REVIEW ARTICLE

Medycyna Środowiskowa – Environmental Medicine 2025, Tom 28, Nr 3, 115–119
www.environmed.pl

Impact of the Anti-Vaccination Movement on the health of children and society

Wpływ ruchu antyszczepionkowego na zdrowie dzieci i społeczeństwo

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Zalewska A, Drobik M, Lichodij A, Hariasz W, Gądek K, Kozieł M, Michałek M. Impact of the Anti-Vaccination Movement on the health of children and society. Med Srodow. 2025;28(3):115–119. doi:10.26444/ms/211668

Abstract

Introduction and Objective. The Anti-Vaccination Movement has become a significant concern for public health, challenging scientific consensus on vaccine safety and effectiveness, and contributing to declining vaccination rates. The review discusses the consequences of the movement for the health of children and society, with emphasis on psychological factors driving vaccine hesitancy, and presents strategies to mitigate its negative impact.

Brief description of the state of knowledge. Medically, the movement has led to a resurgence of preventable diseases such as measles and pertussis. Reduced herd immunity endangers children too young or medically unable to receive vaccines and increases healthcare burdens. Socially, rapidly spreading misinformation, especially on social media, influences public perception more than scientific facts and undermines trust in healthcare professionals. Psychologically, vaccine refusal is fuelled by cognitive biases, fear, conspiracy thinking, and emotional narratives, which often outweigh data-based communication. These mechanisms explain the persistence of false beliefs despite factual corrections.

Summary. The movement poses a complex threat to both individual health and trust in science. Combatting it requires consistent medical guidance, strong public health messaging, and building lasting trust in healthcare providers. Effective strategies include the 3Cs model (confidence, convenience, complacency) and the CASE (corroborate, about me, science, explain) approach. Success depends on addressing emotional and cognitive barriers through respectful, empathetic communication and evidence-based advocacy.

Key words

public health, infectious diseases, herd immunity, children's health, Anti-Vaccination Movement

Streszczenie

Wprowadzenie i cel pracy. Ruch antyszczepionkowy, który podważa naukowy konsensus dotyczący bezpieczeństwa i skuteczności szczepień oraz przyczynia się do spadku wyszczepialności, stał się istotnym problemem zdrowia publicznego. Artykuł omawia jego konsekwencje dla zdrowia dzieci i społeczeństwa, ze szczególnym uwzględnieniem czynników psychologicznych wpływających na wahania wobec szczepień, oraz przedstawia strategie ograniczania jego negatywnego wpływu.

Opis stanu wiedzy. Z medycznego punktu widzenia ruch ten spowodował nawrót chorób możliwych do uniknięcia, takich jak odra czy krztusiec. Osłabienie odporności populacyjnej zagraża dzieciom zbyt małym lub niezdolnym medycznie do szczepienia oraz zwiększa obciążenie systemu opieki zdrowotnej. Perspektywa społeczna pokazuje, że dezinformacja, szczególnie w mediach społecznościowych, rozprzestrzenia się szybko, kształtując opinię publiczną silniej niż fakty naukowe i podważając zaufanie do pracowników ochrony zdrowia. Z perspektywy psychologicznej można powiedzieć, iż odmowę szczepień napędzają błędy poznawcze, lęk, myślenie spiskowe i emocjonalne przekazy, które często przewyższają skutecznością komunikację opartą na danych. Czynniki te tłumaczą, dlaczego fałszywe przekonania utrzymują się mimo naukowych sprostowań.

Podsumowanie. Ruch antyszczepionkowy stanowi złożone zagrożenie dla zdrowia jednostki i zaufania do nauki. Walka z nim wymaga spójnych zaleceń medycznych, silnego przekazu na temat zdrowia publicznego oraz budowania trwałego zaufania do opieki zdrowotnej. Skuteczne strategie to model 3C (ang. *confidence*, *convenience*, *complacency*) i podejście C.A.S.E. (ang. *corroborate*, *about me*, *science*, *explain*). Sukces zależy od przezwyciężania barier emocjonalnych i poznawczych poprzez szacunek, empatię i komunikację opartą na dowodach.

Słowa kluczowe

zdrowie publiczne, choroby zakaźne, zdrowie dzieci, odporność populacyjna, ruch antyszczepionkowy

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INTRODUCTION

Opposition to vaccination dates back to 1796, when Edward Jenner first introduced the smallpox vaccine to the Royal Society of London [1]. Since the controversial publication in 1998 by Andrew Wakefield et al, linking the vaccine against measles, mumps, and rubella (MMR) to autism, later retracted due to its flawed assertion, there has been a significant increase in the number of individuals who oppose vaccination, commonly referred to as 'anti-vaxxers'. The anti-vaxxers are characterised by postponing the decision to accept or decline vaccination despite the availability of vaccination services [2]. Moreover, recent estimates from the World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF) indicate that the coronavirus pandemic which began in 2019 (COVID-19) has led to a most significant decline in global routine immunization coverage in the past 30 years [3]. In 2019, vaccine hesitancy was described by the WHO as one of the 10 most significant threats to global health [4], the consequences of which are becoming increasingly evident in contemporary society. Vaccine refusal has contributed to a rise in vaccine-preventable diseases, such as measles, pertussis, and mumps [5].

Vaccination plays a critical role in mitigating the transmission of infectious diseases, particularly among vulnerable populations, such as pregnant women, children, and those with compromised immune systems, who are at heightened risk of infection and the development of related complications [6]. Research shows that in order to attain herd immunity, a significant proportion of the population – varying according to a specific disease – must be vaccinated. A decrease in the vaccination coverage presents a considerable risk of resurgence of the disease [7]. To illustrate the current immunization gaps and potential risks for the resurgence of vaccine-preventable diseases in Poland, Table 1 presents the herd immunity thresholds for selected diseases, alongside the most recent vaccination coverage levels, based on WHO/UNICEF Estimates of National Immunization Coverage [8–10]. Notably, measles coverage in the Polish population is approximately 82%, which is significantly below the 92–94% threshold required to prevent outbreaks. This gap in Polish population immunity highlights the vulnerability of the community to epidemic outbreaks, particularly in the context of declining vaccine acceptance. Thus, the expansion of the Anti-Vaccination Movement constitutes a substantial risk for public health, and additionally presents a multitude of social consequences. The aforementioned phenomena are the reason for the current in-depth review of the questions instigated by the Anti-Vaccination Movement [11].

Table 1. Estimated risk of resurgence for selected diseases

Disease	Herd immunity threshold (%) [8]	Vaccination coverage in Poland (%) [9,10]	Estimated risk of resurgence
Measles*	92–94	82	High
Pertussis**	92–94	94	Low-moderate
Rubella*	83–85	82	High-moderate
Mumps*	75–86	82	Low-moderate
Poliomyelitis	75–92	86	Low-moderate

*Measles-containing vaccine, 2nd dose (MMR); **DTP-containing vaccine, 3rd dose

Consequences of the Anti-Vaccination Movement on children's health. In recent years, there has been a growing concern regarding the intensified activity of the Anti-Vaccination Movement which undermines widely accepted scientific evidence on the safety and effectiveness of vaccinations. One of the most troubling and direct consequences of this trend is the documented increase in the number of infectious disease cases among children [3]. Diseases that were once brought under control through decades of consistent vaccination efforts, and in some regions almost eliminated, are re-emerging as serious threats to public health. Particularly alarming is the resurgence of such as highly contagious diseases as measles and pertussis, especially for infants, epidemic outbreaks which are increasingly being recorded in countries with a high standard of living, including Europe and the United States [4]. Furthermore, studies indicate a worrying downward trend in measles vaccination rates and the overall immunization coverage in the years 2019–2023, which further exacerbates the risk of the spread of these dangerous infections [4].

The cornerstone of infectious disease control is the concept of herd immunity, also known as community immunity. This is a crucial level of protection achieved when a sufficiently high proportion of the population develops immunity to a particular pathogen, primarily through vaccination. This widespread immunity acts as a barrier, significantly hindering the transmission of the disease, and consequently protecting individuals who are not immunized. This vulnerable group includes newborns whose immune systems are still developing, individuals with medical contraindications that prevent them from receiving vaccines, and those for whom vaccination, unfortunately, does not elicit a robust immune response [5]. However, the decline in vaccination rates, a direct and concerning consequence of the persistent efforts of the Anti-Vaccination Movement to sow doubt and spread misinformation, directly undermines this critical protective barrier [6]. As a result, even seemingly minor outbreaks of infectious diseases can rapidly escalate into more extensive epidemics, posing a significant but preventable danger to the health and well-being of entire communities [6]. The erosion of herd immunity thus creates a precarious situation where diseases once under control can resurge, endangering both individual health and the stability of the healthcare system.

Vaccination not only prevents disease but also protects against serious post-illness complications and long-term health effects that can affect unvaccinated children; for instance, measles can lead to measles, pneumonia, and sub-acute sclerosing panencephalitis, a progressive and fatal brain disorder [7]. Pertussis can lead to pneumonia, apnea (temporary cessation of breathing), seizures, brain damage (pertussis encephalopathy), pulmonary hypertension, and often requires mechanical ventilation [11]. Refusing vaccinations exposes children to these potentially devastating consequences, which not only burden the patient and the family, but also lead to significant financial strains on healthcare systems [12].

Social consequences of the Anti-Vaccination Movement. Public trust in vaccines has been a persistent challenge since their inception, with varying levels of public support. From the initial scepticism surrounding Edward Jenner's smallpox vaccine in the 18th century [13], through the widespread panic instigated by the now-debunked claims by Wakefield

et al. linking the MMR vaccine to autism [14, 15], to the more recent surge in vaccine hesitancy during the COVID-19 pandemic [16], the Anti-Vaccine Movement has expanded both in scale and influence. Although the medical and scientific implications of this movement are profound, it is equally important to recognize its complex and far-reaching social consequences.

One of the alarming factors of misinformation is how widespread it has become. One study found that 57.6% of participants had encountered vaccine-related misinformation during the COVID-19 pandemic [17]. Another study reported that 28.6% of respondents recognized the false claim that COVID-19 vaccines can cause heart problems [18]. The high percentage of exposure suggests that misinformation is spreading through various channels, including social media, news outlets, and word-of-mouth. An overwhelming amount of information circulating during an epidemic has become a phenomenon referred to as an 'infodemic' [19]. This rapid spread of both true and false information has the potential to create a chaotic environment, where individuals can often feel overwhelmed by conflicting messages.

Misinformation exerts a particularly strong influence on public attitudes. A study conducted in the United Kingdom and the United States to investigate how exposure to either vaccine-related misinformation or factual information influenced vaccination intent, revealed that even a single exposure to misinformation could substantially reduce the willingness to accept a COVID-19 vaccine. In the United Kingdom, exposure to vaccine misinformation decreased the intention to vaccinate by 6.2%, while in the USA, the reduction reached 6.4%. This is particularly alarming when contrasted with the minimal increase in vaccination intent observed among participants who were shown accurate, science-based information. The increase in those cases was marginal and statistically insignificant, suggesting that misinformation is not only more impactful but also more emotionally resonant and memorable [20]. This imbalance likely stems from the narrative and emotive qualities often present in misinformation.

Social media platforms have played a significant role in the spread of misinformation related to vaccines, which contributed to the growing vaccine hesitancy among the public. A rapid review of studies on COVID-19 vaccine misinformation on social media identified 19 studies confirming the negative effects of misinformation on vaccination attitudes [21]. This highlights the urgent need for public health interventions to mitigate the spread of false information online, and to strengthen the visibility and credibility of evidence-based messaging.

Trust in healthcare institutions is a cornerstone of effective public health systems, and the level of this trust is strongly associated with vaccine-related behaviours. Studies have shown that trust in one›s physician correlates strongly with higher vaccine acceptance [22]. Conversely, exposure to health misinformation directly undermines confidence in medical authorities. Individuals who report reduced trust often had recent encounters with health-related misinformation [18], highlighting the critical need for efforts to rebuild and maintain public trust.

Psychological aspects of the Anti-Vaccination Movement. The movement is shaped by a range of complex psychological factors that influence the attitudes and behaviours of individuals toward vaccination. A comprehensive understanding of the psychological mechanisms that contribute to the spread of disinformation and conspiracy theories, as well as the underlying causes of vaccine-related fears, is essential for developing effective strategies to address and mitigate the impact of the movement [23, 24].

The proliferation of misinformation is underpinned by several well-documented psychological mechanisms that influence how individuals perceive, process, and disseminate information. These include emotions – happiness, anger, and anxiety, repeated exposure, altruism, identity-protective mechanisms, source credibility, social endorsement, motivated reasoning, and conspiracy thinking [25]. Belief in vaccine-related conspiracy thinking is often powered by psychological needs and cognitive biases, e.g. *cognitive bias* which includes such mechanisms as *intentionality bias* – the inclination to attribute events to deliberate intent or purpose, rather than to unintentional causes, *confirmation bias* – the tendency to pay attention only to evidence that supports pre-existing beliefs while ignoring contrary evidence, and *proportionality bias* – the assumption that significant outcomes must arise from equally significant causes [26].

Fear of vaccination is a significant reason for the existence of the Anti-Vaccination Movement. The fear can stem from various sources, including perceived risk of illness, concerns about the safety of vaccination, and beliefs about the necessity for and effectiveness of vaccination. Past healthcare experiences, emotional responses, cognitive patterns, source of information, trust in institutions and providers, social networks, and prevailing norms, all play their roles. These are further influenced by socio-demographic variables, such as age, gender, income, and level of education [27].

To effectively counter the Anti-Vaccination Movement, a multi-faceted approach is required, one of which could be combining community engagement, technological innovation, and strategic communication. These efforts should align with the 3Cs model – boosting Confidence, improving Convenience, and reducing Complacency – to build trust and ensure sustained vaccination coverage [28]. The strength of this framework lies in its clarity and practical applicability, as it captures the main psychological and structural barriers to vaccination in an integrated way. By addressing confidence, convenience, and complacency simultaneously, the model supports the development of strategies that promote sustained vaccine acceptance and coverage.

Nonetheless, it must be acknowledged that healthcare providers have a dominant influence on combating the anti-vaccination theories [29]. It has been stated that the following practices could improve up-to-date vaccination rates:1) assessing the vaccination status of the patient during each visit should be put into practice, a strategy that would enable both control of the vaccination rate, and find those who feel uncertain about the concept of vaccination [30]. 2) Physicians should make clear recommendations, because studies on under-vaccination indicate that patients often report a lack of vaccine recommendation from their clinician [31]. 3) Using the CASE (Corroborate, About me, Science, and Explain) approach during patient-doctor dialogue can give outstanding results in convincing doubting patients. This tactic is designed to guide clinicians in addressing vaccine hesitancy by aleviating parent's concerns, sharing relevant personal context, presenting scientific evidence, and offering clear guidance [32].

CONCLUSIONS

The Anti-Vaccination Movement poses a significant threat to public health, particularly among children. Declines in vaccination coverage have already led to the resurgence of previously controlled infectious diseases, such as measles and pertussis, which can result in severe complications, or even death. The trend not only endangers unvaccinated individuals but also weakens herd immunity, which puts at risk those who cannot be vaccinated for medical reasons. The spread of misinformation, particularly through social media, has proven more emotionally impactful than factual content, eroding public trust in healthcare institutions and reducing compliance with vaccination programmes. The psychological mechanisms that drive vaccine hesitancy, including cognitive biases and fear-based reasoning, highlight the need for empathetic and evidence-based communication strategies. Addressing this issue requires a multi-faceted approach that involves consistent medical guidance, community engagement, and combatting misinformation.

Reinforcing the value of vaccination in society requires more than general support, it calls for clear and coordinated action. Health authorities should invest in broad public education efforts that are adapted to the needs of different communities. These campaigns should use both traditional media and social networks to spread accurate vaccine information and limit the influence of false or misleading content. Working with social media platforms to reduce the visibility of harmful misinformation, while promoting trustworthy sources, is essential.

In clinical settings, healthcare providers need training and practical tools to communicate effectively with patients who are unsure about vaccines, including approaches like CASE, asking about vaccine status during each visit, and providingclear, confident recommendations. Local involvement is also important – schools, religious groups, and community leaders can help build trust by sharing messages that reflect the values and concerns of the people they serve.

Finally, to improve access and reduce hesitation, systems should make vaccines easier to obtain by minimizing costs, simplifying appointments, and bringing services closer to where people live. These steps, when combined, follow the logic of the 3Cs model (Confidence, Convenience, Complacency) and can help increase vaccination rates, rebuild trust in healthcare, and better protect the public from vaccine-preventable diseases.

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