Does social media provide adequate health education for prevention of COVID-19? A case study of YouTube videos on social distancing and hand-washing

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Abstract

Social media offers an opportune platform for educating the public about the recommended interventions during global health emergencies. This case study evaluated information in the popular social media platform YouTube about two key interventions (namely, ‘social distancing’ and ‘hand washing’) recommended during coronavirus disease-2019. Using the keywords ‘social distancing’ and ‘hand washing’, 77 and 78 videos, respectively, were selected from YouTube through pre-defined criteria. The understandability, actionability and quality of information in these videos were assessed. Cumulatively, the social distancing videos received >9 million views and the hand-washing videos received >37 million views. Thirteen social distancing videos (16.9%) and 46 hand-washing videos (58.9%) provided understandable, actionable and good-quality information. The non-understandable, non-actionable or poor-quality videos had paradoxically more viewer engagements than the understandable, actionable or good-quality videos, respectively. Most social distancing videos came from news agencies (68.8%). Hand-washing videos were mostly uploaded by health agencies or academic institutes (52.6%). The videos were less likely to be understandable and actionable and to be of good quality when uploaded by sources other than health agencies or academic institutes. The paucity of adequate information and the limited representation of ‘authoritative’ sources were concerning. Strategies for harnessing social media as an effective medium for public health education are necessary during pandemics.

Introduction

The proliferation of internet services and mobile phones and the presence of networking and sharing interfaces have consolidated social media into a popular platform for instant access and rapid dissemination of health-related information across the globe. According to the global survey on eHealth by the World Health Organization (WHO) in 2016, citizens from nearly 80% (range: 70–90%) of the participating member countries across all income groups used social media as a source of information for learning about health issues [1]. Social media–based information can influence health perceptions and attitudes and foster changes in health-related behavior [2–5]. Therefore, social
media is increasingly considered as a powerful tool for improving health. It is also regarded as a medium to promote health equity in people across all demographics and nationalities, including those from low- and middle-income countries and disadvantaged populations [6–8].

Coronavirus disease-2019 (COVID-19) first began as a series of pneumonia cases from Wuhan in China during December 2019 [9] but was declared a global pandemic by the WHO on 12 March 2020. As of March 2021, it has infected more than 130 million people worldwide, and it is still ongoing. Social distancing measures (namely, staying out of crowded places, avoiding groups, maintaining physical distance of at least 1 metre, etc.) and hand-washing (i.e. cleaning hands frequently and thoroughly with soap and water, or with alcohol-based hand rub) were recommended as crucial public health interventions for protecting oneself and preventing the spread of COVID-19 [10, 11]. Previously, these interventions were found to be simple, cost-effective and readily practicable solutions for containing contagions [12–15]. Modeling and simulation studies indicated that these interventions were valuable in limiting the transmission of COVID-19 and would be further necessary for ‘flattening the curve’ and preventing ‘the second peak’ [16–20].

The success of interventions aimed at controlling the spread of pandemics is largely dependent on public participation and adherence. The interventions are most effective if instituted early on. By virtue of their extensive reach and influence, the social media platforms can play a pivotal role in educating the masses in this regard. During the COVID-19 pandemic as well, social media platforms like YouTube have emerged as a major source of obtaining information for the public [21–25]. YouTube, the second most commonly accessed internet website globally (https://www.alexa.com/topsites), is a freely available and user-friendly video sharing or hosting social media platform, that is quite popular for seeking health-related information [26]. In fact, the terms ‘social distancing’ and ‘hand washing’ were searched extensively in YouTube after the COVID-19 outbreak and reached a peak in March 2020, as observed from the search volume traffic in Google Trends (http://google.com/trends), indicating enormous public interest (Supplementary material 1).

With this background, we aimed to investigate if social media provided adequate education about important health measures for the prevention of COVID-19. Toward that end, this case study evaluated YouTube videos on social distancing and hand-washing with respect to three crucial domains (namely understandability, actionability and quality). Moreover, the relationship of this information with video characteristics, viewer engagement metrics and sources of upload was investigated.

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**Methods**

**Study design and selection criteria**

The YouTube search and video retrieval were performed as follows. On 28 March 2020, two query terms, namely ‘social distancing’ and ‘hand washing’ were searched in YouTube (https://www.youtube.com) through the Google Chrome web browser in Windows 10 operating system. The browser was run in ‘incognito’ mode with the search history deleted and cache cleared (to reduce influence of previous searches) during the search. For both the query terms, the first 120 videos from the search results, obtained by using English language filter and sorted according to relevance (i.e. the default YouTube filter setting), were enlisted separately.

From the 120 social distancing YouTube videos thus identified, 11 videos had their viewer engagement features (e.g. comments, likes, etc.) disabled, 1 video was in a language which none of the authors were familiar with, 13 videos were repetitive (in part or whole) and 10 videos were found to be irrelevant (e.g. satellite imagery video of different places before and after social distancing measures, etc.). In addition, eight videos in the search results were from a television program named ‘The Daily Social Distancing Show with Trevor Noah’. These
43 videos were excluded, and the remaining 77 social distancing videos were used for analysis. Similarly, among the 120 hand-washing videos, 31 had their viewer engagement features disabled, one was in an unfamiliar language, two were repetitive and four were not relevant (e.g. autism therapy video using hand-washing as an example of backward chaining behavior, etc.). Four other videos were based on the use of hand sanitizers only. These 42 videos were excluded, and the remainder 78 hand-washing videos from the list were used for analysis. The uniform source locators of the shortlisted videos were saved for backup and future reference.

Variables and data collection

For every video, characteristics such as the video length (in seconds) and the number of days in YouTube since upload were recorded. The indicators of viewer engagement (namely, no. of views, likes, dislikes and comments) associated with each video were noted on the same day as the YouTube search. Additional measures of viewer engagement, namely view ratio (views received/number of days in YouTube), like ratio ([likes received×100]/[likes received + dislikes received]), and video power index (VPI) ([view ratio×like ratio)/100) were computed [27, 28].

The sources uploading the videos were broadly classified into the following categories: (i) health agency and academic institute (e.g. WHO, Centers for Disease Control and Prevention, National Health Service, John Hopkins University, health centers like Mayo Clinic and Apollo Hospitals, etc.); (ii) news agency (e.g. Cable News Network, British Broadcasting Corporation, Reuters, New Delhi Television Ltd, The Print, etc.); (iii) fitness and health information website (e.g. DoctorOz, Babylon Health, etc.); (iv) Entertainment channel (e.g. channels on music, fashion, cooking, etc. such as Entertainment Tonight, BuzzFeed Video, NAYVA, Something’s Cooking with Alpa, etc.); (v) for-profit company (e.g. Dettol India, Focused Film Ltd, etc.); and (vi) independent user (e.g. video bloggers, YouTubers, homemade videos, etc.). Similar schemes of classification were employed in previous studies [29–31].

Evaluation of the videos for understandability, actionability and quality

The information contained in each of the 155 shortlisted videos (i.e. 77 social distancing videos and 78 hand-washing videos) was evaluated with respect to three domains, namely understandability, actionability and quality. The understandability and actionability of the videos were assessed using the Patient Education Materials Assessment Tool (PEMAT) for audiovisual materials (shortly, PEMAT-A/V version) [32, 33]. In the PEMAT framework, materials are considered as understandable when viewers of diverse background and varying health literacy levels are able to process and explain the key messages and as actionable when viewers of diverse backgrounds and varying health literacy levels are able to identify what they can do on the basis of the information presented. For this purpose, the PEMAT-A/V instrument offers a validated and reliable toolkit of 13 items for measuring understandability and four items for measuring actionability, which may be scored by healthcare providers in the PEMAT Auto-Scoring Form based on three possible responses (i.e. ‘agree’, ‘disagree’ and ‘not applicable’) [32–34]. Accordingly, the videos were scored for understandability and actionability using this approach by two authors (A.P. and B.B.) independently. The differences in the scores (when present) were settled by consensus. Depending upon the final scores so obtained (which may range between 0 and 100), the evaluated YouTube videos in our study were regarded as understandable and actionable if they had corresponding PEMAT-A/V scores above 70, as described previously [32, 34].

The quality of the shortlisted videos was assessed with the help of the 5-point Global Quality Scale (GQS) scoring system, which reflects the comprehensiveness, flow and ease of use of the information contained. Accordingly, a video may be assigned a GQS score between 1 (indicating
poorest quality) and 5 (indicating excellent quality) (Supplementary material 2) [30, 35, 36]. The videos obtaining a GQS score of 3 or above were considered to be of good quality. Two authors (K.B. and S.J.P.) independently scored the video quality in this manner, resolving differences in the scores (if any) through consensus.

**Data analysis**

The social distancing videos and the hand-washing videos were analyzed separately. The quantitative variables were expressed as median (with range). The categorical variables were expressed as counts (and proportion). The 95% confidence intervals (CIs) of the proportions were also calculated (by Wilson’s method) for the categorical variables, when appropriate. The differences in the viewer engagement indicators and video characteristics were assessed according to the understandability, actionability and video quality using the non-parametric Mann–Whitney U test. Sub-group analyses (using the Kruskal–Wallis H test or the likelihood ratio chi-square test, as applicable) were conducted to identify the source-wise variations in understandability, actionability and quality of the videos. These findings were corroborated by constructing contingency tables and estimating odds ratio (OR) with 95% CIs by logistic regression (taking videos uploaded by health agencies and academic institutes as reference).

The analyses were done using SPSS 17.0 (SPSS Inc., Chicago, USA) and OpenEpi v3.0.1 (http://www.OpenEpi.com) software suites. For all calculations, a two-sided alpha at 0.05 was set as the cutoff for statistical significance.

**Results**

The YouTube videos on social distancing included in our study received cumulatively 9 224 346 views, 118 660 likes, 9403 dislikes and 29 050 comments. On the other hand, overall 37 997 426 views, 1 269 685 likes, 18 247 dislikes and 58 177 comments were received by the YouTube videos on hand-washing. The summary statistics with respect to views and viewer engagements are presented in Table I. The social distancing videos had longer median length ($P<0.01$) and were uploaded more recently ($P<0.01$) than the hand-washing videos. The understandability, actionability and quality scores of the information contained in hand-washing videos were superior ($P<0.01$) to that of the social distancing videos. A greater proportion of the hand-washing videos were understandable (74.4%) and actionable (65.4%) and of good quality (82.1%) as compared to the social distancing videos (40.3%, 20.8% and 32.5%, respectively). An overview of the various types of sources that uploaded the YouTube videos in the study sample is provided in Table II. While most of the videos on hand-washing were uploaded by health agencies and academic institutes (52.6%), the videos on social distancing were mostly uploaded by news agencies (68.8%).

Viewer engagement and characteristics of the YouTube videos in the study varied significantly as a function of their understandability, actionability and quality (Table III). The social distancing videos which were non-understandable received greater number of median viewer engagements (namely, comments, dislikes, view ratio and VPI) than the understandable videos. Non-actionable social distancing videos also attracted more median viewer engagements (namely, views, likes, dislikes, comments, view ratio and VPI) than their actionable counterparts, but were more recently uploaded and of longer video length than the latter. Further, the social distancing videos which were of poor quality received greater median number of viewer engagements (namely, likes, dislikes, comments, view ratio and VPI) than the good-quality videos, although the good-quality videos were uploaded earlier and had shorter video lengths. Similarly, the hand-washing videos which were of poor quality received a higher median VPI and view ratio than the good-quality videos, in spite of being uploaded more recently as compared to the latter. However, the viewer engagements and the video characteristics of the hand-washing videos were comparable ($P>0.05$) irrespective of their understandability and actionability.
Table I. Summary characteristics of the YouTube videos in the study sample

| Variable                              | Hand-washing videos ($N = 78$) | Social distancing videos ($N = 77$) | $P$-value |
|---------------------------------------|-------------------------------|-------------------------------------|-----------|
| **Viewer engagement indicators**      |                               |                                     |           |
| No. of views                          | 45 771.5 (361–11 373 103)     | 15 946 (424–4 075 931)              | <0.01     |
| Likes                                 | 324.5 (0–446 215)              | 177 (0–21 000)                      | 0.35      |
| Dislikes                              | 22.5 (0–6697)                  | 23 (0–3400)                         | 0.74      |
| Comments                              | 18 (0–25 972)                  | 49 (0–10 417)                       | <0.05     |
| View ratio                           | 476.9 (2.4–1 137 310.3)        | 4887.7 (70.7–509 491.4)             | <0.01     |
| Like ratio                            | 93.9 (0–100)                   | 90.7 (0–100)                        | <0.01     |
| VPI                                   | 470.1 (0–1 120 493.4)          | 4 182.1 (0–438 496.7)               | <0.01     |
| **Video characteristics**             |                               |                                     |           |
| Video length (seconds)                | 124 (30–674)                   | 179 (22–1833)                       | <0.01     |
| No. of days in YouTube                | 66 (1–3826)                    | 4 (1–15)                            | <0.01     |
| **Information contained in the videos** |                               |                                     |           |
| Understandability                     |                               |                                     |           |
| PEMAT-A/V Understandability score     | 80 (0–100)                     | 67 (9–100)                          | <0.01     |
| Understandable videos (PEMAT-A/V score > 70) | 58 (74.4%, 63.7–82.7%)         | 31 (40.3%, 30.0–51.4%)              | –         |
| Non-understandable videos (PEMAT-A/V score ≤ 70) | 20 (25.6%, 17.3–36.3%)         | 46 (59.7%, 48.6–69.9%)              | –         |
| Actionability                         |                               |                                     |           |
| PEMAT-A/V Actionability score         | 100 (0–100)                    | 50 (0–100)                          | <0.01     |
| Actionable videos (PEMAT-A/V score > 70) | 51 (65.4%, 54.3–74.9%)         | 16 (20.8%, 13.2–31.1%)              | –         |
| Non-actionable videos (PEMAT-A/V score ≤ 70) | 27 (34.6%, 25.0–45.7%)         | 61 (79.2%, 68.9–86.8%)              | –         |
| Quality                               |                               |                                     |           |
| Quality score (GQS)                   | 3 (1–5)                        | 2 (1–5)                             | <0.01     |
| Good-quality videos (GQS score ≥ 3)   | 64 (82.1%, 72.1–89.0%)         | 25 (32.5%, 23.1–43.5%)              | –         |
| Poor-quality videos (GQS score < 3)   | 14 (17.9%, 11.0–27.9%)         | 52 (67.5%, 56.5–76.9%)              | –         |

Values expressed as median (minimum value – maximum value) or $n$ (percentage, 95% CI). Comparison of the variables between hand-washing videos and social distancing videos was performed by the Mann–Whitney U test.

Table II. Distribution of sources uploading the YouTube videos

| Sources of video upload                          | Hand-washing videos ($N = 78$) | Social distancing videos ($N = 77$) |
|-------------------------------------------------|--------------------------------|-------------------------------------|
|                                                 | $n$ | Percentage (95% CI) | $n$ | Percentage (95% CI) |
| Health agency and academic institute            | 41  | 52.6 (41.6–63.3)    | 6   | 7.8 (3.6–16.0)      |
| News agency                                     | 8   | 10.3 (5.3–18.9)     | 53  | 68.8 (57.8–78.1)    |
| Fitness and health information website          | 4   | 5.1 (2.0–12.5)      | 1   | 1.3 (0.2–6.7)       |
| Entertainment channel                           | 8   | 10.3 (5.3–18.9)     | 9   | 11.7 (6.3–20.7)     |
| Independent user                                | 16  | 20.5 (13.0–30.8)    | 7   | 9.1 (4.5–17.6)      |
| For-profit company                              | 1   | 1.3 (0.2–6.9)       | 1   | 1.3 (0.2–6.7)       |

Among the various sources uploading the social distancing and hand-washing videos in YouTube, the scores for understandability, actionability and quality were generally higher for those uploaded by health agencies and academic institutes than those uploaded by other sources (Table IV). However,
### Table III. Comparison of the viewer engagement indicators and video characteristics according to the understandability, actionability and quality of the videos

| Videos            | Variable                  | Understandable videos | Non-understandable videos | P-value | Actionable videos | Non-actionable videos | P-value | Good-quality videos | Poor-quality videos | P-value |
|-------------------|----------------------------|-----------------------|---------------------------|---------|-------------------|------------------------|---------|---------------------|---------------------|---------|
| **Hand-washing videos** | No. of views               | 30845.5 (361–1137310.3) | 94627.5 (292–2799070) | 0.42    | 29978 (361–7825072) | 59494 (2592–1137310) | 0.21    | 42211.5 (361–1137310) | 92462 (2592–2799070) | 0.31    |
|                   | Likes                      | 315 (4–446215)        | 605.5 (29–396777)        | 0.08    | 318 (0–193920)    | 593 (7–446215)       | 0.18    | 315 (4–446215)        | 660.5 (0–396777)     | 0.15    |
|                   | Dislikes                   | 22.5 (0–6697)         | 38.5 (0–743)             | 0.43    | 33.1 (0–9474)     | 39.9 (0–25–972)      | 0.31    | 20 (0–6697)           | 97.5 (0–903)         | 0.13    |
|                   | Comments                   | 13 (0–25–972)         | 19.5 (0–6246)            | 0.08    | 397.4 (2.4–1137310.3) | 739.2 (2.4–1137310.3) | 0.08    | 397.4 (2.4–1137310.3) | 217.0 <0.05         |         |
|                   | View ratio                 | 80.2 (2.4–1137310.3)  | 317.2 (31–466511.7)      | 0.22    | 93.7 (0–100)      | 95.5 (54.3–100)      | 0.15    | 93.7 (0–100)         | 95.9 (0–999)         | 0.63    |
|                   | Like ratio                 | 93.9 (0–100)          | 95.9 (54.3–100)          | 0.11    | 364.7 (0–1120493.4) | 2074.0 (361–1120493.4) | <0.05  | 364.7 (0–1120493.4) | 2074.0 (361–1120493.4) | <0.05  |
| Video characteristics | Video length (seconds)     | 133 (50–674)          | 92.5 (30–471)            | 0.39    | 362 (50–674)      | 209 (30–471)        | 0.06    | 362 (50–674)         | 209 (30–471)         | 0.18    |
|                   | Days in YouTube            | 248 (2–3524)          | 19.5 (4–3524)            | 0.13    | 292 (1–3896)      | 21 (1–3524)         | 0.13    | 292 (1–3896)         | 21 (1–3896)         | <0.05   |
| **Social distancing videos** | No. of views               | 7846 (424–4075931)    | 910 (70–1202715)         | 0.06    | 6727.5 (424–4075931) | 5585 (70–1202715)    | <0.05   | 10169 (424–381045)   | 36257 (70–4075931)   | 0.18    |
|                   | Likes                      | 94 (0–21–000)     | 504.5 (0–16000)          | 0.09    | 68 (0–21–000)     | 439 (0–16000)       | <0.05   | 127 (0–8600)         | 352 (4–21–000)       | <0.05   |
|                   | Dislikes                   | 8 (0–3400)            | 25.5 (0–1500)            | <0.05   | 4.5 (0–3400)      | 26 (0–1500)         | <0.01   | 9 (0–181)            | 25.5 (0–3400)        | <0.05   |
|                   | Comments                   | 23 (0–19–53)          | 135.5 (0–10417)          | <0.01   | 7.5 (0–480)       | 107 (0–10417)       | <0.01   | 21 (0–1108)          | 135.5 (0–10417)      | <0.01   |
|                   | View ratio                 | 1878.3 (70.7–509491.4) | 11395.4 (177.5–300678.8) | <0.01   | 1148.4 (70.7–509491.4) | 9999.6 (177.5–509491.4) | <0.01   | 1148.4 (70.7–509491.4) | 11395.4 (177.5–509491.4) | <0.01   |
|                   | Like ratio                 | 91.13 (0–100)         | 89.2 (0–100)             | 0.51    | 93.3 (0–100)      | 89.0 (0–100)        | 0.32    | 90.9 (0–100)         | 90.3 (57–1–100)      | 0.58    |
|                   | VPI                        | 1566.0 (0–438496.7)   | 10085.3 (0–258917.8)     | <0.01   | 908.7 (0–438496.7) | 861.9 (0–258917.8)  | <0.01   | 1566.0 (0–438496.7)  | 10073.2 <0.01        |         |
| Video characteristics | Video length (seconds)     | 164 (28–945)          | 191 (22–1833)            | 0.31    | 292 (30–945)      | 240 (22–1833)       | <0.01   | 150 (30–877)         | 264 (22–1833)        | <0.05   |
|                   | Days in YouTube            | 4 (1–15)              | 4 (1–8)                  | 0.16    | 6 (2–15)          | 4 (1–8)             | <0.01   | 5 (2–15)             | 4 (1–8)             | <0.05   |

Values expressed as median (minimum value – maximum value). Comparison of the variables across the respective video categories performed by the Mann–Whitney U test.
Table IV. Comparison of viewer engagement metrics, video characteristics and the information contained in the YouTube videos according to the sources

| Videos | Variable | Health agency and academic institute | News agency | Entertainment channel | Independent user | P-value |
|--------|----------|--------------------------------------|-------------|-----------------------|------------------|---------|
| Hand-washing videos | Viewer engagement indicators | | | | | |
| No. of views | 25692 | 12 100.5 | 85 643.5 | 30 7341.5 | <0.05 |
| Likes | 80 (0–19 190) | 136 (4–193 920) | 612.5 (215–744 456) | 5479 (37–446 215) | <0.01 |
| Dislikes | 6 (0–1834) | 9.5 (0–3252) | 38.5 (10–743) | 108.5 (3–6697) | <0.01 |
| Comments | 3 (0–2207) | 17.5 (1–9474) | 45.5 (20–6246) | 275 (6–25972) | <0.01 |
| View ratio | 134.9 | 3217 | 4501.5 | 3377.4 | <0.01 |
| Like ratio | 93.6 (0–100) | 95.9 (70–100) | 94.7 (89.4–99.0) | 97.4 (91.6–99.9) | 0.06 |
| VPI | 124.6 (0–145 10.3) | 3022.8 | 4148.5 | 3290.2 | <0.01 |
| Video characteristics | | | | | | |
| Video length (seconds) | 133 (30–674) | 66.5 (35–224) | 185 (65–362) | 94.5 (30–620) | 0.15 |
| No. of days in YouTube | 466 (1–3826) | 10 (2–22) | 14 (4–1457) | 14.5 (4–3102) | <0.01 |
| Video content | | | | | | |
| PEMAT-A/V Understandability score | 89 (50–100) | 80.5 (50–100) | 78 (0–89) | 78 (13–91) | <0.05 |
| PEMAT-A/V Actionability score | 100 (33–100) | 83.5 (33–100) | 83.5 (0–100) | 67 (0–100) | <0.01 |
| Video quality (GQS) score | 3 (2–5) | 3.5 (2–5) | 2.5 (1–3) | 3 (1–4) | <0.05 |
| Understandable videos | 38 (84.4) | 5 (62.5) | 5 (62.5) | 9 (56.3) | 0.1 |
| Actionable videos | 36 (80.0) | 4 (50.0) | 4 (50.0) | 6 (37.5) | <0.05 |
| Good-quality videos | 43 (95.6) | 5 (62.5) | 4 (80.0) | 11 (68.8) | <0.01 |

(continued)
| Videos                              | Variable                  | Health agency and academic institute | News agency | Entertainment channel | Independent user | P-value |
|------------------------------------|---------------------------|--------------------------------------|-------------|-----------------------|------------------|---------|
| Health agency and academic institute | Understandability odds    | Reference 0.31 (95% CI: 0.06–1.59)   | 0.31        | 0.23 (95% CI: 0.07–0.85) |
|                                    | Actionability odds        | Reference 0.25 (95% CI: 0.05–1.19)   | 0.25        | 0.15 (95% CI: 0.04–0.52) |
|                                    | Good-quality odds         | Reference 0.08 (95% CI: 0.01–0.58)   | 0.05        | 0.10 (95% CI: 0.02–0.60) |

**Social distancing videos**

**Viewer engagement indicators**

| No. of views | Likes | Dislikes | Comments | View ratio | Like ratio | VPI |
|--------------|-------|----------|----------|------------|------------|-----|
| 25 (0–21 000) | 25 (0–21 000) | 1 (0–3400) | 0 (0–21) | 1675.9 (70.7–509 491.4) | 86.9 (0–100) | 398.8 (0–438 496.7) |

**Video characteristics**

| Video length (seconds) | No. of days in YouTube |
|------------------------|------------------------|
| 109 (30–350)           | 8 (4–15)               |

(continued)
Table IV. (Continued)

| Videos | Variable                      | Health agency and academic institute\(^a\) | News agency | Entertainment channel | Independent user | \(P\)-value |
|--------|-------------------------------|------------------------------------------|-------------|-----------------------|-----------------|-------------|
|        | **Video content**             |                                          |             |                       |                 |             |
|        | PEMAT-A/V Understandability score | 91 (64–100)                  | 67 (10–100) | 40 (30–90)           | 27 (9–82)       | <0.01       |
|        | PEMAT-A/V Actionability score  | 100 (50–100)                  | 50 (0–100)  | 33 (25–67)           | 25 (0–67)       | <0.01       |
|        | Video quality (GQS) score     | 4 (1–5)                       | 2 (1–4)     | 1 (1–3)              | 1 (1–2)         | <0.01       |
|        | Understandable videos         | 6 (85.7)                      | 21 (39.6)   | 2 (22.2)             | 1 (14.3)        | <0.05       |
|        | Actionable videos             | 5 (71.4)                      | 10 (18.9)   | 0                     | 0               | <0.01       |
|        | Good-quality videos           | 5 (71.4)                      | 16 (30.2)   | 3 (33.3)             | 0               | <0.05       |
|        | Understandability odds        | Reference                     | 0.11        | 0.05 (95% CI: 0.01–0.96) | 0.03 (95% CI: 0.0–0.56) | –           |
|        | Actionability odds            | Reference                     | 0.09        | 0\(^b\)              | 0\(^b\)         | –           |
|        | Good-quality odds             | Reference                     | 0.17        | 0.20 (95% CI: 0.03–0.99) | 0\(^b\)         | –           |

Values expressed as median (minimum value – maximum value) or \(n\) (percentage) or OR (with 95% CI). Comparison of the variables across the sources of video upload performed by the Kruskal–Wallis H test or the likelihood ratio chi-square test or simple logistic regression, as applicable. Statistically significant \((P < 0.05)\) OR values are marked in bold.

\(^a\)Videos uploaded by fitness and health information websites (four hand-washing videos and one social distancing video) were clubbed with videos from health agency and academic institutes during analysis. Only two videos were uploaded by for-profit company (one hand-washing video and one social distancing video), and these were therefore not included in the analysis due to the extremely small sample size.

\(^b\)OR not computed due to zero cell count.
the videos uploaded by sources other than health agencies and academic institutes usually received more viewer engagements. For instance, a significantly higher number of viewer engagements (namely, views, likes, comments, view ratio, like ratio and VPI) were received by the social distancing videos which were uploaded by independent sources ($P<0.01$). Similarly, the hand-washing videos from independent users received a significantly higher ($P<0.01$) number of views, likes, dislikes and comments; meanwhile those from entertainment channels received a significantly higher ($P<0.01$) view ratio and VPI in comparison to other sources.

The YouTube videos in the study had a lesser likelihood of being understandable and actionable and having good quality, if they came from sources other than health agencies and academic institutes (Table IV). For example, the YouTube videos on hand-washing uploaded by independent users were nearly 4 times (OR: 0.23, 95% CI: 0.07–0.85), 7 times (OR: 0.15, 95% CI: 0.04–0.52) and 10 times (OR: 0.10, 95% CI: 0.02–0.60) less likely to be understandable and actionable and of good quality, respectively, than those uploaded by health agencies and academic institutes. Further, the YouTube videos on social distancing uploaded by news agencies were about 9 times (OR: 0.11, 95% CI: 0.01–0.96) less likely to be understandable, 11 times (OR: 0.09, 95% CI: 0.02–0.55) less likely to be actionable and 6 times (OR: 0.17, 95% CI: 0.03–0.99) less likely to be of good quality than the ones uploaded by health agencies and academic institutes.

**Discussion**

Social distancing and hand-washing are important interventions for curbing the spread of COVID-19. The successful mitigation of health emergencies depends largely upon adherence of the public to the prescribed interventions. By and large, people from different parts of the world were quite knowledgeable about the COVID-19 disease and displayed optimism toward its successful control [21, 24, 37–40]. Still, a considerable number of people did not follow social distancing and hand-washing [37, 41–43]. Therefore, educating the public about following the prescribed interventions warrants urgent attention. Social media or internet websites offer a promising opportunity in this context since these platforms are widely sought by the public for COVID-19-related information [21, 22, 24]. In addition to acting as tools for public health education and awareness, social media–based content can catalyze and effectuate behavioral changes for promoting health and controlling diseases [2, 4]. Multimedia materials such as videos are particularly appealing and were previously proven to be very effective for health education and behavioral modification [5, 44].

Consecutive studies by Basch et al. found that more than 50% videos (retrieved from YouTube using the search term ‘coronavirus’) in general had repeatedly failed to address any of the key preventive behaviors recommended against COVID-19 [45, 46]. However, there is a dearth of studies that have evaluated videos in social media which have specifically covered the preventive measures. The present study investigated the understandability, actionability and quality of YouTube videos addressing two important protective behaviors recommended against COVID-19, namely social distancing and hand-washing.

Thirteen (16.9%) out of 77 social distancing videos and 46 (58.9%) out of 78 hand-washing videos provided information that was understandable and actionable and of good quality. It was also observed that the non-understandable, non-actionable or poor-quality videos elicited greater views or viewer engagements than the understandable, actionable or good-quality videos, respectively. Therefore, it is plausible that several viewers were probably unable to gauge the ‘helpful’ and ‘informative’ videos. Besides, the content of the videos varied according to their uploading sources, with those from health agencies/academic institutes being the best (in terms of the understandability, actionability and quality). However, these sources constituted only a modest proportion of the total videos (nearly 7% social distancing...
videos and 53% hand-washing videos) and they attracted far fewer views or viewer engagements than the videos from other sources. Only one each of social distancing and hand-washing videos received the perfect scores for understandability, actionability and quality (i.e. PEMAT-A/V Understandability and Actionability scores of 100 each and GQS score of 5); both of them were uploaded by health agencies. Such limited representation of public health agencies, government organizations, research institutes, universities, etc. in social media during health emergencies is worrisome and was reported by earlier studies as well [29–31, 47].

The social distancing and hand-washing YouTube videos in the current study had differing time periods. Unlike the social distancing videos that were all of recent origin (the oldest one was uploaded in YouTube just 15 days before we initiated the study), many of the hand-washing videos were available since the pre-COVID times (the oldest one was uploaded more than a decade back). Although familiar in academic circles, ‘social distancing’ became a buzzword and captured attention of the general public only after the COVID-19 outbreak. In contrast, measures to promote public awareness about hand-washing have been going on since the pre-COVID times. For example, Global Handwashing Day is observed worldwide on 15th of October every year since 2008 by various international and national health agencies (e.g. United Nations Children’s Fund, WHO, Centers for Disease Control and Prevention, etc.). Therefore unsurprisingly, many of the YouTube videos about hand-washing which we encountered in the study date back to the pre-COVID times.

Targeted social media campaigns in the Netherlands had led to improvements in social distancing and personal hygiene in the community during the COVID-19 crisis [48]. Social media or internet platforms hold immense potential for supporting preparedness, response and recovery during health crises [49]. This potential, if untapped during the ongoing COVID-19 crisis, would be a missed opportunity to aid the pandemic control efforts. From our observations, the utilization of social media platforms like YouTube for disseminating important information to prevent COVID-19 appeared insufficient. Therefore, it is of interest that health planners and policy makers associated with COVID-19 response take a closer look at the various social media options available and explore ways for effectively harnessing them for public health benefits.

Limitations

Although the study fulfilled the primary objective of evaluating the understandability, actionability and quality of information presented in the YouTube videos, it was unable to evaluate the perception of the viewers to this information. We could not determine how successful the viewers were in differentiating a ‘good’ from a ‘bad’ video or if they had to watch multiple videos before forming an opinion about the information conveyed by the videos. Further, it is likely that some non-understandable, non-actionable and poor-quality videos were probably viewed and shared frequently owing to their ‘entertaining’ content, which may have skewed the viewer engagement metrics. These aspects were beyond the scope of the current study and may be addressed through studies focusing on the viewers themselves (and their perceptions) rather than on the videos. Further, given the dynamic nature of social media sites, the cross-sectional design of our study precluded the evaluation of temporal changes in the videos enlisted in YouTube, as also the changes in the views and viewer engagements of the shortlisted videos. This was another limitation. Nonetheless, as the pandemic continues, the insights provided by the current study may serve as a starting point to capture and inform such temporal variations through follow-up studies in the future.

Conclusion

This case study highlighted the state of information present in social media (taking YouTube as an example) about two crucial public health
interventions, namely social distancing and hand-washing, recommended during the COVID-19 pandemic. Information contained in a sizable proportion of videos were found to be non-understandable and non-actionable and of poor quality. A greater presence of ‘reliable’ and ‘authoritative’ organizations is desirable for providing the needful health information to the public through social media. Simultaneously, strategies for enhancing the ‘visibility’ of this information in social media platforms are also required. Such initiatives, if mounted early on in the course of a pandemic, would strengthen the efforts to control the pandemic.

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Conflict of interest statement

None declared.

Supplementary data

Supplementary data are available at HEAL online.

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