



UTM
UNIVERSITI TEKNOLOGI MALAYSIA

WEB PROGRAMMING - SECV 2223
REPORT - COMPARATIVE EVALUATION OF WEBSITES

2024/2025 - SEMESTER 2
SEC 01

NAME	MATRIC NUMBER
ANG CHUN WEI	A23CS0046
MUHAMMAD HAZIQ BIN MOHD HAFIZAL	A23CS0132
NUR AINA SYAFINA BINTI KAMASUAHADI	A23CS0152
WAN NUR RAUDHAH BINTI MASZAMANIE	A23CS0195

LECTURER: TS. DR. SARINA BINTI SULAIMAN

DATE: 12TH APRIL 2025



Table Of Contents

1.0 Introduction	2
2.0 Literature Review	2
3.0 Methodology	3
4.0 Google LightHouse	3
5.0 Comparative Performance Result.	4
6.0 Recommendation and Optimization for Each Website	5
7.0 References	6
8.0 Appendices	8

1.0 Introduction

For this project, we have chosen a selection of hospital websites in Malaysia to assess their web performance using Google Lighthouse. The hospitals' websites selected for this analysis are KPJ Healthcare, Columbia Asia, Pantai Hospital, Prince Court Medical Centre, Gleneagles Hospital, Sunway Medical Centre, and Subang Jaya Medical Centre. We choose these websites because they have a strong online presence, which offers an opportunity to compare how each institution utilizes web technologies. The goal of this assignment is to evaluate their website performance.

2.0 Literature Review

2.1 Website.

A website is essentially an online platform that enables individuals to exchange information, provide services, or just interact with one another. According to Akshay K (2024)[1], websites can be accessed from any device with internet connectivity, providing users a convenient means to engage with content or services at any time and from any location. For hospitals, particularly in Malaysia, maintaining a well-structured and informative website is crucial. It enables patients to obtain the necessary information swiftly, like scheduling appointments or discovering more about the available treatments.

2.2 Google Lighthouse.

Google Lighthouse is a free tool developed by Google to help check the quality of websites. According to Pol (2023)[2], it looks at several key areas like how fast a site loads, how easy it is to use (especially for people with disabilities), whether it follows modern coding standards, and how well it shows up in search engines. In this project, we utilized Lighthouse to assess various hospital websites to determine their performance and identify potential areas for enhancement. It's an excellent method to identify technical problems that might impact user experience.

2.3 Lighthouse Metrics.

The metrics provided by Lighthouse help us understand how a website is actually performing in real-life situations. Tools like PageSpeed Insights and DebugBear use these metrics like First Contentful Paint and Time to Interactive to show how fast and smooth a website feels to users (DebugBear, 2025)[3]. These numbers are especially useful for websites that provide important services, like hospitals, where people might be looking for urgent help. By using these metrics, we can clearly see which websites are doing well and which ones might need some performance fixes.

2.4 Hospital Websites in Malaysia.

In Malaysia, private hospitals are increasingly focusing on developing robust digital platforms to maintain communication with their patients. The websites we examined, including KPJ Healthcare, Columbia Asia, Pantai Hospital, Prince Court, Gleneagles, Sunway Medical Centre, and Subang Jaya Medical Centre, were selected due to their existing strong online presence. These websites serve a purpose beyond appearance. They actually play a big role in helping patients access services and get information easily. By evaluating them using Lighthouse, we can better understand how well these hospitals are using technology to meet their patients' needs.

3.0 Methodology

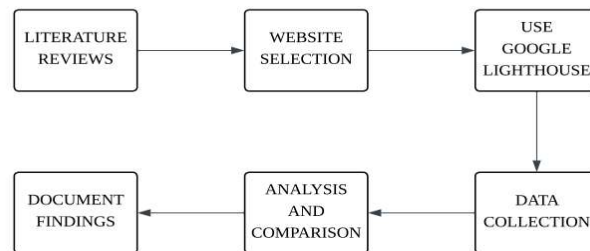


Figure 3.0: Method steps that was followed for this report

We selected seven Malaysian hospital websites to evaluate their web performance: KPJ Healthcare, Columbia Asia, Pantai Hospital, Prince Court, Gleneagles, Sunway Medical Centre and Subang Medical Centre. We used the mobile version of each site for testing. The tool used for evaluation is Google Lighthouse. The results were recorded and compared in a table. From the data, we analyzed their strengths and weaknesses and suggested improvements.

4.0 Google LightHouse

Google Lighthouse is an open-source tool by Google that evaluates website quality in five key areas: performance, accessibility, best practices, SEO, and Progressive Web App (PWA) capabilities (Morris, 2022)[4]. It simulates real-world conditions to help developers improve site usability and speed.

The performance audit measures load times and responsiveness using metrics like First Contentful Paint (FCP) and Time to Interactive (TTI). Accessibility checks ensure the site is usable for everyone, including users with disabilities. Best practices focus on modern coding standards, while SEO checks for basic search engine visibility elements. Therefore, by analyzing these aspects, Lighthouse helps developers optimize websites for both users and search engines (Pol, 2023)[1][2].

5.0 Comparative Performance Result.

Website	Comparison			
	Performance	Accessibility	Best Practice	SEO
KPJ HEALTHCARE	64	90	89	42
COLUMBIA ASIA	68	98	93	58
PANTAI HOSPITAL	85	84	93	46
PRINCE COURT	71	98	71	50
GLENEAGLES	71	90	71	50
SUNWAY MEDICAL CENTRE	67	87	93	50
SUBANG JAYA MEDICAL CENTRE	70	87	93	46

Figure 5.1: Shows The Table comparison for seven hospitals. Referring to appendices

The best overall score among the evaluated hospitals is attributed to Pantai Hospital, which achieved a performance score of 85. This exceptional rating is complemented by strong accessibility (84) and best practices scores (93). However, the hospital does face a notable challenge with its low SEO score of 46, indicating that its online visibility could be significantly enhanced. To improve its reach and attract more patients, it is suggested that Pantai Hospital focuses on developing more effective SEO tactics.

On the other hand, the worst overall score among the hospitals is recorded by KPJ Healthcare, with a performance score of 64. Despite relatively good scores in accessibility (90) and best practices (89), the low performance and SEO score of 42 underscore critical areas for improvement. To address these shortcomings, KPJ Healthcare should concentrate on enhancing its website loading speed and implementing stronger SEO strategies. By doing so, the hospital can improve its overall effectiveness and better connect with potential patients.

6.0 Recommendation and Optimization for Each Website

KPJ Healthcare demonstrates commendable accessibility (90) and adherence to best practices (89). However, it faces challenges with performance (64) and SEO (42). To address these, optimizing site speed through image compression, minification of CSS and JavaScript, and implementing lazy loading can be beneficial. Enhancing SEO by refining meta tags, utilizing appropriate headings, and integrating relevant keywords will also improve visibility.

Columbia Asia excels in accessibility (98) and best practices (93), yet its performance (68) and SEO (58) scores indicate room for improvement. Enhancing loading speed via compression techniques and CDN integration can elevate user experience. Additionally, refining SEO structure through improved metadata and content hierarchy will bolster search engine rankings.

Pantai Hospital leads in performance (85), indicating efficient load times. However, its accessibility (84) and SEO (46) scores suggest the need for enhancements. Improving accessibility features, such as color contrast and ARIA support, alongside strengthening SEO strategies with comprehensive keyword integration and structured data, will enhance usability and online presence.

Prince Court Medical Centre boasts excellent accessibility (98), but its performance (71) and SEO (50) are average. To improve, optimizing performance through asset minification and code cleanup is advisable. Enhancing SEO with proper meta tagging and ensuring effective search engine indexing will increase the site's relevance.

Gleneagles Hospital maintains good accessibility (90) and decent best practices (71), but its performance (71) and SEO (50) are average. Boosting loading speed through better caching and adopting modern development practices, along with implementing stronger SEO elements like effective management of robots.txt and sitemap files, will enhance the website.

Sunway Medical Centre stands out with high best practices (93), yet its performance (67) and SEO (50) scores are lower. Enhancing loading times through the use of a Content Delivery Network (CDN) and implementing lazy loading can significantly improve performance. To boost SEO, optimizing the content structure and refining metadata are essential steps.

Subang Jaya Medical Centre showcases strong best practices (93) and good accessibility (87), but its performance (70) and SEO (46) are weaker. Enhancing performance by reducing

server response time and boosting SEO through targeted keyword strategies and improved meta structure will strengthen the website.

To improve overall website quality, hospitals should focus on optimizing performance by compressing images preferably in WebP format, minifying CSS, JavaScript, and HTML files, implementing lazy loading for media, enabling server-side compression like GZIP or Brotli, removing unused code, utilizing a Content Delivery Network (CDN), preloading critical resources, and enhancing server response times. These performance practices are emphasized in tools like Google Lighthouse, which assesses image efficiency, server responsiveness, and code structure to improve loading speed and user experience (Pol, 2023; DebugBear, 2025)[2][3].

For accessibility, it's essential to use semantic HTML elements such as `<header>`, `<nav>`, `<main>`, provide descriptive alt text for images, ensure keyboard navigability, label form inputs appropriately, maintain sufficient color contrast, apply ARIA roles and landmarks correctly, ensure visible focus indicators, and use descriptive link text. Google Lighthouse also evaluates accessibility criteria based on these elements, ensuring websites are inclusive for all users (Morris, 2022)[4].

Adhering to best practices involves serving content over HTTPS, avoiding outdated libraries or APIs, eliminating untrusted inline scripts, preventing image distortion, ensuring browser compatibility across devices, and refraining from using deprecated code or tags. These are key components of Google's best practices audit, which aims to improve security, maintainability, and compliance (Pol, 2023)[2].

To enhance SEO, hospitals should incorporate essential meta tags like `<title>`, `<meta name="description">`, use descriptive and clean URLs, structure headings properly with only one `<h1>` per page, ensure pages are crawlable by checking robots.txt and meta directives, add structured data and schema markup, use canonical URLs to prevent duplicate content issues, and ensure the site is mobile-friendly with fast loading speeds. These SEO principles align with Lighthouse's audit for search engine discoverability and visibility (Pol, 2023)[2].

7.0 References

1. K, A. (2024, July 4). **What is a website?** Hostinger Tutorials. Retrieved April 12, 2025, from <https://www.hostinger.com/my/tutorials/what-is-website/>
2. Pol, T. (2023, March 25). **Google Lighthouse: The Ultimate Guide.** SEMrush Blog. Retrieved April 12, 2025, from <https://www.semrush.com/blog/google-lighthouse/>
3. (2025, March 16). **Lighthouse Performance Metrics.** DebugBear. Retrieved April 12, 2025, from <https://www.debugbear.com/docs/metrics/lighthouse-performance>
4. Morris, W. (2022, September 2). **What Is Google Lighthouse and How to Use It.** Elegant Themes Blog. Retrieved April 12, 2025, from <https://www.elegantthemes.com/blog/wordpress/what-is-google-lighthouse-and-how-to-use-it>
5. KPJ Healthcare. (n.d.). *Official website of KPJ Healthcare.* Retrieved April 12, 2025, from <https://www.kpjhealth.com.my>
6. Columbia Asia. (n.d.). *Official website of Columbia Asia.* Retrieved April 12, 2025, from <https://www.columbiaasia.com>
7. Pantai Hospital. (n.d.). *Official website of Pantai Hospital.* Retrieved April 12, 2025, from <https://www.pantai.com.my>
8. Prince Court Medical Centre. (n.d.). *Official website of Prince Court Medical Centre.* Retrieved April 12, 2025, from <https://www.princecourt.com>
9. Gleneagles Hospital. (n.d.). *Official website of Gleneagles Hospital.* Retrieved April 12, 2025, from <https://gleneagles.com.my>
10. Sunway Medical Centre. (n.d.). *Official website of Sunway Medical Centre.* Retrieved April 12, 2025, from <https://www.sunwaymedical.com>
11. Subang Jaya Medical Centre. (n.d.). *Official website of Subang Jaya Medical Centre.* Retrieved April 12, 2025, from <https://subangjayamedicalcentre.com>

8.0 Appendices

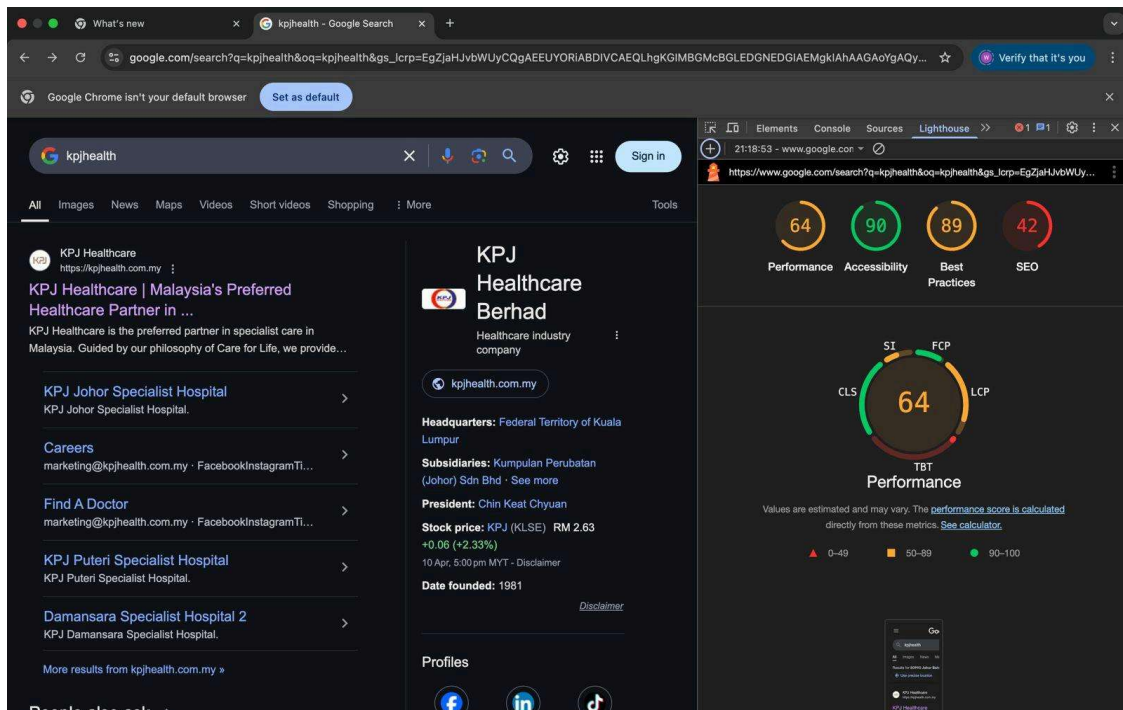


Figure 7.1: Kpj mobile (mobile)

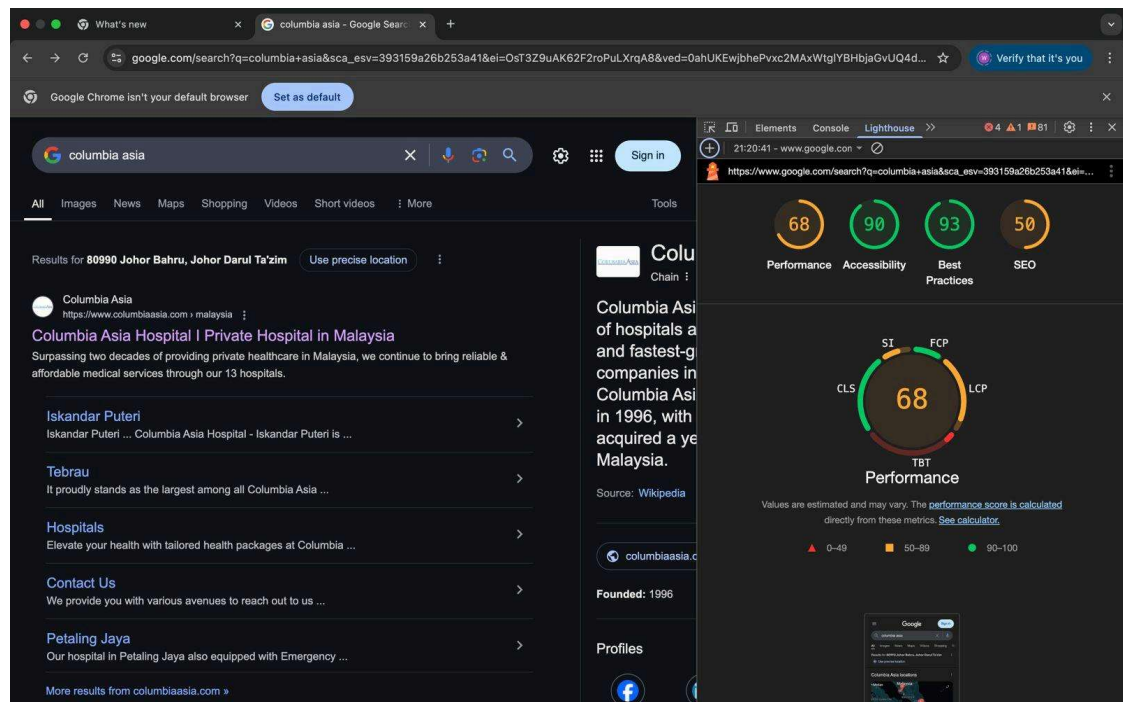


Figure 7.2: Columbia Asia (mobile)

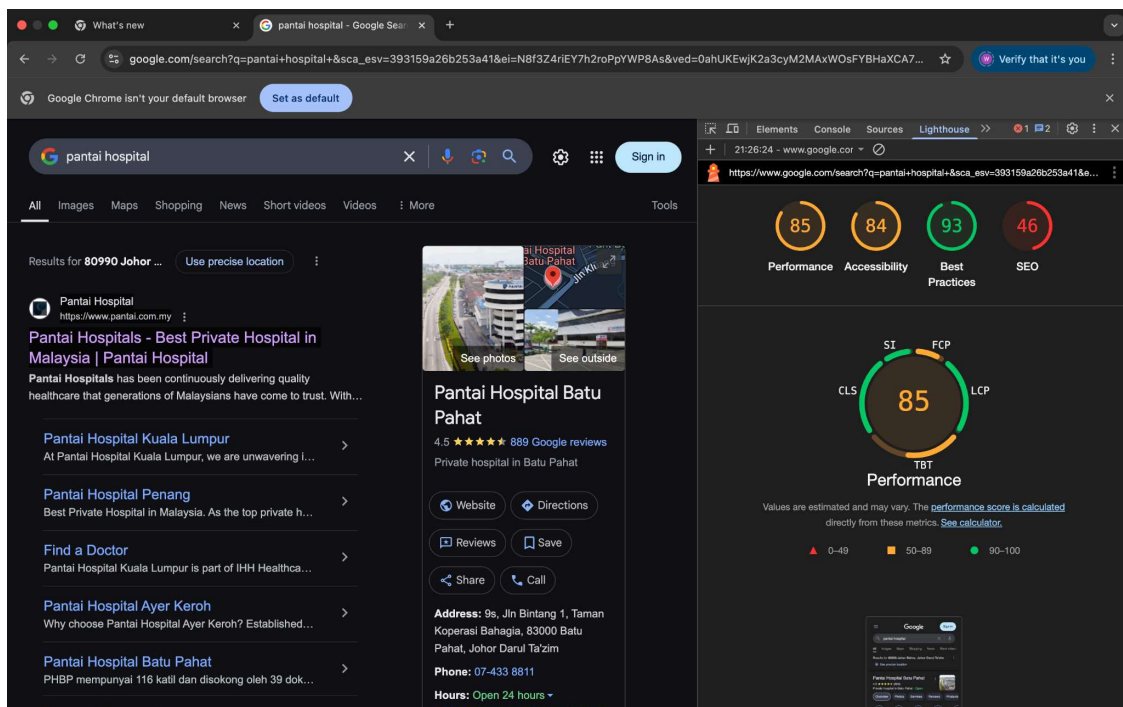


Figure 7.3: Pantai Hospital (mobile)

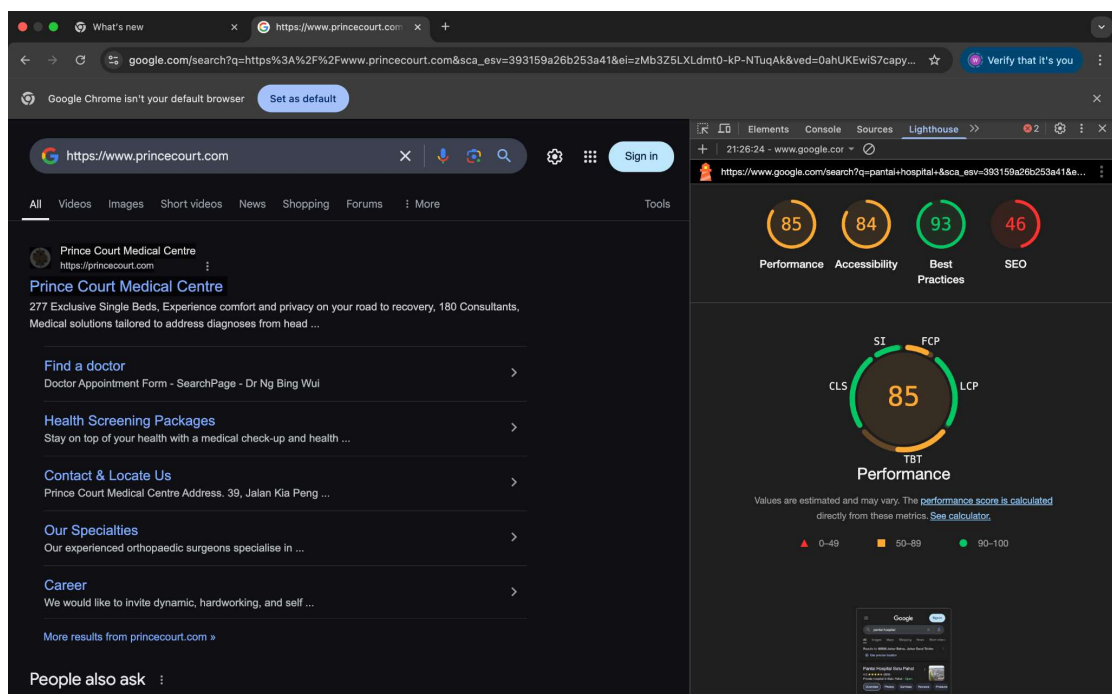


Figure 7.4: Prince Court (Mobile)

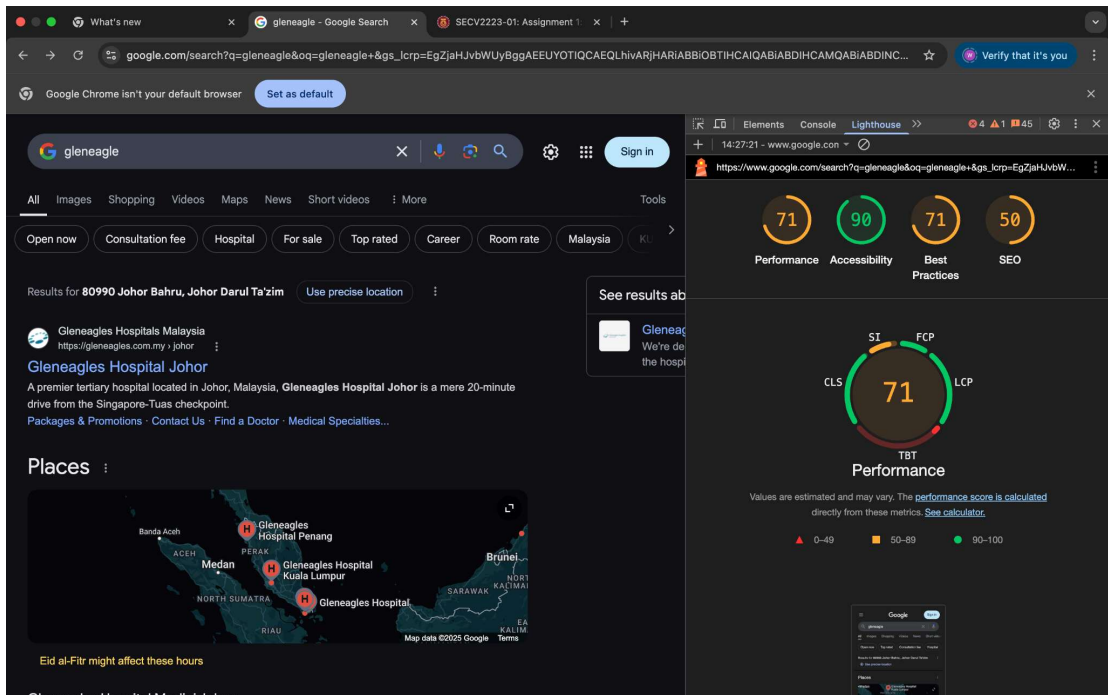


Figure 7.5: Gleneagles (Mobile)

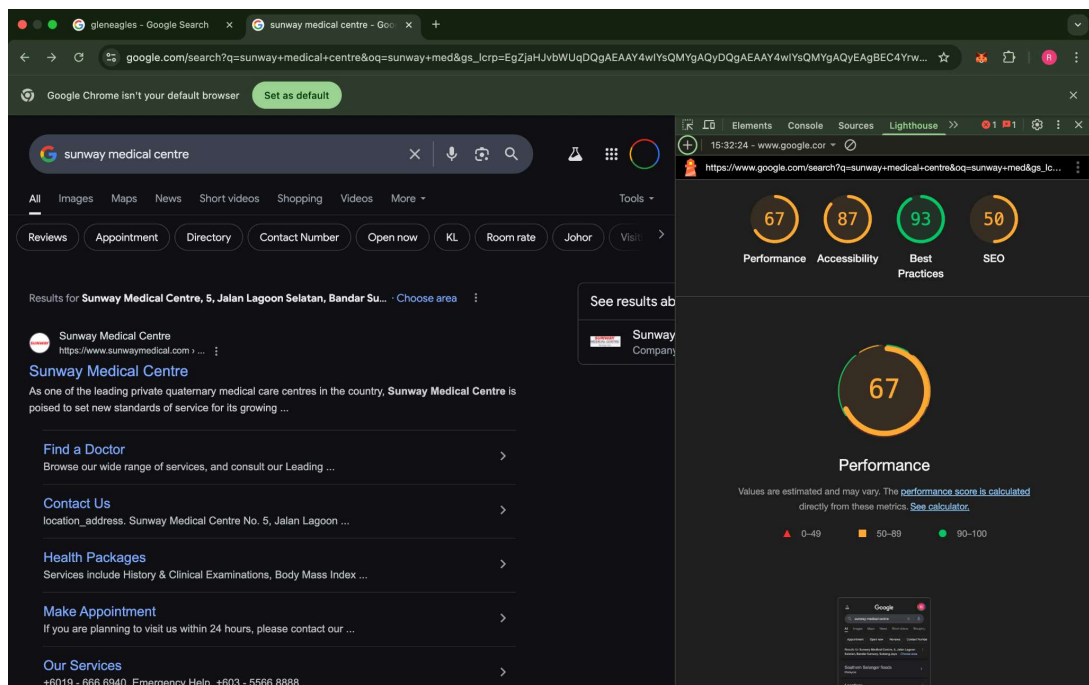


Figure 7.6: Sunway Medical Centre (Mobile)

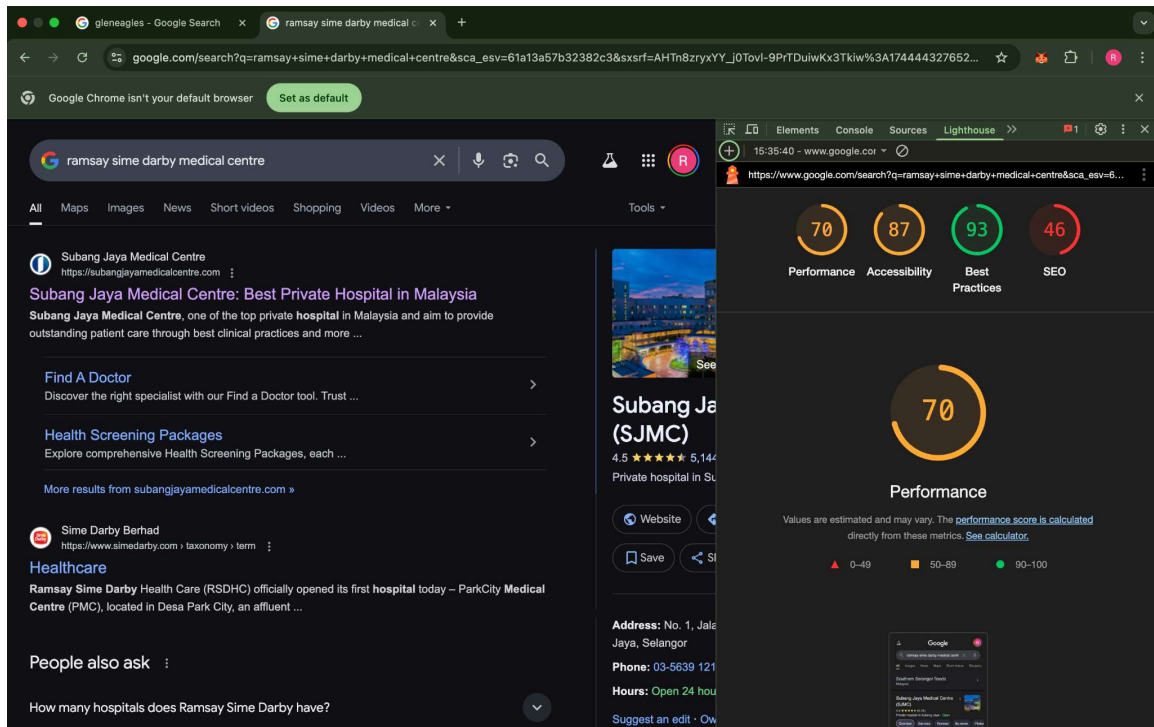


Figure 7.7: Subang Jaya Medical Centre (Mobile)