



Anti-vaccine movements – health care, ignorance or a diversion aimed at destabilizing the health situation? Part 2. Contemporary conditions for the functioning and development of anti-vaccination movements

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Abstract

Introduction. Vaccinations are a way accepted by science of the struggle against infectious diseases. Because of their epidemiological significance, vaccinations are considered compulsory in many countries and their evasion is penalized. The WHO experts list anti-vaccine attitudes and movements among the top 10 threats to human health. Most people's refusals are mainly due to fears of anti-vaccine propaganda. Understanding this phenomenon will be the basis for improving the epidemiological situation in Poland.

Materials and method. The study is based on the analysis of data stored in scientific databases, as well as information obtained from Google, Bing and Yahoo and newspapers, magazines and opinion-forming websites.

Results. The anti-vaccine movements occur due different motivations, such as ignorance, fear and religious beliefs. Sometimes they can be supported by foreign services aimed at destabilization in selected areas of the globe.

Conclusions. Increased activity and effective propaganda carried out by anti-vaccination movements is possible, among others, thanks to the development of the so-called 2nd generation of the Internet (Web2), enabling the free and difficult to control flow of information. Increasing data indicate that the activity of anti-vaccine movements may be a form of organized action (diversion in cyberspace) aimed at social, epidemiological, and economic destabilization of selected countries and regions.

Among the various forms of combating anti-vaccination movements currently used are awareness-raising activities and restrictions on freedom on the Internet by monitoring information flow, blocking materials containing selected phrases or keywords associated with anti-vaccine propaganda, and sanctions imposed on people avoiding vaccination.

Key words

vaccination, cyberspace, misinformation, anti-vaccine movements, diversion

INTRODUCTION

Because vaccination is an obvious interference with the normal functioning of the human body, its use arouses interest, doubts and fears (as is any interference with the functioning and integrity of the human body). Vaccinations, like any medical intervention, can also be the reason for the appearance of adverse symptoms and complications, especially when the benefits and potential risks of the

medical procedure are inadequately balanced. Data on the harmfulness of vaccinations cited in historical sources are often disturbing and provoke anxiety. The fact, however, is that these reservations and doubts relate primarily to the older generations of vaccines that have long since been withdrawn from use. The mentioned disturbing data are often based on unverified and exaggerated facts, duplicating superstitions, containing distortions, and are quoted, exaggerated and misrepresented by people with no medical knowledge.

There is no doubt that the activity of opponents of vaccines has increased in recent years. Scientific analysis of this phenomenon and attempts to counteract the behavior of individuals, as well as formal and informal groups introducing information chaos, can help in the fight against growing

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reluctance or refusal to vaccinate. This is especially necessary in countries with low vaccination coverage, especially when it concerns vaccinations against infectious diseases thought to be under control. This opinion has been also expressed by WHO experts who have listed the anti-vaccine attitudes and movements among the top 10 global threats to human health [1]. The list also includes threats, such as increasing antibiotic resistance, environmental poisoning, including air pollutions, as well as the spread of HIV, EBOLA and Dengue diseases.

The state of global vaccination for the most important diseases covered by vaccination programmes – diphtheria, hepatitis B, measles, mumps, rubella, whooping cough, polio, rotavirus diarrhea, tetanus – does not exceed 85% and has not increased in recent years, despite many efforts [2]. For most infectious diseases, the population safety threshold is between 90–95%, i.e. when 90–95% of the population has satisfactory immunity [3]. It is estimated that the implementation of satisfactory immunizations against the mentioned diseases could result in saving the lives of 1.5 million people worldwide [4].

Despite the fact that the level of global vaccination has remained unchanged in recent years, there are countries where the percentage of people refusing vaccination has increased, and the percentage of people who are properly immunized has decreased. Poland, Finland, Ukraine and Romania belong to the last mentioned group of countries [4, 5]. A thorough analysis of the reasons for anti-vaccination movements indicates that the majority of refusals are mainly due to fears fueled by anti-vaccine propaganda. Understanding this phenomenon will be the basis for effective actions aimed at halting the dangerous trend manifested in opposition to vaccination and, as a consequence, in the increase of the epidemiological threat in Poland.

OBJECTIVE

The aim of the study is to present the history, conditions of functioning in public space, and the current context of the actions of vaccine opponents. The fact that anti-vaccine attitudes may be the consequence of cyberspace sabotage involving interference in the epidemiological state through impact on the morale of the populations, was also taken into account.

MATERIALS AND METHOD

The study is based on the analysis of published data on anti-vaccination movements and their broad historical, political and social context. Data on anti-vaccine movements and threats resulting from the uncontrolled flow of information in the era of rapid Internet development come from the following database materials: NCBI (The National Center for Biotechnology Information), MEDLINE / PubMed created by the National Library of Medicine in the USA, Science Direct Web of Science, Springer, Medline Complete and Web of Science. Data on arguments and agitation methods carried out by anti-vaccination movements, as well as actions taken to identify and prevent sabotage in cyberspace, also come from the above-mentioned databases, as well as from resources registered by the Google, Bing and Yahoo search

engines, i.e. from content published in daily press, popular books, advertisements, leaflets, magazines and websites, including those forming opinions.

Additional sources of information were legal acts in force in Poland and the EU, Reports of the European Commission and official documents published by the Polish government and EU agencies. Materials published in Polish, English and Russian were analyzed.

RESULTS

Conditions for the existence and functioning of anti-vaccination movements. The term ‘anti-vaccine movement’ is used to describe a very heterogeneous group of people representing different points of view, reporting various doubts and making various postulates. They are people who:

- fear vaccination as a result of lack of knowledge – doubts that have not yet been sufficiently explained by scientists and /or there are no satisfactory answers in official means of social communication (leaflets, articles in popular magazines, posters in clinics);
- are convinced that they or their family members / friends have lost their health as a result of vaccination;
- express dislike / hostility towards evidence-based medicine, because they themselves benefit from advocating so-called alternative medicine (unfair competition);
- are psychopaths who want to appear in public space at all costs;
- are full of sick emotions present (mentally unstable) and enjoy the anxiety and fears of others;
- express the interest of producers of medicines and supplements advertised as effective in infectious diseases;
- are religious fanatics (including opponents of medical interference in the human body or the use of drugs based on blood or other human tissues);
- present the willingness to act in accordance with the broadly understood personal freedom; they do not deny the sense of vaccination, but strive to abolish the obligation to vaccinate (e.g. in Poland the National Association for the Knowledge of Vaccinations ‘STOP NOP’) [6];
- force the interests of organizations / countries seeking to destabilize the epidemiological situation, and consequently the economic and social situation in the region / country.

The idea of vaccine movements is mistakenly linked to the numerous protests and criticisms of health care expressed by numerous population groups that appeared after Andrew Wakefield published a paper suggesting that MMR vaccines are the cause of undisclosed complications, such as autism and chronic inflammatory bowel disease. The theses contained in his dishonestly prepared scientific work (1999) [7] caused uncertainty, and even fear of vaccines, and the formulation of allegations of dishonesty of scientific and pharmaceutical companies.

Meanwhile, various forms of opposition to vaccination had appeared much earlier, during the first attempts at active immunization in the 18th century. Examples of such opposition are contained in published sermons of clergymen such as John Williams of Massachusetts, who claimed that vaccines were the work of the devil [8] and Fr. Edmund Massey in England, who in 1772 voiced the suggestion that vaccinations are ‘devilish attempts’ to oppose God and the

punishment he sent for human sins [8]. Initially, therefore, the criticism of vaccination resulted from religious aspects. In the nineteenth century, criticism also concerned the very fact of compulsion to vaccinate, and thus a form of limiting personal freedom (freedom of decision making). Movements fighting for personal freedom, criticizing the compulsion to vaccinate, were particularly active in England, especially in London, where the League Against Vaccination was established [8]. In 1989, the league forced the British parliament to accept a law abolishing penalties for evading vaccination, and gave parents the right to opt out of vaccinating children [9]. The development of modern medicine, the appearance of effective methods of combating many infectious agents and the development of methods for counteracting epidemics based, among others, on mass vaccination, have led to the disappearance of many emotions associated with vaccination.

There is no doubt that Andrew Wakefield's scientific counterfeiting has become a factor that has undoubtedly influenced the re-emergence of strong anti-vaccination emotions. It seems that the emergence of a new information medium that was almost completely uncensored – that is, the appearance of the Internet with web browsers and social networking services contributed to this phenomenon.

Over time, the Internet has become a medium with a very strong impact on society. Symbols of this power of influence have become, among others, Facebook, founded in 2004, and Twitter in 2006. The Internet has given previously unattainable opportunities for rapid, cheap, global dissemination of both important, educationally, and scientifically valuable content, as well as content that violates social order, violating existing norms of coexistence – such as anti-vaccine movements, pro-anorectic movements (pro-ana), as well as Internet forums that encourage teenagers to commit suicide (pro-suicide websites), movements promoting various dangerous eating habits, groups rejecting evidence-based medicine and promoting new and traditional methods of unconventional treatment, forums dealing with the issues of hand-made weapons, drugs, and terrorist groups. The possibilities of any Internet content control are very limited and it can become an ideological diversion tool. The theory of this type of disinformation was described, e.g., by Vladimir Volkoff [10], and examples of disinformation operations (conducted by, among others, the Eastern Bloc), e.g. described by the defectors, e.g. by Anatoliy Golitsyn [11] and Ion Mihai Pacepa. Currently, there is evidence that support for anti-vax movements can also be a form of international war aimed at destabilizing the situation in a target country without committing physical attacks.

Intelligence data indicate that in January 2012, the Foreign Intelligence Department of the Russian Federation (SVR) allocated over 30 million rubles [12] to develop new methods of monitoring the Internet network and 'mass distribution of information messages' on social forums 'to modify public opinion'- 3 Dysput, Monitor-3 and Sztorm-12 projects [13]. The first two projects were to analyze social attitudes, flow of information on the Internet, assess factors affecting public perception of information, identify determinants of the propagation of attitudes and views, and monitor the Internet for the presence and changes of these factors. The Sztorm-12 project aims to control mass consciousness, both at home (Russia) and abroad. This task is implemented by placing prepared information in social networks [13, 14].

There is also a so-called dark side of the Internet, known as the 'dark internet' or 'dark network', a deliberately

hidden part of online resources that can only be viewed using special software. In practice, control is a very difficult form of communication, and the flow of thoughts and concepts takes place in almost unlimited freedom, also in the worst sense of the word, such as trafficking in human beings, arms trafficking, drugs, drug production, poisons, paedophile groups, purchase of dedicated viruses, purchase of stolen databases (from banks and social networking sites – passwords, logins, etc.) as well as the hire of paid killers. One of the possibilities offered by the 'dark internet' is the use of so-called 'bots' – servers to carry out ideological redirection and purchase of spyware to infect private computers with prepared computer programmes in order to engage them in the dissemination of false information affecting moods and shaping views.

Anti-vaccination movements and anti-vaccination arguments as a symptom of a crisis of confidence in science, its representatives, the authority of governments and integrity of pharmaceutical companies. Criticism of vaccination and the arguments used contribute to the widespread lack of confidence in science, State authorities (the Minister of Health decides on the content of the preventive vaccination programme, State institutions deal with vaccine testing and marketing), and health care workers.

Judging by the published opinions, many people are able to believe that the world has been dominated by supranational forces aiming at making profits at all costs, depopulating and making people slaves (vaccines help to achieve this goal by impairing the intelligence quotient [15]). The crisis of confidence in science is fuelled by published cases of dishonesty by scientists, and irresponsible statements by those shaping public opinion (politicians, celebrities, and even scientists). Probably the most publicized case of abuse by scientists is an article published by researcher Andrew Wakefield in the highly respected British medical journal *The Lancet* suggesting that MMR vaccines are the cause of autism in children [9]. The article was a fraud, which was proved, and *The Lancet* withdrew the publication after an independent auditor proved that there were factual errors in Wakefield's article [16]. He was reprimanded by the British General Medical Council for his unethical conduct and his right to practice medicine in the UK was withdrawn. This does not change the fact that the theory of autism appearing as a vaccination complication already lives 'its own life', and the author of the published lie is still an 'anti-vaccine guru'.

Preaching 'own' truths which are not confirmed by scientific evidence is also found in Poland. This becomes particularly dangerous when it is carried out by people with scientific titles, doctors, celebrities, politicians (who enjoy the privileges of publicly promoting their own opinions), or when disinformation campaigns are conducted in the broadly understood public space and do not meet the appropriate reaction of the security forces. Examples of such publicly voiced opinions used for the purpose of anti-trailer vehicles are detailed below:

- 'Vaccinations reduce intelligence and cause autism' – this is the conclusion of a lecture by Prof. Maria Dorota Majewska, a neuroscientist at the Catholic University of Lublin in 2017 [15].
- Prof. Maria Dorota Majewska also stated during a discussion on vaccinations that 'it is estimated that about 20% of corporate crimes are committed by pharmaceutical

- companies' (including those producing vaccines), these crimes are associated with 'falsification of research results, publishing fabricated, deceptive publications, as well as concealing evidence of their harmfulness, bribing doctors and medical officials to prescribe and recommend specific medications' to their patients [17];
- In 2014, Prof. Maria Dorota Majewska gave an interview in which she stated that 'both historical data and contemporary research and observations show that in the 21st century, when 24-hour medical care is available, mass vaccinations are not needed because they bring more harm than benefits' [17]. In the interview, she referred to unspecified scientific studies which 'prove that in countries where less vaccinations are used, child mortality is lower' [17] and stated that 'German survey research on several thousand children 'indicates' the relationship between autism and many other chronic paediatric diseases and vaccinations is evident' [17];
 - In 2017, Prof. Maria Dorota Majewska published an article on the blog 'Astromaria' containing accusations that vaccine manufacturers add heavy metal nanoparticles that damage DNA and cell membranes, and that 'forced vaccinations should be considered as gigantic, illegal, criminal pseudomedical experiments on entire nations, whose real goals remain hidden and 'in countries that use a wide range of vaccinations, societies are close to annihilation'. She expressed the opinion that 'in the US, more than 60% of children already have serious chronic vaccinations complications (epilepsy, diabetes, asthma, autism, ADHD, mental retardation, autoimmune diseases, rheumatism, cancer, and others), about 30% of children have seriously damaged brains, and hundreds of thousands are killed with vaccines' [18];
 - In 2014, Prof. Maria Dorota Majewska sent to the Board of the Polish Society of Vaccinology, the Board of the Polish Paediatric Society and the Board of the Association of Medical Hygiene Department of Health Prevention Department, a letter in which she stated that the harmful effects of vaccines are intentionally hidden from societies by the governments of Poland and other countries [19];
 - Dr Dorota Sienkiewicz, MD, paediatrician and rehabilitation doctor, employee of the Children's Rehabilitation Clinic of the Medical University of Białystok, Poland, which supported the STOP NOP initiative in the lower chamber of the Health Committee of the Polish Parliament (2018), in the article 'Safe vaccinations – prophylactic vaccinations' (...) it is worth applying the following principle of caution: if there is a probable, though little known risk of negative effects of the new technology, it is better not to implement it than to risk uncertainty, and potentially very harmful consequences' [20].
 - Dr Dorota Sienkiewicz, MD, is also the author of a publication in which she suggests that vaccines, on one hand, can cause autism, ADHD, allergies, and other civilization diseases, while on the other hand, they are ineffective.
 - Andrzej Majkowski, MD, a paediatrician and until recently an employee in a clinic in Zielonka near Warsaw, is an opponent of vaccinations and publicly proclaims that vaccines cause autism. His statements are often cited by vaccination opponents [21];
 - Jerzy Jaśkowski, MD, a graduate of the Medical University of Gdańsk, describes vaccinations as genocide and official information on vaccinations as 'an operation of satanic globalists regarding the physical extermination of Poles by means of lethal vaccination' [22];
 - Hubert Czerniak, MD, candidate for the position of MEP (European Parliament elections in 2019) supporting the STOP NOP Association, and supporter of Jerzy Zięba (a well-known propagator of treatment of diseases with megadoses of vitamin C) and alternative medicine, participated in anti-vaccine rallies. During such rallies, he appealed to participants 'don't let your children be murdered', suggesting that vaccines cause autism, brain damage and death [23].
 - In September 2015, Elżbieta Dąbrowska, MD, a paediatrician and family doctor, in the article in the journal entitled 'Głos Wielkopolski', unequivocally opposed vaccination, suggesting that 'vaccination ruins your health' and 'an alternative to vaccination is building immunity using a proper diet' [24, 25];
 - In June 2018, Paweł Skutecki, a politician and journalist, member of the Sejm of the 8th term (formation: Kukiz'15), during the march of 'anti-vaccines', used the statements, 'I am against mandatory vaccinations' and 'Scaring us with an epidemic is absurd and the word 'epidemic' is abused' [26];
 - The well-known journalist Wojciech Cejrowski, on his Facebook profile appealed to the parents of vaccinated children to persuade doctors to sign a statement that vaccines do not harm the child, do not contain such substances as ammonium sulfate, glycerol, foetal calf serum, phenol red, or neomycin [27]. In this way, he undermined trust in the integrity of persons and institutions involved in the prevention of infectious diseases.
 - In 2009, Ewa Kopacz, Minister of Health and member of the Polish government, spoke publicly about vaccines authorized for use in the EU using the words, 'There will be no vaccines against A/H1N1v until I find them safe'. In this way, she suggested that the EU institutions dealing with the prevention of infectious diseases were not trustworthy.
 - in 2014, a surprising post-graduate course was created at the Silesian Medical University: 'Homeopathy in alternative medicine and pharmacy' [28]. This happened despite the fact that in Poland homeopathy is not considered recommendable and does not comply with the principles of evidence-based medicine. It should be mentioned that there are many opponents of vaccination among supporters of alternative medicine;
 - In 2017, a billboard campaign appeared under the brand name of the National Association of Vaccination Knowledge 'STOP NOP' in the Kuyavian-Pomeranian and Łódź provinces which, in the statute, have the declared task 'to disseminate knowledge about actual safety and effectiveness, so-called protective vaccinations'. The posters had the provocative slogan 'More vaccinations = more diseases?', exposed slogans: allergies, cancer, asthma, diabetes, autoimmune diseases and the obviously provocative sentence, 'studies show those who are vaccinated, become ill more often'. The posters were also decorated with graphics referring to the times of terror and genocide of World War II. Officially, the action was funded through an online fundraiser [29], but the details of the financing are still not completely clear. This was against the provisions of Polish law and the official statutory

objectives of ‘STOP NOP’, but was not effectively blocked and stigmatized by institutions designated for this purpose. Similar billboards appeared in 2018 in Żywiec.

Of course, one can question the meaning of the above statements, their intentions, actions and decisions, but the fact is that they have been articulated and appeared in the public domain and have not been met with sufficiently severe criticism, effective counter-arguments, effective opposition from State authorities, and due to the facts mentioned, these statements are still cited and appear in public areas. Meanwhile, a report from the European Commission, published in 2018, states that Europe has become the region with the lowest trust in vaccination in the world, and since 2015, trust in vaccination has clearly decreased in Poland, Sweden, Finland and the Czech Republic [30]. In 2018, Poland was among the leaders in European countries in terms of distrust of vaccination safety: 72.4% of respondents expressed confidence, in Germany – 83.6%, the UK – 89.9%, and Portugal – 95.1%) [30].

Crisis of trust in science as well as public institutions, and freedom of speech. The ideas of freedom of speech and the emergence of universal access to the Internet significantly facilitate the spreading of disinformation in society (Tab. 1), and cause a crisis of confidence in government institutions, as well as scientific and official authorities.

Table 1. Media – range of information dissemination and possibilities of censorship

Means of interpersonal communication	Range of information dissemination	Possibilities of censorship
Conversation, social gatherings	short	Self-censorship only.
Rallies, meetings	medium	Possibilities are moderate. Preventive censorship under local law regarding the conditions for organizing meetings.
Radio and television broadcasts	wide	Large possibilities. Censorship regarding selection of invited guests. Moderator supervision.
Local magazines, newspapers	wide	Large possibilities. Editorial supervision.
Internet – Official websites edited by magazine editors, governmental and non-governmental organizations	very wide	Large possibilities. Editorial supervision.
Internet – Private websites	very wide	No possibilities or very limited possibilities. ‘Shutting down servers’, cutting off access to the Internet (e.g. China).
Internet – Social media based on the concept of Web 2.0	very wide	Limited possibilities of automatic censorship. No effective moderation possible.

Source: author's own study.

Analysis of the participation of individual media in the process of information exchange and shaping of public opinion indicates a gradual disappearance of the traditional press and periodicals market, as shown by the drastic annual decrease in newspaper expenditure. Every year, radio and

television record a decline in their audiences. This decrease is explained, on the one hand, by the low flexibility of the form and content of the message in relation to the expectations of individual recipients (interaction expected today), and on the other hand, by losing confidence in the impartiality and integrity of traditional media (the slogan: ‘television lies’, newspaper = ‘rag’ (pol. *piśmiǳło, gadzinówka*).

Currently, public opinion is shaped by the Internet, online advertising, real or fake news, content on social networks, content on blogs that are affected by interests and attitudes, so-called ‘influencers’, often funded by companies expecting the display of advertisements in exchange for sponsorship.

Today, using the Internet is also the cheapest way of accumulating knowledge; however, it is also a medium with great potential for effective disinformation, among others by dishonestly creating a good reputation for companies that do not deserve such a reputation (Online Reputation Management, ORM). ORM can promote as credible any companies / groups of people that benefit from propagating lies and counterfeiting. There is the so-called positioning of specific search terms in search engines, there is also the practice of shaping public opinion based on false information / opinions / reviews edited by dishonest, paid Internet users (such dishonest ‘reviewers’ can earn PLN 600–800 in a few hours, thanks to several entries and responses to comments on social media [31]).

Examples of vaccine misinformation on the Internet identified as coordinated and targeted hostile actions.

Little is known about the potential role of hostile political interests in the implemented secret disinformation activities because information on this subject appears very rarely. These include data published by The East StratCom Task Force, a team created during the European Council meetings on March 19–20, 2015. Its goal, among others, is the development of forms of effective information exchange strategies in the EU, and to prevent misinformation.

An important source of information on observed activities are also materials published by DARPA (US Agency for Advanced Defense Research Projects). Examples of identified hostile activities detrimental to health security implemented in 2017–2019 are given in Table 2.

There are suggestions that Internet diversion groups use programme based on artificial intelligence algorithms that allow for automatic conversation, without the need for human involvement [33]. Computers conducting automatic conversations and making autonomous decisions regarding the course of discussion are called ‘bots’ [34]. In 2015, as a result of the action taken by DARPA, 25 Russian bots [34] were identified that were carrying out propaganda activities spreading disinformation about vaccinations.

A particular intensity of such propaganda has been noted on such social networks as Twitter and Facebook [35]. In the period 2014 – 2017, an anti-vaccination campaign was conducted on Twitter by the Internet Research Agency (IRA), a group of Russian paid agents dealing with disinformation on the Internet. This group used servers with specialized software allowing the generation of a large number of entries while maintaining the appearance of actual discussion. The campaign used the hashtag ‘#VaccinateUS’ [36]. Sample entries promoted the following content, ‘freedom of choice / opposition to vaccination’, ‘you can’t trust the government about vaccinations’, ‘vaccines do evil and have side-effects’,

Table 2. Misinformation regarding vaccinations related to identified Russian sources [32]

Date of identification of source of misinformation	Message content	Source of misinformation	Coverage / recipients of misinformation
10.03.2019	The Ukrainian authorities are so stupid that they are unable to manage the measles epidemic	<i>Voskresnyi Vecher s Vladimiram Solovyovym</i>	Ukraine
03.03.2019	The measles epidemic in Ukraine is the fault of Ulana Suprun, the incumbent Minister of Health of Ukraine and the effect of his reforms	<i>Russian RT</i>	Ukraine
25.02.2019	Vaccines in Georgia are carried out by the Lugar laboratory (about which there are many reservations); it is preferable to use vaccines produced in Russia	<i>Asaval-Dasavali weekly newspaper</i>	Georgia, Russia
15.01.2019	Almost 100 deaths have been reported after using the free Hep C vaccine produced by Lugar Lab	<i>News Front</i>	USA Georgia, Russia
14.01.2018	The population of Ukraine is rapidly decreasing due to lack of money and health care reform	<i>Vesti Nedeli s Dmitriem Kiselyovym @ Rossiya 1 TV</i>	Ukraine
03.12.2017	Bill Gates wants to depopulate the world	<i>Vesti Nedeli s Dmitriem Kiselyovym @ Rossiya 1</i>	Worldwide coverage
06.11.2017	European countries with no compulsory vaccination programmes are more successful in fighting disease; vaccinations cause autism	<i>Tbilisi 24 online</i>	Europe (mainly Italy, Czech Republic, Germany)

'natural immunity is better', 'vaccines cause autism', 'diseases are not so dangerous', 'vaccine components are a hazard to humans' [36].

Fight against misinformation in response to movements against vaccines. The new five-year strategic plan of the World Health Organization (WHO) adopted at the 71st World Health Assembly in May 2018 – '13th General Programme of Work' for 2019–2023, outlines the anti-vaccine attitudes as well as anti-vaccine movements among the top 10 threats worldwide.

In 2010 in the United States and Canada, it was estimated that about 75–80% of Internet users sought health information, and 52% believed that 'all or almost all' information they found in the Internet was trustworthy [37, 38]. In 2012, 84% of Poles using the Internet expressed the opinion that the Internet was their primary source of knowledge on broadly understood aspects of health and disease [39].

In practice, taking into consideration the scope of the Internet (and the Web), speed of dissemination of information, the flexibility of the language of communication (memes, colloquial language, language of subcultures), as well as changings in political contexts, there are difficulties in controlling the transmitted content [40].

Individual governments fight against harmful content on the Internet through [41]:

1. Awareness campaigns.
2. Awareness campaigns in government media (e.g. government-controlled radio stations in Nigeria).
3. Introducing law penalizing certain behaviours (Rwanda, Italy, Egypt, Indonesia, Cameroon).
4. Network monitoring and server blocking.
5. Monitoring the network and cutting-off access to the Internet for people breaking the established rules (China, India).
6. Blocking certain types of Internet activity (creating databases of prohibited words, passwords, hashtags) [42].
7. Blocking access to social media in selected areas (China).
8. Introducing a limited version of the Internet (Intranet – having the equivalents of global network functionality in the form of separate Internet search engines, e-mail and information services) in the country (North Korea, Cuba, Iran).

These activities are used by undemocratic countries that are afraid of ideological diversion and are attempting to destabilize the social situation. For now, vaccine movements are not widely considered a serious threat, and do not prompt governments to take such drastic measures as blocking servers or blocking the Internet and creating internal networks (Intranet). However, the facts speak for themselves, that the only reasonable way to fight the spread of fraudulent vaccination content [40] must be carried out through the Web and social networking.

To-date, the fight against the spread of anti-vaccine content has been conducted in a rather insignificant way. The methods used include publishing content raising citizens' awareness, monitoring the Internet and blocking content containing words suggesting propaganda against vaccination. Awareness campaigns seem to be a good solution, but the following condition must be fulfilled – public willingness to read such content. In Poland, such an educational and informational role is played by materials published by the National Institute of Public Health – National Institute of Hygiene. The materials are published on the website 'Information on vaccinations. All about vaccination'. Unfortunately, this is not a sufficient opinion-forming portal to block the functioning of vaccine movements and debunk false accusations that vaccine data is false, and governments, scientists and pharmaceutical companies should not be trusted. People who have encountered anti-vaccine propaganda usually do not look for arguments on the websites of official institutions.

The introduction of censorship on the Internet is becoming a drastic but more effective way of fighting against vaccine movements. This may include imposing an obligation on Internet providers or social media owners to control the Internet and report infringements [43]. The obligation to comply with such requirements (acceptance of the so-called EU Code of Practice on Disinformation adopted in 2018) has already been signed by Google, Facebook, Twitter and Mozilla [44, 45]. There are also first attempts to block disseminated content promoting anti-vaccine attitudes.

Instagram owner, Facebook (since 2012), has declared that this site will block hashtags used to disseminate false vaccination information. Currently, the site is blocking hashtags that suggest harmfulness of vaccinations (e.g. **#Autism vaccines – #vaccinations cause autism**), and

preparations are underway to also block hashtags under which attempts to publish disinformation content have been attempted in the past [42]. In 2017, the Pinterest community site removed the keyword ‘vaccine’ from its search engine.

Another form of opposing the anti-vaccine movement is blocking the revenue generated by anti-vaccine content promoters, e.g. blocking advertising revenue on YouTube. This web portal has blocked revenue sources for broadcasters such as LarryCook333, VAXXED TV and iHealthTube. Restrictions did not apply to Polish broadcasters because, as explained on YouTube, locks are only applied after a greater number of objections raised by users, and this condition has not been met [46]. Such actions that violate broadly understood freedom on the Internet are criticized, and criticism is also fueled by persons / organizations dealing with disinformation on the Internet. The paradox of modern times is that free nations try to limit the freedom of their citizens, and the slogans of freedom are proclaimed by forces seeking destabilization in the world.

Regardless of awareness campaigns and attempts to block anti-vaccine content on the Internet, attempts are being made to mobilize the parents / guardians of children and implement the vaccination programme. Forms of pressure are activities that impede the social functioning of unvaccinated people, and even financial sanctions. Among the examples are following ones:

- Penalties for avoiding qualifications for vaccination. The Supreme Administrative Court (*Naczelny Sąd Administracyjny*, NSA, in Poland) ruled that a parent who does not appear with the child to perform the pre-vaccination qualification test breaks the law because he refuses to comply with his statutory obligation. The NSA allows the imposition of a fine on each parent separately [47].
- Financial penalties for parents whose children have not been vaccinated despite the absence of medical contraindications. In Poland, a fine for avoiding child vaccination can range from 100 – 5000 PLN (1 PLN = approximately ¼ USD) at one time. Fines may be imposed repeatedly. The upper limit of fines is PLN 50,000. The decision to give parents a criminal mandate is taken by the provincial governor, at the request of the local sanitary officer. Unfortunately, the possibility of using the appeal procedure makes this provision ineffective.
- Parental rights limitation – The Ombudsman for Children (Poland) in 2016 issued the opinion that ‘a guardianship court may and should, at the request of the sanitary court, initiate proceedings on the limitation of parental authority’, citing art. 109 of the Family Guardianship Code [48], paragraph 1 regarding the threat to the best interests of the child [49].
- Creating difficulties associated with admission to educational institutions (schools, kindergartens) in some cities, which charges parents additional costs (the child must provide compulsory education in educational institutions distant from the place of residence). Such decisions are made by local governments (e.g. Łódź Voivodeship, Poland), but this is not fully supported by the Ombudsman for Children and the Ombudsman and the Minister of Education, because they impede the constitutional right to access education. Meanwhile, in Canada, the USA, France, and recently also in Romania [50], the law in force allows the refusal of admission of

unvaccinated people to school, in France also to sports clubs, and in Germany to kindergartens [51].

- Refusal of medical care for an unvaccinated child [52] – actions taken by some outpatient clinics in Poland [52]. However, these attitudes are not fully in compliance with Polish law.
- Reducing the value of Child Benefit if the child has not been vaccinated (Australia, action called ‘You don’t prick, we don’t pay’ [51]).
- Prevent unvaccinated children from attending childcare centres (New South Wales, Australia since January 2018. Headmasters of such childcare centers who would violate the ban on accepting such a child would face a penalty of \$ 5,500 (\$ 4,400) [50]).
- Parents who are against vaccination must participate in training on the importance of vaccination (Germany). There is no obligation to vaccinate, but refusal to participate in such a conversation / training is punishable by a fine of up to EUR 2,500 [50, 53]).
- Penalties for parents of unvaccinated children. The city of Rimini (Italy) adopted a resolution that non-compliance with the obligation to vaccinate children up to 6 years of age is punishable by a penalty of 50 Euros per day [54]. In Rimini in 2019, the parents of unvaccinated children who developed measles were charged a sanitary penalty of 181 Euros [54].
- The obligation to have a certificate of current vaccinations is imposed on people starting work in some professions (in Finland, from March 2018, health and social care workers must be vaccinated against measles, chickenpox, pertussis and influenza, despite the right to choose to be vaccinated or not).

In many countries, attempts to tighten the rules are associated with strong public opposition supported by specific political movements. Due to the social context and the emotions hidden by some socially catchy slogans, such as abortion, LGBT, abuse, the right to own weapons, and vaccination, political parties often resort to this method of mobilizing their voters. Such methods are used by political parties known as populist [55], and anti-vaccination moods increase when such parties gain popularity (this is particularly evident in Greece, France and Italy) [55]. These trends can also be seen in Poland [56]. Below there are listed some examples of political parties officially involved in rhetoric or anti-vaccination activities and their activists:

- In Poland, the Kukiz’15 movement, considered a ‘political voice against vaccines’. In 2016, on the initiative of the Kukiz’15 Movement, the Parliamentary Team on the Safety of Vaccination for Children and Adults was established. The purpose of this movement is ‘to change the system for monitoring adverse vaccination reactions(...) and (...) to eliminate sanctions associated with cancellation of vaccination’ and (as intended) – to abolish the obligation to protect against vaccination [57].
- in Italy, the co-leader of the Five Stars Movement, founded by Beppe Grillo, a well-known opponent of vaccination.
- in France, the National Union led by Marine Le Pen.
- in Ukraine, according to Kateryna Bulavinova, a UNICEF medical expert, ‘with every election, with every change of power, politicians speculate on vaccines’ [58].
- in Denmark, the populist Danish People’s Party.
- In Russia, populist parties use anti-vaccine rhetoric as an argument to polarize voters’ moods [59].

CONCLUSIONS

1. Increased activity and effective propaganda carried out by anti-vaccination movements is possible, among others, thanks to the development of the so-called 2nd generation of the Internet (Web2) enabling the free and difficult to control flow of information.
2. Increasing data indicate that the activity of anti-vaccine movements may be a form of organized action (diversion in cyberspace) aimed at social, epidemiological, and economic destabilization of selected countries and regions.
3. Among the various forms of combating anti-vaccination movements currently used are awareness-raising activities and restrictions on freedom on the Internet by monitoring information flow, blocking materials containing selected phrases or keywords associated with anti-vaccine propaganda, and sanctions imposed on people avoiding vaccination.

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