 |
| 3. | Kabupaten Bandung | 66,0 | 54,9 | 47,7 | 71,0 | 61,0 | 59,6 |
| 4. | Kabupaten Ciamis | 61,2 | 61,2 | 62,4 | 63,8 | 61,0 | 60,1 |
| 5. | Kabupaten Sumedang | 60,0 | 41,5 | 42,4 | 81,9 | 73,2 | 74,6 |
| 6. | Kabupaten Kuningan | 59,6 | 44,6 | 60,7 | 63,8 | 73,2 | 63,0 |
| 7. | Kota Tasikmalaya | 58,9 | 43,0 | 55,1 | 95,8 | 58,3 | 51,3 |

| | | | | | | | |
|-----|-----------------------|------|------|------|------|------|------|
| 8. | Kabupaten Cirebon | 57,7 | 50,4 | 42,9 | 71,0 | 58,3 | 68,8 |
| 9. | Kota Cirebon | 56,6 | 45,4 | 21,9 | 63,8 | 86,6 | 59,6 |
| 10. | Kabupaten Pangandaran | 55,9 | 36,6 | 53,0 | 63,8 | 74,4 | 56,0 |
| 11 | Kabupaten Tasikmalaya | 55,5 | 49,6 | 42,5 | 71,0 | 40,2 | 54,2 |
| 12. | Kabupaten Subang | 52,0 | 41,5 | 18,9 | 55,7 | 86,6 | 54,6 |
| 13. | Kota Sukabumi | 51,6 | 41,5 | 14,4 | 62,0 | 74,4 | 56,0 |
| 14. | Kota Bogor | 49,5 | 37,4 | 48,2 | 55,7 | 48,8 | 59,6 |
| 15. | Kota Depok | 49,3 | 47,2 | 29,0 | 65,9 | 87,8 | 87,8 |
| 16. | Kota Bandung | 49,0 | 34,3 | 9,5 | 71,0 | 74,4 | 59,6 |
| 17. | Kabupaten Purwakarta | 47,0 | 49,6 | 51,8 | 55,7 | 28,0 | 50,5 |
| 18. | Kabupaten Cianjur | 50,1 | 29,6 | 75,0 | 60,1 | 28,0 | 68,8 |

2. AudioEye

The following are the results of the Disdukcapil website analysis using AudioEye.

Table 2. AudioEye Assessment Results

| No | Region | Total Issues | Severity (H/M/L) | Summary of Top Issues | Level |
|----|------------------|--------------|------------------|---|--------|
| 1 | Kota Bekasi | 2 | 0/1/1 | Skip link missing, lang missing | A-AA |
| 2 | Kota Banjar | 3 | 0/2/1 | Skip link missing, focus unreachable, new window | A-AA |
| 3 | Kab. Bekasi | 5 | 1/2/2 | Title missing, skip link, H1 missing, lang missing | A-AAA |
| 4 | Kota Sukabumi | 6 | 0/3/3 | Skip link missing, H1 missing, link name unclear | A-AA |
| 5 | Kab. Sumedang | 25 | 0/2/23 | Skip link, heading order, non-semantic tag, deprecated tag | A-AA |
| 6 | Kab. Cirebon | 35 | 15/4/16 | SVG name missing, link name missing/unclear, title unclear | AA-AAA |
| 7 | Kab. Garut | 35 | 26/2/7 | SVG missing, link name missing, button name missing | AA-AAA |
| 8 | Kab. Subang | 38 | 10/5/23 | Button name missing, link name missing, form label missing | AA-AAA |
| 9 | Kota Bandung | 52 | 21/7/24 | Link name missing, button name missing, SVG missing | AA-AAA |
| 10 | Kab. Purwakarta | 67 | 19/6/42 | Button name missing, link name missing, iframe duplicate | AA-AAA |
| 11 | Kab. Bandung | 72 | 14/8/50 | Link name missing, button name missing, SVG missing | AA-AAA |
| 12 | Kab. Bogor | 73 | 0/2/71 | Skip link missing, heading order, new window, H1 multiple | A-AA |
| 13 | Kab. Cianjur | 89 | 4/6/79 | Link name missing, heading order, skip link, focus issue | A-AAA |
| 14 | Kab. Pangandaran | 89 | 12/10/67 | Link name missing/unclear, title unclear, heading order | AA-AAA |
| 15 | Kota Tasikmalaya | 122 | 10/12/100 | Link name missing, form label missing, heading order | A-AAA |
| 16 | Kab. Majalengka | 129 | 11/2/116 | Link name missing, button name missing, form label missing | AA-AAA |
| 17 | Kota Cimahi | 137 | 17/13/107 | Link name missing/unclear, form label missing, heading order | AA-AAA |
| 18 | Kab. Ciamis | 179 | 27/17/135 | Link name missing, SVG missing, form label missing | AA-AAA |
| 19 | Kab. Kuningan | 194 | 18/8/168 | Link name missing/unclear, form label missing, iframe duplicate | AA-AAA |

3. Accessibility Categories Based on AudioEye

Table 3. Accessibility Categories of Disdukcapil Websites

| Category | Region | Total Violations | Main Issues |
|----------|------------------|------------------|--|
| Low | Kota Bekasi | 2 | Suboptimal skip link, unclear HTML language attribute |
| | Kota Banjar | 3 | Unlabeled links/buttons |
| | Kota Sukabumi | 6 | Incorrect heading order, unlabeled form fields |
| Medium | Kab. Sumedang | 25 | Missing labels for links and buttons, missing skip link |
| | Kab. Cirebon | 35 | Unlabeled form fields, inconsistent headings |
| | Kab. Garut | 35 | Missing link and button labels |
| | Kab. Subang | 38 | Incorrect heading structure, unclear form fields |
| | Kab. Purwakarta | 67 | Unclear navigation, non-functioning skip link |
| | Kab. Bandung | 72 | Unlabeled links/buttons, inconsistent headings |
| | Kab. Bogor | 73 | Unlabeled form fields, disorganized headings |
| | Kab. Cianjur | 89 | Unlabeled links/buttons/forms, unclear navigation |
| | Kab. Pangandaran | 89 | Incorrect heading order, iframes without descriptions |
| | Kota Tasikmalaya | 122 | Unlabeled links/buttons, complex navigation |
| High | Kab. Majalengka | 129 | Unlabeled form fields, missing skip link |
| | Kota Cimahi | 137 | SVG and iframes without labels, inconsistent headings |
| | Kab. Ciamis | 179 | Missing labels across links/buttons/forms, difficult navigation |
| | Kab. Kuningan | 194 | Nearly all elements lack accessible label attributes (links, buttons, forms, iframes, SVG) |

Based on Table 1, a component is considered safe if it achieves a minimum score of 75. However, the analysis of eighteen Disdukcapil (Civil Registry Office) websites across West Java Province revealed that none of the regions attained a “Good” rating across all components. Overall, Majalengka Regency obtained the highest average score (67.1), while Purwakarta Regency recorded the lowest (47.0). These findings indicate that the overall quality of Disdukcapil websites remains below the ideal benchmark.

The evaluation using Site Analyzer further demonstrates that the SEO component is the weakest among the five assessed categories. Thirteen regions fell into the “Poor” category, five into the “Fair” category, and none qualified as “Good.” This suggests that the websites are difficult to locate through search engines due to insufficient keyword optimization. Regarding Content, Table 1 shows that only Cianjur Regency achieved a “Good” category with a score of 75.0, while other regions lag in information delivery. Conversely, the Design component performed relatively better, with Sumedang (81.9) and Tasikmalaya (95.8) categorized as “Good.” Nevertheless, a visually appealing design does not necessarily ensure functional accessibility.

Performance results show that three regions reached the “Good” category, yet disparities persist due to low scores recorded in Purwakarta and Cianjur. Lastly, the Accessibility component was dominated by the “Fair” category, with only Depok City (87.8) achieving a “Good” rating, indicating that accessibility considerations have not been evenly integrated across regions.

Audit results from AudioEye reveal substantial variation in accessibility violations across the examined websites. Bekasi City recorded the fewest violations (two findings), suggesting that some foundational accessibility principles have been addressed. In contrast, regions in the moderate category, such as Cirebon, Garut, and Bogor exhibited violations related to unlabeled links, buttons, and form-fields, which hinder screen reader navigation. More severe issues were detected in regions with high violation counts, such as Kuningan (194 violations), Ciamis (179),

and Cimahi (137). These cases involved more complex problems, including unlabeled interactive elements and poorly structured navigation.

Common violations identified include unnamed links, missing skip links, unlabeled form-fields, improper heading hierarchy, and unidentified interactive elements such as iframes and SVGs. These issues disrupt navigation, create confusion, and limit the functionality of assistive technologies. Such findings indicate that the adoption of WCAG accessibility guidelines has not been prioritized during website development. These violations not only hinder users with blindness but also affect individuals with low vision, motor impairments, and cognitive disabilities.

Psychological Implications

The accessibility issues found across Disdukcapil websites in West Java impose not only technical barriers but also significant psychological consequences for users with disabilities. Violations such as unlabeled links, ambiguous form fields, inconsistent heading hierarchies, and missing skip links directly affect users' emotional, cognitive, and social experiences.

Audit results show that many page elements cannot be interpreted properly by screen readers. This situation often generates frustration, anxiety, and feelings of exclusion among visually impaired users, as they are unable to interact with content in the same manner as sighted users (College, 2011; Pascual et al., 2015). Previous studies indicate that visually impaired individuals are at higher risk of depression, anxiety, and loneliness when access to public information and services is restricted, particularly in the presence of repeated navigation errors and non-logical content structures. More broadly, these limitations foster social exclusion when public information cannot be accessed equally (Hamideh Kerdar et al., 2024).

For users with motor impairments, the absence of skip links or inaccessible interactive elements creates severe challenges in keyboard-based navigation, an essential requirement for this population (Henry et al., 2014). Psychologically, these barriers may trigger frustration, negative mood states, and decreased motivation to use government digital services (Pascual et al., 2015). Such issues reflect not only technical shortcomings but also implicit forms of social exclusion, where digital systems fail to accommodate diverse user needs.

Users with cognitive disabilities are similarly affected. Violations such as unlabeled form-fields, inconsistent heading structures, and ambiguous link names increase cognitive load, forcing users to remember, guess, or repeatedly test interface elements. This heightened cognitive burden may lead to frustration, mental fatigue, and reduced willingness to continue using the service. Studies show that web developers often lack awareness of cognitive disabilities despite understanding the technical aspects of accessibility (Abuaddous et al., 2016; Pichiliani & Pizzolato, 2021).

Further research highlights that unlabeled form-fields and inconsistent page layouts contribute to substantial frustration among screen reader users, with up to 30% of online interaction time lost due to accessibility failures (Lazar et al., 2007). Similar findings from affective computing research reveal increased frustration and discomfort among blind users when website navigation and content structure lack intuitiveness (Nogueira et al., 2019). A rapid review in Behavioral Sciences also confirms that long text blocks, excessive scrolling, and complex navigation structures significantly increase cognitive load and reduce interaction effectiveness for users with cognitive disabilities (Gartland et al., 2022). In the context of public services such as Disdukcapil, these challenges may cause users to feel incompetent or discouraged from using digital platforms.

These patterns are consistent with accessibility issues commonly observed in Indonesian government websites, which frequently fail to meet WCAG standards during system design and development (SetyaningNastiti et al., 2022). As a result, functional and emotional barriers often emerge among users with disabilities. Thus, failure to comply with WCAG guidelines has

consequences not only for technical usability but also for the psychological well-being of vulnerable user groups.

In the context of digital public services, accessibility barriers in Disdukcapil websites may lead users with disabilities to feel marginalized due to difficulties accessing essential administrative services. From a psychological standpoint, such negative experiences may diminish self-confidence and increase feelings of helplessness. Therefore, the implementation of cognitive accessibility principles such as simplified navigation, clear language, and consistent labelling is crucial to ensure that all individuals can interact effectively with government digital services.

CONCLUSION

This study aimed to evaluate the level of accessibility of Disdukcapil websites across West Java Province using two analytical tools, Site Analyzer and AudioEye. The findings indicate that, overall, the Disdukcapil websites in all examined regions have not yet met the ideal standards of usability and accessibility. Results from the Site Analyzer show that none of the websites achieved a “Good” rating across all evaluated components. SEO and content emerged as the weakest aspects, thereby fulfilling the research objective of identifying the primary weaknesses in information structure and digital visibility. Although several regions performed relatively well in design and performance, these strengths were insufficient to guarantee an optimal user experience.

The audit conducted through AudioEye further confirmed that accessibility violations remain widespread, particularly in fundamental elements such as link labels, form-field descriptions, heading structures, and the presence of skip links. These findings address the research objective of identifying the types and severity of the most dominant accessibility issues. Additionally, the analysis demonstrates that the application of WCAG accessibility standards has not been carried out consistently, resulting in significant barriers for users with disabilities and reducing the effectiveness of their interaction with digital public services.

Based on these results, this study contributes empirical insights that can guide improvements in web-based public service systems. The evaluation highlights the need for the implementation of user-centred interface engineering, the integration of international accessibility standards throughout the development process, and the enhancement of content quality and navigation structure as part of sustainable system improvement. Thus, this research not only outlines the current state of Disdukcapil websites but also provides direction for actionable improvements that can be adopted by practitioners in information systems engineering and interaction design to advance the quality and inclusivity of government digital services in a scientifically grounded and measurable manner.

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