



# YouTube as a Source of Information About Air Pollution

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## Abstract

YouTube is an important source of information on air pollution. The information presented on youtube may be of high or low quality. In our study, we aimed to evaluate the YouTube videos for their qualities and compare their view numbers, likes, and comment numbers according to high- and low-quality groups. In our study, 32.2% of all videos were in the high-quality group, 15.1% in the intermediate quality group, and 52.7% in the low-quality group according to Global Quality Scale (GQS). Significant differences were found among the quality groups in video length ( $p < 0.001$ ), dislikes/day ( $p = 0.043$ ), comment/day ( $p = 0.005$ ), DISCERN (DS) tool scores ( $p < 0.001$ ). The duration and DS tool scores were higher in high-quality videos; dislikes/day and comment/day averages were higher in low-quality videos. On the other hand, there was no significant difference in views, views/day, likes/day, likes ratios among quality groups. On this important matter, low-quality videos are abundant. Considering that there are lots of nonreliable information on YouTube, it is needed that individuals should be referred to reliable videos on air pollution.

**Keywords** YouTube · Air pollution · Information · Quality

## 1 Introduction

At present, air pollution is a big environmental problem that is documented to affect general health, making itself even more serious in developing countries (Dehghan et al. 2018; López-Villarrubia et al. 2010). In 2019, World Health Organization named air pollution and global warming in the top list of the ten causes that threaten human health (World Health Organization 2019). Air pollution has acute and chronic effects on human health ranging from the irritation of the upper respiratory tract, asthma, chronic bronchitis, other pulmonary diseases, and health problems that affect multiple systems and organs (Kampa and Castanas 2008). Air pollution is a serious preoccupation for human health is caused by reasons such as the rapid increase of human population, industrialization, an increase of the demands on

energy, deforestation, and great accumulation of vehicles in urban areas. In various studies conducted worldwide, air pollution has been associated with high mortality (Rajper et al. 2018).

Even though the perception of people on air pollution has improved over several decades, some gaps in our knowledge of how to mitigate the negative effects of air pollution remain (Larkin and Hystad 2017). In means of communication, the acceleration of air pollution gets widespread coverage in rapidly industrializing cities (Shi et al. 2014). As a means of communication, the internet has become an important means of getting informed as a result of its usage in the communities. At present, YouTube is the most visited website after Google and contains so many videos. YouTube is a popular, free-for-use, widely used video-sharing site that allows users to upload and watch videos (Şahin et al. 2019; Kocuyigit et al. 2019; Lewis et al. 2012). Although Youtube is an important source of information for people, video parameters such as view numbers, likes and comments might not result to direct people to qualified and correct videos. So far, no studies have been conducted to evaluate its videos on air pollution. In our study, we aimed to evaluate the videos for their qualities and compare their view numbers, likes, and comment numbers according to high and low-quality groups.

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## 2 Material and Methods

The video-sharing website YouTube ([www.youtube.com](http://www.youtube.com)) was searched from its inception through February 24, 2021 using the keyword “air pollution”. The authors utilized keywords such as “air pollution environmental health”, “air pollution environmental pollution”, and “air pollution public health” to compass environmental and public health videos. A total of 400 videos were selected, with 100 videos from each search term. Selected videos were saved for later evaluation browsing history deleted before searching to avoid being affected by previous searches and the results of the search were listed in order of views count. Duration of the video, the number of views, comments, likes, and dislikes were recorded. The comments per day and views per day of the videos were calculated according to the total number of days the video stayed on YouTube. English language videos were assessed by two public health specialists. Any disagreement between reviewers was resolved by the researchers gathering again and reaching the final decision. Videos that were irrelevant, non-English, duplicate, and longer than one hour were excluded from the study. The remaining 258 videos were analyzed. These videos should contain information about the definition, effects, preventions, causes, measurements, and severity of air pollution. Video sources were categorized into seven headings; Physician/engineer (1), university (2), independent users/blog (3), news agencies (4), health information websites (5), government/organization (6), TV films, documentary (7).

### 2.1 Assessment of Quality and Reliability

\*We used the Global Quality Scale (GQS) to assess of quality of the videos. GQS tool designed by Bernard ranges from 1 to 5 points (Bernard et al. 2007). A video's score of 4 or 5 points is considered high quality, 3 points intermediate quality, and 1 or 2 points low quality (Table 1). Some previous studies made with similar methods were observed (Kocyigit et al. 2019; Rittberg et al. 2016).

\*We used the modified DISCERN tool (DS) to score the reliability of the videos. DS tool score adapted by Singh ranges from 0 to 5 points. In this tool, each yes answer is given one point and consists of 5 questions in total (Singh et al. 2012; Radonjic et al. 2020) (Table 2).

**Table 2** Modified DISCERN reliability tool

1. Are the aims clear and achieved?
2. Are reliable sources of information used?
3. Is the information presented balanced and unbiased?
4. Are additional sources of information listed for patient reference ?
5. Are areas of uncertainty mentioned?

### 2.2 Ethics

Ethics committee approval was not required as public available data were used.

### 2.3 Statistical Analysis

Data were analyzed with SPSS 15v. Chicago, IL.  $p$ -value  $< 0.05$  was considered statistically significant. Cohen's kappa coefficient was used for inter-rater reliability. Median (minimum, maximum) indication has been preferred because there are excessive values in some data. The Kolmogorov- Smirnov Test tested for normality, then the Kruskal Wallis test found differences for more than two categorical variables.

## 3 Results

After the inclusion and exclusion criteria were applied, there were 258 videos left for later analysis (Fig. 1). The Kappa scores used to examine inter-rater agreement were 0.81 and 0.84 for the GQStool and DS tool, respectively. The most mentioned topics in the videos were the causes of air pollution 76.4% ( $n = 197$ ) and the effects of air pollution 75.6% ( $n = 195$ ) (Table 3).

When the videos were analyzed according to their source, 9.7% ( $n = 25$ ) of the videos were by physician/engineer, 5.4% ( $n = 14$ ) by the university, 42.2% ( $n = 109$ ) by independent users/engineers. blog, 24.1% ( $n = 62$ ) by new agencies, 1.2% ( $n = 3$ ) by health information websites, % 2.7 ( $n = 7$ ) by TV films, documentary and 14.7% ( $n = 38$ ) shared by government/organization.

32.2% ( $n = 83$ ) of all videos were in the high-quality group, 15.1% ( $n = 39$ ) in the intermediate quality group,

**Table 1** Global quality scale

1. Poor quality, poor flow, most information missing, not helpful for patients
2. Generally poor, some information is given but of limited use to patients
3. Moderate quality, some important information is adequately discussed
4. Good quality good flow, most relevant information is covered, useful for patients
5. Excellent quality and excellent flow, very useful for patients

**Table 3** Video content in air pollution, *n* (%)

Contents <sup>a</sup>	<i>n</i>	%
Definition	101	39.1
Effect	195	75.6
Prevention	116	45.0
Causes	197	76.4
Measurement	28	10.9
Severity	95	36.9

<sup>a</sup>There is more than one topic, *n*: number, %: percentage

and 52.7% (*n* = 136) in the low-quality group (Table 4). The highest percentage of high-quality video sources were physician/engineer (64.0%), government/organization (39.5%) and university (35.7%).

Significant differences were found among the quality groups in video length (*p* < 0.001), dislikes/day (*p* = 0.043), comment/day (*p* = 0.005), DS tool scores (*p* < 0.001). The duration and DS tool scores were higher in high-quality videos; and dislikes/day, comment/day averages were higher in low-quality videos. On the other hand, there was no significant difference in views, views/day, likes/day, likes ratios among quality groups. The like ratio was defined as like/[like + dislike] (Table 5).

**Table 4** Quality categorization of the videos according to video sources, *n*

Video source	Low quality	Intermediate quality	High quality	Total
Physician/engineer	4	5	16	25
University	7	2	5	14
Independent users/blog	55	14	40	109
News agencies	48	9	5	62
Health information web sites	1	1	1	3
Government/organization	15	8	15	38
TV films, documentary	6	-	1	7
Total	136	39	83	258

**Table 5** Analysis of video characteristics according to GQS quality, median (minimum–maximum)

	Low ( <i>n</i> = 136)	Intermediate ( <i>n</i> = 39)	High ( <i>n</i> = 83)	<i>p</i> value
Video length (min)	4.24 (0.50–58.30)	3.30 (1.12–48.85)	9.15 (0.50–58.20)	< <b>0.0001</b>
Views	64,605 (2328–6,770,360)	34,458 (2389–4,420,640)	35,300 (2434–3,274,764)	0.318
Views/day	70.14 (0.75–5665.36)	24.42 (0.69–24.015)	39.59 (0.96–2121.46)	0.193
Likes/day	0.64 (0–70.68)	0.12 (0–317)	0.29 (0–48.28)	0.058
Dislikes/day	0.06 (0–2.39)	0.01 (0–688)	0.02 (0–2.36)	<b>0.043</b>
Likes ratio <sup>a</sup>	0.93 (0.63–1)	0.92 (0.32–0.99)	0.92 (0.71–1)	0.874
Comments/day	0.06 (0–13,25)	0.01 (0–514)	0.02 (0–4.28)	<b>0.005</b>
DISCERN score	1 (0–4)	3 (2–5)	4 (2–5)	< <b>0.0001</b>

<sup>a</sup>Like ratio: like/like + dislike

## 4 Discussion

Air pollutants are not always visible and may lead to people is not aware of the air pollution (Sun and Li 2019). In a study conducted in China, it has been that people may develop a high sense of awareness of air pollution through the practices of environmental protection and policies (Dong et al. 2019). In densely populated urban areas, online platforms and digital technology are used as additional resources to facilitate monitoring and detection of air pollution (Hswen et al. 2019; Zhang et al. 2014). The public primarily uses TV, radio, and the internet as a source of information about air pollution has been found out (Liu et al. 2016) in China, one of the countries with the most widespread urban air pollution. In our present world where internet use increases, individuals tend to use online sources about health. YouTube is a significant online platform that is easily accessible and capable of providing information. Today, in YouTube videos, there is no regulation of information. Any person can upload air pollution-related videos accessible to billions of people. Due to that, wrong information spread through this platform might result in worse health consequences (Delli et al. 2016; Szmuda et al. 2020).

In our study, it has been seen that in the videos included, the causes and effects of air pollution were discussed. The

definition of air pollution, its prevention, severity, and measurement were discussed less because the majority of air pollution-related video content on YouTube had been found neither well-organized nor comprehensive on evaluation, even if they did not contain any misleading information. Knowing the sources and their effects on health might increase awareness among people, expand the preventive measures against air pollution and contribute to the reduction of air pollution.

In our study, 32.2% of the videos were of high quality, 15.1% were of medium quality and 52.7% of them were of low quality. In Önder et al. study (Onder and Zengin 2021), while consecutively the high, medium, and low-quality videos were 57.9%, 28.9%, and 13.2%, in Koçyiğit et al. (2020) study these rates were 41.4%, 21.7%, and 36.9%. In these studies that were conducted on different topics and with similar methods, YouTube could present high-quality information with different rates and additionally, the evaluation of the videos is made based on certain criteria, it is subjective. YouTube contains a significantly high number of videos of low quality depending on sources. At this point, individuals can recognize high-quality videos. The sources of the videos can be an important indicator of quality. In our study, the highest quality video sources consecutively were physician/engineer (64.0%), government/organization (39.5%) and university (35.7%). Examining the other studies, similar to our study, universities, Professional organizations, physician, health information websites, government agencies sources were shown to contain a significantly high number of qualified information (Lewis et al. 2012; Gul and Diri 2019; Kovalski et al. 2019). Individuals should take into consideration the sources of the videos using YouTube, at the same time, they should know that every source can not contain precise and high-quality information. Before all, the users should consider the videos coming from universities, governments, and physicians. Besides, universities, government, and physicians/engineers should upload more videos.

In YouTube, the users can manifest their opinions by clicking 'like' or 'dislike'. In our study, when comparing some parameters according to quality groups, in high-quality videos the duration of the video was longer and the DS tool score was higher, in low-quality videos dislikes/day, comments/day averages were significantly high. In our study, even though viewing numbers did not display much of a difference, view numbers were higher in low-quality videos. In Koçyiğit et al. (Kocyigit et al. 2019) study, while it has been seen that dislike averages were higher in low-quality videos just like in our study, in Şahin et al. (2019) study, in high-quality groups videos were longer. Besides, in these two studies, similarly to our study, viewing numbers, likes, comments did not show great differences according to the quality of the video. The study conducted on the videos about food poisoning, for the quality groups, likes, and viewing numbers were not different (Li

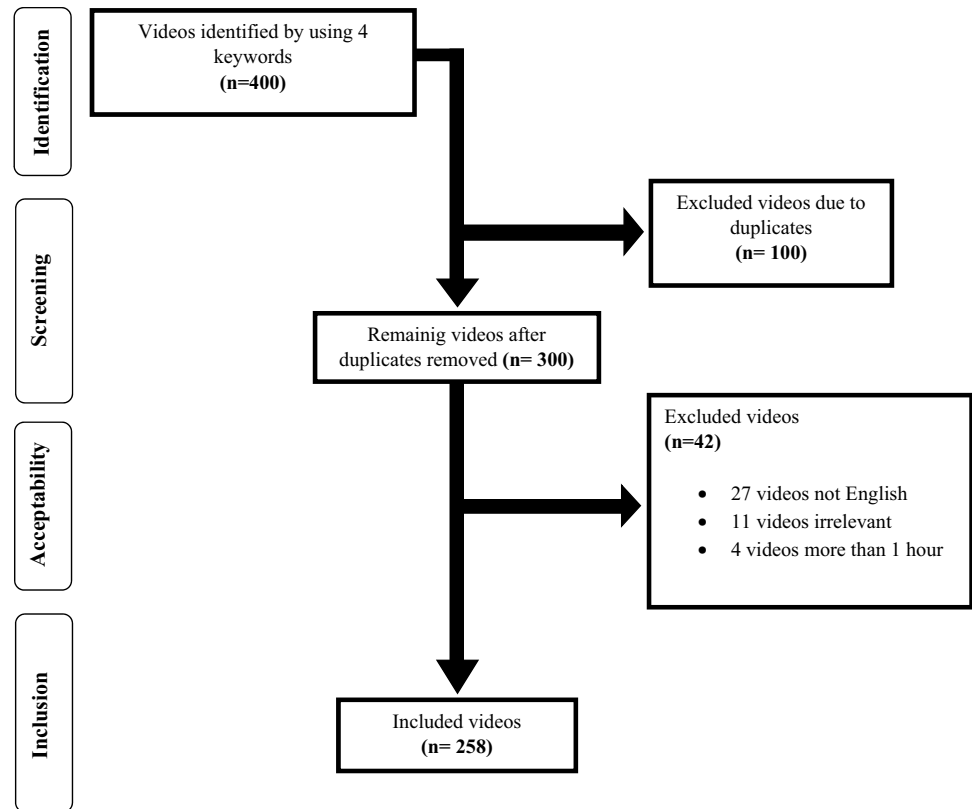
et al. 2019). In the study that oral leukoplakia and video qualities were compared, higher quality videos were liked more. According to the DS tool, high-quality videos had a higher number of likes and viewings (Kovalski et al. 2019). In the study about COVID-19 and rheumatic disease, among the quality groups, in terms of daily viewings, a significant difference was detected no significant difference was detected in daily comments (Kocyigit et al. 2020). In the study about premature ejaculation treatment, videos were qualified as reliable and nonreliable. But, while reliable videos received more likes and fewer dislikes, they received fewer comments (Gul and Diri 2019). In our study as well, it has been detected that low-quality videos received more comments. This situation might be caused by the fact that wrong information awakens a sense of argumentation in individuals. High-quality videos might not manifest significant differences in likes, dislikes, and viewing numbers, low-quality videos might receive more likes and viewings. For this reason, these video parameters should not be used as an indication in YouTube videos and should not be a guide to determinate the right guide for the information. These parameters are dynamic and constantly changing spectator reactions.

This study has some limits. First of all, even though there are some criteria, the evaluation is subjective as there are no confirmed tools yet to evaluate video data. Second of all, YouTube search results are dynamics and the ranking might change adding and deleting videos, and search results might be affected by the ranking standard. Videos were chosen at a specific date for a moment. Besides these, the videos were evaluated in English. For this reason, results might not reflect the whole picture. Because of our search terms, we might have missed some videos. Videos that went beyond the first page were included and different search terms were used, to be able to eliminate the effects of these limitations, in our study. Of the limitations, the dynamic nature of YouTube may have more affected inference. A study with a similar method at another time may give a different perspective.

## 5 Conclusion

As a result, there is a lot of information on air pollution on YouTube. Videos on air pollution provide information to prevent air pollution and mitigate its effects. On this important matter, low-quality videos are abundant. Considering that there are lots of nonreliable information on YouTube, it is needed that individuals should be referred to reliable videos on health information. User choice is the key to accessing qualified information. For video choices, apart from video sources, no parameters should be considered as a quality criterion, universities, government, and physicians/

Fig. 1 The process of study



engineers should use YouTube more actively so that users can have more access to precise information.

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**Code availability** Not applicable.

## Declarations

**Conflict of interest** Not declared.

**Ethical approval** Not applicable.

**Consent to participate** Not applicable.

**Consent for publication** Not applicable.

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