Open Access e-ISSN 2549-75961

ORIGINAL ARTICLE

Trends in Hemodialysis-Related Search Interest in Indonesia: A Decade Google Trends Analysis

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ARTICLE INFO

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Article history:
Received August 25, 2025
Revised; September 16, 2025
Accepted; September 20, 2025
Available online;
September 25, 2025

Keywords:
chronic kidney disease,
google trends,
hemodialysis,
infodemiology,
public health

ABSTRACT

Background: End-stage renal disease (ESRD) is increasing in Indonesia, but little is known about how people seek information about hemodialysis online. Understanding this digital behavior is essential for effective health education and access to care.

Methods: Google Trends data (2014–2024) were analyzed for lay and clinical hemodialysis-related terms. Four keywords were selected to capture public search behavior: “cuci darah”, “hemodialisa”, “hemodialisis”, and “hemodialysis”. Trends were compared across time, provinces, as well as related queries.

Results: Searches for hemodialysis steadily increased, with the lay term “cuci darah” dominating over clinical terms. Seasonal peaks were observed in 2019 and 2023, with notable increases during March–April each year. Provinces such as North Sumatra, East Java, and West Java showed the highest interest. Related queries commonly involved definitions (“hemodialisa adalah”) and kidney disease concerns (“gagal ginjal”).

Conclusion: Public online interest in hemodialysis across Indonesia is growing but remains uneven across regions, with persistent reliance on lay terminology. Integrating colloquial language such as “cuci darah” into kidney health promotion and aligning campaigns with seasonal peaks may improve reach and impact. Google Trends can be a practical tool for guiding education and service planning.

Medical and Health Science Journal

https://doi.org/10.33086/mhsj.v9i1.7952

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Introduction

Chronic kidney disease (CKD) is a growing global health concern, affecting approximately 10% of the world's population, with a disproportionately rising burden in low- and middle-income countries (LMICs) [1–3]. At its most advanced stage—CKD stage 5 or end-stage renal disease (ESRD)—renal replacement therapy (RRT) becomes essential for survival [4, 5]. The main RRT modalities include hemodialysis, peritoneal dialysis, and kidney transplantation [6], with hemodialysis remaining the most widely used, especially in LMICs due to limited access to transplantation and peritoneal dialysis (PD) infrastructure [7–10].

In Indonesia, CKD is a mounting public health issue, with a prevalence of 0.38% (3.8 per 1,000 population) based on the 2018 Basic Health Research (Riset Kesehatan Dasar, RISKESDAS). Approximately 60% of patients with CKD stage 5 require dialysis [11]. The introduction of the national health insurance scheme (Jaminan Kesehatan Nasional, JKN) in 2014 significantly expanded access to dialysis services, particularly hemodialysis [12]. By 2020, the number of new dialysis patients had tripled compared to 2017. In 2019 alone, Indonesia's Social Security Administrator for Health (BPJS Kesehatan) financed 1.93 million dialysis sessions at a cost of IDR 2.79 trillion [13].

Parallel to this expansion, the internet has become a key source of health information, particularly in countries like Indonesia where digital penetration is rapidly increasing [14, 15]. Google Trends, a publicly available tool, enables researchers to track public interest in specific topics over time using search query data [16–19]. This method, referred to as infodemiology, can provide valuable insights into public engagement, health-seeking behavior, and informational gaps at the population level [20, 21].

Despite the increasing prevalence of ESRD and the scale-up of hemodialysis services in Indonesia, little is known about how the public engages with this topic online. This study aims to explore temporal trends in hemodialysis-related search interest in Indonesia over a ten-year period (2014–2024) using Google Trends. The findings may support the development of more targeted health promotion, service planning, and policy responses.

Materials And Methods

Study Design and Data Source

This study employed an infodemiological approach using publicly available data from Google Trends to analyze public interest in hemodialysis-related search terms in Indonesia. Google Trends normalizes search data, enabling comparisons between terms and regions. The results reflect the proportion of searches for a particular keyword relative to the total number of Google searches conducted in a specified location and period, scaled from 0 to 100. While the data do not provide absolute search volumes, they are valuable for identifying temporal patterns and trends in public interest. Data collection was carried out on July 26, 2025, via the Google Trends platform (https://trends.google.com).

Search Terms and Parameters

Four keywords were selected to represent public search behavior related to hemodialysis: "cuci darah," "hemodialisa," "hemodialisis" (in Indonesian), and "hemodialysis" (in English). These terms were chosen based on their prevalence in both clinical contexts and everyday language. Searches were conducted separately for each keyword using the following parameters: time frame from January 1, 2014, to December 31, 2024; geographic location restricted to Indonesia; category set to "All categories"; and search type set to "Web Search."

Data Extraction and Processing

Relative Search Volume (RSV) values were retrieved for each keyword. RSV represents normalized search interest on a scale from 0 to 100, where 100 indicates peak popularity within the selected timeframe and location, and 0 indicates minimal or no search activity. The data were downloaded in .csv format, compiled, and organized using Microsoft Excel 2021 (Version 2507 Build 16.0.19029.20136).

Data Analysis and Visualization

Temporal trends were analyzed by plotting RSV values over time to identify shifts in public interest throughout the 10-year period. Comparative analysis of the four search terms was conducted to assess variations in terminology preference. All data visualizations, including line graphs, were created using Canva (https://www.canva.com/), an online graphic design platform.

Results

Temporal Trends in Hemodialysis-Related Search Interest

Between January 2014 and December 2024, the RSV for hemodialysis-related terms in Indonesia demonstrated a general upward trajectory, particularly for the term "cuci darah" (Figure 1; Supplementary Table 1). This term consistently ranked highest in monthly RSV and showed the most substantial growth over the 10-year period. The term "hemodialisa" followed with stable, albeit less dynamic, search interest. In contrast, "hemodialisis" and "hemodialysis" maintained low and relatively flat trends over time. Despite being clinically accurate, these latter terms appear less frequently used by the general public. These findings reflect a persistent public preference for colloquial terminology over medical or English-language alternatives.

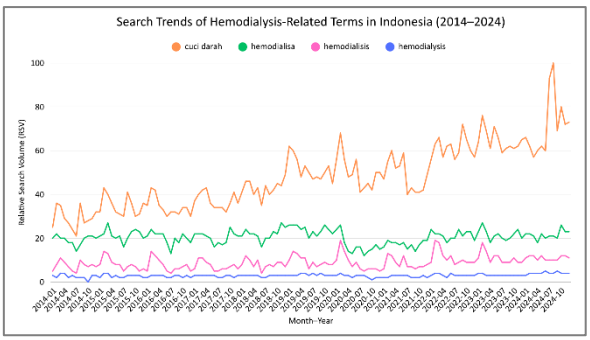


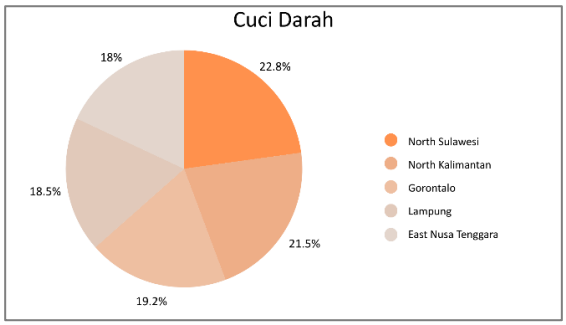
Figure 1. Temporal Trends in Google Search Interest for Hemodialysis-Related Terms in Indonesia (2014–2024). Monthly search interest for four hemodialysis-related terms—"cuci darah" (orange), "hemodialisa" (green), "hemodialisis" (pink), and "hemodialysis" (blue)—in Indonesia from January 2014 to December 2024. Data were obtained from Google Trends and reflect normalized RSV on a scale from 0 to 100. The X-axis is displayed in three-month intervals for readability.

Seasonal Variations and Notable Search Spikes

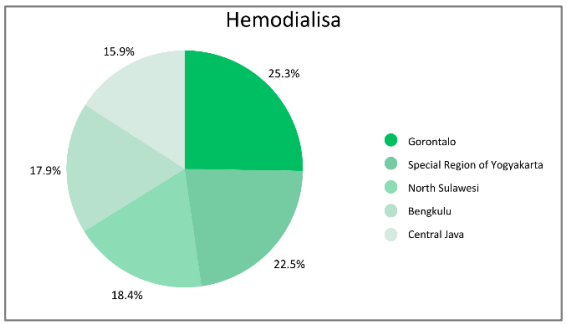
Visual inspection of monthly trends revealed recurring seasonal fluctuations and several notable spikes, especially in "cuci darah" searches (Figure 1). Peaks were consistently observed in the early months—particularly February—in years such as 2015, 2016, 2018, 2020, 2022, and 2023. Additional spikes occurred from late 2022 into early 2023. A pronounced surge was also observed in the second half of 2024, with RSV peaking at 100 in August and remaining elevated through December. While "hemodialisa" showed mild seasonal variation, these were less pronounced. Meanwhile, "hemodialisis" and "hemodialysis" did not exhibit any consistent seasonal patterns.

Geographical Patterns of Search Interest

Regional analysis revealed distinct patterns across provinces (Figure 2; Supplementary Table 2). The highest RSV for "cuci darah" and "hemodialisis" was observed in North Sulawesi (100), for "hemodialisa" in Gorontalo (100), and for "hemodialysis" in Yogyakarta (100). Figure 2 presents a visual comparison of the top five contributing provinces for each term.



(a)



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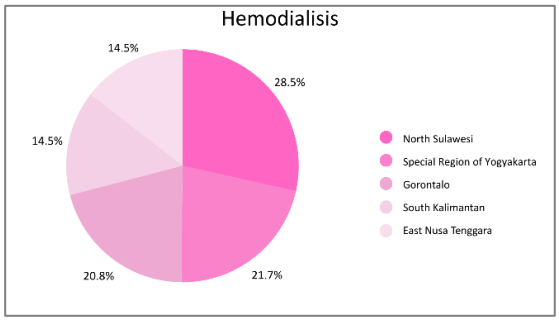

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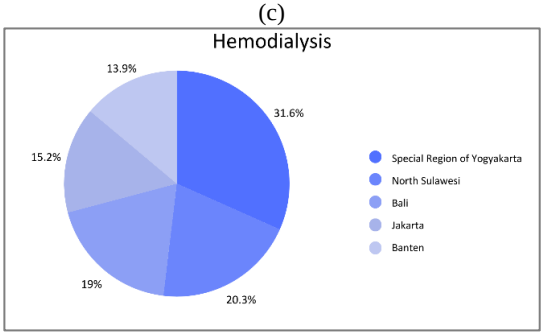

(d)

Figure 2. Top 5 Regions for Each Hemodialysis-Related Search Term in Indonesia (2014–2024). Pie charts displaying the top five provinces with the highest RSV for each term: a. cuci darah, b. hemodialisa, c. hemodialisis, and d. hemodialysis.

Top Associated Search Queries

Analysis of associated search queries revealed recurring themes across the four hemodialysis-related terms (Table 1). Public interest was not limited to dialysis procedures but extended to kidney disease in general. For instance, "gagal ginjal" and "ginjal" consistently appeared as high-ranking related queries, indicating strong lay concern about underlying kidney conditions. Foundational knowledge gaps were evident from definitional searches such as "cuci darah adalah," "hemodialisa adalah," "hemodialisis adalah," and "hemodialysis adalah," each reaching peak RSVs of 100. Procedure-related queries were also common, including "cuci darah gagal ginjal," "proses hemodialisis," and "hemodialysis patients." Interestingly, cross-term searches such as "hemodialisa" vs. "hemodialisis" highlighted ongoing public confusion between lay and clinical terminology.

Table 1. Grouped Top Associated Search Queries for Hemodialysis-Related Terms in Indonesia (2014–2024)

Category	Cuci Darah (RSV)	Hemodialisa (RSV)	Hemodialisis (RSV)	Hemodialysis (RSV)
Kidney disease terms	gagal ginjal (49)	ginjal (47), gagal ginjal (32)	ginjal (71), gagal ginjal (34)	dialysis (66)
Definitions / lay queries	ginjal (100), cuci darah adalah (45)	hemodialisa adalah (100)	hemodialisis adalah (100)	hemodialysis adalah (100)
Procedure-related	cuci darah gagal ginjal (48), penyakit cuci darah (38)	hd (33)	proses hemodialisis (35)	hemodialysis patients (91)
Cross-term searches	–	hemodialisis (26)	hemodialisa (39)	hemodialisa (72), hemodialisis (81)

HD: hemodialysis; RSV: Relative Search Volume.

Emerging and Rising Related Queries

The fastest-growing queries over the past decade reflected not only clinical curiosity but also structural aspects of care (Table 2). Breakout search queries—defined as those with exceptionally high growth (over 5,000%)—highlighted evolving public concerns over the decade. Under health financing and access, "cuci darah ditanggung BPJS" emerged as a breakout term, underscoring strong public concern about treatment affordability. Clinical and procedural knowledge queries expanded rapidly, including "kreatinin tinggi," "penyakit apa yang harus cuci darah," "jelaskan proses hemodialisis," and "hemodialysis indications/complications." Training and education-related searches (e.g., "pelatihan hemodialisa 2023") pointed to growing professional and academic interest. Meanwhile, technical/clinical terms such as CDL, CRRT, and proses pembentukan urine indicated a subset of users seeking advanced or specialized information. Collectively, these rising queries demonstrate how online search behavior spans from basic lay definitions to specialized clinical knowledge, reflecting the needs of both patients and professionals.

Table 2. Hemodialysis-Related Search Terms with Highest Growth in Indonesia (2014–2024), Grouped by Theme

Category	Cuci Darah (Rising)	Hemodialisa (Rising)	Hemodialisis (Rising)	Hemodialysis (Rising)
Health financing & access	cuci darah ditanggung bpjs (Breakout)	klinik hemodialisa depok (Breakout)	-	-
Clinical/procedure knowledge	kreatinin tinggi (Breakout); cuci darah karena apa (Breakout); penyakit apa yang harus cuci darah	ICD 10 CKD (Breakout)	fungsi ginjal (Breakout); jelaskan proses hemodialisis (Breakout); bagaimana proses pencucian darah	hemodialysis indications (Breakout); hemodialysis complications (Breakout)

	(Breakout)		(Breakout)	
Training/education	-	pelatihan hemodialisa 2023 (Breakout); pelatihan hemodialisa 2017 (Breakout)	prinsip utama dari teknologi hemodialisis adalah (Breakout)	-
Technical/clinical terms	CDL; CDL cuci darah (Breakout)	CDL (Breakout)	proses pembentukan urine (Breakout)	double lumen (Breakout); CRRT (Breakout)

Breakout: high growth, over 5,000%; CDL: catheter double lumen; CKD: chronic kidney disease; ICD: international statistical classification of diseases and related health problems; CRRT: continuous renal replacement therapy; Rising: related topics with the biggest increase in search frequency since the last time period.

Discussion

Principal Findings

This study demonstrates a steady increase in online interest related to hemodialysis over the last decade in Indonesia, with a notable dominance of the colloquial term “cuci darah” over its clinical counterparts such as “hemodialisis” and “hemodialysis.” This linguistic preference may be attributed to several sociocultural and systemic factors. The phrase “cuci darah” (literally “blood cleansing”) is easier to understand and more relatable for the general public. It is commonly used in everyday conversations, health services, and public campaigns. For example, during the 2016 World Kidney Day organized by the Indonesian Ministry of Health, the term “cuci darah” was prominently used to refer to hemodialysis procedures, helping increase public awareness through familiar language [22]. The popularity of this term likely contributes to its higher online search frequency compared to more technical alternatives.

Geographic trends revealed consistently high RSVs in provinces such as North Sulawesi and Yogyakarta, suggesting heightened regional awareness or a higher burden of ESRD in those areas. However, national survey data show that while provinces like Yogyakarta do report a relatively high prevalence of CKD, regions such as East Kalimantan, Central Sulawesi, and West Java have also been identified as areas with elevated CKD incidence based on RISKESDAS 2018 [11]. This discrepancy between online interest and epidemiological burden highlights the importance of further investigating regional awareness, healthcare access, and information-seeking behavior in the context of CKD and hemodialysis services.

Contextual Triggers Behind Search Surges

Elevated search volumes related to hemodialysis were frequently observed in the months surrounding World Kidney Day, a global health campaign held annually in March. In Indonesia, this event is regularly supported by public awareness initiatives from national health organizations, such as Perhimpunan Nefrologi Indonesia (PERNEFRI) and the Indonesian Kidney Foundation, often launched in the weeks leading up to the commemoration [23–26]. These initiatives—including educational outreach, media campaigns, and community activities—may contribute to heightened public interest and increased online searches for kidney-related terms during this period.

A sharp rise in public interest during late 2022 and early 2023 was linked to the pediatric acute kidney injury (AKI) crisis in Indonesia. The outbreak, associated with contaminated syrup medications containing ethylene glycol and diethylene glycol, drew intense media and public attention [27]. By October 2022, the Ministry of Health had reported 206 cases and 99 deaths across 20 provinces [28], prompting urgent recalls, advisories, and regulatory scrutiny [29], with additional cases identified in January 2023 [30]. This visibility likely triggered increased searches for terms such as “cuci darah”, commonly associated with kidney failure treatment.

The substantial public attention to kidney health issues during the latter half of 2024 appears to have significantly influenced online search behavior. Heightened awareness was likely driven by widespread media reports on rising dialysis cases among children, coupled with public health seminars, and advocacy activities by patient groups pushing for improved access and quality of care [31–33]. These developments may have contributed to a surge in online interest, as reflected in the marked increase in search activity for terms related to dialysis observed during this period.

Knowledge-Seeking Behavior in Kidney Health

The consistent presence of ginjal and gagal ginjal among the top related search terms suggests a broad public concern not only with treatment options but also with kidney health in general. This pattern implies that online health-seeking behavior extends beyond the procedure itself [34, 35], reflecting a wider interest in understanding kidney disease and its implications. Such behavior may also be driven by increased media coverage and personal experiences within families, prompting individuals to seek more comprehensive information online [36]. Additionally, the most frequent related queries for hemodialisa, hemodialisis, and hemodialysis were definitional phrases, such as "hemodialisa adalah." This indicates a foundational gap in public knowledge, with users often searching for basic explanations of the term [37]. These findings highlight the need for targeted public education to accompany awareness campaigns, ensuring that exposure to medical terms leads to informed understanding rather than confusion.

Limitations

This study is subject to several limitations. Google Trends provides relative, not absolute, search volume data and may be influenced by changes in internet access, population size, or search engine usage over time. The analysis does not capture demographic data of search users, limiting inferences about specific subpopulations. Causality also cannot be established between media events and search behavior, as associations are temporal and observational. Furthermore, reliance solely on Google Trends introduces potential bias, as it excludes populations that use other search engines or rely on offline sources of health information.

Conclusion

This study demonstrates the value of Google Trends in capturing public engagement with hemodialysis in Indonesia. Beyond documenting rising interest, the findings highlight the importance of incorporating colloquial terms such as *cuci darah* into health communication to enhance resonance and reach. By identifying regional variations and persistent knowledge gaps, this study provides actionable insights for tailoring kidney health promotion. Public health authorities may also leverage Google Trends for real-time monitoring and evaluation of educational campaigns, ensuring that strategies remain responsive to public needs.

Conflict of Interest

No conflict of interest in this study

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