

# Biological mis(dis)-information in the Internet as a possible Kremlin warfare

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## Abstract:

Background: Although much emphasis is placed on the foreign intelligence driven disinformation and other associated phenomena, there is almost no attempt to reveal its impact on biological negationism. The article discusses the use of narrations via ICT in biological negationism terms against Europe, particularly Poland, and provides examples of such narratives such as the "Ukrainian biolabs", animal breeders protests, infectious disease among refugees and food insecurity. Means of possible influence of foreign intelligence on European public health and agricultural (mainly animal) production (i.e. by dis(mis)- information in social media) in context of agro/bio-terrorism are attempted. Our goal is to raise awareness among ONE health specialists and security managers about empirical symptoms of the Kremlin in fueling the Polish (European) Internet.

Methods: The study employs both qualitative (12 months) and quantitative (5 months) methods to assess digital traditional and social media after 24.02.2022. 1) We assessed qualitatively media releases in Russian about biological weapons and compared them with official documents released by Russia for the Biological Weapon Convention (BWC) meetings. 2) We performed quantitative analysis of the Polish infosphere between 24.02-01.08.2022 to measure the effectiveness of external Russian propaganda on causing anxiety and fear in Polish society the context of biological weapons and food insecurity 3) Additionally we attempted qualitatively material from 01.02.2022-31.01.2023 to understand the potential use of misinformation in the context of biological weapons, food insecurity infectious diseases among Ukrainian refugees and

agroterrorism as a form of propaganda. 4) The study also applies calibrated Grunow & Finke and Agricultural Index epidemiological assessment tools (per analogy of viral information) to animal breeders' protests in the Netherlands and their supporters in Poland.

Results: Due to the lifecycles and content of narration in One health we can observe adaptive behavior of Russian Intelligence.

Conclusion. In our opinion, the strategic goals of Russian INFOOPS (information operations) were not achieved (i.e. as we see less and less impact on Polish infosphere after failure of BWC consultation and failure of hunger threats). The "Biolab" disinformation campaign is purely a product of propaganda offices or PR agencies and was without any kind of attention to biological integrity. However, fueling polarization and fear in food insecurity, animal breeders' protest and refugees' health may be interpreted in PSYOPS (psychological operations) dimensions, so operational goals of Russian intelligence were satisfied as popularity and social consequences of biological negationism raised in 2022.

keywords: agroterrorism, bioterrorism, food security, biopolitics, INFOOPS / PSYOPS

## 1)Introduction

The food crisis, biolabs, COVID-19 in other infectious diseases in the media dimension can be analyzed in the INFOOPS (information operations) and PSYOPS (psychological operations) dimensions (Marek, 2022a). This study sets out to analyze communication processes in a security bio/agro-terrorism perspective. From the perspective of infodemiology (as we have learned well during the pandemic (Eysenbach, 2020)), it is very important to understand potential engagement of foreign intelligence in the discourse on infectious diseases through "bot army", "troll farm", influence agents, or ordinary useful idiots (Kasprzyk, 2022). Unfortunately, Poland is dealing with a well-prepared and experienced with information warfare enemy who might use biological agents for propaganda purposes, because it allows for a low cost populational effect. Hybrid risks pose a threat to the contemporary security environment. Exploration of the methods used by the Kremlin around biological topics in attempts to influence Polish and other European societies (both open and possibly hidden) is a burning issue right now (Pamment, 2022). Mis(dis)-information content may be manually or automatically disseminated using social bots, artificial intelligence, trolling and micro-targeted advertising.

### Infodemiology and infoveillance

There are plenty institutes between the EU (de Place Bak et al., 2022) and NATO (Pamment, 2022) to combat biological disinformation, particularly in the Eastern Partnership countries, by establishing a task force within the framework of the European External Action Service (EEAS) East Strat Com - EUvsDisinfo, aimed at monitoring the pro-Kremlin media and the propaganda they spread, which is currently of particular importance during the ongoing war in Ukraine and intensified information warfare activities at that time.

Nowadays researchers widely use online social media data to investigate the behavioural and affective dynamics of the public during COVID-19 pandemics, however non-English European languages are highly underrepresented and other infectious diseases are not covered at all (Jarynowski, Wójta-Kempa, & Belik, 2020). This approach could offer biomedical description from a deeper socio-cultural context. There is a need for research directly concerning what direction biological information security policy should follow next year and present an analysis of official Russian narratives and possible shadowed influence of Kremlin Intelligence. To do so, analysis of the data collected from Internet social media using state-of-the art machine learning methods (i.e. quantitative media analysis of secondary data) should be performed. Understanding the importance of biological risk perception (ie. concepts of risks or attitudes towards prevention and treatment) requires sociological interdisciplinary methods in the area of preventive infectious disease control. Covid-19 pandemic demonstrated that veterinization or medicalization paradigm where the interactions are described in purely biological terms, have some limits. In particular,

actions of human actors, participating in the disease transmission process, are driven by social dynamics. Our project aims to fill this gap and analyse the social feedback (backlash) leading to biological negationism.

Infodemiology is very useful in understanding social dynamics during epidemics acting a supplementary role to standard tools as surveys (Eysenbach, 2020; Jarynowski, Wójta-Kempa, & Belik, 2020), infoveillance could be useful for public health decision makers (i.e. in early warning systems of prevalence estimation (Jarynowski, Semenov, Kamiński, et al., 2022) or burden of measures (Jarynowski, Semenov, Kamiński, et al., 2021)), but it should also be remembered that the COVID-19 pandemic is also a potential area of hybrid activities below the threshold of war. Thus the COVID-19 pandemic and its related mis(dis)-information have encouraged Western governments to introduce media monitoring programs (WHO-World Health Organisation-<https://www.who-ears.com/> , ECDC - European Centre for Disease Prevention and Control <https://github.com/EU-ECDC/epitweetr>) or media regulation (censorship).

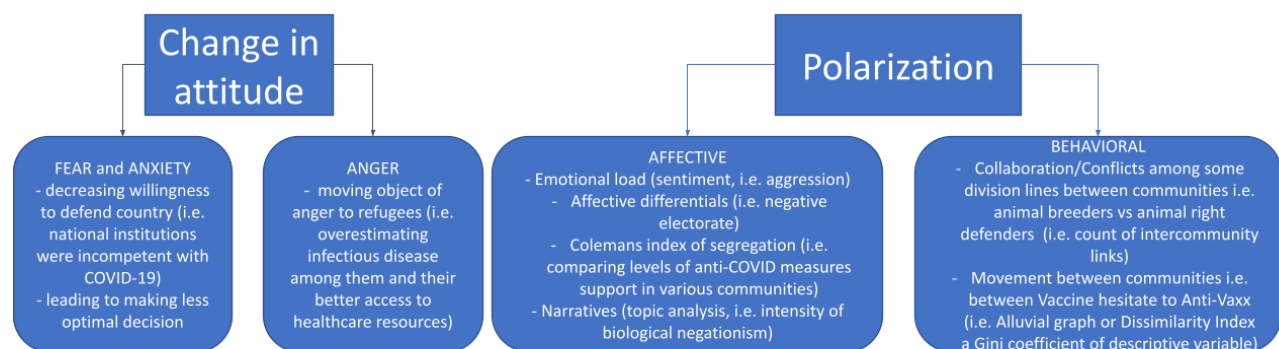


Fig. 1) Theoretical framework for biological driven effects of war propaganda . Adopted and extended from (Jarynowski, Semenov, Wójta-Kempa, et al., 2021)

Classic typology of influence techniques in a broad sense is divided into: propaganda, misinformation, disinformation, and malinformation (Kasprzyk, 2022). Propaganda is manipulation of populations by pretending communication. Misinformation in the biological field is inaccurate or misinterpreted information which can propagate as a rumor (Grabowski & Jarynowski, 2016) (i.e. on possible adverse events of vaccines), or a mistake, publishing unverified reports without a purpose to do harm. Disinformation is on the other hand strictly deliberate and includes malicious content as fake news so producing and spreading false information on biolabs with a purpose to do harm. Malinformation is producing and spreading (partly) true information with a purpose to do harm for instance the danger of infectious diseases of refugees. Contrary to classical propaganda (Legucka & Kupiecki, 2022), mis-(dis)information no longer aims to convince anyone (i.e. that Sputnik V is the best anti COVID-19 vaccine available). Its task is to undermine trust in information (i.e. mainstream media will not tell us any infectious threats coming with refugees), authoritative (i.e. Polish Sanitary Inspection is abusing its power).

Although most of the efforts of researchers and fact-checkers is concentrated on a narrowed form of dis-information, experts from European Digital Media Observatory suggest that concern should be expanded on by also including us possibly being classified in terms of intentionality modified information, often described as misinformation.

Thus, these techniques are offensive information operations by interfering with the process of achieving situational awareness, and the purpose of which is to evoke in a given population a specific picture of reality (DKWOC, 2022).

To conduct dis/mis-information campaigns, Russia employs a synchronized mix of traditional (TV, radio, newspapers and their digital forms) media and news website content to far/left right social

media content (with unclear attribution) with gaining visibility with the army of bots and trolls (Helmus et al., 2018).

## How social and traditional media are used as Russian information warfare in biological context?

In order to analyze the involvement, it is worth using media monitoring (Jarynowski, 2022c). Moreover, association between pro-Kremlin narration and vaccine diplomacy (Wiśniewska, 2021) and hesitancy (Broniatowski et al., 2018) is not a new phenomenon. As COVID-19 vaccines uptake is promoted in state sponsored media inside Russia, anti-vaccination attitudes are fuelled to the international audience (Kiriya, 2021). It is worth emphasizing that the rather unusual dynamics of interest in Oxford/AstraZeneca product (Jemielniak & Krempovych, 2021) and especially in its adverse events (Belik & Jarynowski, 2021) in Europe shows signs of interference by foreign intelligence (potentially Russian (EEAS, 2021)), but also some analysts also point to Chinese (Lipińska, 2021) vaccine diplomacy (Economist, 2021). Russia-sponsored traditional and social media have been marked by the European External Action Service (EU counter disinformation agency) as propagating dis-/mis-information during Covid-19 pandemic in Europe (EEAS, 2020, 2021). According to surveys, the highest “coronasceptic” protest potential is mainly among the far right and to some extent far left part of the electorate (Lamberty et al., 2022) and a similar mosaic can be found on Twitter (Jarynowski, Semenov, et al., 2020; Jarynowski & Płatek, 2022). Thus, both fractions of the far right and far left side of the European political sphere did not support sanctions issued by the European Parliament on 01.03.2022 against Russia after invasions on Ukraine. Even after the full scale Russian invasion, the medical community was so reluctant this problem, and there is literally no article published in an indexed medical journal on the link between Kremlin narration and anti-vaccine and anti-lockdown movement in Europe till the end of 2022 (Jarynowski, 2022f). On the other hand, the dis(mis)-information phenomenon in infodemic concepts was carefully studied, but foreign influence was a taboo, at least in Europe. Fake-news (a direct element of disinformation) in this war is constructed in very different ways, but all contain most of the elements derived from the fake news construction matrix (Terp & Breuer, 2022).

## Biological Disinformation vs misinformation

The use of informational operations in infectious disease by the Kremlin has already a long history (Leitenberg, 2020). Soviet military scientists have proposed multiple cybernetic frameworks of sociotechniques as reflexive co theory by Lefebvre or action theory of Leontiev (Kasprzyk, 2022). Denialism of HIV and AIDS (Field, 2004) by the Easternblock (for internal audience) caused a parallel (para-)medical network of support in these countries in the 1980s (emergence of HIV in USSR was “confirmed” in 1987 and the problem officially had not existed before). Social movements formed resources (i.e. social capital) linked to possession of a durable network of organized relationships in opposition to official government. On the other hand, the Kremlin (for external audiences) ran a disinformation campaign that the US government had synthesized the HIV virus and released it in Africa. Alternative social structures with intellectual capacity and biomedical knowledge existed in communist countries a few decades ago and are still alive in historical memory (Vlassov, 2017). Thus, Russian one health elites are experienced in creating alternative biology as well as are aware of the consequence of circulation of alternative medical information.

As obvious fake news (i.e. conspiracy theories about vaccines) and obvious engagement of Russia sponsored media (i.e. vaccine diplomacy) is relatively easy to be found (due to multiple fact-checking agencies), the most important research should focus on the gray area of intelligence (Kasprzyk, 2022). There is high uncertainty in threats identification, because pro-healthy and biologically correct content is also produced by proKremlin media. There are plenty of possible explanations of this kind of pro-Kremlin engagement in the infosphere. For instance Mark Owen Jones (Jones, 2022) and David Broniatowski (Broniatowski et al., 2020) are suggesting that one of the tactics of proKremlin agents of influence is mixing opposing content (presenting views of both

sides) to get higher reach and cause confusion. Increasing existing polarization of society in Poland using biological negationism [Fig. 1], not only affects the one health security of the country, but also may reduce the defense capabilities (Kuczabski, 2019)

## Goals

Current war can be seen as a theater of competing models of social influence (Dolinski & Grzyb, 2022) because it is a powerful tool that governments and other entities use to shape public opinion and gain support for their actions via manipulating the media to decrease (i.e. adherence to biomedical guidelines) or increase (i.e. biological negationism) acceptance of certain narrations. Understanding the nature of use of biological threats and biological negationism in modern information warfare (hybrid war) on traditional and social media appears to be a key challenge. To measure the impact of Kremlin campaigns, their goals have been anticipated. The substantive scope of the study includes analysis of adaptive narration which might determine the effectiveness of its impact on the society. We want to understand the scale and main features of Kremlin influence which may lead to assessing questions such as how sanitary, veterinary and food inspectors can detect them and protect the population from manipulation in health promotion campaigns.

In Poland, however, it has long been noticed that certain accounts appear strangely in all discourses, often in positions unusual for them. For instance in discourses around the coronavirus (Jarynowski, Wójta-Kempa, Płatek, et al., 2020) or lockdowns (Jarynowski & Płatek, 2022) appearing on the right, but precisely in the context of combating ASF (african swine fever), they clustered together with the ideological left (Jarynowski et al., 2019), the only pattern linking these attitudes is acting to the detriment of the One Health through biological negationism (Duplaga, 2022).

The officially Kremlin-sponsored Polish-language have been active in anti-vaccine and anti-lockdown propaganda (EEAS, 2020) however this process was noticeable until the activities of these portals were limited after February 2022 (Marek, 2022b).

## Socio-political environment

The secondary objective of the study was to investigate the multidimensionality of narrations after 24.02.2022 in a security perspective and to systematize selected issues as biolabs in Ukraine, food insecurity and animal breeders protests about as crisis and strategic communication.

Biological disinformation campaigns are carried out to manipulate the information ecosystem for sociological (polarization), economic (cause indirect losses to targeted economy) and political goals. Currently, in the field of agroterrorism, we have two basic acts of international law:

- BWC: Biological Weapons Convention (KONWENCJA o Zakazie Prowadzenia Badań, Produkcji i Gromadzenia Zapasów Broni Bakteriologicznej (Biologicznej) i Toksycznej Oraz o Ich Zniszczeniu, 1972) Art. 1. "(...) not to develop, produce, stockpile or otherwise acquire or store: microbes or other biological agents or toxins (...) which are not justified for prophylactic, protective or other peaceful purposes. " States party to the Biological Weapons Convention stayed notified on 07.08.2022(Lentzow & Littlewood, 2022)that Russia has triggered Art. V and called for a formal(this is the second time in history after the case of Cuba vs. USA in 1997).
- Geneva Convention (Protokoły Dodatkowe Do Konwencji Genewskich z 12 Sierpnia 1949 r., Dotyczący Ochrony Ofiar Międzynarodowych Konfliktów Zbrojnych (Protokół I) Oraz Dotyczący Ochrony Ofiar Niemiędzynarodowych Konfliktów Zbrojnych (Protokół II), 1977) Protection of victims of (non-) international armed conflicts - Protocol I (art. 54), II (art. 14). "Starvation of civilians as a method of combat is prohibited. It is therefore forbidden to attack, destroy, remove or render unusable (...) such as foodstuffs, agricultural areas for producing foodstuffs, crops, livestock (...)"

Biological weapons have a huge potential for socio-political influence, as the Russians recently showed when the topic of alleged secret US laboratories. „American” Biolabs” concept is not new. In 2007 USA was accused in Russian media for introducing ASF to Russia via Georgia (Jarynowski et al., 2019; Trotta et al., 2022). The narration focus on the accuse that “the disease was caused by the Pentagon working out its strategy and tactics of biological war”) and the allegations referred even to a possible origin of the virus in the laboratory because of the resilience to a new sylvatic cycle (without soft-ticks as in Africa) which “proves that it was developed in a biological laboratory and that the U.S. military bio-lab in Georgia” (Jarynowski, 2022d). The so-called “conspiracies theories” as role of “Big Pharma” or “bio-weapon laboratories” were discussed in Poland, however to a smaller extent than in Germany for instance (Jarynowski, 2022f).

Rising fertilizer prices in the world, Russia's war against Ukraine and actions weakening Ukraine's ability to export agri-food products could affect the global food crisis in short and medium term perspective (Radziejewski, 2022). Russia also attacked Ukraine's transport infrastructure and de facto blocked the Black Sea ports completely from the end of February to the end of July 2022 as since August, under cross-agreements via the UN and Turkey, exports of cereal products from Ukrainian ports were resumed. Hybrid actions below the threshold of the BWC (KONWENCJA o Zakazie Prowadzenia Badań, Produkcji i Gromadzenia Zapasów Broni Bakteriologicznej (Biologicznej) i Toksycznej Oraz o Ich Zniszczeniu, 1972)) and the Geneva Protocols (for the protection of victims of armed conflict (Protokoły Dodatkowe Do Konwencji Genewskich z 12 Sierpnia 1949 r., Dotyczący Ochrony Ofiar Międzynarodowych Konfliktów Zbrojnych (Protokół I) Oraz Dotyczący Ochrony Ofiar Niemiędzynarodowych Konfliktów Zbrojnych (Protokół II), 1977)) by states (e.g. attacks on supply chains or the polarization of food producers) or by making it difficult to prove an act of terrorism (Radosavljevic et al., 2018).

## 2)Methodology

Measuring the social interest in/around SARS-CoV-2 and COVID-19 in the Internet media arises in terms of technological capacity during the epidemic. Thus, collected material could be analyzed similarly to more popular topics like the elections in order to search for the footprint of foreign intelligence (Zhuravskaya et al., 2020). Quantifying dynamics of interest (demand and supply of content) and discourse patterns. Internet as a digital footprint of social activities (secondary document analysis). Media Analysis of the social processes is often performed with the help of SEO-marketing solutions as Brand24, SentiOne, Sentimenti, SoTrender (used by Infodemic management by WHO). OIE (World Organisation for Animal Health) and JRC (Joint Research Centre) use MedSYS, FAO (Food and Agricultural Organization) uses PadiWeb mining engines. Media monitoring serves as a complement to longitudinal surveys monitoring public perception (and other socio-economic methods) in real time. The spread of dis(mis)-information is currently one of the main tools of war propaganda (DKWOC, 2022), as well as a tool for the aggressor to conduct destabilizing and destructive actions in cyberspace.

### Infodemiology

Traditional and Social media is also becoming a tool for the white intelligence community, the so-called “OSINT” (open-source intelligence). The most important material for Military infodemiology can be found (Jarynowski, 2022c):

- Google, Yandex trends
- Social media monitor (mainly Twitter and Telegram)
- Nationwide and local media monitor

Statistical models of obtaining data can be applied to i.e. classify users (Jarynowski, 2022f; Röckl et al., 2023), ML tools for topic, sentiment analysis, AI tools for bots, and trolls as well as audio and vision manipulation detections (Kasprzyk, 2021).

Possible Kremlin activity on the Internet may refer to the formation of European’ (Poles) opinions

[Fig. 1] i.e. to induce fear of diseases and also to polarize society (Marek, 2022b). Social media is not only an increasingly popular communication channel, but also one of the arsenals of information warfare as well as one of the theaters of hybrid war.

In Poland, in contradiction to other European countries, Russian state media like Sputnik or RT were not specifically popular, so even they were banned in EU since March 2022, other less obvious actors (mainly on social media) was and is used by Kremlin (*RESILIENCE TO DISINFORMATION*, 2022). Thus, social media are seen as the main vehicle for spreading false information, rumors, and deep fakes during the war in Ukraine (Fredheim & Stolze, 2022). Fake digital images (i.e. related to so-called Ukrainian biological programs) on social media may be an attack tool in case of the Russian-Ukrainian.

Since the beginning of the war, among those following many Telegram channels and groups (mainly Russian/Ukrainian speaking part of Polish population) along with other social media and traditional news marathons in the background to fulfill this need for information. Thus media exposure on biological related content in war's news was very high and needed both content and impact analysis.

For internal biological narration in Russia we focus on data from Telegram, a messaging app and a social media platform with over 500M active users. Telegram has become the most popular social media platform to follow war news both in Russia and Ukraine (Fredheim & Stolze, 2022), and its penetration rate increased from about 30% in 2020 to over 50% of the literate population. The leading media platform in Russia is Yandex (searching platform as Google) and social media giant VK.com with 70% penetration, however they have recently lost popularity in Ukraine. In Poland, Telegram is a marginal medium for a general population, however an important place to observe evolution of biological conspiracy theories (Jarynowski, 2022c).

We have analysed the content of produced media releases in context of their biological integrity and agenda setting (in context of Poland). For biolabs narration also internal Russian narrative was analyzed from Telegram (i.e. channel of Russian Ministry of Defence). To assess impact we have attempted to measure the influence of Russian allegations using Buzzsumo, Brand24, Twitter API, or Google trends content monitors, related to the variations of the keyword biolab / biological weapon, hunger and the food crisis as well as infectious disease (COVID-19 and HIV) related to refugees.

### 3)Results

Let us compare different biological negationism narrations since the full scale Russian invasion on Ukraine. There are some similar aspects of typical narration concerning biological threats. Usually the language of both official propaganda as well as non-professional media is emotional. For all issues a link between war and COVID-19 pandemic is often drawn. Discourse is usually chaotic with linkage to different threads of different orders (war, pandemic, globalism) and to conspiracy theories. There is observed a confusion of fact and interpretation (i.e. food insecurity) and fiction (i.e. biolabs). We often see multiplication of source material, for instance literate or machine translation of materials published originally in Russian often with grammatical errors or other stylistic signs of Russian origin (Marek, 2022a). The material is presented multimodally (video-conference, maps, animations, photos, and memes) additionally to text. There is the common motif of grayness (all sides of conflict are partially guilty). However, Russia is trying its best to control the spread of disease and minimize biological and hunger hazard (according to narration). On the other hand USA and Ukraine as an enemy with historical association with a concealed threat (often a picture of current issue biolab/food/HIV is shown with historical Western abuses). Poland is seen as a country not taking care about biological hazard for its own population.

#### Biolabs

Biological weapons have a huge potential for intimidation, as the Russians recently showed when the topic of alleged secret American laboratories in Ukraine began a series of public slots by the



Russian Ministry of Defense (Кириллов, 2022) in 2022 (10.03, 14.03, 14.04, 27.05, 17.06, 07.07, 04.08, 03.09-during BWC meeting, 19.09, 26.11, 24.12). It should be emphasized that in each of these presentations there is a constant threat of infectious diseases of animals, mainly concerning ASF and avian influenza. The commander of the radiological, chemical and biological defense forces of Russia Igor Kirillov repeatedly emphasizes that the Russians "obtained" evidence of biological experiments on humans, but also on pigs, wild boar and birds, or with insects (Кириллов, 2022). Additionally, at the session of the UN Security Council on 11.03.2022, the arguments between the US and Russia were confronted (Maksymowicz, 2022). In addition, on 07.08.2022, Russia launched Art. V BWC and called for a formal consultation meeting (Lentzow & Littlewood, 2022). According to American analysts, Russia may be trying to mask the use of biological agents as part of a staged incident or to support tactical military operations in this way (Maksymowicz, 2022). Conspiracy theories about US biological weapons laboratories in Ukraine have been propagating around radical political activists in the USA, Hungary and Poland (Kessler, 2022).

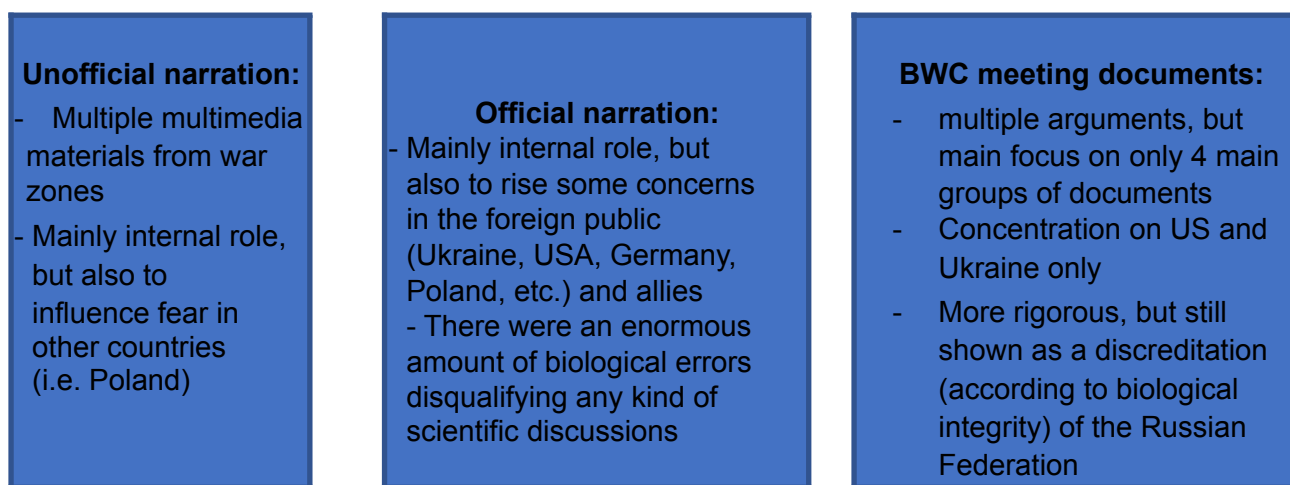


Fig. 2) Three types of narration about Biolabs by Kremlin

The material can be divided according to targeted groups (as subchapters of the article) into (i) internal, (ii) Poland and (iii) international organizations as well as by information sender role into (i) unofficial, (ii) official, and (iii) deliverables for international organizations (as presented on Fig. 2).

## Internal Russian narration (domestic impact)

In internal Russian narration theme (Kiriya, 2021) of the development of biological weapons by Poland has long been present in the media form pseudo-scientific studies, there are:

- historical anecdotes from the Polish-Moscow wars,
- accumulation of charges is based on the "mythical" Polish biological program in the interwar period, developed during and after the Polish-Bolshevik war,
- the activity of the Polish Underground State.

Thus, it could be natural to a reader that Poland may continue militarization in biological warfare (even if it is forbidden by BWC).

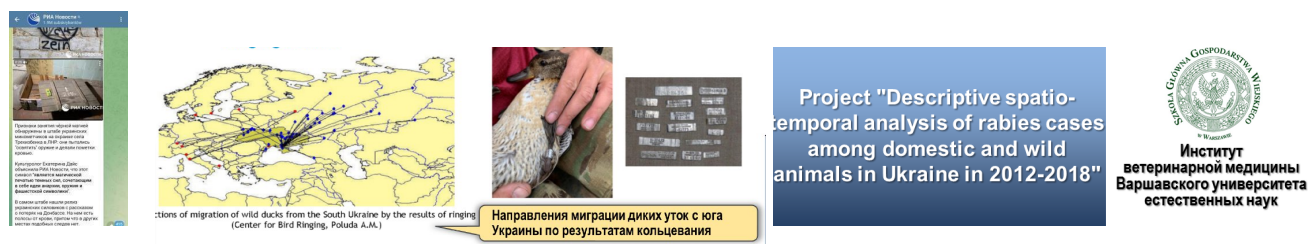




Fig. 3, Examples of news against biological integrity, From left “Magic” Ukrainian forces (source РИА Новости [https://t.me/rian\\_ru](https://t.me/rian_ru)), central allegation of use birds as vector of diseases (source Минобороны России [https://t.me/mod\\_russia](https://t.me/mod_russia)), right a “prove” of Polish-Ukrainian collaboration

Since middle of March 2022, a new phase of information and psychological operations (Info/Psy-Ops) began with footage from temporarily occupied territories. Here a narrowed understanding of disinformation is seen as the deliberate dissemination of false information in order to achieve military objectives more effectively and provoke the opponent to take certain actions (Mahda, 2019). Much of what gets broadcast on the constellation of sites that make up the totality of social media (mainly Telegram) depends on the different content policies. There were plenty of documents overtaken by Russian Intelligence i.e. the order to destroy gems in Ukrainian labs or results of inspection on biosecurity levels in Ukraine (Кириллов, 2022). Thus Americans as well as Poles and other NATO countries were involved, because offensive infection agents were developed with collaboration with them in Ukraine (according to narration). Poland was working closely with the US and Ukraine (according to narration) to develop biological weapons. Moreover, Poland was accused of not respecting international conventions and even its own national laws (Pulawski, n.d.). In both official documents (i.e. video released by the Ministry of Defence) as well in national broadcasting media as well on famous propaganda leaders one can find claims that “the U.S. was testing biological weapons in the Ukraine and is preparing for a Third World War”. Thus Russia with “special military operation” preceded the Ukrainian attack on the Donbas with the use of biological weapons (Chawryło, 2022). It's important to notice that in official media established in occupied areas (i.e. Zaporozhsky Viestnik) there was no news distributed about Ukrainian biolabs, which means that the public there was not the target of biological propaganda.

There was an enormous amount of biological errors [Fig. 3] discrediting any kind of scientific discussions (i.e. science fiction like biological mechanism, wrong names of pathogens and diseases), about these problems.

## Impact on Poland

We attempt to measure the influence of Russian allegations in order to measure effectiveness of external Russian propaganda (mainly through Polish-language propaganda channels or channels resonating with Russian propaganda) on causing anxiety and fear in Polish society. Some historical allegations about the Polish biological warfare program presented in the previous chapter are used towards Polish patriots (mainly through Polish-language propaganda channels or channels resonating with Russian propaganda (Marek, 2022) as a technique of causing confusion (EEAS et al., 2018).

Using the content in Polish between 24.02-01.08.2022 using the Buzzsumo, Brand24, Twitter API, or Google trends content monitors, 65 articles and multimedia were found in traditional digital media with the largest reach and 396 Tweets (representing the interest in in social media) related to the variations of the keyword biolab / biological weapon. As many as 41% of mentions in social media were negative - which proves the strong emotional character of the discourse (emotions such as user anger towards America and Ukraine for conducting “illegal” research or fear of an attack on Poland). It is worth noting that the interest of the Polish society in biological laboratories and biological weapons (based on queries in Google) was more than twice as high as in Ukraine, and several times greater in Russia or Germany itself. The waves of interest closely correlate with the waves of Russian propaganda (which was most visible in March 2022).

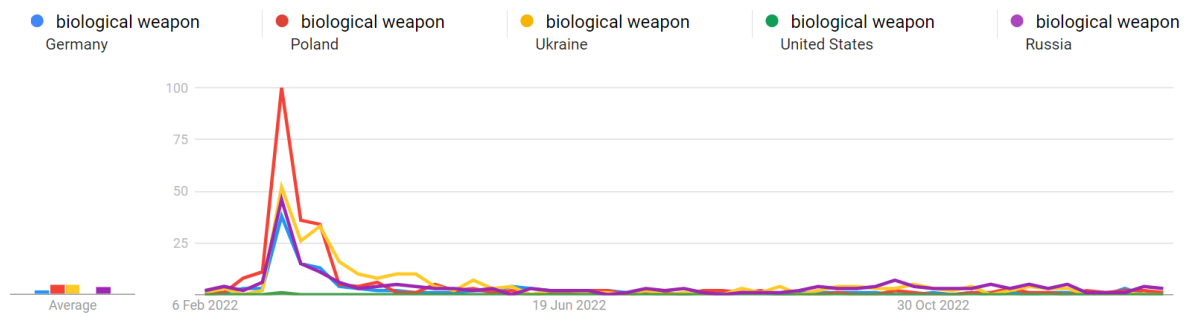


Fig. 4) Google trends of biological weapon keywords across countries

The peak of activity in Polish traditional and social-content media took place between 9-24.03.2022 (which is only 9% of the entire time period), when as many as 72% of Google queries, 49% of articles and multimedia on internet portals and 43% of Tweets has been posted with multi-million reach. It suggests that the Kremlin's influence on Polish society was effective in the sense that it sparked a wave of interest. The Russians biolab conspiracy theory has an effect causing panic in Poland and anti-Ukrainian and anti-American sentiments (main impact on March 2022 [Fig. 4]). It suggests that the tactical goal to create a fear in the particularly Polish population was achieved and for some reason an impact on Poland was a few folds higher than on Ukraine or other European NATO countries, which need further qualitative investigation.

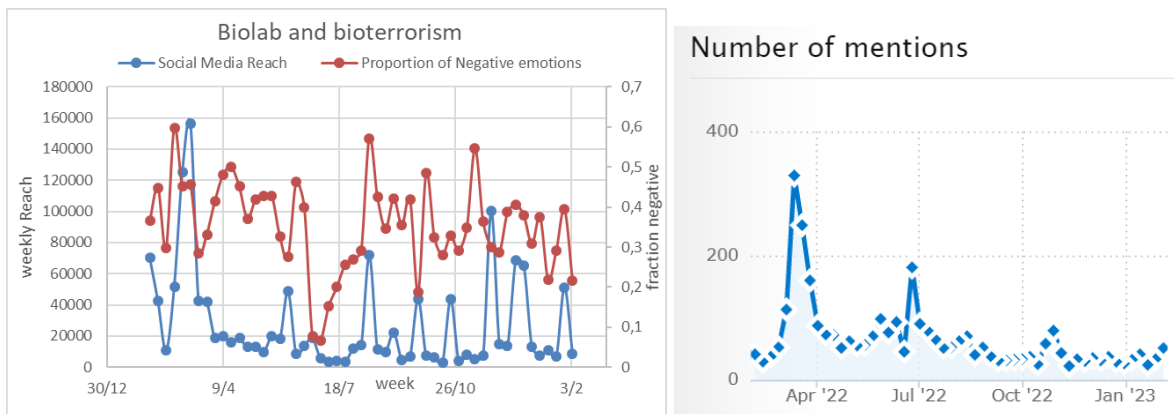


Fig. 5) Sentiment and reach on social media [left] and cumulative No. mentions in both traditional and social media [right] of biolab/bioterrorism/biological weapon keywords in Poland (Brand24)

Biolab discourse has the highest emotional load among all biological negationistic narratives [Fig 5.] "American laboratories" may influence (according to narration) the alleged biological catastrophe and become the cause of World War III. The above-mentioned narrative is also an element of blaming the US for Russia's aggression against Ukraine. The ridiculous concept of developing biological weapons that would be spread by specially trained migratory birds targeting ethnic Slavs such as Russians (its against genetic knowledge, because Russian population has less so-called „Slavic genes" than other populations i.e. Polish (Underhill et al., 2015)). It is worth emphasizing that the Russians certainly notice how much Polish society is susceptible to conspiracy theories (Jarynowski, Semenov, & Belik, 2022; Jarynowski, Semenov, Platek, et al., 2022) in the area of animal disease (low health/veterinary literacy among population living in the cities) and concentration of narration on zoonosis and animal host only diseases may show recognition of the field. The Russian side was trying to introduce a narrative to the Polish infosphere about the existence of secret American laboratories, which allegedly not only caused the deaths of many of Ukrainians (i.e. soldiers under experiments or people living in Dombas), but were also one of the reasons for the of the invasion. According to the Russian vision of reality, these animal disease and zoonosis laboratories are currently located, among others, in the territory of the Republic of Poland (have been transferred). The distribution of such messages serves to stimulate anti-American sentiments in Poland, which is part of the efforts to disintegrate NATO.

## Narration at BWC meetings

We have analyzed documents of the BWC Formal Consultative Meeting in late summer 2022 to discuss Russian allegations to the USA and to Ukraine concerning the fulfillment of their respective obligations under the BWC in the context of the operation of biological laboratories in Ukraine (UN, 2022a). No consensus was reached regarding the outcome of the Formal Consultative Meeting. Main Questions and allegation towards Ukraine were:

- Ukraine failed to ensure an adequate level of biological protection in organizations and institutions that work with particularly dangerous pathogens?
- How was the US assistance, as implemented, supposed to ensure the sanitary and epidemiological well-being of the population of Ukraine?
- Why were veterinary and not human diseases the object of US-Ukraine collaboration?

The Russians use arguments in the form of (i) International projects dissemination and legal documents, (ii) internal (Ukrainian) reports of stockpiling and on security, (iii) after war documents as “unmanned aerial vehicles equipped with containers and equipment which can be used to spray bioagents in Kakhovka and Cherson”.

All main documents presented to the international community have been previously used in internal and unofficial narrations (Кириллов, 2022). However, there is an interesting situation that some of very important documents (previously officially disseminated in the Russian infosphere) were missing:

- From Sanitary-Epidemiological station in Mariupol. This is the only important biological laboratory in the occupied area, which was involved for instance in Cholera and Tuberculosis research.
- Order (by the Ministry of Health Care of Ukraine) to destroy potentially dangerous germs in various Ukrainian research centers from the first days of invasion.

There is a lack of arguments is very interesting and some explaining hypotheses (i.e. being fake or manipulated) arises.

Above suggests that biolab narration is purely a product of propaganda offices or PR agencies without any kind of attention to biological integrity (which sounds very strange as Russian microbiology and epidemiology scientific level is very high). Moreover, a low level of preparedness by Russian delegates is surprising with multiple errors in documents (i.e. Warsaw University of Life Sciences was incorrectly called University of Warsaw in both primary Russian documentation and its English translations), almost no evidence after 24.02 neither from intelligence or captured areas, etc. This led to rather passive orientation of Russia allies such as China or Iran and Cuba (targeting only US biological programs in general), even though they voted in line with Russia. After the BWC meeting no more new biological official allegations were stated (till late November 2022 to prepare the scene for 9th Review Conference), and no massive propaganda operation with biology as threat was observed (since September nuclear threat was „turn on”).

The Ninth Review Conference (Geneva, 28.11-16.12.2022) was used to continue allegations towards the US (UN, 2022b). For instance increase the pathogenic qualities of the SARS-CoV-2 by American researchers. Thus, all additional claims from Russia and allies were directly targeted towards the US and biolab topic was accentuated there. The interest of the media to the outcome of the Ninth Review Conference was very low.

## Veterinary and food related biological issues campaigns

Foreign information manipulation and interference is known to be involved in food problems and animal disease as ASF (Jarynowski et al., 2019; Leitenberg, 2020; Trotta et al., 2022). According to Russia's disinformation, the disruption of agricultural production and trade in Ukraine was partially caused by EU sanctions. Moreover current CBRN threats mainly concern agricultural and health issues (Gawlik-Kobylińska, 2022) and risk of agroterrorism in Europe is the highest since decades (ALLESLEV, 2021; Jarynowski, 2022a).

## Impact of Food/Hunger Crises on Polish Population

Russian propaganda and disinformation blamed Ukraine and the collective West for “causing the global food crisis”. But the most visible effect of media involvement seems to be induced fear (i.e. about food price) or polarization (i.e. general population against farmers).

For phrases related to hunger and the food crisis, content monitoring was applied during 02.24-01.08.2022. Again, using Buzzsumo, Brand24, Twitter API and Google trends, 958 articles and multimedia in traditional digital media with the greatest reach and 59,453 Tweets were analyzed.

Only 33% of the mentions were negative, which may result from many threads of the discussion, such as the positive sentiment of the support of Polish farmers towards Dutch animal breeders protests (analyzed in the following subchapter) in the summer of 2022 as a unity (among other farmers) effect (Jarynowski, Semenov, Platek, et al., 2022). In the case of hunger, there is a fairly even distribution of interest. Interestingly, the traditional media noted a slightly increased interest between 24.04-23.05.2022 (e.g. discussions about the export of food products from Ukraine), the most searches on Google took place between 02.24-14.03.2022 (fear related to the beginning of the war), above average interest on internet portals 23.05-24.06.2022 (discussion on Ukrainian grain and the role of Poland in transport) and increased activity on Twitter between 04-14.07.2022 (large contribution of agricultural protests in the Netherlands and negotiations on access to Ukrainian grain in Poland or via unblocking the ports in Odessa), which proves the different dynamics of interest in various media targets.



Fig. 6) Google trends of various food security concepts as Famine, grain price, food price, farmers protests

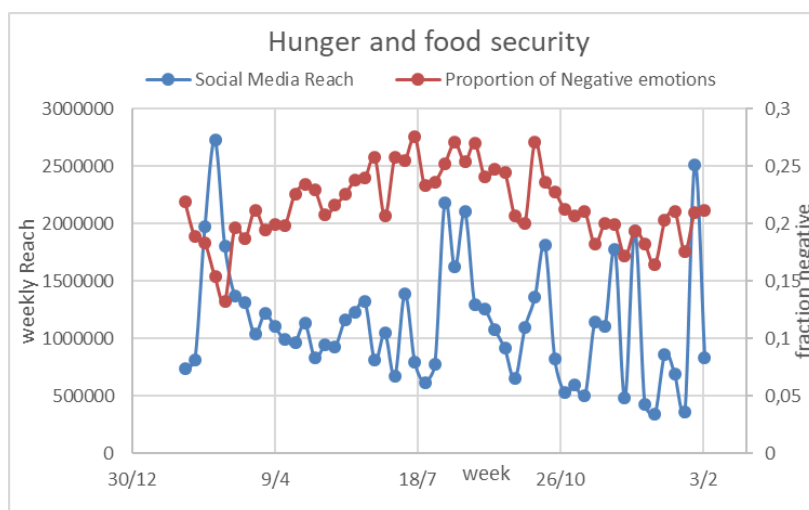


Fig. 7) Sentiment and reach on social media of food security keywords in Poland (Brand24)

It is worth emphasizing that the widespread fear of the food crisis and the high price of food products in Poland had already expired in April 2022 and later mainly specialized actors as farmers

drive the discourse, which is a typical phenomenon in this subject (Jarynowski, Semenov, & Belik, 2022). The food security discourse has the highest volume of interest and was the least emotional among [Fig. 7] all biological narrations. Therefore, it seems that the Kremlin propaganda in the first phase of the conflict fueled the fear of high food prices, and then shifted the emphasis to the potential threat to Polish agriculture, by cheap food and supply products from Ukraine. In the case of July's jump in interest in social media, these are largely issues related to the appearance of Ukrainian grain in Poland and solidarity protests with Dutch farmers against EU programs such as "Green Deal" or "From farm to table" (Barreiro Hurlé et al., 2021), e.g. through accounts related to by the Agrounia organization.

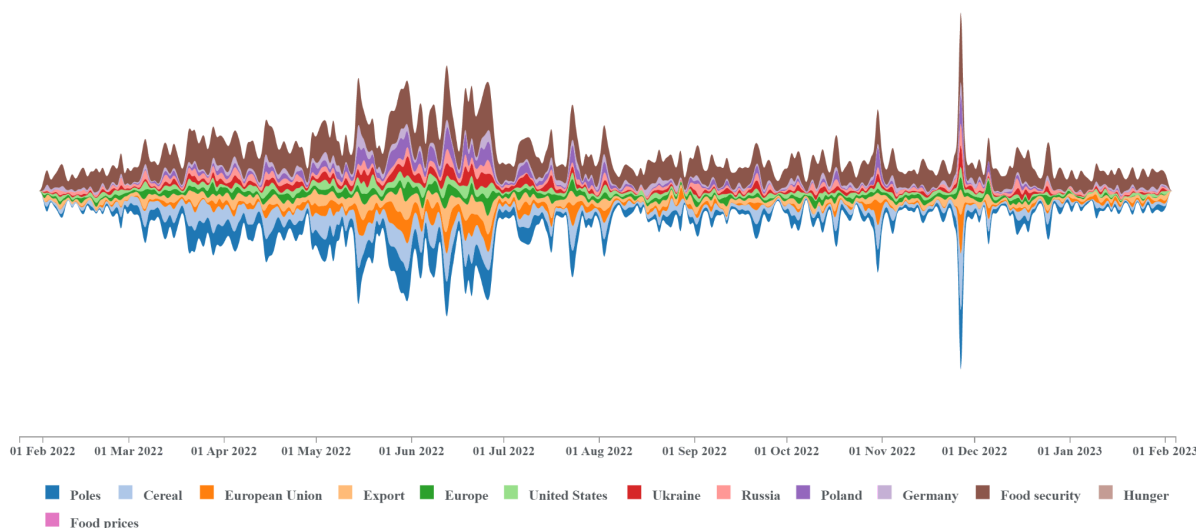


Fig. 8) Topics intensity in time in discussion about hunger/food security in Polish traditional media (EventRegistry)

We can observe dominating Cereal and Food security topics in professional discourse [Fig. 8] around summer (harvesting time) and in late Autumn 2022 and January 2023 (Polish farmers protest). Food price (which is connected to inflation) seems to be the most important [Fig. 6, 8] driver of discussion for the general population.

## Animal breeder protests

Can one interpret the interference of foreign intelligence on social media as an act of agroterrorism? Let us apply scales used in agroterrorism with biological pathogens for propagation of information (per analogia). Here information can be viral and its seeding or helping to spread may be by deliberative inference (Jarynowski et al., 2015). Information can also be viral, which we learnt during COVID-19: “just fighting an epidemic; we’re fighting an infodemic” (Eysenbach, 2020), caused by the propagation in social media of conspiracy theories, and mis/(dis)-information about the pandemic. In fact, often the solutions to this problem are similar to “antivirus programs for computers”, which have the aim of identifying the online primary source of affected information to intervene (Kasprzyk, 2022), before other users become “infected”, by blocking accounts of blocking paths (Jarynowski & Płatek, 2022).

Protests of animal breeders taking place very often epizootics and the measures of controlling them (Jarynowski, Semenov, & Belik, 2022). There are some pre-existing social conflicting matters of animal production, which may be important to understand the phenomenon. Such a structural configuration facilitates mobilisation of own groups of interest and ends up with conflict between animal breeders, far-right, agricultural parties, Christian organisations as well as opposing, government opposition and ecological organisations and far-link (Jarynowski, Semenov, Platek, et al., 2022). COVID-19 crisis and pressures on farmers related to economic and climate challenges

cause more and more farmers to escape from animal production (Jarynowski, Krzowski, & Belik, 2021). Moreover, Russian invasion on Ukraine during 2022 threatens supplies for fertilizers and some crops, causing increases in animal feed prices (which dropped down due to availability of Ukrainian grains since autumn 2022) as well as high energy prices (high level of energy consumption in animal products). Moreover, last year's livestock production is changing as well as deanimalization processes sped up. The European Green Deal is projected to affect livestock production by decline between 5% and 15% (Barreiro Hurlé et al., 2021), with the animal breeders income being the hardest hit among all farmers in the perspective of the next 10 years.

Our object of analysis is a series of protests that were organized by Dutch farmers in summer 2022 to voice their concerns and frustrations about issues such as government regulations, environmental policies. These protests often involve large convoys of tractors and other farming equipment, as well as marches and rallies in cities and towns throughout the Netherlands and have their digital representation under #Boerenprotest (Jarynowski, 2022g), as interlining between actual physical events with social media reflection is very important (Domalewska, 2019; Kowalewski, 2020). We could see that the European mainstream media posted did not get engaged in providing information on farmers' protests. There is much more information in the European media on Sri Lanka farmers protest than Dutch animal breeders protest. On the other hand, Animal breeders protests have been well-represented in social media platforms, where farmers, activists and sympathizers have created groups and pages to share information, organize events and express their views. Social media has also strengthened polarization in this case by creating echo chambers, filter bubbles, because only the exposed part of the population have been discussing this issue (as Polish farmers support protests analyzed in a previous chapter). These groups have been used to mobilize support, coordinate protests, and disseminate news and updates about the movement. Social media has also been used to share photos and videos of protests and events. Some footage from protests on TikTok have >10 mln views and this should alarm if it's a self-organized protest only. Thus it is worth talking about foreign attempts (Tarafdar & Kajal Ray, 2021), which could have helped to raise awareness about the movement and the polarizing issues it is concerned with.

For differentiating intentional introduction of pathogen/agrophag from natural outbreaks (risk of bio/(agro)-terrorism, scale on the calculation of the weighted averages of the assigned scores have been proposed (Chen et al., 2019; Jarynowski, Krzowski, & Belik, 2021; Sequeira, 1999).

Tab. 1) Criteria in agricultural index and the improved Grunow–Finke tools with partial and overall scores.

Criteria	Farmer Protests Summer 2022, NI	
Biorisk	2	6
Unusual strain	1	3
Geographic distribution	1	1
Environmental concentration	3	9
Epidemic intensity	1	1
Transmission mode	1	1
Time	0	0
Unusually rapid spread	2	2
Population limitation	2	4
Clinical	1	1

Special insight	2	6
Grunkow-Finke total score (Chen et al., 2019)	<b>34</b>	<b>&gt;50% of agroterrorism</b>
use of non-traditional pathways	1	
increase of the probability of survival of the pest in-transit	0,5	
widespread dissemination of the disease from disparate foci	0,5	
use of highly virulent strains,	1	
high rates of inoculum	0,5	
introduction into remote areas	0,5	
targeting of susceptible production areas	0,5	
targeting of susceptible natural environments	0	
release of multiple species simultaneously	0,5	
precise timing of releases to coincide with maximal colonization potential	0	
Agricultural Intex total score(Sequeira, 1999)	<b>5</b>	<b>~30% of agroterrorism</b>

Obtained values [Tab. 1] from the scales (especially Calibrated Gunkow-Finke) are high and suggest that probability of observing such an event naturally (without external influence) is low.

## Other infectious diseases

Covid-19 related conspiracy theories have been associated with both obvious fake news and gray misinformations (Engels et al., 2023). With the M-pox crisis (timely co-occurring with the second phase of war in Ukraine) it is especially visible how in some countries the conversation shifted from information about how the disease was spread to disinformation anti-LGBTQ+ narratives targeting the community in a harmful way (Alju et al., 2023). Some of these stigmatizations were seen in Kremlin narration too, as M-pox was considered as God punishment to the Western societies or secret American bioweapon. Thus Kremlin spin doctors replace COVID-19 (mainly the vaccine) with Monkeypox. However, the strengthening of anti-vaccine sentiments forms the basis for the formation of anti-vaccine protests (of an anti-governmental nature) and it was observed that. A lot can be inferred from German data on potentially pro-Kremlin accounts in the war narrative and overlapping (over 50 times greater chance of involvement) with the discourse of anti-sanitarian and anti-vaccine protests (Jarynowski, 2022d). Thus, quite a lot can be deduced from the dynamics of social media discourse in the context of combating contagious diseases (also of animal hosts). Thus, pro-Kremlin agenda is different in each society, as in German speaking population fossils and liberty are the main frame of concern, in English speaking world anti-Western attitudes are highly present when in Polish Ukrainian genocide on Polish population during WWII is and anti-refugee attitude may be amplified. Especially, as this topic seems to be under-investigated in Western Europe in comparison to Eastern Europe or Anglo-American countries. However, Pro-Kremlin users' motivation to engage in anti-vaccination/anti-lockdown communities may be either internal (to promote their own agenda) or external (to spread pro-Russian propaganda), but it is untraceable. There are multiple portals and several social media fan pages/channels that are not openly pro-Russian, but are the source responsible for introducing misinformation content to the Polish Internet space. The Polish public's reaction vis-à-vis the Ukrainian refugees in the first month of the war was driven mainly by a decreasing wave of



Omicron COVID-19 variants (Jarynowski, 2022e). Thus, refugee infectious disease could be weaponized by the pro-Russian media ecosystem for gaining the ability to interfere with attitudes of the Poles after February 2022 – especially in the field of Polish-Ukrainian relations.

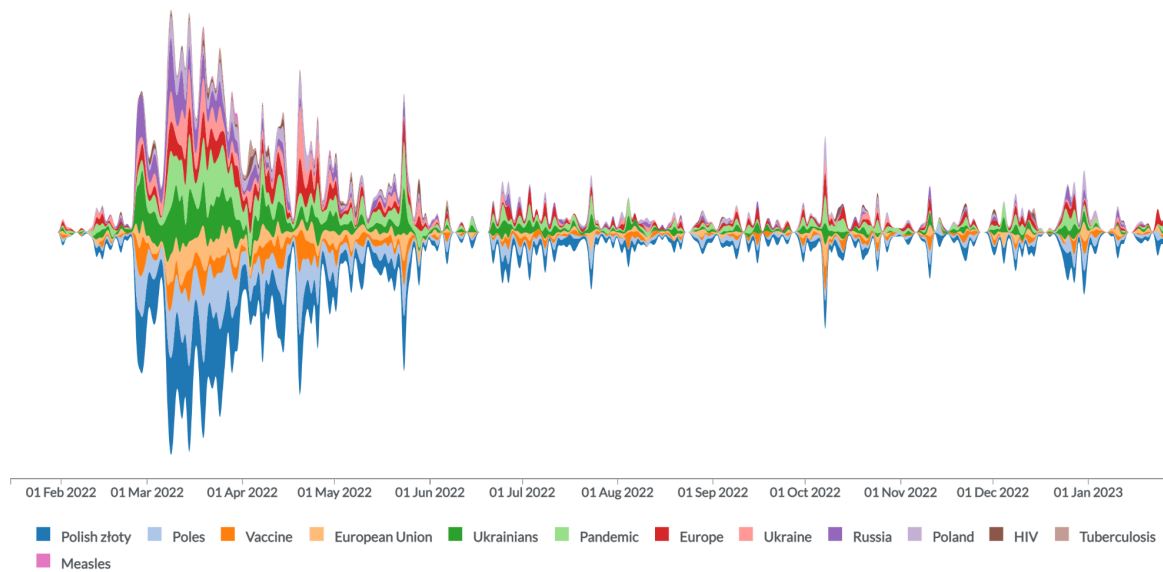


Fig. 9) Topics intensity in time in discussion about infectious disease of refugees in Polish traditional media (EventRegistry)

The activities of alternative portals and social media channels permanently involved in the distribution of biological negationisms were concentrated on the following directions (Marek, 2022b):

- Stimulation of anti-sanitarism narration protests, mainly till lifting the state of epidemic in Poland in middle of May 2022 (including building a positive image of protesters actively disobeying the covid restrictions);
- Building a negative image of the Western vaccines (spreading anti-vaccine attitude by overestimating adverse events and underestimating cost-effectiveness (Jarynowski, 2022b) and lobbying for a positive image the Russian Sputnik V and chinese Sinovac-CoronaVac/Sinopharm);
- Noticing that Ukrainian refugees have lower covid vaccination coverage and were not forced to vaccination [Fig. 9];
- Undermining trust in country medical and veterinary institutions (lack of effectiveness in managing COVID-19 ASF, HPAI (Highly Pathogenic Avian Influenza)) and mainstream media;
- Building perception of unequal rights (better for refugees) to limited healthcare access due to for instance high cost and non-legal ambulatory Tb (Tuberculosis) treatment not available for native population;
- Stigmatization of Tb and/or HIV positive Ukrainian population (Jarynowski & Belik, 2023) and propagating Anti-refugees narratives targeting the community in a harmful way [Fig. 10].

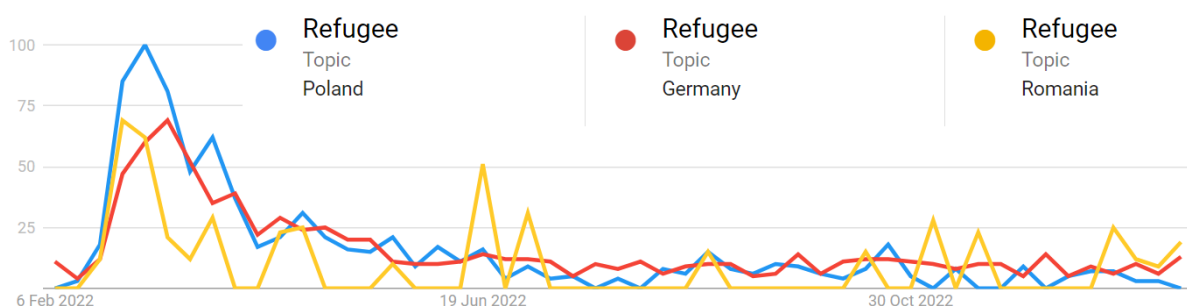


Fig. 10) Google trends of infectious disease related to refugees keywords across countries

This induced fear, confusion and polarity can also lead to social stigmatization and discrimination against individuals perceived as being at high risk for infectious diseases.

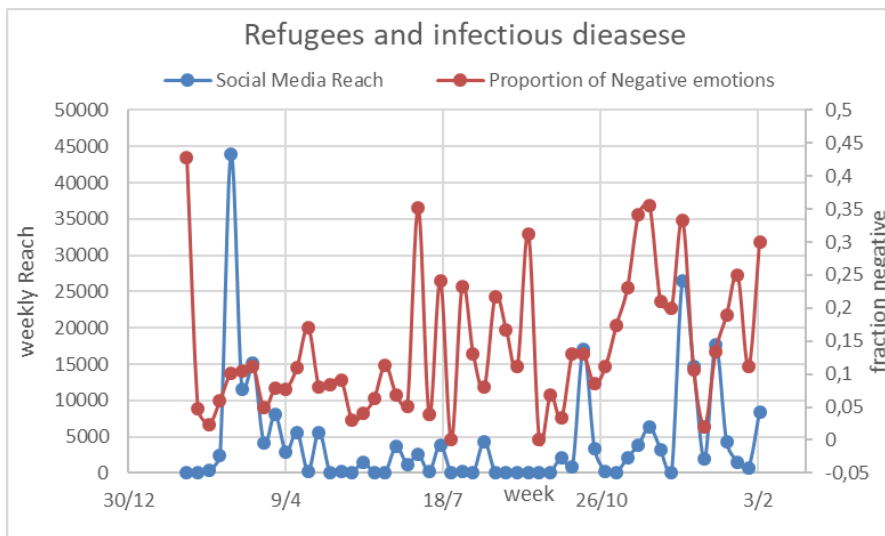


Fig. 11) Sentiment and reach on social media for infectious diseases associated with refugees keywords in Poland (Brand24)

The massive discussion in social media stigmatizing refugees mainly due to higher than in native population prevalence of HIV [Fig. 11] in Autumn 2022 didn't percolate into the general public to such an extent (we see only a small peak of interest in GT [Fig. 10]).

## Summarizing trajectories of interest

The time series of interest suggests the adaptability of Russian information warfare to contemporary conditions (Baraniuk, 2021; Legucka & Kupiecki, 2022). We show that Poland was at the epicentre (in terms of impact on the general population) of Russian disinformation and propaganda about biological weapons. Poland and other European countries supporting Ukraine politically and militarily, were also targeted in infectious disease and food insecurity misinformation campaigns (*RESILIENCE TO DISINFORMATION*, 2022). We can observe that the same media platforms or users accounts are reproducing misinformation on COVID-19, vaccines and food insecurity (which is just a continuation of conspiracy theories live in Polish infosphere before the full scale war) or refugees disease status, as well about as disinformation about biolabs (but in less extent).

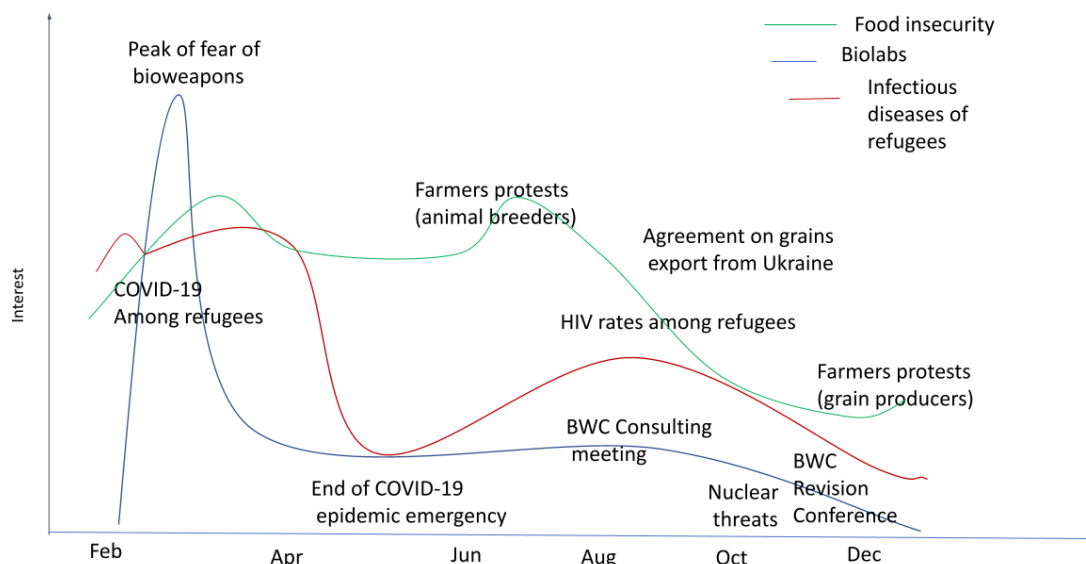


Fig. 13) Simplified time series of interest in different biological narration since full scale Russian aggression

We can differentiate some phase of narrations in Poland in 2022:

- 0) 01.02-23.03 “Pre” war situation with high interest in health of migrant (on Polish-Belarusian border) and Covid-19
- 1) 24.02-31.03 “Fresh” war with the highest interest in all biological concerns with high degree of fear of bioweapon and hunger;
- 2) 01.04-30.05 “Normalization” phase with the discussion about refugees diseases;
- 3) 01.06-31.07 “Pre Odessa treaty” phase with intensification of food related issue;
- 4) 01.08-30.10 “Post Odessa treaty” phase with decrease of all biological narration;
- 5) 01.11-31.12 “Infection season” phase with returning infections topic and farmer protests.

These activities were not devoid of purpose [Fig. 12], but they were probably paving the way for a wider strategic or tactical plans of a hybrid war. Moreover, Russian spin doctors have observed reactions of Polish infosphere on given stimulus and with lessons learnt may be able to induce wanted emotions and attitudes if needed.

## 4) Conclusions

Biological threats are constituting a kind of involvement in the public discourse on the war. The empirical findings and ad hoc analysis of digital traces in this study contribute to our understanding of Polish information security and how biological negationism gains popularity in Europe. A multi-dimensional approach is needed when it comes to combating Russian propaganda and dis(mis)-information in the biomedical field. We learnt that the narration is a clear fake (such from the beginning to the end), then its chance of propagation outside the niche conspiracy theory media (biolab case) is very low and large reach can be generated only in the “gray” area of mis-information (i.e food insecurity). In Poland, it is not possible to separate the pro / anti-Kremlin narrative as easily as in Germany for instance, where users openly support the Russian invasion, and in Polish case it is grayer (IBIMS, 2022), which requires much more work of services such as the Internal Security Agency (ABW) or the Military Counterintelligence Service/Cyber Defence Forces (SKW/WOC). It is worth emphasizing that the modus operandi of Russian propaganda differs depending on the country or medium, so as a rule Polish services should focus more on

their own empirical analyzes (Jarynowski, 2022f) than on world literature (especially American (Broniatowski et al., 2020)). Anthroposophic concepts are usually conflicting with mitigation or control strategies, which we see for instance in COVID-19 pandemic or ASF epizootic, so they are susceptible for external influence (Jarynowski et al., 2019). According the adopted NATO StratCom COE typology of Kremlin agents (Szwed et al., 2016) in the media the most common category is “blame the US conspiracy trolls” which propagate narratives of distrust (for instance about american biolabs), next one are “bikini trolls” who engage in discussion with the general population (e.g. about HIV and measles among refugees), “aggressive trolls” attacking governmental sanitary institutions in the Internet (as Konfederacja Korony Polskiej of Mr Braun (*RESILIENCE TO DISINFORMATION*, 2022) contesting in social media Polish Sanitary Inspection, National Institute of Health or Physicians Associations, etc.), and “attachment trolls” to repeatedly link to pro-Kremlin news platform content.

## Biolabs in Ukraine

Biological weapons have a huge potential for media coverage and disinformation campaigns and Poland was clearly a target of an INFOOPS. Trajectory of the interest suggests that the Kremlin's influence on Polish society was effective in the middle of March. Thus, we could speculate that some kind of CBRN action was considered by Russian and a Polish society was tested on how it could react to it. However, the decision on use of CBRN was taken and after the Russian failure of the BWC meeting and 9th review conference topic died out. Biolab narration is purely a product of propaganda offices or PR agencies without any kind of attention to biological integrity. Therefore, Biolabs can be treated purely as the INFOOPS (information operations), which was tactically successful in March 2022 (by creating a fear), but defeated strategically due to failure of BWC meeting.

## Animal breeders, Food insecurity and epizootics

Social media success of animal breeders protests may be also an effect of foreign intelligence. Acceptance and positive sentiment among Internet society of multiple acts of agroterrorism performed by animal right defenders and climate activists (with multiple crime acts happening after 24.02.2022) in Europe need further investigation (Jarynowski, 2022a). Food issues were the most popular during the war period (among all biological negationsms), so this problem is the most likely to be targeted by foreign intelligence to destabilize society in 2023. The strategic goals of the campaign to destabilize food security were not achieved, but on the tactical level polarization between farmers and the general population increased.

## Other (human) infectious diseases

The anti-sanitarian, anti-vaccine and anti-refugee narration was the successful PSYOPS strategically due to promotion of unhealthy (anti scientific) behavior and on operational/tactical level because of polarization society sanitarian vs antivaxxers and stimulating conflict between Polish people and Ukrainian refugees.

## Recommendations and future works

The threat of Kremlin intelligence in biological infosphere is currently greatest the beginning of the 3rd Republic of Poland (with possible huge role of media to escalate the effect or hidden the source of agroterrorism) our main recommendation are:

- A system of traditional and social media listening should be developed in order to detect in real-time the potential impact of Kremlin propaganda and actors resonating with it;
- Awareness campaigns (with gathered Evidence Based material) among ONE health specialists in Poland (and also in other EU or NATO countries) about involvement of foreign intelligence in promoting biological negationism may be organized;

- More attention should be put into gray high volume discourse of anti-vaccine, anti-refugees discourse than obvious fakes (i.e. biolab);
- The use of calibrated tools for the epidemiological assessment of Grunow & Finke or the Agricultural Index should be popularized, which should be applied to agricultural events (i.e. in the social media) that took place in Europe after the Russian invasion on Ukraine.

In order to measure effectiveness of external Russian propaganda (mainly through Polish-language propaganda channels or media resonating with Russian propaganda) on causing anxiety, fear and anger in Polish society as well as detecting hybrid use of INFOPS following direction of future research is suggested:

- To monitor jumps of agrophages or invasive /animal pathogens on the disease free areas (surveillance of local media and forums/groups on Facebook i.e. monitoring of seeds sent to plant owners);
- To investigate local outbreaks of human diseases in context of CBRN use (surveillance of Google trends, local media and social media);
- To better understand Animal breeders protests and animal right defenders counter protests (analysis of Twitter and other social media)
- To search of digital footprints of foreign intelligence in coronascepticism anti-vaccination engagement in the Internet (analysis of Telegram and TikTok)
- the image of refugees on the Internet based on Google trends, traditional media and social media in topic of infectious diseases (e.g., HIV, COVID-19, Measles, Tb),
- We need a better understanding of the relationship between actors, content (field) and channels (traditional and social media)
- Some particular questions need further investigation within international diplomacy framework, as why "decree of the Ministry of Healthcare of Ukraine (24.02.2022) for emergency destruction of pathogen collections has reinforced our concerns about possible violation of the BWC requirements" was not include in BWC argumentation, but was used for official narration?
- Attempt to analyze chinese biological propaganda (Legucka & Szczudlik, 2023)
- To discuss if parts of the liberal scripts activated during COVID-19 pandemic in European societies (i.e. the Polish speaking population) could be used and played by foreign intelligence.

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