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Infodemic – "Epidemic of Rumours". The Characteristic Features of the Phenomenon on the Example of the Infodemic Accompanying COVID-19 in 2020

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Abstract: The purpose of the analysis described in the text was to identify the characteristic features of the infodemic as a phenomenon on the example of the infodemic accompanying the COVID-19 epidemic in 2020. The author began with the definition developed by the World Health Organization in 2018, and traced the earliest scientific studies describing the phenomenon. Then, based on results of the examination of the studies and experts' comments relating to the COVID-19 infodemic, the author described the main features of infodemic and their indicators. As a result of the investigation, the author decided to add four additional features to the initial infodemic characteristics. This is a new approach to the topic: the scientific literature on the does not contain such detailed characteristics of infodemic and focuses rather on selected phenomena associated with it.

Keywords: infodemic, COVID-19, coronavirus, social media, fake news, misinformation, media effects, media audience

INTRODUCTION

Although several other epidemics have broken out during the 21st century, the COVID-19 epidemic was global and therefore became the focus of news media (both the traditional components of print press, radio and television broadcasts, and the digital of websites and podcasts) and the users of social media (platforms). In this context, the concept of infodemic refers to a very large amount of information accompanying the epidemic. The phenomenon is currently under intensive research all over the world, but its in-depth characteristics have not

yet been discerned because the focus of research has so far been the analysis of the infodemics individual aspects.

The purpose of this article is to fill this gap, by providing all the characteristics of the phenomenon based on the topic's scientific literature, articles and scientists' comments published on opinion-forming media websites, and the query of scientific and commercial research. The article aims to map the characteristic features of an infodemic and their indicators. Such a map will enable future research to confirm the presented characteristics, and create premises for the risk management model of an epidemic.

The author used secondary data analysis as the main method. Sources used for this analysis included: media monitoring reports such as that prepared in 2020 by PSMM, (a Polish media monitoring company), about the nation's media during the first wave of the COVID-19 pandemic. The report presented the volumes of both media and social media and fake news coverage concerning COVID-19 and an internet audience measurement (Comscore and Gemius/PBI research). The author also used the published results of scientific research which used different methods and data sources.

THE GENESIS AND THE DEFINITION OF THE PHENOMENON

During the initial two decades of the 21st century, at least seven major epidemics broke out: SARS (2003), bird flu (2003–2006), influenza A / H1N1 (2009–2010), MERS (2012), Zika (2013–2016), Eboli (2014–2016) and COVID-19 (beginning in November 2019). The World Health Organization (WHO) has officially recognized both Influenza A / H1N1 and COVID-19 as pandemics due to their long contagious period and subsequent rapid rate of spread. Epidemics as potentially dangerous events with a large reach have also become the object of the strong media interest (see Shih et al., 2008).

The term 'infodemic' was coined by John N. Erni (2008), who describes the SARS epidemic in Hong-Kong in 2003 as a media phenomenon. Erni argues that like other large-scale epidemics, SARS was a reality with two parallel tales. The first tale presents the disease in epidemiological and clinical terms, the second describes an epidemic of meaning, an infodemic, evident in the rhetoric, symbols and cultural frameworks that the media provide. Erni (2008) argues epidemic spawned a triumphant media and that this triumphalism was then socially embedded, for the first time in recent history, as the sign of an emboldened public, or the image of the masses reaching a platform where their voices could finally be expressed and heard (Erni, 2008, p. 602).

The WHO used the concept of infodemic in its current sense for the first time in the report M*anaging Epidemics. Key Facts about Major Deadly Diseases* released in 2018. According to WHO, infodemic is a type of „epidemic of rumors":

> the rapid spread of information of all kinds, including rumours, gossip and unreliable information. They are spread instantly and internationally through the growing popular use of mobile phones, social media, the internet and other communication technologies. (WHO, 2018, p. 26)

In this document the WHO also notices the popularity of web-based 'experts' with diverse and often contradictory views that can generate confusion, anxiety and even panic in times of serious infectious outbreaks. The organization also stresses that fake or misleading information are dangerous because they can cause widespread public reluctance to well-founded infection control measures promoted by health authorities – and thus delay essential interventions (WHO, 2018).

The WHO definition provided an interpretative framework for further analysis. Researchers studying the media outbreak of the Ebola virus in Africa in 2014–2016 noticed that during this epidemic, rumors and unverified information emerged, which caused widespread fear. This alarm led to global entry bans of people from the affected countries and the introduction of trade barriers (Gunnlaugsson et al., 2019). During this epidemic, Sell at al. (2020) argue that information from traditional media mingled with that from social media and attracted the attention of the news outlets even in those countries where there were fewer cases of infection.

At the end of 2019, a new virus (SARS-CoV-2) appeared in China, causing COVID-19. The virus gradually spread in China and then around the world. In Europe, the onset of coronavirus cases occurred at the turn of the first and second quarter of 2020. The pace and extent of COVID-19 transmission were so high that on March 11, the WHO made the assessment that COVID-19 could be characterized as a pandemic.

During the Munich Security Conference in February 2020, Tedros Adhanom, WHO Director-General, pointed out that „we're not just fighting an epidemic, we're fighting an infodemic" (Zarocastas, 2020, p. 676). Sylvie Briand from WHO emphasizes that every outbreak of an epidemic is accompanied by an information tsunami, which always contains misinformation and rumors. Societies have known this phenomenon since the medieval times, but due to the advent of social media spreads the information faster and further (Zarocastas, 2020). Researchers argue the COVID-19 related infodemic was for the first time on an enormous scale (Kulkarni et al., 2020; Hao & Basu, 2020), and social media played a crucial role in it (Hao & Basu, 2020), which was caused by their popularity and enabling every user to spread content (Gavgani, 2020).

CHARACTERISTICS OF THE COVID-19 INFODEMIC

From the previously quoted definitions and descriptions of the phenomenon (WHO, 2018, 2020; Chao et al., 2020; Erku et al., 2020; Gao et al., 2020, Ni et al., 2020, Sell et al., 2020) the characteristic features of the infodemic are:

- flood of information accompanying the epidemic;
- use of communication technologies, especially the internet, mobile technologies and social media;
- speed of information dissemination;
- co-existence of true and false information;
- emotional discomfort of the media audience.

Have all these elements appeared in the case of the COVID-19 pandemic? The answer to this will be provided by the literature review, analyses, statements of researchers and publications describing COVID-19 in the context of the infodemic.

FLOOD OF INFORMATION

The media were strongly interested in COVID-19 issues. This could be seen even from the perspective of the media audience: websites launched special sections devoted to coronavirus, the topic completely dominated TV and radio broadcasts, and was also widely reported in the press. As the PS&P (2020) report confirms, in less than two months preceding the epidemic threshold in Poland and shortly afterwards (January 1, 2020 – March 10, 2020) there were 235,000 pieces of coverage in the press, on the radio, television and internet portals, and 1.1 million social media posts (PS&P, 2020) The topic of COVID-19 was most often described by publications specializing in news (Table 1).

Table 1. Digital portals with the highest incidences of items about the pandemics

Publication	Pieces of coverage – number
www.wnp.pl	2602
Polsat News	1803
Radio TOK FM	1640
TVP Info	1603
TVN24	1527
Polskie Radio 24	1465
www.niezalezna.pl	1257
TVN24 BiŚ	1156

Publication	Pieces of coverage – number
www.rp.pl	1135
www.polskieradio.pl	1114
Polskie Radio Program 1	1076
www.stooq.com	1006
www.polskieradio24.pl	962
www.portalsamorzadowy.pl	931
www.se.pl	917
www.forsal.pl	898
www.bankier.pl	889
www.fakty.interia.pl	868
Polskie Radio Program 3	866
www.rmf24.pl	741

Source: PS&P (2020)

The media not only produced a lot of information about COVID-19, but also the demand for this information from the media audience was high. This is confirmed by the volume of the traffic on the websites and mobile applications of news outlets. In selected European markets – French, German, Italian, Spanish and British (Gevers, 2020a) these websites and applications in March 2020, when COVID-19 first appeared in Europe – had high visit incidences (Table 2). A similar trend occurred on the Polish market – in March 2020 compared to March 2019, the traffic on the news outlets websites increased (Gevers, 2020a).

Table 2. Increase in the quantity of real users for the top 10 news outlets in Poland

Node	Real users		Views	
	03.2019	03.2020	03.2019	03.2020
onet.pl / Information and journalism	8 412 900	14 142 565	140 455 184	419 668 519
wp.pl / Information and journalism	9 197 041	11 843 128	193 512 351	451 688 534
tvn24.pl / Information and journalism	7 592 576	11 384 784	120 286 505	290 693 627
wyborcza.pl / Information and journalism	7 174 357	10 736 316	65 930 423	137 107 426
naszemiasto.pl / Information and journalism	7 197 135	10 320 705	140 617 710	192 352 901
fakt.pl / Information and journalism	4 544 454	9 998 811	65 876 108	110 354 785
rmf24.pl	3 959 440	8 809 272	19 943 264	64 651 384
gazeta.pl / Information and journalism	5 788 541	8 710 119	44 009 171	102 641 266
se.pl / Information and journalism	4 769 141	8 705 370	43 464 300	88 282 644
interia.pl / Information and journalism	7 514 871	8 600 772	93 594 840	209 841 364

Source: PBI (2019; 2020

For many consumers, the websites of news outlets were the main channel, from which they learned about COVID-19. These sites were the first to count a significant increase in user activity as early as January 2020, when the epidemic had begun to spread beyond China's international borders. Another major peak occurred at the end of February 2020, when the coronavirus appeared in Europe. The moment of introducing national lockdowns in mid-March 2020 resulted in another peak in the internet consumption and lasted until Comscore's analysis was carried out at the end of May 2020 (Gevers, 2020b).

Table 3. News/information websites and applications: visit incidences across selected European countries, 13 January 2020 – 10 May 2020, WEEK OF JAN 13 – JAN 19 = 100

	JAN 13 – JAN 19	JAN 27 – FEB 2	FEB 24 – MAR 1	MAR 9 – MAR 15	MAY 4 – MAY 10
	Germany, Italy and Spain confirm their first cases of the coronavirus within their borders	As the virus spreads in northern Italy, jitters are felt in the financial markets	Italy and Spain declare national lockdowns	The process of lifting restrictions starts	The process of lifting restrictions starts
France	100	110	129	142	157
Germany	100	110	126	142	143
Italy	100	112	153	170	136
Spain	100	100	105	148	142
United Kingdom	100	115	128	140	140

Source: Gevers (2020b)

In turn, the data of American analytical companies show that 10% of the content placed on the websites of American news outlets in mid-March 2020, covered the coronavirus topic. The website traffic and the number of users reading a single article at the same time, increased. Also, the time spent on a piece of coverage lengthened, and the number of page views increased by 33% (Molla, 2020; Husnayain et al., 2020).

The high demand for pandemic information was also shown in the increased number of pandemic-related queries to Google search, shown by Google Trends. An analysis of search behaviors of Italian users proved that "China coronavirus" was most searched phrase in Google shortly before the epidemic outburst and especially when COVID-19 was diagnosed in two Chinese tourists. However, the growing number of cases in Italy did not translate into the growth of adequate searches until the announcement of the pandemic (March 11, 2020). When the Italian government imposed strict restrictions to prevent further spread of the coronavirus, the number of inquiries about disease symptoms and protective

measures increased again, which mirrored rising social anxiety (Rovetta & Bhagavathula, 2020). Similar regularities were observed in the analysis of Google searches on the other continents (Husnayain et al., 2020).

USE OF COMMUNICATION TECHNOLOGIES

The use of various communication technologies, especially the internet, social media and mobile technologies, accompanied the COVID-19 epidemic. As previously mentioned, there was an increase in demand for coronavirus information through general news services and applications. When country lockdowns were introduced and most people stayed at home, there was a shift in audience towards communication technologies. At the beginning of March 2020 (and for Italy even earlier, in the second half of February 2020), the visits both on social networking and messaging sites and applications increased, as shown by Comscore's internet traffic analysis for selected European countries (Gevers, 2020a).

The pandemic was also accompanied by an increased supply of current information on social media platforms. The report of Press-Service and Publicon, cited as PS&P above, noted that there were 1.1 million posts in Polish social media; this number was almost five times higher than the number of pieces of coverage in traditional media. The content, that most engaged internet users, was more entertaining or sensational in nature, while the pieces created by experts did not meet with such a large response (PS&P, 2020).

The communication on social platforms was also carried out by various communicators. The authors of the content were not only media representatives and experts, but also influencers, and internet users (sometimes anonymous or not verifiable). The communication around COVID-19 also converged – the traditional media communicated through owned profiles on social media (PS&P, 2020). The reverse pattern was also observed: traditional media journalists were inspired by stories from social media.

Table 4. Top profiles on social media by the number of posts

Top social media profiles	Number of posts
Rzeczpospolita (Twitter)	788
portal tvp.info (Twitter)	620
Polskie Radio 24 (Twitter)	607
Tvn24 (Twitter)	555
Radio ZET NEWS (Twitter)	452
PolsatNews.pl (Twitter)	477
PolskieRadio24.pl (Twitter)	439

Top social media profiles	Number of posts
Polskie_Sluzby (Twitter)	416
Telewizja Republika (Twitter)	386
Polska Dzisiaj (Facebook)	332
Człowiek w Masce (Twitter)	328
LudzieHonoru (Twitter)	306
Dziennik.pl (Twitter)	279
wPolityce.pl (Twitter)	269
Forsal.pl (Twitter)	269
polsatnews.pl (Facebook)	263
Comparic (Twitter)	251
Fakty TVN (Facebook)	247
Radio Maryja (Twitter)	240
Z Ostatniej Chwili (Twitter)	230

Source: PS&P, 2020.

Internet usage during the first weeks of the epidemic was so intense that Speedtest observed significant decreases in the speed of internet connections in several countries, including Poland, Italy, the United States, and Ukraine (PJ, 2020).

SPEED OF INFORMATION DISSEMINATION

Due to the widespread use of the internet in communication, information on the epidemic was disseminated very fast, much more than in case of Ebola epidemic in 2018. During the first month of the epidemic, over 41,000 English-language press articles related to coronavirus, and 19,000 put the name of the disease in the headlines. In the case of articles about Ebola, these numbers were respectively 1,800 and 700 (Ducharme, 2020). In turn, Polish media became interested in the subject relatively quickly, in January 2020, when the first disturbing news began to flow from China (PS&P, 2020).

The speed of spreading information depended also on the social platforms – their specifics and their popularity. Users could connect with their friends, create content on their own, and share information (Miotk, 2017). Social media platforms are very popular on a global scale: in April 2020 Facebook had 2.5 billion users, YouTube and WhatsApp messenger – 2 billion each, Facebook Messenger – 1.3 billion, Instagram – 1 billion, Twitter – 386 million (Statista, 2020). At that time, the largest platforms in Poland were Facebook with 22.2 million users, YouTube – 20.9 million, Instagram – 8.6 million and Twitter – 6.4 million (PBI, 2020). Because the platforms gather mass audiences around the world – people

connected with each other and were enabled to publish content on their own – information on social media can disseminate very fast, on a global scale and in a totally uncontrolled way.

TRUE AND FALSE INFORMATION

Social media platforms, such as YouTube and Twitter contain a lot of content and may amplify rumors and questionable information (Cinelli et al., 2020) and increase the reach of both fake news on social media (Vosoughi et al., 2018) and algorithmic filtering, which supports sensational and controversial content (Tarkowski, 2020). The dissemination of fake news deriving from social media, in traditional ones, is also easy. Many jounalists have problems with fake news recognition (Public Dialog, 2017) so do the users of social media platforms (Editorial LDH, 2020)

During the COVID-19 pandemic, true information in the media or on social media was accompanied by false information. Lebanese researchers who analyzed a sample of 673 tweets noticed that 24.8% of them contained misinformation and 17.4% of them – unverifiable information about the pandemic. The misinformation rate was higher among informal individual and group accounts (33.8%). More incorrect information was also found in tweets from unverified accounts – 31.0%, while in the case of verified accounts it was 12.6% (Kouzy et al., 2020).

Most of the fake content concerned the prevention of the coronavirus infection, but also false images or conspiracy theories about the origin of COVID-19 (PS&P, 2020; Rogowska, 2020). In the flood of false information, it was possible to notice the content from information wars – such as the content connecting the epidemic with the launch of the 5G transmission network in Europe, widely spread on the internet by Russian intelligence (Gliwa, 2020). Internet fraudsters used the coronavirus-related messages to phish for money – the pandemic was a time of their increased activity (Maj, 2020; Fontanilla, 2020). Numerous memes were also created, which a scientist specializing in cultural research called a 'memdemic' (Kamińska cited by Mazur, 2020).

Users of social platforms barely distinguished true and false information about COVID-19 (The Lancet Digital Health, 2020). This was caused by the sheer volume of information, use of social media as the main source of information, and panic (PS&P, 2020; Ahmad et al., 2020), which could translate into further sharing of content evoking high-arousal emotions and controversy (Ahmad et al., 2020).

EMOTIONAL DISCOMFORT

The COVID-19 pandemic was accompanied by a decrease in the mood of media audiences. The hyperactivity of social media, due to which information spread very quickly, created an environment of heightened uncertainty. This, in turn, fueled fears and hostility toward strangers, especially people of color (Petropoulos & Makridakis, 2020; Rovetta & Bhagavathula, 2020). Even memes, seemingly innocent at first glance, expressed aggression or were racist in tone (Mazur, 2020). Moreover, press coverage about the coronavirus often used the term "fear", which could negatively affect the audience's emotions. Khan (2020) observed a similar phenomenon in media coverage on the H1N1 influenza epidemic, but it did not occur when reporting the topic of 'ordinary' influenza.

As shown by analyses of Twitter posts (20,325,929 tweets, 7,033,158 unique users from over 170 countries) at the beginning of the pandemic, fear and anger were the dominant emotions of the authors. The anger culminated on the day after the WHO announced the pandemic (March 12, 2020) but afterwards the number of tweets expressing anger remained high. Fear derived from little knowledge of the new disease. Anger was associated with xenophobia against the Chinese and Asian people when the disease was only developing in the Far East. Anger was also raised by the criticism of governments and epidemiological services, and prolonged isolation. Sadness was also expressed because of the loss of loved ones taken by the pandemic. The authors of the posts also expressed gratitude, hope and joy of well-being, but very seldom (Lwin, 2020).

Attention was also paid to the traditional and social media influence on anxiety and panic in the audiences (Sell et al., 2020; Ahmad & al., 2020; Kulkarni et al., 2020). Social media exposure during a pandemic could result in mental health problems (Gao et al., 2020). Moreover, the negative sentiment of the press coverage corresponded with the number of COVID-19 cases in the same area (BBAV, 2020).

CONCLUSIONS

The COVID-19 infodemic has all the features of the phenomenon. There was a flood of information about the pandemic, true and false, and modern communication technologies such as websites, social platforms or mobile applications were used to disseminate it. The pace of dissemination was rapid, even faster than in the case of the other epidemics. The exposure to this tsunami of information caused emotional discomfort in the audience.

As a result of the examination of the COVID-19 infodemic, four additional features could be added to the characteristic. The first is the high demand for

information from media's audiences. Available analyses of audience behavior showed that a large amount of information in the media about the COVID-19 pandemic met the audience's increased interest. The second feature is the nature of this information – sensational, emotional, sometimes even tabloid-like (which all influence the audience's moods). Communicators comprise the third feature. They participate in the discourse on the pandemic, are representatives of traditional media and epidemiological services, and are also average internet users (often with unverified identities). The fourth feature is the convergence of the media active on the discourse. Traditional media journalists were inspired by and communicated through social media, and their content was distributed by users of the latter. All the features of an infodemic match with the detailed indicators of media and audience activity, selected from the examination (Table 5).

Table 5. The main features of an infodemic

Feature	Indicators
Flood of information	Higher than average number of pieces of coverage in traditional and social media
Use of communication technologies, especially the internet, mobile technologies and social media	Slowing speed of internet connections, increase of traffic on social networking sites/applications, greater than average use of instant messages sites/applications
Speed of information dissemination	Information on the epidemic appears in the media from around the world shortly after its outbreak, the use of inherently fast communication technologies (internet, social media)
Co-existence of true and false information	True information, mainly from official sources and false information from sources of unknown identity co-exist
Emotional discomfort of the media audience	The contact with information about the epidemic results in deterioration of mental and physical well-being among the media audiences
High demand for information from media audience	Increase of number and length of visits to news outlets websites, increased number of searches on epidemic-related keywords
Variety of communicators types	The information exchange involves both official media, government institutions, epidemiological and sanitary services, average internet users and people with an unspecified identity
Emotionality and negative sentiment of media messages	Coverage in traditional media about epidemics is strongly emotional and have a negative sentiment, the word „fear" and its synonyms are used more often than average
Traditional and social media convergence	Journalists are inspired by information from social media, traditional media conduct communication via social channels, social media content is distributed on social media.

Source: own query

Since the author used secondary data from many sources, the limitation of this analysis is that the data are presented in the scope (regarding both periods and territory) disclosed to the public by either the company or scientists. The authors' intended to describe the infodemic phenomenon by characterizing its

main, observable features. Therefore, the main infodemic features presented above would require further empirical studies. In particular, the set of infodemic features presented at the end of this article needs further targeted research. The proposal would be worth investigating in specified countries affected by COVID-19, to compare the differences in the intensity of the features and to clarify the infodemic model. The next step would be to compare COVID-19 with other epidemics to identify these features, which are independent of the stage of technological development and show the evolution of the phenomenon over time. On the practical side, confirmation of the proposed model of this phenomenon could aid in the development of an effective risk management model for an epidemic.

Due to the development and popularization of social media and their convergence with traditional ones, outbreaks of subsequent epidemics will increasingly be accompanied by an infodemic, a flood of true and false information, as well as misinformation. This is a phenomenon characterized by a flood of information, the use of communication technologies (especially the internet), the speed of information dissemination, the occurrence of true and false information and the emotional discomfort of media users. This description should also include a high supply of information from their recipients, various types of communicators taking part on the discourse, the emotional and sensational tone of the information, and the convergence of various media channels. The infodemic is a major challenge for information services, but at present cannot be stopped completely because it would require total censorship of the media, which as Tarkowski (2020) argues is the price society pays for open information flows.

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