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Trends and diversity of Japanese encephalitis videos on YouTube: an analysis of Indonesian-language health promotion content

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Abstract

Purpose: This study aims to analyze trends and diversity in Japanese encephalitis videos on YouTube to promote health information in Indonesia. **Methods:** We collected the videos on YouTube by searching with the keyword "Japanese encephalitis". The search results were identified to confirm their relevance to Japanese Encephalitis, and the videos were then classified for use in Indonesia. We analyze trends by examining the frequency of videos over time. For the videos identified as Indonesian-language content, further categorization was conducted based on their thematic content type. **Results:** We retrieved 586 videos and excluded 44 videos that were not related to Japanese encephalitis. The videos were published from January 6, 2008, to August 3, 2024. There was a global increase in the production of Japanese encephalitis content videos on YouTube, particularly in 2019, from 3.5% to 11.4%. However, only 22 (4.31%) Japanese encephalitis-related videos used Indonesian, with the most common content category being educational (22.7%). **Conclusion:** An increase in Japanese encephalitis-related content videos on YouTube in 2019, yet Indonesian-language videos remain limited. This highlights the need for more Indonesian-language content and diverse information on Japanese encephalitis, targeting Indonesian audiences, to improve public awareness and preventive measures.

Keywords: digital public health; health promotion; Japanese encephalitis; YouTube

INTRODUCTION

Japanese encephalitis (JE) is a mosquito-borne disease that remains a pressing public health challenge, especially in Asia. JE was first identified in Japan in 1871 [1], and it is caused by the Japanese encephalitis virus (JEV) [2]. The virus is primarily transmitted to humans and animals through the bites of Culex mosquitoes, with Culex tritaeniorhynchus being the predominant vector [3]. JE primarily targets the central nervous system [4], leading to severe neurological symptoms. The disease has a high fatality rate, with up to 30% of cases resulting in death. Survivors often face long-term complications, with approximately 30% to 50% experiencing persistent neurological or psychological sequelae that significantly impact their quality of life [5].

Although initially reported in Japan, JE cases have been reported in several Asian countries, including China, South Korea, Vietnam, Malaysia, India, and Indonesia [2,6]. In Indonesia, JE cases have been

identified in 29 provinces, with Bali, West Kalimantan, East Nusa Tenggara, West Java, and East Java reporting the highest numbers of cases [3]. Indonesia is recognized as an endemic region for Japanese encephalitis (JE), with sporadic cases reported annually across various provinces since 1960 [7]. An exceptionally high JE seroprevalence is reported in western Indonesia, with neutralizing antibody rates of 27% in Pontianak (Kalimantan), 26% in Samarinda (Kalimantan), 22% in Balikpapan (Kalimantan), and 51% in Bali. By contrast, Lombok exhibited a lower seroprevalence of 16% and a distinct age-related antibody distribution pattern [8]. In a clinical study of 118 children admitted to two hospitals in Jakarta in 1981 with JE-like symptoms, 25% were seropositive and demonstrated a fourfold rise in antibody titers against JE antigens, as measured by hemagglutination inhibition (HI) and immune-adherence hemagglutination (IAHA) assays [9].

Furthermore, a 2016 sentinel surveillance across eleven provinces in Indonesia identified 37 seropositive JE cases among 243 acute encephalitis syndrome presentations, including five fatalities [10]. Estimating the burden of Japanese encephalitis in Indonesia is impeded by fragmented surveillance and the absence of standardized reporting across national, provincial, and district levels, leaving its incidence and prevalence poorly defined [10]. In the absence of reliable incidence data, health promotion materials cannot be tailored to communities with elevated JE risk, including building community awareness.

The distribution of JE is strongly influenced by environmental and geographic factors, such as the presence of rice paddies and pig farms, which serve as breeding and amplification sites for Culex mosquitoes [11]. Agricultural practices, particularly in irrigated rice-farming regions, have been shown to increase mosquito populations, thereby heightening the risk of JE transmission [12]. Seasonal changes and environmental factors would increase the spread of JE, emphasizing the importance of mosquito control strategies [13].

As there is no specific antiviral treatment or cure for JE, vaccination remains the most effective and sustainable method of prevention [14]. Vaccination programs have been recognized as critical tools in reducing JE incidence and controlling outbreaks. The World Health Organization (WHO) recommends JE vaccination for populations in high-risk areas, emphasizing its role as the cornerstone of JE prevention and control efforts [14,15]. In Indonesia, JE prevention efforts began in 2011 with the initiation of a national serum-based surveillance program. Bali, a high-priority area due to its elevated number of cases, became the focus of these efforts [16]. Between 2014 and 2016, surveillance identified 408 JE cases among children in Bali, prompting the launch of a vaccination program in 2018 [16]. Building on this foundation, the vaccination program expanded to West Kalimantan and Yogyakarta Province in 2023-2024 [17].

Despite the efficacy and availability of JE vaccines, misinformation and disinformation have emerged as significant obstacles to the success of vaccination campaigns. Misinformation often undermines public trust in health authorities and spreads false narratives about vaccine safety and efficacy [18]. Social media platforms, including YouTube, have become key channels for disseminating misinformation, reaching large audiences quickly [19]. Viral posts and influential personalities sharing unfounded claims about severe side effects or vaccine-related conspiracies can increase vaccine hesitancy, leading individuals to delay or refuse immunizations [20,21]. Persistent misinformation impedes achieving herd immunity, leaving commu-nities vulnerable to outbreaks of vaccine-preventable diseases [22,23].

In Indonesia, combating misinformation is crucial due to the country's diverse population and widespread internet access. Public health authorities are under increasing pressure to counter misinformation while ensuring that accurate, evidence-based messages reach the public. Platforms like YouTube, widely used in Indonesia, can spread misinformation but also serve as a powerful tool for health education. This dual role highlights the importance of evaluating and improving the content on these platforms to ensure it effectively informs and engages the public.

This research aims to investigate YouTube videos about JE, specifically to promote health information in Indonesia by analyzing trends and diversity. The findings of this study are expected to be beneficial in mapping the availability of promotional materials about JE. Consequently, this research could support the JE vaccination program in Indonesia by increasing public awareness and reducing the potential spread of misinformation about vaccination.

METHODS

This study employs a descriptive research design, focusing on collecting and analyzing data to describe the characteristics of YouTube videos related to Japanese encephalitis. We examine YouTube videos as the primary subjects, based on a global YouTube video search conducted on August 3, 2024. Data collection was conducted using the YouTube API through the tuber package in the R Statistical Software Environment. The search was performed using the keyword "Japanese encephalitis". The following data were

extracted for each video: Video ID, title, description, publication date, and channel title.

All search result videos were analyzed, disregarding upload time, to obtain a comprehensive overview. The inclusion criteria for this study were videos related to Japanese Encephalitis that directly covered topics such as transmission, symptoms, prevention, vaccination, public health awareness, or case information. Each video was assessed for relevance by at least two researchers to ensure consistent results. In cases of disagreement, a third researcher was consulted to provide a final evaluation and reach a consensus. We excluded duplicate videos and links that no longer led to accessible videos. Then, videos in English and Indonesian were included in the initial search, with a specific focus on analyzing Indonesian-language content.

The data analysis involved several steps. First, the total number of videos was calculated for each year to identify temporal trends and patterns. Subsequently, Indonesian-language videos were selected to focus the analysis on regionally relevant content. Finally, these Indonesian-language videos were examined using thematic analysis to interpret the content types.

All data were collected from publicly available sources, ensuring that no privacy or confidentiality breaches occurred. We have received ethical clearance from the Medical and Health Research Ethics Committee (MHREC) of the Faculty of Medicine, Public Health, and Nursing at Universitas Gadjah Mada, with reference number KE-FK-1725-EC-2024.

RESULTS

A total of 586 videos have been identified through a YouTube search using the keywords “Japanese Encephalitis”. After assessing their relevance based on the inclusion criteria, 44 videos were excluded as unrelated to Japanese Encephalitis (JE), and 32 videos were excluded due to duplication, leaving 510 videos for further analysis—videos uploaded on YouTube between January 6, 2008, and August 3, 2024. The video selection process is illustrated in Figure 1.

As shown in Table 1, the majority of videos related to JE were categorized as news (45.88%), while only a small proportion (4.31%) were in Indonesian. Various YouTube channels contributed to JE-related content. These include government agencies such as health centers, health offices, and the Ministry of Health. Additionally, a significant portion of the content originated from personal accounts, some of which featured the names of medical professionals in their account titles, lending credibility to the videos.

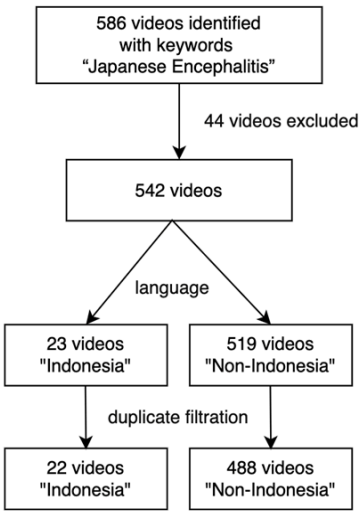

Figure 1. Flowchart of video selection process

Table 1. Characteristics of YouTube videos contributing to JE-related content (n= 510)

Characteristics	%
Publication year	
< 2017	16.67
2017 - 2020	30.20
2021 - 2024	53.13
Categories	
News	45.88
Educational	15.10
Presentation	11.76
Documentary	6.86
Short	5.10
Animation	4.71
Webinar	2.35
Conference	1.96
Others	6.27
Language	
Indonesian	4.31
Others	95.69
YouTube channel	
Government agencies	2.35
Others (including medical professionals)	97.65

The availability of Indonesian-language videos remains limited, indicating a gap in localized health communication. There were only 22 videos (4.31%) in Indonesian. On average, the videos received 30 likes, 5 comments, and 2,981 views (Table 2).

Table 2. User engagement of JE videos in Indonesian (n = 22)

Engagement metric	Mean	Min	Max
Like	30	0	108
View	2,981	10	11,668
Comment	5	0	31

Figure 2 highlights the number of JE-related videos uploaded over time. There has been a fluctuating trend in the number of uploaded videos over the years. The earliest videos appeared in 2008, marking the beginn-

ing of JE-related content on the platform. Notably, there has been a marked increase in the publication of these videos in 2019 from 3.5% to 11.4%, reflecting a growing global interest and awareness of JE. The highest number of uploads occurred in 2022, accounting for 25.5%. As shown in Figure 3, among the Indonesian-language videos, educational content was the most common (22.7%), followed by documentary and presentation (18.2%). These findings underscore the need for more diverse, engaging content tailored to Indonesian audiences to enhance public understanding and awareness of JE prevention and management. Content analysis revealed nine distinct categories: animation, documentary, educational, podcast, presentation, school project, short video, talk show, and webinar.

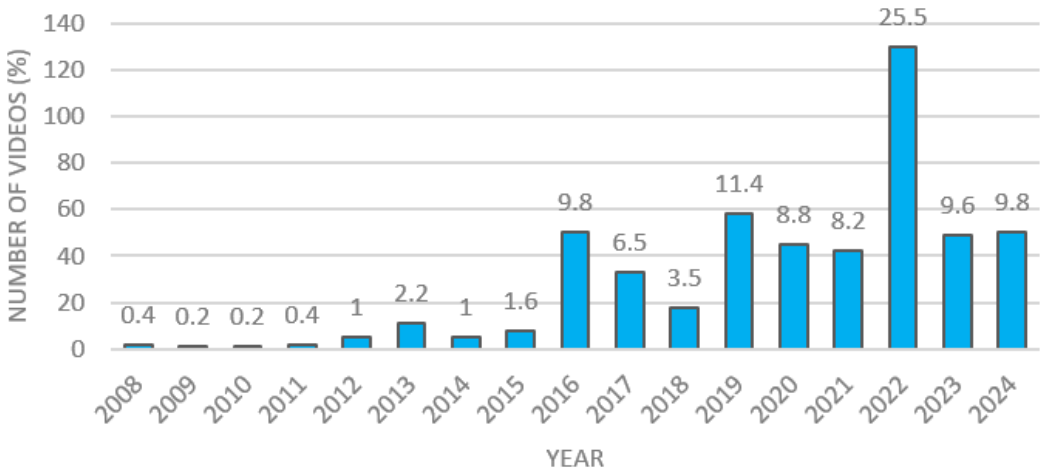

Figure 2. Japanese encephalitis video trends over time

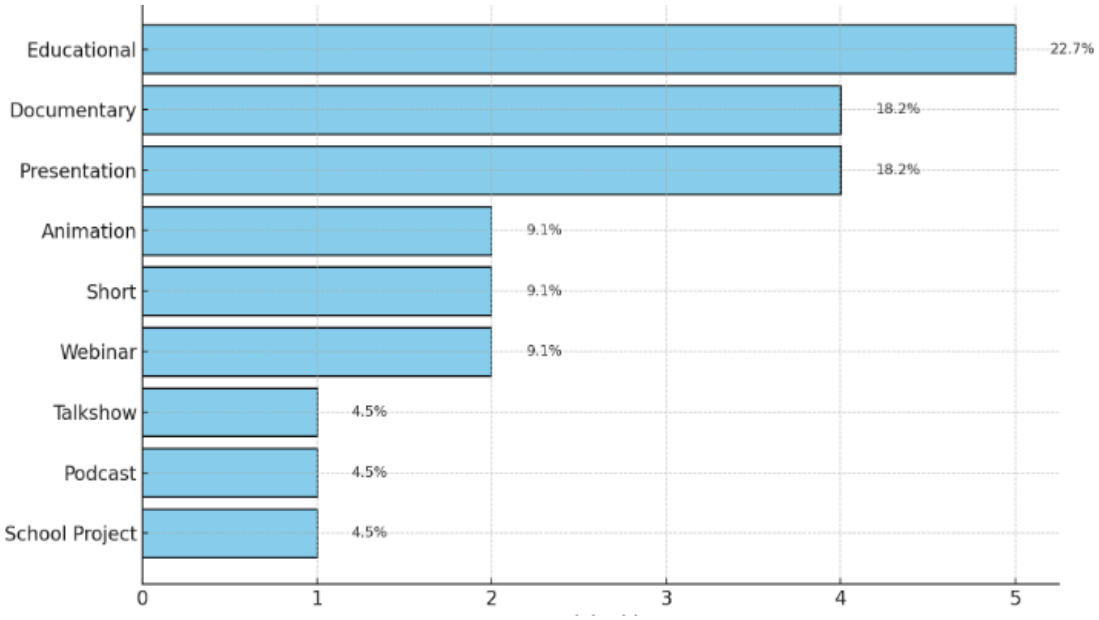

Figure 3. Characteristics of Indonesian Japanese encephalitis videos

DISCUSSION

YouTube is a widely utilized educational platform that disseminates information through video-based content. This platform enables users to access a diverse range of educational materials conveniently and at no cost for general content [24]. Additionally, YouTube serves as an essential platform for disseminating health related information [25], including public awareness campaigns on various diseases.

Results showed an increase in the number of JE-related videos on YouTube since 2019. This reflects the rising global awareness of the importance of JE-related health information. These findings also underscore YouTube's growing role as a platform for disseminating health information on JE. Factors that may be

driving this increase include a high number of JE cases, epidemics in specific regions, and global initiatives to prevent JE, such as vaccination. The infection rate of JE virus in India has been high between 2017 and 2021, despite a worldwide decline in JE incidence. In 2019, nearly 2,500 cases were registered in India. Moreover, there was a JE outbreak in Australia with three fatalities in 2022 [26]. In 2018, the Government of Indonesia conducted a vaccination campaign to introduce the JE vaccine program in Bali.

Furthermore, the program has been implemented as a routine immunization program since 2019 [27]. It is also likely influenced by the increasing use of digital platforms for health communication during the COVID-19 pandemic. Despite year-to-year variations, the presence of JE-related videos on YouTube remains consistent, indicating ongoing interest and relevance of this topic in global health discourse.

One of the critical challenges in vaccination campaigns is the language barrier. Despite the increase in JE-related video releases, only 22 (4.31%) videos were in Indonesian, limiting access to vital information for Indonesian-speaking populations. This indicates a lack of locally relevant information. This gap may affect the accessibility of health information for Indonesians, especially in JE endemic areas. The limited production of JE social media content in Indonesia may be attributed to a lack of public awareness. This may be attributed to limited availability of information and reporting, inadequate monitoring, and the absence of standardized diagnostic approaches and systematic routine surveys across regions, as well as insufficient spatiotemporal surveillance of JE cases [3]. Although Japanese encephalitis is endemic in Indonesia, reports of JE infection are still limited and come from a relatively narrow geographic area, with most reported cases being neuroinvasive disease [28].

This study found that several videos were uploaded by government agencies, such as the Ministry of Health and medical professional accounts that include the doctor's name. Medical professionals can use their expertise to provide accurate, detailed explanations, helping the public understand the complexity and context of health information. Evidence-based information provided can strengthen public trust [29]. The study by Korshakova et al. stated that medical professionals and government agencies were rated as the most trustworthy sources of health information [30]. Additionally, personal accounts, especially those that include the doctor's name, can help strengthen public trust in the information. Health information videos uploaded by these accounts can diminish misinformation in the community, particularly if the account collaborates with government agencies or health organizations [29]. Educational categories dominated Indonesian videos. Expansion of categories may be necessary to enhance the engagement and effectiveness of health messaging. In the previous study, there were positive effects of animation videos. Animation can improve learning in a healthy context [31]. Moreover, animation videos can be more appealing to youth [32]. However, shorter videos are more likely to be viewed. This leads to increased user engagement [33].

The lack of Indonesian-language content may hamper education and prevention efforts in endemic areas. Strategic initiatives from the government or health agencies are necessary to utilize platforms like YouTube to disseminate information about JE. Such efforts include encouraging collaboration with local content creators to produce appealing and informative videos. The use of regional languages, combined with engagement from local councils, community leaders, healthcare practitioners, and third-sector organizations, constitutes a critical strategy for enhancing the effectiveness of vaccination campaigns [34].

Recommendations from this study emphasize the importance of increasing the quantity and quality of Indonesian-language content on Japanese encephalitis. To achieve this, it is essential to integrate evidence-based information into engaging formats that resonate with local audiences, ensuring the data is both accessible and appealing. Additionally, fostering collaboration with key stakeholders—including government agencies, educational institutions, healthcare professionals, community organizations, and content creators and influencers—is essential to creating impactful content.

The partnerships can help amplify accurate infor mation and counteract the spread of misinformation-tion, which often circulates in society “organically” [25]. By addressing these gaps, we can enhance public awareness and understanding of Japanese encephalitis, ultimately improving prevention efforts.

A limitation of this study is that the analyzed videos were only available in English and Indonesian. We excluded videos in Indian languages that contained Indian script in the title or video content due to language constraints. This led to the omission of relevant information on JE. Moreover, it mainly focuses on assessing trends rather than evaluating the effectiveness of different types of videos. Future research should analyze user engagement metrics—views, comments, likes, and shares—to better understand audience interaction. Additionally, examining the impact of these videos on individuals' behavior and awareness will provide valuable insights into the effectiveness of health communication strategies on platforms like YouTube.

CONCLUSION

This study highlights the growing presence of JE-related content on YouTube, especially since 2020. However, the lack of Indonesian-language videos represents a critical gap. YouTube has significant potential as a platform for promoting health information about JE in Indonesia. To improve public awareness and preventive measures, there is an urgent need to increase the production of Indonesian-language content and diversify the content formats to engage broader audiences.

It is recommended that the Ministry of Health, particularly the Directorate of Health Promotion and Community Empowerment, and regional health offices take an active role in initiating and supporting the development of JE-related digital content. These stakeholders should collaborate with universities, public health professionals, and content creators to ensure the delivery of accurate, engaging, and accessible information through platforms like YouTube.

In conclusion, leveraging YouTube as a health promotion tool in Indonesia can help bridge the current awareness gap. Additionally, community participation is necessary to counteract misinformation that spreads organically. Collaboration between public health institutions and digital creators is essential to achieve this goal.

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