

PRELIMINARY ANALYSIS OF A PUBLIC HEALTH TWITTER CAMPAIGN: WORLD HEALTH DAY 2014

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ABSTRACT

Public health campaigns aim to positively affect health-related behaviors and/or raise awareness of specific health conditions, risk factors and issues. These campaigns have traditionally relied upon various media and mechanisms for success, such as mass media distribution by television and radio, information propagation by individuals, involvement and engagement of stakeholders, and recruitment to the campaign of celebrities or advocates well known to the community. More recently, microblog platforms such as Twitter have also been increasingly utilized for public health campaign delivery. This is a relatively recent phenomenon and so is not yet well understood or studied. In this paper we provide an initial description of a case study of a global Twitter-based public health campaign, namely that involving the use of the #worldhealthday hashtag during and surrounding the 2014 World Health Day, April 7th 2014. In addition, the various characteristics and properties of this public health campaign within this contemporary medium are explored utilizing software tools that enable the capture and analysis of Twitter information flows.

INTRODUCTION

Social media and microblog systems provide a promising new medium to deliver truly global public health campaigns. The use of Twitter, and particularly the use of public health campaign-specific hashtags, has emerged relatively recently and spontaneously over the last number of years. A hashtag is an identifier preceded by the '#' symbol used in Twitter microblog posts. The inclusion of a hashtag allows for the categorization, association and searching of microblog posts that are about that particular subject (e.g. #worldhealthday indicates tweets about or related to World Health Day). As microblogs are a new public health information dissemination platform, there has been relatively little formal study of the properties or characteristics of these microblog-based public health campaigns. Therefore the purpose of this initial study is to capture, examine and analyze data and trends specifically related to the online aspect of a public health campaign, to gain better understanding of the social media-driven aspects of such a phenomena. In this paper we study the prominent global campaign, World Health Day, and how this was manifested in terms of Twitter-based dissemination, in the case of this event on and surrounding April 7th 2014.

BACKGROUND

Previous public health-related campaign research has explored the impact of knowledge awareness and effect of campaigns addressing specific issues such as mental health [1], HIV [2] and tobacco use [3]. However these types of studies analyzed these campaigns from an audience-perspective, such as exploring the impact of the health message on its audience, and did not track other aspects of the campaign, such as full reach across a social networking sphere, general dissemination trends, sources of information, the type of highly disseminated information and the engagement of and extent of information sharing. This study will attempt to address these various aspects of an online public health campaign, rather than focusing on the perspective of the end-user.

Little existing research has been carried out in relation to microblog-based public health campaigns specifically, however the potential of such platforms for health campaigns [4] and health promotion [5] have been recognized due to developing technology allowing for online communication to be more interactive. There have been recent studies in relation to other Twitter-based public/government interactions (such as natural disasters and emergency situations) [6], but not specifically in relation to health-related campaigns. The general characteristics of the public's engagement in health-related tweeting behavior via microblog systems have been previously described [7][8]. However this study aims to fill a gap in the literature by exploring contemporary health campaign delivery, and provide quantitative data and analysis of such a public health campaign the details of such having been previously relatively unexamined.

METHODOLOGY

We utilized the Hashtracking Web application (www.hashtracking.com) to capture data for this study. This online tool captures real-time data by tracking tweets containing specific hashtags, which in the case of this study was set to '#worldhealthday'. To capture a significant amount of relevant data and trends pertaining to the event, data collection was carried out over the course of a week, commencing 3 days before (midnight 4th April

2014) and ending 3 days after (midnight 11th April 2014) World Health Day (April 7th 2014). Hashtracking provided basic report generation, as well as the ability to export the collected data, which was analyzed using Microsoft Excel and SPSS. This data was analyzed in terms of temporal distribution, numbers of tweets, levels of engagement, account participation, account reach, numbers of participants, retweeting behaviors and frequency.

OVERVIEW of #worldhealthday DATA

The 2014 #worldhealthday campaign resulted in over 170,270,000 ‘timeline deliveries’ over the week surrounding World Health Day (Figure 1). By timeline deliveries, it is meant the total number of possible times recipients of microblog posts could have seen posts containing that hashtag. 17,613 unique accounts (contributors) posted 26,566 tweets, which were received by approximately 94,800,000 unique individuals (reach) (Figure 2). There were on average approximately 2.6 tweets per minute containing this specific hashtag over the entire sampling period (between midnight 4th April 2014 and midnight 11th April 2014).

Figure 1. Number of tweets and number of timeline deliveries

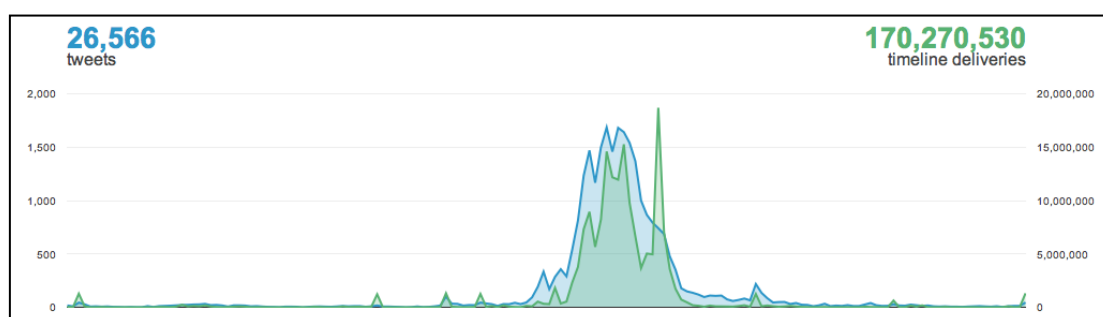
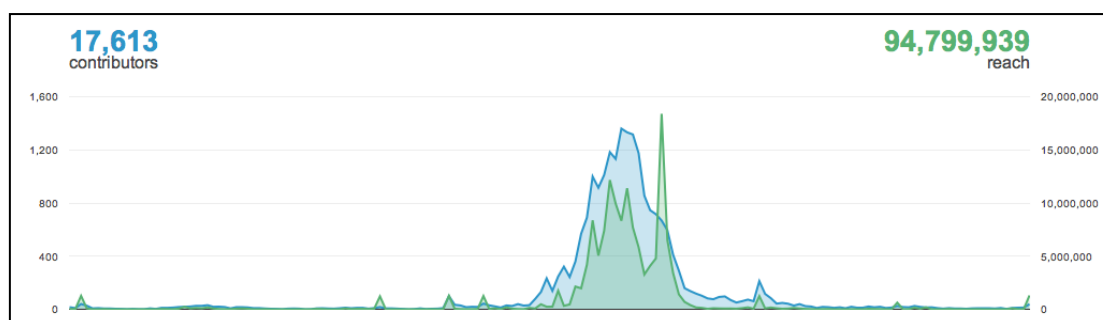


Figure 2. Number of contributors and number of unique individuals reached



These figures demonstrate that a public health campaign via Twitter can have a large reach to a broad audience (nearly 95 million unique accounts). More importantly, these figures also show that with over 17,600 unique contributors, such public health campaigns are no longer only restricted to information dissemination by just a few large public health organizations, and instead involve a very large number of other entities [9]. As can be seen by both Figure 1 and Figure 2, the pattern of tweets, timeline deliveries, contributors and reach showed a broadly symmetrical pattern around World Health Day on the 7th April, however with a longer drop-off tail following the day itself in comparison with the days preceding. In addition, unusual peaks in timeline deliveries and reach can be seen within the broader main peak around World Health Day, and a number of much smaller peaks can be seen preceding and following the day itself. These phenomena will be discussed in a later section.

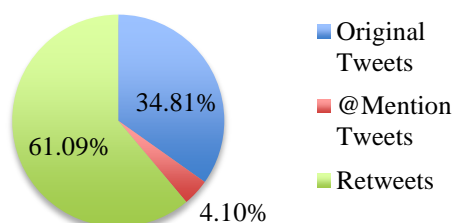
53.0% (or 14,080) of all tweets collected with the hashtag #worldhealthday also contained other hashtags (we refer to these as co-occurring hashtags). The most prevalent of these was #just1bite (the focal message of World Health Day 2014, which relates to vector-borne diseases), with 7.0% of all collected tweets containing this co-occurring hashtag. #health (5.1%) and #malaria (2.9%) were second and third respectively. However there were other campaign unrelated co-occurring hashtags, such as #childrenofsyria and #assadwarcrimes. In relation to the words within tweets, the most commonly occurring in this set of over 26,000 tweets included expected words such as ‘health’, ‘today’, ‘happy’, ‘disease’, ‘bite’, ‘mosquitoes’, ‘check’, ‘support’, and ‘dengue’.

ENGAGEMENT AND PARTICIPATION

Data for the whole campaign period shows interesting characteristics in relation to engagement and participation. Engagement refers to the way in which contributors chose to interact with the campaign via the types of tweets that were posted, whereas participation refers to the number of contributors and their relative scale of contribution during the period of data collection.

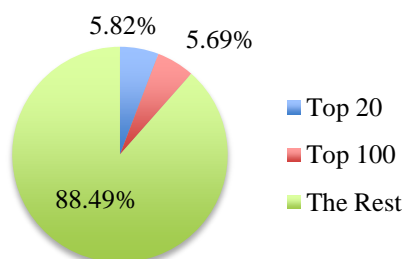
In relation to engagement, only about one third (34.81%) of the total 26,566 tweets were original tweets (Figure 3). The remainder of the microblog posts were ‘mention’ tweets (MTs), which are tweets that refer to another user account using the @accountname syntax, or retweets (RT) which are previously posted tweets that are forwarded or shared by an account. 4.10% of the total tweets were MTs - this is considered a measure of conversational activity within the #worldhealthday campaign. In addition, 61.09% of tweets were retweets, demonstrating that the most common tweeting activity was the forwarding of information already posted by another account. The combination of MTs and retweets (65.19%) were approximately two-thirds of all tweets captured, and this emphasizes the significant engagement of public health campaigns through social media whereby information is pushed towards others by many participants (rather than there being few key accounts sending information). This also displays the advantage of this novel medium by which public health campaigns can be delivered, whereby it is possible to quantitatively assess the extent of information being generated and how it is being shared.

Figure 3. Engagement



Participation showed a large number of unique participants but also a highly skewed distribution. That is, the top 20 accounts by number of tweets accounted for 5.82% of all tweets (that is an average of 77 tweets per account). The next 80 accounts contributed a further 5.69% of all tweets (approximately 19 tweets on average for each of these accounts) and the remaining accounts accounted for 88.49% of all tweets. This indicates that the vast majority of accounts (the 17,513 outside the top 100) on average contributed approximately 1.3 tweets per account. This demonstrates the influence of individuals on such public health campaigns. In addition, these results display how campaign-related discussion and information can be rapidly propagated to a large audience, when considering vast numbers of contributors outside the top 100 tweeters as well as the multiple followers these accounts may have.

Figure 4. Relative participation of contributors



Further indicating the skewed distribution of tweeting activity and the impact of individuals in the dissemination of campaign-related information, the account that tweeted the most during the one week period examined tweeted 503 times using the hashtag #worldhealthday (@sosweet196). The second most frequently tweeting account (@AshaLama85) tweeted 142 times using the #worldhealthday hashtag. In fact, approximately half of the top 20 tweeting accounts were individuals without (publicly known) health backgrounds and with no identified direct association with World Health Day.

CONTENT DISTRIBUTED VIA CAMPAIGN

Of the total of 26,566 tweets sent, 11,478 (43.21%) contained links/URLs to Web pages (Figure 5). Previous research has found that health organizations have a very high proportion of URLs in their public health-related tweets [10]. Table 1 provides information on the most distributed linked-to pages, which is an indication of what types of information were most commonly being distributed within the campaign. This linked-to information can be referred to as 'in-depth', as these are Web pages that were referred to, in comparison with the text within tweets themselves that is limited to only 140 characters.

Figure 5. Proportion of tweets which linked-to Web pages

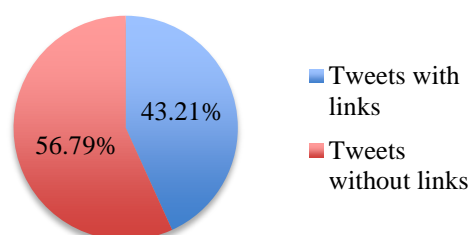


Table 1. The top 15 disseminated URLs

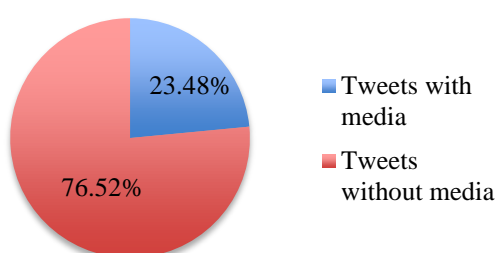
Organization	URL	Number of times posted
Greenpeace	http://www.greenpeace.org/international/Golden-Rice/#food	294
Mindset Foundation	http://accessourmedicine.com	275
Alliance for a Healthier Generation	https://www.healthiergeneration.org/live_healthier/	267
World Economic Forum	http://forumblog.org/2014/04/world-health-day-fight-against-malaria-mosquitos/?sf2489185=1	243
Virgin	http://www.virgin.com/richard-branson/world-health-day	193
World Health Organization	http://www.youtube.com/watch?feature=player_embedded&v=LutGFrwysRI	107
The Travel Magazine	http://www.thetravelmagazine.net/i-4966--10-natural-remedies-for-travellers.html	100
Global Fund for Women	http://www.globalfundforwomen.org/what-we-do	76
CISCO	http://www.slideshare.net/CiscoBusinessInsights/mobilizemag-healthcare-and-mobilityand-new-advancements-lead-to-better-patient-care	73
WaterAid	http://www.wateraid.org/uk/what-we-do/the-crisis/health?utm_source=twitter&utm_medium=referral&utm_content=what_we_do_health&utm_campaign=world_health_day	68
The Travel Magazine	http://www.thetravelmagazine.net/i-4966--10-natural-remedies-for-travellers.html	65
CNN	http://edition.cnn.com/2014/04/07/opinion/world-health-day-beating-diseases/index.html	63
World Health Day	https://www.facebook.com/media/set/?set=a.727397897305596.1073741868.154163327962392&type=1	58
UN Women	http://www.unwomen.org/en/news/stories/2014/4/women-living-with-hiv-in-ugandas-slums	57
Oxfam International	http://www.oxfam.org/en/grow/pressroom/pressrelease/2014-04-07/emissions-must-be-cut-if-we-are-to-tackle-hunger	52

We analyzed the top 15 disseminated URLs from the collected data. The analysis showed the interesting characteristic of some frequently distributed content not being directly relevant to the 2014 World Health Day. This shows a potential lack of precision in how the distribution of information occurs through such social media campaigns. This also highlights that such campaigns are inherently not completely controllable by the originating organization(s), due to the propagation of information being carried out by various unaffiliated

individuals and organizations.

For example, the most highly disseminated URL in the collected dataset related to ‘golden rice’ a genetically engineered variety of rice that is designed to address Vitamin A deficiency. However, the URL is to a Greenpeace article and this article is in fact critical of golden rice. The second most highly disseminated URL is a petition in relation to promoting all to have access to affordable medicine. And for example, the fourth most highly disseminated URL is an article from the World Economic Forum titled ‘How can humans bite back at mosquitoes?’, which is directly relevant to the World Health Day 2014’s theme, namely vector-borne diseases. Another widely distributed URL was a Travel Magazine article titled ‘10 Natural Remedies for Travellers’, which appeared twice on the top 15 URLs (which may have been due to slight variations within the URLs). However, the majority of the top 15 most disseminated URLs were directly about World Health Day or topics related to its specific theme in 2014, namely vector-borne disease. It is also interesting to note that quite a number of these highly disseminated Websites contained further links for donations. This shows that through this medium, other health organizations may benefit by becoming involved in the campaign by actively tweeting and targeting an already involved audience of this large-scale campaign. Similarly, previous social media-related public health campaigns have resulted in significant fundraising-related activities [7].

Figure 6. Proportion of tweets with embedded media



A little less than a quarter (23.48%) of the 26,566 tweets contained embedded media such as images or video (Figure 6). With over 17.8 million timeline deliveries, an image of a mosquito being held in a transparent container was the highest media item potentially seen by those it was pushed towards. The most highly retweeted image (323 times) however was a picture of a child drawing a cartoon (relating to art therapy for Syrian children recovering from trauma). This reinforces how the content disseminated may not always be focused on the campaign topic, but the campaign can be used to disseminate information to an already established audience by including #worldhealthday in microblog posts. In addition to this, the three most highly retweeted tweets were written in a language other than English, a further indication of the global reach of such a microblog-based campaign.

POPULARITY, REACH AND CELEBRITY

From the collected data, there were interesting patterns in relation to the impact of high profile organizations and individuals that contributed to the campaign. ‘Popularity’ may be defined by the level of interaction of an account, and can be measured by the total number of MTs plus retweets. By this measure the most popular account was the World Health Organization account itself (@WHO) with 2,744 MTs and 410 retweets (Table 2). Although this account was classified as the most popular, it only sent 11 tweets (that included the #worldhealthday hashtag) in total during the one-week period and ranked 10th for the number of retweeted tweets alone. This demonstrates the impact of perceived authority of an account on subsequent tweeting activity (particularly engagement) of others. This is also an interesting finding - although the WHO did not have the highest number of retweets, the organization had the highest number of MTs and thus was the most referred to account during the data collection period. This finding may also possibly demonstrate the importance of both offline and online presence, with contributors identifying the campaign with the originating organization.

Other accounts that ranked high in terms of this measure of popularity included: celebrities and well-recognized individuals (Richard Branson, David Bisbal, Dr. Ryan Thamrin), well-known organizations (Greenpeace, USAID Global Health, UNICEF) and bodies/accounts that were relevant to the campaign (such as Apollo Hospitals, which relates to integrated healthcare in India).

Table 2. The top 10 most popular accounts

Name	Twitter account description	MT + RT	MT	RT
WHO	Official Twitter account of the World Health Organization, the United Nations' health agency	3154	2744	410
Apollo Hospitals	The pioneer of integrated healthcare delivery in India with owned and managed hospitals, diagnostic clinics, dispensing pharmacies & consultancy services	2108	1298	810
Richard Branson	Tie-loathing adventurer and thrill seeker, who believes in turning ideas into reality, Otherwise known as Dr Yes at @virgin!	1023	536	487
David Bisbal	#DiezMilManeras http://bit.ly/1eGxn1W http://facebook.com/DavidBisbal http://Instagram.com/DavidBisbal	984	511	473
Greenpeace	We're an independent global campaigning organisation acting to change attitudes and behaviour, to protect the environment and promote peace.	640	324	316
USAID Global Health	For over 50 years, the U.S. Agency for International Development has improved the health of people in developing countries around the world.	635	349	286
UNICEF	UNICEF promotes the rights and wellbeing of every child in 190 countries and territories, with a special focus on reaching those in greatest need.	612	338	274
جهاز المخابرات العامة	المخابرات العامة السورية الرسمية الحساب السوري العام للمخابرات العامة General intelligence Department	602	302	300
dokter Ryan Thamrin	Akun resmi dr.Ryan Thamrin Host Dr. Oz 2013 Sabtu & Minggu pk15.00 di #TransTV Pembicara dlm #SeminarKesehatan dberbagai kota instagram: @dr_ryanthamrin	593	300	293
World Economic Forum	Official account of the World Economic Forum - committed to improving the state of the world, organizer of the Davos Annual Meeting. Follow #WEF / http://wef.ch	587	306	281

Table 3 represents the top 10 accounts that had the broadest reach in relation to microblog posts with the hashtag #worldhealthday. The reach represents the number of unique accounts who received or will receive a post from an account (i.e. the number of followers a specific account has is a measure of that account's immediate/direct reach). In our sample, the greatest reach was in fact achieved by the well-known public figure Bill Gates (@billgates). Whilst Bill Gates sent only one tweet, he had over 15,500,000 followers at the time of data collection. This achieved the highest total reach by one account during the whole one week period studied. In fact as seen in Figures 1 and 2, the tweet by Bill Gates created a prominent spike in timeline deliveries and reach during the declining phase of the World Health Day event. This single microblog post may also have had a factor in contributing to further discussion toward the later stage of the campaign (thus creating a longer drop-off tail than compared with the days preceding). The third highest reach was achieved by another well-known figure, Sir Richard Branson (@richardbranson), who sent only three tweets but had over 4,000,000 followers. This shows the high impact in a microblog system of high profile individuals, which has been considered previously [7], with their distribution capacity often exceeding that of large and prominent organizations. The World Health Organization (@WHO) for example currently has approximately 1,200,000 followers, and even with the 11 tweets they had sent throughout the campaign, still had less timeline deliveries than the single tweet by Bill Gates.

It should be noted that every one of the top 10 reach accounts in Table 3 had been 'verified' (i.e. the process by Twitter of identifying a user as authentic). Only 3 accounts in the top 10 most popular accounts (Table 2) were not verified. As per our previous work [7], the impact of 'celebrity' tweeters was shown to be high. This yet again provides an indication that microblog distribution channels are not as evenly balanced as may typically be assumed. It also shows that there may not be a direct link between the reach of these celebrity tweeters and their popularity (similar to level of engagement). Although @billgates ranked first in terms of reach, he did not appear in the top 25 in terms of popularity (engagement). On the other hand @richardbranson appeared third in terms of reach, but also appeared third in terms of popularity (engagement).

Table 3. The top 10 accounts with the highest reach

Name	Twitter account description	Followers (or reach)	Timeline deliveries	Tweets
Bill Gates	Sharing things I'm learning through my foundation work and other interests...	15,552,222	15,552,222	1
David Bisbal	#DiezMilManeras http://bit.ly/1eGxn1W http://facebook.com/DavidBisbal http://Instagram.com/DavidBisbal	6,281,311	6,281,311	1
Richard Branson	Tie-loathing adventurer and thrill seeker, who believes in turning ideas into reality. Otherwise known as Dr Yes at @virgin!	4,021,687	12,064,644	3
UNICEF	UNICEF promotes the rights and wellbeing of every child in 190 countries and territories, with a special focus on reaching those in greatest need.	2,639,275	2,639,275	1
Pau Gasol	Barcelona, Memphis, Los Angeles... And now Twitter!! http://www.facebook.com/paugasol	2,530,231	2,530,231	1
The Guardian	Top stories, special features, live blogs and more from http://theguardian.com	2,089,335	2,089,335	1
World Economic Forum	Official account of the World Economic Forum - committed to improving the state of the world, organizer of the Davos Annual Meeting. Follow #WEF / http://wef.ch	2,071,890	4,143,694	2
CNN International	Breaking News, World, Business, Sports and Entertainment News	1,947,806	1,947,806	1
Farah Khan	Film Director, Choreographer, Producer, now Actress & proud Mother of Triplets.	1,272,577	3,817,539	3
WHO	Official Twitter account of the World Health Organization, the United Nations' health agency	1,202,763	13,165,973	11

This may be explained by analyzing the semantic nature of their tweets. Bill Gates single tweet was actually a retweet “RT @davos: How can humans bite back at mosquitoes? <http://t.co/CRCWXnaMej> #worldhealthday #wef <http://t.co/sDngkybt7S>” from the World Economic Forum, which was not original content from himself. On the other hand, Richard Bransen tweeted information about his company Virgin and their work related to the campaign “From healthcare to motorbikes: This #WorldHealthDay, meet an inspiring Kenyan entrepreneur <http://t.co/465EWId3zW>” and “How entrepreneurs & business are tackling healthcare in rural Kenya <http://t.co/465EWId3zW> @WHO @christian_aid #WorldHealthDay”, as well as tweeting an interactive petition “For #WorldHealthDay, I declared medicine must be affordable for everyone. Sign to add your voice: <http://t.co/iSy8OE714t> #accessourmeds”. These tweets were the 18th, 12th and 6th most retweeted tweets respectively. Similar to previous findings, influence of an account can not necessarily be judged simply on the number of followers a user has, rather on other factors such as level of community interaction and level of engagement [11].

Despite the large participation of over 17,600 unique accounts, it can be seen that individuals and organizations with well-established real-life and online presences have a large influence on the propagation of such campaign information. It could also be argued that through a different medium (such as television or print), these public health campaigns may not have involved such a large array of individuals or organizations.

LIMITATIONS

As this study utilized the hashtag #worldhealthday to capture data, tweets relating to the campaign but not using this hashtag would not have been included in our sample (e.g. the phrase “World Health Day” may have been excluded by using these parameters). However, this was justified as creating filters based on words such as “World” “Health” and “Day” may have led to the inclusion of data irrelevant to the specific campaign. Therefore, the use of the hashtag may have ignored possible relevant tweets about the campaign, but would also have assisted in the filtering out of unrelated data.

Another limitation was that the data collected was only from Twitter. As this campaign is widespread across various other social networking sites, such as Facebook and Instagram, our sample does not include data from these applications. However we do not claim that our research involves the collection and analysis of online World Health Day data across all online media, but across one of the most predominantly used networks for these types of campaigns

CONCLUSION

Due to the recent and novel role of emerging technologies in the role of public health information dissemination, little has been studied about microblog-based public health campaigns in terms of temporal engagement, participation, information propagation and user characteristics. World Health Day is a well-known annual public health event, which has only recently (alongside various other campaigns) adopted online applications such as Twitter to spread its message(s). Our preliminary study has explored various aspects of this campaign such as the amount of users contributing and reached via the campaign, engagement and participation of users, the type of content distributed, and the effect of 'celebrity' tweeters on such a campaign. Notable results were not only the wide reach of the campaign, but also the extent of engagement and participation by individual entities to propagate various information using the hashtag #worldhealthday. In addition, the influence of larger organizations and well-known public figures upon the dissemination displayed that the most 'popular' accounts were more campaign-relevant thus had more interaction, whereas accounts with the highest reach could generate very large dissemination with minimal tweeting due to their large online following. Consequently through the utilization of emerging applications such as Twitter, campaigns (such as the 2014 World Health Day) can now be quantitatively analyzed and further understood, which may potentially be used to change communication strategies of future public health campaigns.

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