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# Digital impact of world hepatitis day: Formulating evidence-based recommendations for promoting healthcare awareness events

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## Abstract:

**BACKGROUND:** Social media applications provide room for public interaction and forming communities, thus helping disseminate health-related information. Since 2010, World Hepatitis Day has been observed on July 28 with endorsement from the World Health Organization. This study aimed to ascertain the global digital impact of World Hepatitis Day on Twitter (an online microblogging social network) and on the web (web searches and news) to formulate evidence-based recommendations for promoting future policy development.

**MATERIALS AND METHODS:** We analyzed publicly available data from Twitter, a popular microblogging social network on the internet (data accessed from India). Three social media assessment tools (Sprout social, SocioViz and Symplur) and Google Trends were used to obtain data about the tweets and global impressions worldwide about World Hepatitis Day. A time frame from July 27<sup>th</sup>, 2022 to July 29<sup>th</sup>, 2022 was taken into account for all the tweets in various time zones around the world.

**RESULTS:** “#WorldHepatitisDay” and “#Hepatitis” received 519.16 million and 412.37 million impressions in the defined timeframe, respectively. A total of 39,069 tweets were posted about World Hepatitis Day, an increase of 24.1% compared to the previous year. On social network analysis, 93 of the top 100 influencers collaborated among themselves, which helped in the wider dissemination of awareness.

**CONCLUSIONS:** World Hepatitis Day 2022 was an impactful healthcare awareness event on Twitter for the global audience and sets forth an example of the effective utilization of resources. Future policies shall inculcate constructive feedback from our findings and must be inclusive of all the underrepresented communities.

## Keywords:

Digital media, hepatitis, internet, policymaking, search engine, social media, Twitter

## Introduction

Hepatitis, as a clinical disorder, ranges from subclinical and self-limited disease to chronic liver disease and sudden liver failure.<sup>[1]</sup> It is a cause of global health concern that an estimated 1.4 million people die from hepatitis-related cirrhosis and liver cancer each year.<sup>[2]</sup> Despite being

such a global health issue, it has not yet gained the attention it requires. Thus, the WHO specified the worldwide eradication of viral hepatitis as a goal in the 2030 Agenda for Sustainable Development.<sup>[2]</sup> To aid in eradicating viral hepatitis, we need to create effective screening methods for safer transfusion of donated blood, administration of safer injections in medical

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settings, adoption of safer sexual practices, as well as increase awareness among intravenous drug abusers. Comprehensive international action plans and alliances can be made to contain viral hepatitis epidemics. Jefferies *et al.* proposed a global strategic plan with five core interventions, including hepatitis vaccine plans, preventing perinatal transmission of hepatitis B, injection and blood product safety testing, morbidity reduction, and successful treatment.<sup>[2]</sup> Better therapies and immunizations could help eliminate viral hepatitis as a danger to public health by 2030. Only by carrying out such customized interventions and utilizing the strength of communities, healthcare professionals, medical institutions, advocacy groups, and governmental entities can help accomplish it. One such endeavor is World Hepatitis Day (WHD), observed every year on July 28 since 2010 by people around the world in memory of Dr. Baruch Blumberg (credited with the discovery of the Hepatitis B virus and the very first hepatitis B vaccine), with endorsement from the World Health Organization (WHO) and other organizations worldwide.<sup>[3]</sup> The objective of celebrating this day with dedicated themes is to raise awareness, promote research, and foster equitable partnerships among diverse stakeholders and the general public.<sup>[4]</sup>

WHO's theme "Bringing hepatitis care closer to you" aimed to bring awareness via a patient-centered approach, with a goal to diagnose at least 60% of people living with Hepatitis B and C, and cure at least 50% of diagnosed individuals by 2025.<sup>[4,5]</sup> World Hepatitis Day campaign—"I can't wait (to get tested)" highlights the need to accelerate the fight against the disease by realizing the importance of testing and treatment, and the need to put an end to associated stigma and discrimination.<sup>[6]</sup> Keeping in mind the inclusion of diverse races, religions, ethnicities, and cultures, the varying prevalence of hepatitis across all countries must be accounted for, and a global action plan must be tailored to campaign programs as per the target audience, to promote WHD in order to bring about a noteworthy impact. The pressing priority today is to harness the hidden potential of digital media to disseminate credible information among a higher number of users each progressive year.

The origin of digital media and web-based application programs have brought about a revolution in healthcare networking, not just as an information disseminating tool, but also for online consultations in difficult-to-reach remote areas. Traditional mass media reporting has been extrapolated to digital technologies which have interconnected the whole world today, such that electronic word-of-mouth has become increasingly valuable.<sup>[7]</sup> There is an immense potential to use untapped digital health solutions for the improvement of the health of the general public. WHO aims to

harness this potential for health innovation and the well-being of patients suffering from hepatitis and other such illnesses.<sup>[8]</sup> The expanse of digital health ranges from health information technology to mobile health, and telemedicine. We have come a long way to revolutionize the healthcare sector today with the introduction of artificial intelligence (AI) to make clinical diagnoses alongside understanding the limitations of AI.<sup>[9,10]</sup> Healthcare providers and stakeholders use these technologies to reduce inefficiencies in our system, improve costs, and increase quality and access, to make medicine more personalized for patients in general.<sup>[11]</sup>

Sharing new experiences and insights internationally using the online media helps establish novel connections and form communities among patients, expert scientists, healthcare providers, and policymakers.<sup>[12]</sup> As per global media statistics (July 2022), an estimated 4.7 billion users, i.e., more than half (59%) of the world population use one or the other digital media, with average daily usage of 2 hours and 29 minutes.<sup>[13,14]</sup> Digital media has emerged as the routine driver to establish connections, share opinions, and actively promote WHD with the global audience, and could serve as a potent tool for circulating critical messages regarding screening, prevention, and treatment in the community. One such social media platform is Twitter, wherein followers can get real-time feeds from other users, as well as, mention others using @ and retweet the posts to increase the overall impression of each follower and thus, communication dialog.<sup>[7]</sup>

With this context, we aimed to evaluate WHD's digital impact on Twitter to navigate future policy development.

## Materials and Methods

### Study design and setting

This was a cross-sectional observational study conducted on the internet. We collected data from a popular microblogging website—Twitter and a web search trend analysis website—Google Trends. For the data collection, we used a personal computer connected to the internet. The data collection period was July 27–29, 2022. The data was collected prior to Twitter acquisition by X Corp.

### Study participants and sampling

This study does not involve any human research participants. However, it includes the analysis of social media posts of the individual that were posted on an open social media platform. We collected all the data searching by a fixed set of keywords or phrases. All the tweets, posted from a public profile, were included in the analysis. We did not filter the posts by language or region. Hence, any user tweeting from any corner of the world was included in the study.

### Data collection tool and technique

We evaluated the total number of tweets, impressions, popularity, collaboration, and search interest according to different regions of the world. We studied the total number of impressions and influencers of “#WorldHepatitisDay” and “#Hepatitis” hashtags that highlight the maximal number of Twitter users these hashtags could have reached between July 27–29, 2022 using Symplur’s machine learning algorithm.<sup>[15]</sup> We extracted the total number of tweets from July 27–29, 2014 to 2022 for the search query—“World Hepatitis Day OR Hepatitis Day OR WHD OR #WorldHepatitisDay OR #HepatitisDay OR #WHD” to analyze the trends via regression analysis from Sprout social.<sup>[16]</sup>

Furthermore, we did the social network analysis of the above-mentioned search query for the most popular and real-time recent tweets to find the top associated hashtags using SocioViz and Gephi 0.9.5.<sup>[17]</sup> Using the ForceAtlas2 layout, we studied the interactions between the top 100 users and hashtags. The size of each node was proportional to the total mentions received and different colors represented arguments that usually appear together.

To study overall web and news search popularity, Google Trends analysis of the topic “World Hepatitis Day” for interest by region was studied for the past 5 years. No language or geographical restrictions were set in any search method.

### Ethical consideration

No patient data were collected and no human/animal participants were involved in this study. Hence, according to prevalent guidelines by the Indian Council of Medical Research’s National Ethical Guidelines for Biomedical and Health Research Involving Human Participants (2017), anonymous data audit from the public domain does not require any ethical clearance.<sup>[18]</sup>

### Statistical analysis

Data were descriptively presented in terms of frequencies (number of cases) and relative frequencies (percentages) and for inferential analysis, we used linear regression. All the statistical calculations were conducted using Statistical Package for the Social Science (SPSS) 26 version (SPSS Inc., Chicago, IL, USA) statistical program for Microsoft Windows. A  $P$  value  $<0.05$  was considered the level of statistical significance.

## Results

The hashtags—“#WorldHepatitisDay” and “#Hepatitis” received 519.16 million and 412.37 million impressions on Twitter in the defined timeframe of July 27–29,

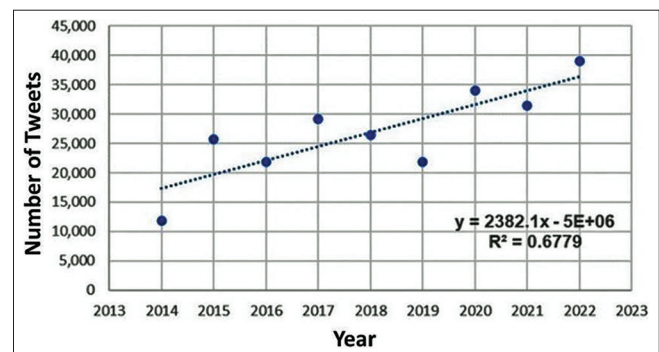
respectively. A total of eight out of the top 10 users by highest impressions were news handles for both #WorldHepatitis Day and #Hepatitis. A total of 39,069 tweets were posted about WHD, which is an increase of 24.1% and 54.3% compared to 2021 tweets and the mean of total tweets from 2014 to 2021, respectively. On linear regression analysis from 2014, there has been an increase in the number of total tweets as shown in Figure 1 which is statistically significant ( $R^2 = 0.678$ ,  $F [1, 7] = 14.733$ ,  $P = 0.006$ ).

On user social network analysis, 93 of the top 100 influencers collaborated with each other. Figure 2 highlights the social network analysis of the top 100 related hashtags. The top 10 related hashtags could be broadly classified into three categories—hepatitis day specific (#worldhepatitisday\_2022, #worldhepatitisday2022), hepatitis specific (#hepatitisc, #hepatitis, #hepatitisb), and hepatitis day theme specific (#hepcantwait, #icantwait).

On Google Trends analysis, Hepatitis Day had a global reach except in several parts of Africa and Central-Asian countries. All of the top 20 countries based on interest by region for “World Hepatitis Day” were either low- or middle-income countries. The top five countries were—Nigeria, India, Pakistan, Tanzania, and Myanmar. The relative search volumes of the top 10 countries are shown in Figure 3.

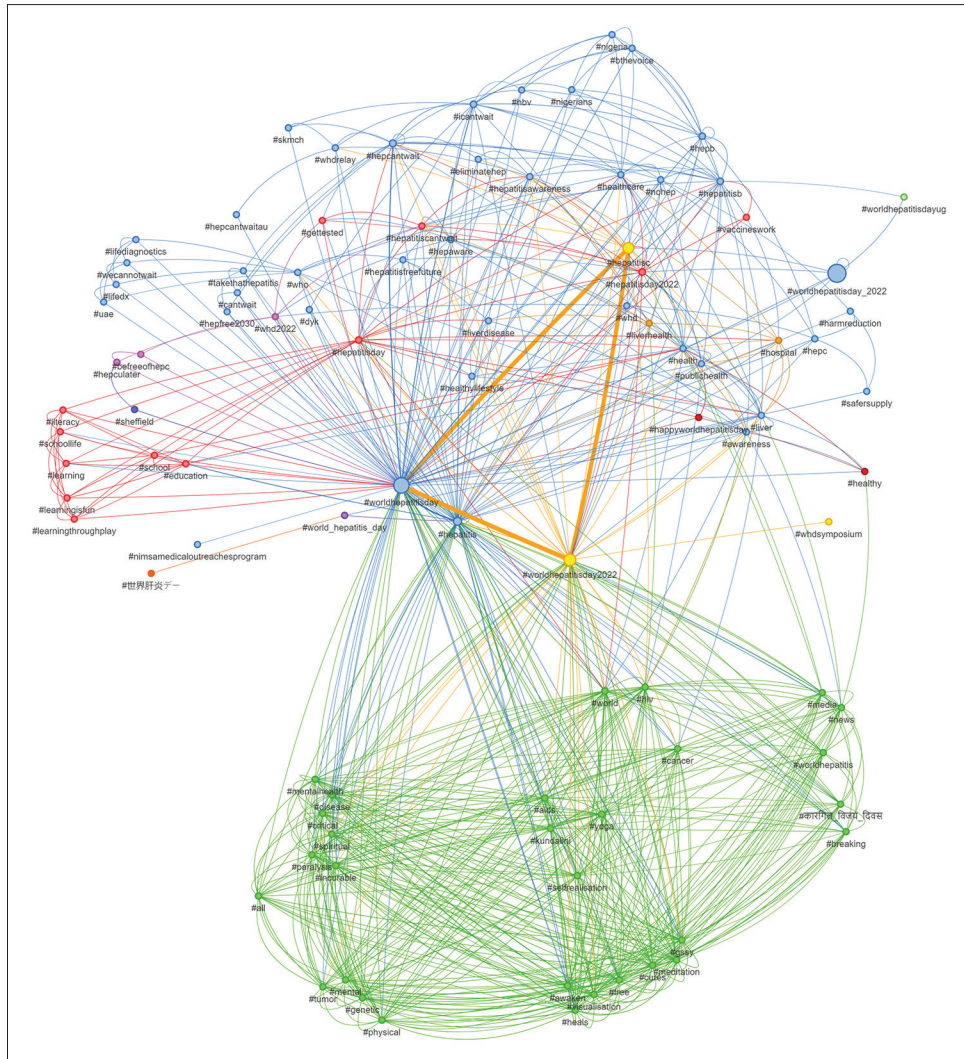
## Discussion

With a lack of substantial awareness about hepatitis, digital media is a large platform to unite people from different socioeconomic and geographic backgrounds to involve, collaborate, and educate about hepatitis. Digital platforms and search engines have the ability to engage global audiences at unprecedented speeds, explaining the success of some internet news outlets. Social media posts with targeted hashtags may be more credible for health-related issues.<sup>[19]</sup> “#WorldHepatitisDay” gained over half a billion Twitter impressions from



**Figure 1:** The total number of tweets posted for the search query “World Hepatitis Day OR Hepatitis Day OR WHD OR #WorldHepatitisDay OR #HepatitisDay OR #WHD” from July 27–29, 2014 to 2022. The linear regression was statistically significant ( $R^2 = 0.678$ ,  $F [1, 7] = 14.733$ ,  $P = 0.006$ )





**Figure 2:** Social network (Twitter) analysis of top 100 related hashtags of the search query—“World Hepatitis Day OR Hepatitis Day OR WHD OR #WorldHepatitisDay OR #HepatitisDay OR #WHD”. The top five most commonly associated hashtags were—#worldhepatitisday\_2022, #worldhepatitisday2022, #hepatitic, #hepatitis, and #hepcantwait

countries worldwide with life-saving messages about viral hepatitis in 2021, which showed a further increase in trend this year.<sup>[4]</sup> Synergistic actions by all the stakeholders in the form of similar campaigns, like Hepatitis Prevention Week and Hepatitis Awareness Drive, are the need of the hour. Social media campaigns may use easy-to-understand, memorable, and easily reproducible hashtags with similar spellings all over the world, followed by coordinated tweets via pre-identified social media influencers. Social media communication strategies that target fundraising for research, social support of hepatitis patients, and hepatitis screening programs are particularly more relevant.

Joining social media conversations using hashtags like #WorldHepatitisDay, #HepAware, and #Hepatitis to gain and re-share knowledge on hepatitis, following various online international events, podcasts, live-read radio scripts, along with proper use of educational campaign

materials, publications, among other resources, could serve as important resources.<sup>[4]</sup> World leaders, top scientists, notable influencers, news outlets and public advocates may put forth video messages dedicated to raising awareness among the general masses. More emphasis is needed on the LMICs and various African countries to promote hepatitis awareness, which is a similar finding seen in the evaluation of other healthcare awareness campaigns.<sup>[20-23]</sup> Substantial efforts may be needed to raise digital awareness, influence the general public in LMICs, and achieve the elimination goals.

The term Health Awareness Day was first defined by Mulvihill as a “brief exposure, high visibility program designed to stimulate thinking and discussion of certain health risks and issues by a large number of people.”<sup>[24]</sup> It is an intervention strategy well known to and increasingly implemented by healthcare providers and policymakers. Previous studies have established

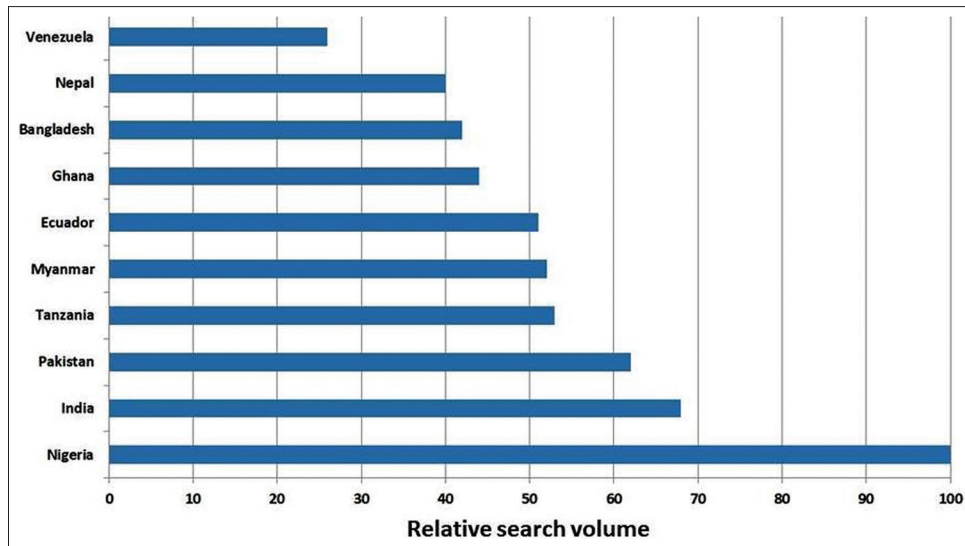


Figure 3: Relative search volume of top 10 countries searching for "World Hepatitis Day", as found from Google Trends

that the digital media may serve as an effective platform dissemination of health-related information.<sup>[25,26]</sup> The WHD is one of the eleven official disease-specific world health days designated by WHO, to focus our attention on millions of patients with chronic Hepatitis B and C infections. Many similar awareness days and months are celebrated worldwide, with recognition from one or more major health institutions around the world. An article on Deep Vein Thrombosis (DVT) Awareness Month concluded that out of a total of 19,922 tweets linked to DVT, 465 (only 2.3%) specifically advocated DVT awareness and/or DVT awareness month.<sup>[20]</sup> In contrast to our results, a declining trend was seen in the total tweets targeting DVT awareness and/or DVT awareness month.

In stark contrast to the increase of 24.1% seen in World Hepatitis Day (WHD) tweets, a spike of over 800% in tweets related to World Hypertension Day was reported, compared to the previous year. "#WorldHypertensionDay" and "#Hypertension" gained around 269 million and 123 million impressions worldwide, respectively, which is quite comparable to the trends seen on WHD.<sup>[21]</sup> A similar report on World Gynecologic Oncology Day recorded a total of 662 tweets, with an abundance of hashtags (around 164 identified) used.<sup>[12]</sup> Another paper evaluating the global digital impact of Stroke Awareness Month concluded that out of 989,935 tweets about stroke posted in the month of May 2022, only 1.07% were related to stroke awareness month. As per the Google trends analysis, the event had quite a nominal involvement from various African countries, concordant with our results.<sup>[27]</sup>

WHD was an impactful healthcare awareness day and presents a universal chronicle of efficient employment

of digital resources for global outreach, with prioritizing focus on equitable participation and encouragement of partnerships among underprivileged and underrepresented communities, especially in countries, where the impact of WHD is evolving but nascent. WHD has a vast global outreach with extensive partnerships with low- and middle-income countries, which makes it necessary for policymakers to plan awareness campaigns with an objective to reduce over 4.5 million preventable deaths due to hepatitis in LMICs by 2030.<sup>[3]</sup>

### Limitation and recommendation

This paper highlights the utility of Twitter to create awareness about WHD, an international health observance day. This study has some limitations. We were limited only to Twitter conversations, while similar discussions were going on other social media platforms like LinkedIn and Facebook as well. Due to the use of specific keywords in search queries, the non-availability of historical data from other social media platforms (e.g., LinkedIn, Facebook, and Instagram), and the exclusion of other language-specific web exploration, our evaluations shall be an underestimation. The usage of dedicated themes appears to be an effective tool to target social media campaigning and generate a digital footprint but our study fails to show any causal relationship with search interest. Additionally, cautious and constructive use of social media is needed to limit misinformation spread. The significant digital impact cannot be correlated to behavioral change and increased belief in evidence-based medicine in our study. Any future study with multiple social media platforms including regional social media (some countries restrict social media like Facebook or Twitter and promote regional media) would reflect more generalizable scenario.

## Conclusion

WHD proved to be a highly impactful event on digital platforms for dissemination of hepatitis-related information and sets forth an example of effective utilization of resources, especially in resource-limited nations. Twitter campaigns shall be designed with a universally assigned easy-to-understand hashtag to encourage active involvement from the people. Future policies shall inculcate constructive feedback from our findings and must be inclusive of all the underrepresented communities.

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## Conflicts of interest

There are no conflicts of interest.

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