



## DIGITAL SOCIAL LISTENING IN COVID-19 PANDEMIC FOR INFORMED INTERVENTIONS IN THE REPUBLIC OF MOLDOVA: INTEGRATED DATA

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**Keywords:** infodemic, COVID-19, Social Listening, report, COVID-19 interventions.

**Introduction.** Social Listening is a suitable tool used in monitoring and controlling the infodemic, a phenomenon that has exacerbated the global public health crisis generated by the COVID-19 pandemic.

**The purpose of the study.** Digital monitoring of public perceptions of the COVID-19 in the Republic of Moldova, evaluating the temporal sequence of message content on social media to understand and inform decision-makers on the necessary actions based on needs/problems.

**Material and methods.** The Talkwalker software, developed for marketing research, has been adapted to the study objective by creating a search syntax for COVID-19. The taxonomy for COVID-19 conversations developed and validated by Purnat et al. was taken into account.

**Results.** Between 01.01-30.11.2022, 18000 results were shared. Interest is expressed through a downward fluctuating curve, the highest audience engagement rate being generated by the Unica.md post regarding the French authorities' decision to waive restrictions (2400 shares, over 155 thousand likes, 521 comments). The aggregate sentiment of netizens is predominantly neutral and negative, dominated by anger and fear.

**Conclusions.** It is observed that the population shows distrust regarding the reality of the pandemic, being reserved towards actions taken by authorities to counter the pandemic, and/or conspiratorial beliefs, which indicate the presence of falsehoods in social media and the need for targeted responses from authorities to increase the population's resistance to misinformation.

**Cuvinte-cheie:** infodemie, COVID -19, dezinformare, „social listening”, raport, intervenții în COVID-19.

**„SOCIAL LISTENING” DIGITAL ÎN PANDEMIA COVID-19 PENTRU INTERVENȚII DE INFORMARE ÎN REPUBLICA MOLDOVA: DATE INTEGRATE**

**Introducere.** „Social listening” este un instrument propice utilizat în monitorizarea și în controlul „infodemiei”, fenomen care a agravat criza globală de sănătate publică, generată de pandemia COVID -19.

**Scopul studiului.** Monitorizarea digitală a percepțiilor publice privind COVID-19 în Republica Moldova, evaluarea pe secvențe temporale a conținutului mesajelor din rețelele sociale pentru a înțelege și informa factorii de decizie privind acțiunile necesare țintite pe nevoi/probleme.

**Material și metode.** Soft-ul Talkwalker, elaborat pentru cercetări de marketing, a fost adaptat la obiectivul studiului prin crearea sintaxei de căutare privind COVID-19. S-a ținut cont de taxonomia pentru conversațiile COVID-19, elaborată și validată de Purnat et al.

**Rezultate.** Între 01.01-30.11.2022, au fost partajate 18 mii de rezultate. Interesul este exprimat printr-o curbă fluctuantă descendentă, rata cea mai mare de implicare a audienței fiind generată de postarea Unica.md privind decizia autorităților franceze de a renunța la restricții (2400 distribuiri, peste 155 mii de aprecieri, 521 de comentarii). Sentimentul agregat al internauților este preponderent neutru și negativ, dominat de mânie și teamă.

**Concluzii.** Se constată neîncrederea populației privind realitatea pandemiei, reticență față de acțiunile autorităților pentru contracararea pandemiei sau/și viziuni conspiraționiste, ceea ce denotă prezența falsurilor în conținuturile difuzate pe rețelele sociale și nevoia de răspunsuri țintite ale autorităților pentru creșterea rezistenței populației la dezinformare.

## INTRODUCTION

The COVID-19 pandemic has created a global public health crisis, exacerbated by the lack of prompt scientific information at its onset regarding the causes of the disease, mode of transmission, prevention measures, necessary treatment, etc., and the simultaneous falsehoods occurrence, which rapidly were distributed (with or without malicious intent) in communities through various sources of information. The proliferation of media sources, particularly online (social media), has catalysed the phenomenon of the general increase in the volume of information, but in the COVID-19 pandemic, it has facilitated the spread of false information to unprecedented levels. The phenomenon of an overabundance of information (both correct and incorrect) from online and offline sources that accompanies an epidemic or another health crisis has conceptually consolidated in the term “infodemic” (1).

The consequences of infodemic are many and alarming. At the community level, it leads to the polarization of opinion, distortion of the interpretation of scientific evidence, promotion of fear and panic, increased mental and physical exhaustion of the population, increase in conspiratorial beliefs, decreased trust in governments and public health systems, as well as in the accuracy of official health messages. Within the healthcare system, infodemics can lead to the misallocation of resources and increased stress among healthcare providers, decreased access to medical care, conspiratorial beliefs, delayed delivery of high-quality care and proper treatment to patients, and more (2, 3).

Particularly, the abundance of information causes confusion and uncertainty regarding the risks of the disease and the benefits of protection/prevention measures, and subsequently, negative attitudes/perceptions and hesitant behaviors towards the interventions initiated by authorities to reduce the impact of the pandemic. The important role of risk perception and the benefits of health interventions and the adoption of healthy behaviors in communities have been demonstrated by multiple studies, including those related to communication and behavioral factors in vaccine hesitancy (4, 5, 6).

Based on the above, monitoring the infodemic for the benefit of public health becomes an imperative and a challenge of our time. The World Health

Organization, together with other international organizations such as UNICEF, Gavi, the Vaccine Alliance, etc., have made efforts to strengthen community capacities globally in the fight against the infodemic (7, 8, 9), including by popularizing and promoting social listening tools conducive to achieving this objective (10).

Digital “social listening” techniques make it possible to quickly process and analyses a large amount of information regarding the questions, concerns, feelings, narratives (opinions), perceptual errors (level of misinformation) of the population, as well as information gaps and outdated or distorted information on social media platforms. Based on these analyses, reports can be created to provide timely and relevant data for targeted, appropriate interventions to shape healthy behaviors, promote the resilience of these behaviors, and develop community engagement with public health strengthening actions.

In this context, our goal is the digital monitoring of public perceptions regarding the COVID-19 pandemic, the evaluation over temporal sequences of the content of messages on social media in order to understand and inform decision-makers regarding targeted actions on needs/problems that need to be implemented.

## MATERIAL AND METHODS

Digital monitoring of public perceptions regarding the COVID-19 pandemic was carried out using the Talkwalker software. This tool, primarily designed for marketing research, was adapted to the study’s objective by creating syntaxes for searching on COVID-19 topics. Thus, using Boolean search operators (AND, OR, and NOT), key words and phrases (such as virus, COVID, vaccination, childhood vaccination, misinformation, etc.) were combined to establish and limit the search to a well-defined research’s area of interest. In establishing the search syntax for COVID-19 information, the taxonomy for COVID-19 conversations in social listening *developed and validated* by Purnat et al. (11) was taken into account: Cause (virus cause, stigma surrounding the spread, spread and immunity); Disease (confirmed symptoms, other discussed symptoms, asymptomatic transmission, pre-symptomatic transmission, modes of transmission, protection against transmission, risks, vulnerable individuals/communi-

ties, restrictions, myths); Treatment (current treatment, research and development, unproven treatment, context: nutrition, myths); Vaccination (vaccine types, efficacy, side effects/safety, number of doses, contraindications); Misinformation (mischaracterization of the disease or protective measures, false treatments, conspiracy theories, sources and influencers, most engaging information, statistics and data); Interventions (testing, supportive care, personal measures, measures in public spaces, travel).

The software was also adjusted to the local specificities of the country by setting the health information channels (official pages of important health institutions, such as the Ministry of Health, the National Public Health Agency, *Nicolae Testemitanu* State University of Medicine and Pharmacy, the National Health Insurance Company, UNICEF, etc.) and information sources (types of mass media and social media alike).

Between January 2022 and November 2022, using the adjusted software, data was collected and analyzed from social platforms and forums. Monthly reports were compiled highlighting the most interesting trends and useful information regarding the number of posts related to COVID-19 (according to the established syntax), the *en-*

*agement* for each post (the number of likes, shares, and comments on the post), the *potential reach* — estimated number of people who can access the post/information, public sentiment regarding the information, influencers, the profile of internet users, the messages conveyed by internet users, and other related factors. Based on the analyzed data, recommendations were developed for actions aimed at adjusting the population’s perceptions, attitudes, and behaviors. This article presents the integrated (synthesized) results of the study obtained over the entire duration of the research.

**RESULTS**

***Fluctuation of interest on COVID-19 topic***

During 01 January - 30 November 2022, 18 thousand posts (results) regarding COVID-19 were shared, structured in descending order according to the engagement rate per post. Interest in this topic during the studied period shows a fluctuating curve, with several moments of increased interest (4 peaks) in the time intervals: 07.02.2022-14.02.2022; 21.03.2022-27.03.2022; 16.05.2022-22.05.2022; 01.08.2022-07.01.2022. There is also a tendency of a slow but constant decrease in internet users’ interest towards the topic (fig. 1).

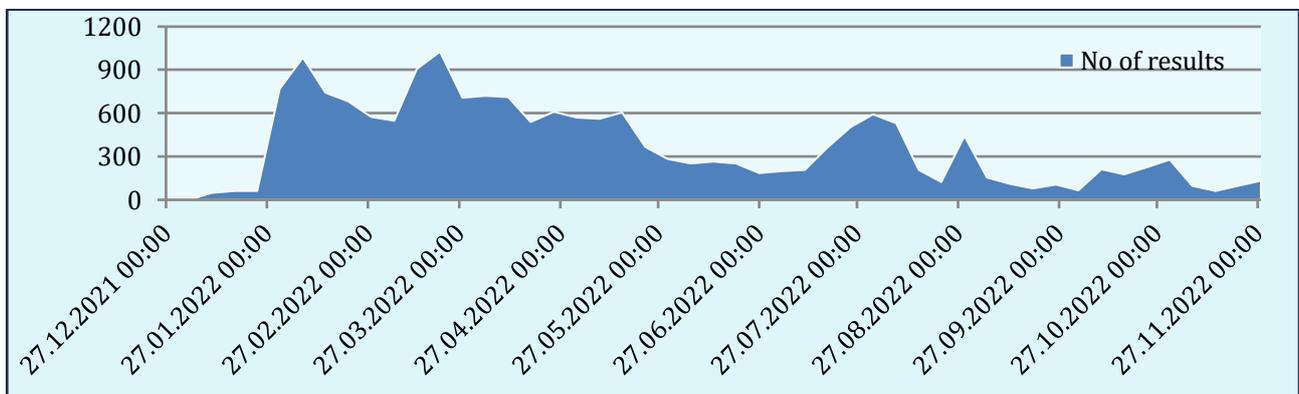


Figure 1. Results over time.

During 7 February 2022 - 14 February 2022, (the first peak) 994 posts were recorded. The information with the highest engagement rate was the post from WHO regarding the disruption of the children’s vaccination schedule during the COVID-19 pandemic and the call for the population to catch up on missed vaccines. The message had a potential reach of 14900 and an engagement rate of 77 interactions (the message was shared 36 times and liked 43 times), with a neu-

tral emotional reaction.

In the period of 21 March 2022 - 27 March 2022 (the second peak) 1000 results were recorded. Several news items presented high interest. The first news item posted by the WHO was about the meeting between the WHO Regional Director for Europe and the President of the Republic of Moldova, during which, support was provided by the WHO on the COVAX platform for the prioritized distribution of COVID-19 vaccine in the Republic

of Moldova. The message had a potential audience of 14,900 people, generated 139 interactions (engagement: likes – 127, shares – 10, comments – 2), and registered a positive emotional reaction. The second news item referred to a message issued by Jurnal.md, stating that Moderna is set to seek emergency authorization for vaccinating children under the age of six for protection against the coronavirus. The potential audience of the post was 180600 people, and the engagement rate was 53 (9 shares, 8 likes, and 36 comments). Although the software qualifies the reaction to the message as neutral, an analysis of the comments reveals an evident negative feeling. The message “Hands off children, you scoundrels” received the most likes (22 in total), while “Take your hands off children” received 20 likes. During the same period, TV8.md reported that mobile vaccination points are no longer as popular as they used to be, and doctors say that the flow of people wishing to be immunized has decreased significantly. The message had a potential target audience of 178600 people and 20 interactions (engagement: 14 likes, 5 comments, and 1 share). The software qualifies the sentiment to the message as neutral, but the comments remained negative as related to the interventions of the authorities: “It was a stupid idea from the beginning. They want to control the population”.

In the period of 16 May 2022 - 22 May 2022 (the third peak), the interest decreases by almost two times, with only 609 posts recorded. The news with the highest engagement is the message from the WHO regarding the launch of the vaccination process intensification campaign in Straseni. The campaign was launched by the Ministry of Health in collaboration with the National Agency for Public Health, with the support of the WHO and the EU, in the presence of high-ranking officials. The

potential reach of the message was 14900 people, and the engagement rate was 141 people (116 likes, 20 shares, and 5 comments). The sentiment of the message was neutral, and the comments were negative towards the authorities and the vaccine. “My personal conclusions regarding the invention of COVID-19 and COVID vaccination: 1. The undermining of humanity’s supreme reason on Earth and the covert or hidden control of vaccinated individuals according to the principle written by the number: 666 of Satan...” however, the message did not receive any likes.

In the period of 1 August 2022 - 7 January 2022 (the fourth peak), 610 results were recorded. The post with the highest engagement was launched by the WHO and refers to promoting a proactive attitude towards vaccination by telling the story and opinion of a nurse who, being responsible for administering the second dose of the COVID-19 vaccine booster, encourages the public to get vaccinated. A total of 167 people showed engagement towards the post (including 15 shares, 128 likes, and 24 positive comments about the character of the post, most of which apparently came from the person’s close circle). The potential reach for the message was 15000 people, and the sentiment towards the message was qualified as neutral.

**Engagement or reactions to the topic**

Engagement is a term that refers to taking a stance (involvement) or interaction/reaction of internet users to posted messages. In the analysed period, the engagement towards posts regarding COVID-19 amounts to 38500 shares, likes, and comments. The intensity of the recorded engagement is relatively uniform and low with only one significant increase throughout the year (fig. 2).

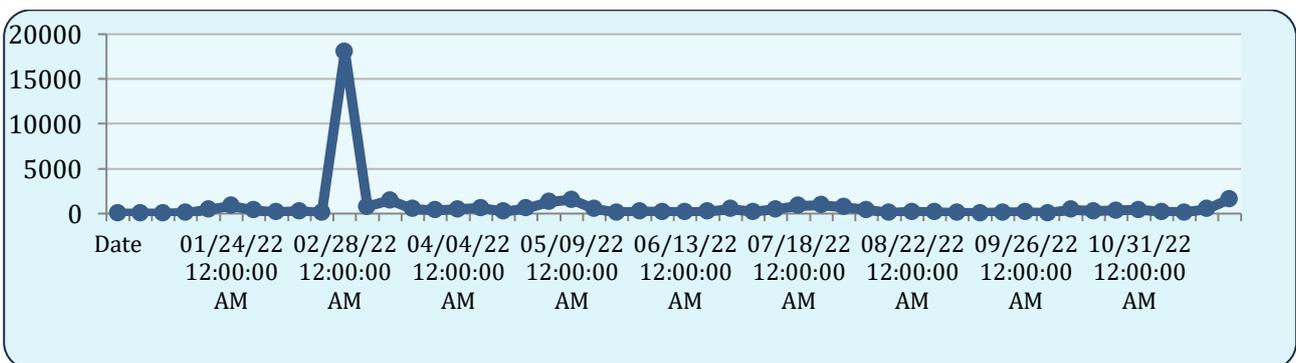


Figure 2. Engagement over time.

The increase in engagement intensity is recorded in the period of 28.02.2022-06.03.2022 and is related to the publication made by Unica.md regarding the decision of the French authorities to cease the enforcement of vaccine passports and protective masks. About 17500 people showed interest in this news, which represents almost half of all reactions/interactions recorded in a year. The news was shared 2400 times, received likes from 15100 internet users, and was commented on 521 times. The message with the most likes (183 likes) was: "2 years of theatre have ended, they got bored and lifted COVID restrictions. Now we have a war on stage and played very, let's see what's next. Only one thing is certain, we are simple people who lose our lives, our loved ones, our homes and are

forced to leave the country. Cursed be you, LEADERS OF COUNTRIES, who play dirty games and kill innocent people and children for your own goals".

**Influential sources of information (top influencers)**

Influencers are active authors or websites with a large potential reach and whose posts generate high-intensity engagement (with multiple interactions) and therefore have the potential to shape the opinions and behaviors of the population. During the studied period, the Unica.md Facebook page is qualified by the Talkwalker software as the most *influential* author (with an engagement of 18300), while News.yam.md is the most *active* author and site (having 1400 posts).

Table 1. Top influencers for Facebook.

Facebook Influencer	Rank	Posts			Potential Reach	Reach per Result	Engagement	Engagement per Result	
		Total	Positive	Neutral					Negative
Unica.md	4	57	3	43	11	7456718	130819.61	18293	320.93
WHO in Moldova	1	79	18	59	2	1184483	14993.46	7417	93.89
Realitatea.md	7	55	1	48	6	4037541	73409.84	484	8.80
TV6 MD	2	62	0	43	19	1974568	31847.87	417	6.73
Ea.md	3	57	1	40	16	4550592	79834.95	196	3.44
TVR Moldova	5	56	0	48	8	2837439	50668.55	156	2.79
Unimedia	9	43	0	30	13	4526669	105271.37	92	2.14
Radio Chisinau	6	55	1	45	9	629053	11437.33	54	0.98
ZUGO	10	42	0	31	11	1901707	45278.74	17	0.40
ORHEI TV	8	46	0	37	9	330743	7190.07	10	0.22

The most intense interactions of internet users are recorded on the social media platform Facebook. The top *influencers* with posts on this site (following the sequence outlined in tab. 1, according to the level of *Engagement*) are: Unica.md, World Health Organization in Moldova, TV8.md, JurnalTV.md, and UNICEF Moldova. The table provides information on the following for each source: the total number of posts; the aggregated sentiments; the general and result-specific potential reach; the cumulative and per-post engagement.

**Sentiment analysis on the topic of COVID-19**

Social media sentiment refers to the emotion or

attitude people express on social media about a particular message, topic, or post (12). Sentiment analysis in "digital social listening" is an automated process of attaching sentiments to the processed text in general terms of positive, negative or neutral polarity, but also in terms specific to the concrete type of emotion.

Regarding the topic of COVID-19, during the analyzed period, the aggregated sentiment of internet users is predominantly neutral and negative (fig. 3), with data distributed as follows: neutral sentiment – 78.8% of posts; negative sentiment – 15.4%; positive sentiment – 5.9%. In specific terms: 4100 posts express anger; 2200 – fear; 1800 – sadness; 1200 – love; 668 – joy; 20 – sur-

prise. The net sentiment score (NSS, calculated by subtracting the percentage of negative sentiment from the percentage of positive sentiment) is negative – 44.6%.

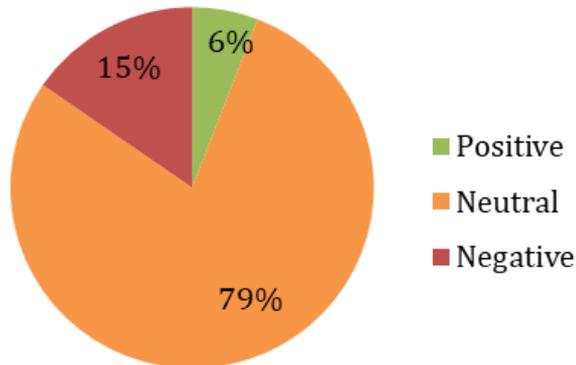


Figure 3. Share of sentiment (*Talkwalker*).

**The social demographic profile of internet users**

The profile of internet users is outlined through the analysis of the following independent variables: gender, age, spoken language, marital status, interests, occupational status, etc. According to gender, 44.3% of internet users are women and 55.7% are men. By age categories, the data is distributed as follows: 20.5% of internet users are 18-24 years old; 66% are 25-34 years old; 10.2% are 35-44 years old; 3% are 45-54 years old; 0.3% are 55-64 years old; and no person is 65+. According to marital status, internet users are classified into 3 categories: parents – 76.9%; married – 21.5%; solitary – 1.6%. Regarding spoken language: 79.6% are Romanian speakers; 3.2% are Russian speakers; 17.2% – other languages. Most internet users express personal opinions (84%) and only 16% share posts on behalf of affiliated companies/organisations.

**DISCUSSIONS**

In the study, it was found that online messages are critical and distrustful of pandemic health protection measures, vaccination, and authorities in general. The health interventions of authorities are perceived as inventions intended for controlling and manipulating the population and vacci-

**CONCLUSIONS**

1. The population’s interest in the COVID-19 topic is constantly decreasing and is characterised by a weak intensity of interactions (engagement) per post, which corresponds to a decrease in the intensity of the pandemic as a public health problem.

nation is seen as “a means of making money”, which presents clear signs of misinformation and false attitudes typical of the infodemic. Public trust is an important factor in the effective implementation of safety measures in public health crises. Acceptance of prevention measures, including vaccination, depends on the public’s trust in the safety and effectiveness of these measures, trust in the healthcare system, healthcare professionals, etc. (13, 14).

Neutral sentiments, which are a priority in this study, can arise from the need for emotional detachment caused by the fatigue associated with the uncontrollable nature of the pandemic and the resulting uncertainty (15). At the same time, both negative and neutral sentiments marking the messages of Internet users are predictors/indicators of negative attitudes and hesitant behaviors. Information about threats and the fear generated thereby lead to avoidance and reduce intentions to adopt recommended protective behavior (16).

Taking into account that emotional responses to the pandemic are inevitable, and that emotions can make the population more susceptible to distorted information, it is necessary to develop and implement targeted strategies based on the needs of the population in public health crises (17).

Some recommendations for developing such strategies would be: (1) Promoting a single source for verifying information about COVID-19 (e.g. [www.covidinfo.gov.md](http://www.covidinfo.gov.md)); (2) Strengthening a fact-checking platform for health information; (3) Forming teams to combat misinformation; (4) Developing partnerships between health authorities and media institutions; (5) Increasing trust in authorities, including through assertive communication strategies; (6) Promoting information that would lead to a positive attitude towards COVID-19 vaccination; (7) Using opinion leaders; (8) Diversifying accurate information offered to national minorities in different languages; (9) Building resistance to misinformation by developing internet users’ competencies; (10) Using Social Listening reports to adjust communication strategies.

2. The net sentiment score of the population regarding the topic of COVID-19 is negative, with a dominance of the emotion of anger.
3. Some of the posts with a high level of engagement express distrust regarding the reality of the pandemic, reluctance towards the actions taken by authorities to counter the pandemic, and/or conspiracy theories, which indicate the presence of falsehoods on social media and the need for targeted responses from authorities to increase the population's resistance to misinformation.
4. The phenomenon of infodemic in public health crises is very complex, and in order to address it at the national level, long-term communication strategies are needed.
5. In the context of the limitations observed in this study, it would be beneficial to combine future digital analyses of public opinions on public health topics with data from complementary research (such as KAP studies, offline population dialogues, observational qualitative studies, etc.).

## LIMITATIONS

The present study has several limitations:

The study gathered the opinions of those who are active on social media platforms, predominantly those aged 18-34, therefore not taking into account the voices of the entire population. At the same time, the opinions of people with limited access to social media (usually classified as vulnerable individuals) are not known. According to World Bank data, 76% of the country's population has access to the Internet (18).

Other limitations are related to the privacy policies of social media platforms, which restrict access to posts with private content (including closed groups), therefore only public posts were analysed in the study.

A particular suspicion is determined by the accuracy of evaluating internet users' sentiments. Some of the automated assessments made by the software did not correspond with the researchers' assessments, which is why sentiment assessments were sometimes done manually.

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## CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## ETHICAL APPROVAL

Ethical approval was not required.

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