



Perspective

Prevention as a Pillar of Communicable Disease Control: Strategies for Equity, Surveillance, and One Health Integration

Giovanni Genovese ^{1,*}, Caterina Elisabetta Rizzo ^{2,*}, Linda Bartucciottio ¹, Serena Maria Calderone ¹,
Francesco Loddo ¹, Francesco Leonforte ³, Antonio Mistretta ⁴, Raffaele Squeri ¹ and Cristina Genovese ^{1,*}

¹ Department of Biomedical and Dental Sciences and Morphofunctional Imaging, University of Messina, 98122 Messina, Italy

² Department of Prevention, Local Health Authority of Catania, 95027 Catania, Italy

³ Department of Integrated Hygiene, Organizational, and Service Activities (Structural Department), Health Management, University Hospital Polyclinic "G. Rodolico—San Marco", 95123 Catania, Italy

⁴ Department of Medical and Surgical Sciences and Advanced Technologies "G. F. Ingrassia", University of Catania, 95124 Catania, Italy

* Correspondence: gigenovese@unime.it (G.G.); caterina.rizzo93@gmail.com (C.E.R.); crigenovese@unime.it (C.G.)

† These authors contributed equally to this work.

Abstract

Global health faces unprecedented challenges driven by communicable diseases, which are increasingly amplified by persistent health inequities, the impact of climate change, and the speed of emerging crises. Prevention is not merely a component but the foundational strategy for an effective, sustainable, and fiscally responsible public health response. This paper delves into the pivotal role of core prevention levers: robust vaccination programs, stringent hygiene standards, advanced epidemiological surveillance, and targeted health education. We detail how contemporary technological advancements, including Artificial Intelligence (AI), big data analytics, and genomics, are fundamentally reshaping infectious disease management, enabling superior predictive capabilities, faster early warning systems, and personalized prevention models. Furthermore, we thoroughly examine the imperative of integrating the One Health approach, which formally recognizes the close, interdependent links between human, animal, and environmental health as critical for combating complex threats like zoonoses and Antimicrobial Resistance (AMR). Despite significant scientific progress, persistent socio-economic disparities, the pervasive influence of health-related misinformation (infodemics), and structural weaknesses in global preparedness underscore the urgent need for decisive international cooperation and equitable financing models. We conclude that only through integrated, multidisciplinary, and resource-equitable strategies can the global community ensure effective prevention, mitigate severe socio-economic disruption, and successfully build resilient healthcare systems capable of withstanding future global health threats.



Academic Editors: Alberto Arnedo-Pena and Giuseppe Stirparo

Received: 11 September 2025

Revised: 6 December 2025

Accepted: 12 January 2026

Published: 3 February 2026

Copyright: © 2026 by the authors.

Licensee MDPI, Basel, Switzerland.

This article is an open access article distributed under the terms and conditions of the [Creative Commons Attribution \(CC BY\)](https://creativecommons.org/licenses/by/4.0/) license.

Keywords: prevention; global health; policy; communicable diseases; one health; digital health; AMR; vaccine hesitancy

1. Introduction

Prevention as the Foundational Strategy for Global Health

Global health, defined as the cooperative effort to achieve the highest attainable standard of health for all people worldwide, constitutes the primary goal of modern healthcare

policy for fostering prosperous, resilient, and equitable societies. The current milieu is characterized by a confluence of accelerating complex challenges, including the re-emergence of established pathogens, the frequent spillover of novel infectious diseases, widening health inequalities, the destabilizing effects of climate change, and the recurring pattern of health crises. Addressing these threats requires a fundamental shift toward an innovative, integrated, and future-oriented paradigm [1]. Within this complex framework, prevention and active health promotion transition from supplementary measures to essential, cost-effective instruments for dramatically reducing the burden of disease and curbing escalating healthcare expenditure [2]. The most innovative tool for achieving global health is the One Health approach, which promotes a unified, holistic view of health [3]. This concept acknowledges the critical interconnectedness and mutual influence of human, animal, and ecosystem health, exemplified by emerging zoonotic diseases such as Ebola, avian influenza, HIV/AIDS, and the recent COVID-19 pandemic, all of which originated from intricate human–animal–habitat interactions [4]. Fundamentally, global health is not restricted to the biomedical domain but inherently involves complex social, economic, and environmental determinants, touching upon sectors such as education, technology, trade, and land use. For this reason, robust intersectoral cooperation and the development of integrated preventive policies are not optional but essential for achieving efficiency and long-term sustainability [5]. The effective control of communicable diseases—which constitute the primary focus of this paper—demands a globally coordinated and proactive strategy centered on clearly defined prevention pillars.

2. Core Prevention Levers for Communicable Diseases

The prevention of infectious diseases fundamentally relies on a hierarchical strategy designed to block the onset and curtail the spread of pathogens across populations by controlling vectors, individuals, and the environment [5].

2.1. *Vaccination Equity: A Public Health Imperative*

Vaccination programs represent one of the crowning scientific achievements in public health, rivaled only by the provision of clean water in their historical impact on reducing mortality and driving population growth [6]. They have been instrumental in significantly decreasing mortality and morbidity from numerous infectious diseases—including measles, diphtheria, tetanus, and pertussis—leading to a marked reduction in infant mortality [7]. High-coverage vaccination is the single most effective tool for protecting the most vulnerable populations through the generation of herd immunity, successfully controlling epidemics and pandemics, as was evidenced during the rapid response to SARS-CoV-2 [8]. Programs have continually evolved, adapting to new challenges with the development of novel vaccines against pathogens like Ebola and SARS-CoV-2 [9]. Despite these monumental successes, the most pressing and unresolved aspect is the lack of universal access to vaccines, which remains severely constrained in low- and middle-income countries (LMICs) where vulnerability to infectious threats is highest [10]. To achieve global equity, strengthened international cooperation in manufacturing and distribution is crucial. Simultaneously, high-income countries face the persistent and growing challenge of vaccine hesitancy, fueled by systematic misinformation and the propagation of false claims that erode public trust in science and public health campaigns [11]. Addressing this dual challenge requires both supply-side equity and demand-side communication efficacy [12].

2.2. *Digital Early Warning Systems and Predictive Analytics*

Effective prevention relies on robust epidemiological surveillance and rapidly scalable early warning systems (EWS) [13–15]. Modern surveillance extends beyond traditional

active and passive methods, increasingly utilizing integrated digital platforms that harness big data and Artificial Intelligence (AI) to monitor and identify emerging outbreak signals with unprecedented speed and precision [16–18]. Using advanced machine learning algorithms and deep analysis of massive, disparate epidemiological datasets, AI and predictive analytics can identify subtle, atypical patterns that may elude human observation, effectively anticipating outbreaks before they escalate into pandemics [19]. The digital revolution has delivered powerful tools for public health: mobile health (mHealth) applications, sophisticated wearable devices, and digital platforms enable granular, real-time monitoring of individual and population health. This facilitates personalized preventive interventions and significantly optimizes resource allocation and response times during health emergencies [20,21]. Given that globalization, international travel, and dense transportation networks accelerate the spread of infectious diseases faster than ever before [22–24], international cooperation remains the bedrock for effectively addressing these threats, ensuring the prompt sharing of critical data and resources, as demonstrated during the COVID-19 pandemic [25,26].

2.3. Antimicrobial Resistance (AMR) Control via Innovation and Stewardship

The evolution of infectious disease management is severely hampered by the escalating global threat of Antimicrobial Resistance (AMR), necessitating a continuous and radical review of therapeutic and preventative strategies [27–30]. AMR is a critical public health crisis, driven by the emergence of bacterial strains resistant to traditional antibiotics [31,32]. Addressing AMR is multifactorial and requires a holistic approach:

- **Antimicrobial Stewardship:** Implementing stringent policies to reduce the inappropriate use of antibiotics in both human medicine and, crucially, in intensive animal farming [33].
- **Research and Development:** Vigorously funding the development of new classes of antibiotics and exploring innovative alternatives. A promising avenue is bacteriophage therapy, which utilizes specific viruses to target and eliminate harmful bacteria without disturbing the host microbiota [34,35].
- **Genomic Surveillance:** Leveraging genomics and advanced biotechnology (e.g., CRISPR-Cas) for real-time monitoring of pathogen mutations, which enhances epidemiological surveillance and facilitates the rapid development of personalized, effective antibacterial and antiviral treatments [36,37].

2.4. Risk Communication and Infodemic Management

The unchecked spread of misinformation poses a significant, persistent obstacle to the efficacy of public health policies. The COVID-19 pandemic clearly demonstrated how “infodemics” could actively sabotage vaccination efforts and erode public trust in scientific institutions [38–40]. Health authorities must proactively counter this by adopting scientific communication that is consistently accurate, clear, transparent, and strictly evidence-based, maximizing reach by utilizing digital channels such as social media, podcasts, and online video platforms [41]. Simultaneously, robust public health education is paramount. Educational campaigns must focus on raising population awareness about essential protective behaviors, including hand hygiene, safe sex practices, and proper management of chronic conditions [42]. School health education, in particular, serves as a fundamental platform for inculcating healthy habits early in life, thereby generating a sustained, positive multiplier effect within the wider society [43].

2.5. One Health Integration: Bridging Human, Animal, and Environment

The One Health framework is the essential strategic approach for achieving sustainable global health outcomes [44]. This model formally recognizes the close, interdependent links between the health of humans, animals, and the integrity of the ecosystem. The emergence of zoonotic diseases is intrinsically linked to complex interactions involving biodiversity loss, deforestation, and rapid, unplanned urbanization [45]. One Health integration is thus non-negotiable for effective infectious disease management, encompassing:

- Zoonotic Surveillance: Implementing joint human and animal health surveillance to monitor zoonoses and predict spillover events before they cause pandemics [46].
- Water, Sanitation, and Hygiene (WASH): Significantly improving foundational hygiene and sanitation conditions—including access to clean drinking water, adequate sewage systems, and proper waste disposal—which are critical environmental measures necessary to prevent the spread of diseases like cholera, dysentery, malaria, and viral hepatitis [47–49].

2.6. Financing, Equity, and Socio-Economic Resilience

Communicable diseases impose a severe and complex socio-economic impact, far beyond the immediate morbidity and mortality statistics. They severely reduce labor productivity, dramatically increase direct healthcare costs, and destabilize national and global economies, particularly affecting vulnerable LMICs [50]. The uncontrolled spread of a disease can trigger a catastrophic economic slowdown, disrupting key sectors globally [51]. The core challenge remains the structural inequality in access to essential health services and novel therapies [52–54]. Scarce, poorly distributed healthcare resources often fail to meet population needs, forcing many families to forgo necessary care [55].

Mitigating this requires systemic change:

- Resource and Infrastructure Investment: Substantially improving the equitable distribution of resources and investing in healthcare infrastructures capable of implementing diagnostic tools and distributing vaccines on a large scale [56].
- Global Supply Chain Security: Strengthening international cooperation to establish robust protocols that ensure the continuity of essential goods supplies, especially pharmaceuticals and medical devices, during health emergencies [57].
- Psycho-Social Support: Addressing the profound psycho-social impact (fear, anxiety, depression, stigma) associated with infectious diseases (e.g., HIV/AIDS, tuberculosis) through awareness campaigns and the promotion of social inclusion [58].

3. The Role of Advanced Diagnostics and an Operational Model

3.1. Advanced Diagnostics: The Time-to-Diagnosis Metric

Early diagnosis is the defining factor for rapid containment of infectious diseases [24]. Rapid diagnostic tests (RDTs)—particularly antigen tests—proved instrumental during the COVID-19 pandemic response. Their key advantage lies in the dramatic reduction in the time-to-diagnosis metric, which is crucial for initiating immediate isolation and contact tracing. For instance, a SARS-CoV-2 RDT provided results in 15–30 min, offering a critical operational gain compared to the benchmark molecular test (RT-PCR), which during periods of high demand often required 24 to 72 h for laboratory processing and result delivery. This difference allowed RDTs to function as an essential tool for effective triage and outbreak management at the community level. Furthermore, investments in universal vaccines against highly variable pathogens like influenza and SARS-CoV-2 are vital for future preparedness [59].

3.2. Implementation Framework: Logic Model for Action

To bridge the gap between narrative perspective and operational action, a structured logic model/implementation table is essential. This framework aligns prevention strategies with tangible actions and measurable outcomes, creating an actionable roadmap for policymakers (Table 1).

Table 1. Implementation Framework: Linking Levers to Action.

Prevention Lever	Strategic Objective (Outcome)	Key Operational Actions (Input)	Success Indicators (Output Metrics)
Vaccination Equity	Achieve high, sustained, and equitable vaccination coverage globally.	Establish global pooled financing mechanisms (e.g., COVAX 2.0). Implement community-led, trusted health messaging to combat infodemics.	Increase in DTP3/measles coverage in 90% of LMICs. Reduction in measured vaccine hesitancy rates (e.g., SAGE survey).
AMR Control	Decouple infection treatment from the reliance on last-line antibiotics.	Integrate veterinary and human health surveillance of antibiotic usage and resistance patterns (One Health Surveillance). Incentivize private sector R&D for novel antimicrobial classes and alternatives (e.g., phage therapy). Adopt AI/Machine Learning models that integrate environmental (e.g., climate, land use) and syndromic data for risk forecasting. Mandate cross-border, real-time data sharing protocols among regional health organizations.	Decrease in the consumption of Highest Priority Critically Important Antimicrobials (HPCIA) in livestock/humans. Increase in the clinical trial pipeline for new-mechanism antibiotics.
Digital Early Warning	Achieve predictive capacity for pandemic threats and reduce alert time.		Reduction in the average “time-to-detection” of novel pathogen spillover events (e.g., from 30 days to <7 days). Accuracy score improvement for 6-month seasonal disease forecasts.

4. Conclusions

A Unified Call for Global Cooperation

Communicable diseases represent a complex, evolving threat demanding a comprehensive, multi-dimensional approach that seamlessly integrates foundational public health measures, advanced emergency management protocols, accelerated research, and decisive healthcare policies [60]. The current trajectory of global health is being fundamentally altered by disruptive innovations in biotechnology, genomics, and digitalization [61]. To effectively combat future emerging threats, it is imperative to fully implement the One Health strategy, invest heavily in the development and rapid deployment of novel therapies (e.g., monoclonal antibodies, personalized medicine), and standardize next-generation surveillance systems globally [62–65]. This paper serves as an urgent call to action, urging researchers, clinicians, policymakers, and private sector leaders to collaborate actively in the creation and deployment of successful strategies [66–73]. Ultimately, the success of these strategies will not be measured solely by scientific discovery but by their capacity for equitable and coordinated implementation across the globe, thereby ensuring that all populations—regardless of socio-economic status—have access to effective, sustainable, and timely preventive measures.

Author Contributions: Conceptualization, C.G. and G.G.; methodology, C.G.; software, C.G.; validation, C.G. and G.G.; formal analysis, C.G.; investigation, G.G., C.E.R., L.B., S.M.C., F.L. (Francesco Loddo), F.L. (Francesco Leonforte), A.M., R.S., and C.G.; resources, G.G., C.E.R., L.B., S.M.C., F.L. (Francesco Loddo), F.L. (Francesco Leonforte), A.M., R.S., and C.G.; data curation, G.G., C.E.R., L.B., S.M.C., F.L. (Francesco Loddo), F.L. (Francesco Leonforte), A.M., R.S., and C.G.; writing—original draft preparation, G.G., C.E.R., L.B., S.M.C., F.L. (Francesco Loddo), F.L. (Francesco Leonforte), A.M., R.S., and C.G.; writing—review and editing, C.G. and G.G.; visualization, C.G.; supervision, C.G.; project administration, C.G.; funding acquisition, C.G. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Ethical review and approval were waived for this study due to its nature.

Informed Consent Statement: Not applicable.

Data Availability Statement: No new data were created or analyzed in this study. Data sharing is not applicable to this article.

Conflicts of Interest: The authors declare no conflicts of interest.

References

- Sharma, M.; Akhter, M.S.; Roy, S.; Srejon, R. Future Issues in Global Health: Challenges and Conundrums. *Int. J. Environ. Res. Public Health* **2025**, *22*, 325. [CrossRef]
- Caron, R.M.; Noel, K.; Reed, R.N.; Sibel, J.; Smith, H.J. Health Promotion, Health Protection, and Disease Prevention: Challenges and Opportunities in a Dynamic Landscape. *AJPM Focus*. **2023**, *3*, 100167. [CrossRef] [PubMed] [PubMed Central]
- Mackenzie, J.S.; Jeggo, M. The One Health Approach—Why Is It So Important? *Trop. Med. Infect. Dis.* **2019**, *4*, 88. [CrossRef] [PubMed] [PubMed Central]
- Horefti, E. The Importance of the One Health Concept in Combating Zoonoses. *Pathogens* **2023**, *12*, 977. [CrossRef] [PubMed] [PubMed Central]
- Salm, M.; Ali, M.; Minihane, M.; Conrad, P. Defining global health: Findings from a systematic review and thematic analysis of the literature. *BMJ Glob. Health* **2021**, *6*, e005292. [CrossRef] [PubMed] [PubMed Central]
- Plotkin, S.L.; Plotkin, S.A. A short history of vaccination. In *Vaccines*, 4th ed.; Plotkin, S.A., Orenstein, W.A., Eds.; WB Saunders: Philadelphia, PA, USA, 2004; pp. 1–15.
- Montero, D.A.; Vidal, R.M.; Velasco, J.; Carreño, L.J.; Torres, J.P.; Benachi, O.M.A.; Tovar-Rosero, Y.Y.; Oñate, A.A.; O’Ryan, M. Two centuries of vaccination: Historical and conceptual approach and future perspectives. *Front. Public Health* **2024**, *11*, 1326154. [CrossRef] [PubMed] [PubMed Central]
- Rasmussen, A.L. Vaccination Is the Only Acceptable Path to Herd Immunity. *Med* **2020**, *1*, 21–23. [CrossRef] [PubMed] [PubMed Central]
- Kennedy, R.B.; Ovsyannikova, I.G.; Palese, P.; Poland, G.A. Current Challenges in Vaccinology. *Front. Immunol.* **2020**, *11*, 1181. [CrossRef] [PubMed] [PubMed Central]
- Hamson, E.; Forbes, C.; Wittkopf, P.; Pandey, A.; Mendes, D.; Kowalik, J.; Czudek, C.; Mugwagwa, T. Impact of pandemics and disruptions to vaccination on infectious diseases epidemiology past and present. *Hum. Vaccin. Immunother.* **2023**, *19*, 2219577. [CrossRef] [PubMed] [PubMed Central]
- Solís Arce, J.S.; Warren, S.S.; Meriggi, N.F.; Scacco, A.; McMurphy, N.; Voors, M.; Syunyaev, G.; Malik, A.A.; Aboutajdine, S.; Adejo, O.; et al. COVID-19 vaccine acceptance and hesitancy in low- and middle-income countries. *Nat. Med.* **2021**, *27*, 1385–1394. [CrossRef] [PubMed] [PubMed Central]
- Hutton, G.; Chase, C. Water Supply, Sanitation, and Hygiene. In *Injury Prevention and Environmental Health*, 3rd ed.; Mock, C.N., Nugent, R., Kobusingye, O., Nugent, R., Abdalla, S., Ahuja, R.B., Apramian, S.S., Bachani, A.M., Bellis, M.A., Butchart, A., et al., Eds.; The International Bank for Reconstruction and Development/The World Bank: Washington, DC, USA, 2017; Chapter 9. [CrossRef]
- Available online: <https://www.cdc.gov/global-water-sanitation-hygiene/about/index.html> (accessed on 11 January 2026).
- Ferreira Caceres, M.M.; Sosa, J.P.; Lawrence, J.A.; Sestacovschi, C.; Tidd-Johnson, A.; Rasool, M.H.U.; Gadamedi, V.K.; Ozair, S.; Pandav, K.; Cuevas-Lou, C.; et al. The impact of misinformation on the COVID-19 pandemic. *AIMS Public Health* **2022**, *9*, 262–277. [CrossRef] [PubMed] [PubMed Central]

15. Fox, M.P.; Carr, K.; D'Agostino McGowan, L.; Murray, E.J.; Hidalgo, B.; Banack, H.R. Will Podcasting and Social Media Replace Journals and Traditional Science Communication? No, but... *Am. J. Epidemiol.* **2021**, *190*, 1625–1631. [[CrossRef](#)] [[PubMed](#)]
16. Available online: https://health.ec.europa.eu/health-security-and-infectious-diseases/surveillance-and-early-warning_en (accessed on 11 January 2026).
17. Aiello, A.E.; Renson, A.; Zivich, P.N. Social Media- and Internet-Based Disease Surveillance for Public Health. *Annu. Rev. Public Health* **2020**, *41*, 101–118. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
18. Findlater, A.; Bogoch, I.I. Human Mobility and the Global Spread of Infectious Diseases: A Focus on Air Travel. *Trends Parasitol.* **2018**, *34*, 772–783. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
19. Kokudo, N.; Sugiyama, H. Call for international cooperation and collaboration to effectively tackle the COVID-19 pandemic. *Glob. Health Med.* **2020**, *2*, 60–62. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
20. Abernethy, A.; Adams, L.; Barrett, M.; Bechtel, C.; Brennan, P.; Butte, A.; Faulkner, J.; Fontaine, E.; Friedhoff, S.; Halamka, J.; et al. The Promise of Digital Health: Then, Now, and the Future. *NAM Perspect.* **2022**, *2022*, 10–31478. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
21. Dixon, D.; Sattar, H.; Moros, N.; Kesireddy, S.R.; Ahsan, H.; Lakkimsetti, M.; Fatima, M.; Doshi, D.; Sadhu, K.; Junaid Hassan, M. Unveiling the Influence of AI Predictive Analytics on Patient Outcomes: A Comprehensive Narrative Review. *Cureus* **2024**, *16*, e59954. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
22. Krammer, F.; García-Sastre, A.; Palese, P. Is It Possible to Develop a “Universal” Influenza Virus Vaccine? Potential Target Antigens and Critical Aspects for a Universal Influenza Vaccine. *Cold Spring Harb. Perspect. Biol.* **2018**, *10*, a028845. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
23. Ellwanger, J.H.; Veiga, A.B.G.; Kaminski, V.L.; Valverde-Villegas, J.M.; Freitas, A.W.Q.; Chies, J.A.B. Control and prevention of infectious diseases from a One Health perspective. *Genet. Mol. Biol.* **2021**, *44*, e20200256. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
24. Jeon, J.; Kim, E. Exploring Future Pandemic Preparedness Through the Development of Preventive Vaccine Platforms and the Key Roles of International Organizations in a Global Health Crisis. *Vaccines* **2025**, *13*, 56. [[CrossRef](#)]
25. Shattock, A.J.; Johnson, H.C.; Sim, S.Y.; Carter, A.; Lambach, P.; Hutubessy, R.C.; Thompson, K.M.; Badizadegan, K.; Lambert, B.; Ferrari, M.J. Contribution of vaccination to improved survival health: Modelling 50 years of the Expanded Programme on Immunization. *Lancet* **2024**, *403*, 2307–2316. [[CrossRef](#)] [[PubMed](#)]
26. Cook, M.A.; Wright, G.D. The past, present, and future of antibiotics. *Sci Transl. Med.* **2022**, *14*, eabo7793. [[CrossRef](#)] [[PubMed](#)]
27. Tadesse, B.T.; Keddy, K.H.; Rickett, N.Y.; Zhusupbekova, A.; Poudyal, N.; Lawley, T.; Osman, M.; Dougan, G.; Kim, J.H.; Lee, J.S.; et al. Vaccination to Reduce Antimicrobial Resistance Burden-Data Gaps and Future Research. *Clin. Infect. Dis.* **2023**, *77*, S597–S607. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
28. AbdulRaheem, Y. Unveiling the Significance and Challenges of Integrating Prevention Levels in Healthcare Practice. *J. Prim. Care Community Health* **2023**, *14*, 21501319231186500. [[CrossRef](#)]
29. Rodrigues, C.M.C.; Plotkin, S.A. Impact of Vaccines: Health, Economic and Social Perspectives. *Front. Microbiol.* **2020**, *11*, 1526. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
30. Tricou, V.; Yu, D.; Reynales, H.; Biswal, S.; Saez-Llorens, X.; Sirivichayakul, C.; Lopez, P.; Borja-Tabora, C.; Bravo, L.; Kosalaraksa, P.; et al. Long-term efficacy and safety of a tetravalent dengue vaccine (TAK-003): 4-5-year results from a phase 3, randomised, double-blind, placebo-controlled trial. *Lancet Glob. Health* **2024**, *12*, e257–e270. [[CrossRef](#)] [[PubMed](#)]
31. Schneider, M.; Narciso-Abraham, M.; Hadl, S.; McMahon, R.; Toepfer, S.; Fuchs, U.; Hochreiter, R.; Bitzer, A.; Kosulin, K.; Larcher-Senn, J.; et al. Safety and immunogenicity of a single-shot live-attenuated chikungunya vaccine: A double-blind, multicentre, randomised, placebo-controlled, phase 3 trial. *Lancet* **2023**, *401*, 2138–2147. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
32. Woolhouse, M.E.J. One Health approaches to tackling antimicrobial resistance. *Sci. One Health* **2024**, *3*, 100082. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
33. Jangra, M.; Travin, D.Y.; Aleksandrova, E.V.; Kaur, M.; Darwish, L.; Koteva, K.; Klepacki, D.; Wang, W.; Tiffany, M.; Sokaribo, A.; et al. A broad-spectrum lasso peptide antibiotic targeting the bacterial ribosome. *Nature* **2025**, *640*, 1022–1030. [[CrossRef](#)]
34. Keck, J.M.; Viteri, A.; Schultz, J.; Fong, R.; Whitman, C.; Poush, M.; Martin, M. New Agents Are Coming, and So Is the Resistance. *Antibiotics* **2024**, *13*, 648. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
35. Sawa, T.; Moriyama, K.; Kinoshita, M. Current status of bacteriophage therapy for severe bacterial infections. *J. Intensive Care* **2024**, *12*, 44. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
36. Traversi, D.; Calabrò, G.E.; Francese, C.; Franchitti, E.; Pulliero, A.; Spatera, P.; Izzotti, A.; Ventura, C.D.; Lai, A.; Bergna, A.; et al. Genomica in Sanità Pubblica Evidenze scientifiche e prospettive di integrazione nella pratica della prevenzione [Genomics in Public Health Scientific evidence and prospects for integration in the prevention practice]. *J. Prev. Med. Hyg.* **2023**, *63*, E1–E29. (In Italian) [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
37. Schambach, A.; Buchholz, C.J.; Torres-Ruiz, R.; Cichutek, K.; Morgan, M.; Trapani, I.; Büning, H. A new age of precision gene therapy. *Lancet* **2024**, *403*, 568–582. [[CrossRef](#)] [[PubMed](#)]

38. Serajian, S.; Ahmadpour, E.; Oliveira, S.M.R.; Pereira, M.L.; Heidarzadeh, S. CRISPR-Cas Technology: Emerging Applications in Clinical Microbiology and Infectious Diseases. *Pharmaceuticals* **2021**, *14*, 1171. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
39. Altomare, A.; Giovanetti, M.; Baldaro, F.; Ciccozzi, M.; Cicala, M.; Guarino, M.P.L. The Prevention of Viral Infections: The Role of Intestinal Microbiota and Nutritional Factors. *Nutrients* **2024**, *16*, 2445. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
40. Noguera-Fernández, N.; Candela-González, J.; Orenes-Piñero, E. Probiotics, Prebiotics, Fecal Microbiota Transplantation, and Dietary Patterns in Inflammatory Bowel Disease. *Mol. Nutr. Food Res.* **2024**, *68*, e2400429. [[CrossRef](#)] [[PubMed](#)]
41. Allegra, S.; Chiara, F.; De Francia, S. Gender Medicine and Pharmacology. *Biomedicines* **2024**, *12*, 265. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
42. Gunaratne, S.H.; Taylor, B.S.; Wilkin, T.J.; Tieu, H.V. CROI 2023: Advances in Antiviral Therapy in HIV and Viral Hepatitis. *Top. Antivir. Med.* **2023**, *31*, 445–467. [[PubMed](#)] [[PubMed Central](#)]
43. Hammitt, L.L.; Dagan, R.; Yuan, Y.; Baca Cots, M.; Bosheva, M.; Madhi, S.A.; Muller, W.J.; Zar, H.J.; Brooks, D.; Grenham, A.; et al. MELODY Study Group Nirsevimab for Prevention of RSV in Healthy Late-Preterm and Term Infants. *N. Engl. J. Med.* **2022**, *386*, 837–846. [[CrossRef](#)] [[PubMed](#)]
44. European Centre for Disease Prevention Control. *Digital Technologies for Infectious Disease Surveillance Prevention Control-Ascoping Review of the Research Literature 2015–2019*; ECDC: Stockholm, Sweden, 2021.
45. Donelle, L.; Comer, L.; Hiebert, B.; Hall, J.; Shelley, J.J.; Smith, M.J.; Kothari, A.; Burkell, J.; Stranges, S.; Cooke, T.; et al. Use of digital technologies for public health surveillance during the COVID-19 pandemic: A scoping review. *Digit. Health* **2023**, *9*, 20552076231173220. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
46. Ezenwaji, C.O.; Alum, E.U.; Ugwu, O.P. The role of digital health in pandemic preparedness and response: Securing global health? *Glob. Health Action.* **2024**, *17*, 2419694. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
47. Gentili, A.; Villani, L.; Valz Gris, A.; Osti, T.; Solimene, V.; De Maio, L.; Corona, V.F.; Zaino, A.; Bonacquisti, M.; Cascini, F. The challenge of infodemic: A scoping review of strategies to tackle health-related fake news. *Eur. J. Public Health* **2023**, *33*, ckad160.1434. [[CrossRef](#)] [[PubMed Central](#)]
48. Merchant, R.M.; South, E.C.; Lurie, N. Public Health Messaging in an Era of Social Media. *JAMA* **2021**, *325*, 223–224. [[CrossRef](#)] [[PubMed](#)]
49. Krämer, A.; Hossain Khan, M.M. Global Challenges of Infectious Disease Epidemiology. *Mod. Infect. Dis. Epidemiol.* **2009**, *28*, 23–38. [[CrossRef](#)] [[PubMed Central](#)]
50. Fonkwo, P.N. Pricing infectious disease. The economic and health implications of infectious diseases. *EMBO Rep.* **2008**, *9*, S13–S17. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
51. Quinn, S.C.; Kumar, S. Health inequalities and infectious disease epidemics: A challenge for global health security. *Bio Secur. Bioterror.* **2014**, *12*, 263–273. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
52. Anawade, P.A.; Sharma, D.; Gahane, S. A Comprehensive Review on Exploring the Impact of Telemedicine on Healthcare Accessibility. *Cureus* **2024**, *16*, e55996. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
53. Awal Chowdhury, N.M.R.; Urme, S.A.; Hridoy, A.; Nusrat, F.; Miah, M.S. Exploring the effects catastrophic health expenditure due to non-communicable diseases and coping strategies: A case study among households in Bangladesh. *Public Health Pract.* **2025**, *10*, 100642. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
54. Salam, M.A.; Al-Amin, M.Y.; Salam, M.T.; Pawar, J.S.; Akhter, N.; Rabaan, A.A.; Alqumber, M.A.A. Antimicrobial Resistance: A Growing Serious Threat for Global Public Health. *Healthcare* **2023**, *11*, 1946. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
55. *The Impact of the COVID-19 Pandemic on Trade and Development: Lessons Learned*; UNCTAD Working Group; United Nations: Geneva, Switzerland, 2022.
56. Nayak, J.; Mishra, M.; Naik, B.; Swapnarekha, H.; Cengiz, K.; Shanmuganathan, V. An impact study of COVID-19 on six different industries: Automobile, energy and power, agriculture, education, travel and tourism and consumer electronics. *Expert Syst.* **2022**, *39*, e12677. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
57. Clemente-Suárez, V.J.; Martínez-González, M.B.; Benitez-Agudelo, J.C.; Navarro-Jiménez, E.; Beltran-Velasco, A.I.; Ruisoto, P.; Diaz Arroyo, E.; Laborde-Cárdenas, C.C.; Tornero-Aguilera, J.F. The Impact of the COVID-19 Pandemic on Mental Disorders. A Critical Review. *Int. J. Env. Environ. Res. Public Health* **2021**, *18*, 10041. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
58. Brooks, S.K.; Webster, R.K.; Smith, L.E.; Woodland, L.; Wessely, S.; Greenberg, N.; Rubin, G.J. The psychological impact of quarantine how to reduce it: Rapid review of the evidence. *Lancet* **2020**, *395*, 912–920. [[CrossRef](#)] [[PubMed](#)]
59. Asrina, A.; Ikhtiar, M.; Idris, F.P.; Adam, A.; Alim, A. Community stigma and discrimination against the incidence of HIV and AIDS. *J. Med. Life* **2023**, *16*, 1327–1334. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
60. Filip, R.; Gheorghita Puscaselu, R.; Anchidin-Norocel, L.; Dimian, M.; Savage, W.K. Global Challenges to Public Health Care Systems during the COVID-19 Pandemic: A Review of Pandemic Measures and Problems. *J. Pers. Med.* **2022**, *12*, 1295. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
61. *Strengthening Health Emergency Prevention, Preparedness, Response and Resilience*; World Health Organization: Geneva, Switzerland, 2023.

62. Hameed, M.; Najafi, M.; Cheeti, S.; Sheokand, A.; Mago, A.; Desai, S. Factors influencing international collaboration on the prevention of COVID-19. *Public Health* **2022**, *212*, 95–101. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
63. Tulchinsky, T.H.; Varavikova, E.A. Expanding the Concept of Public Health. *New Public Health* **2014**, 43–90. [[CrossRef](#)] [[PubMed Central](#)]
64. Kruk, M.E.; Gage, A.D.; Arsenault, C.; Jordan, K.; Leslie, H.H.; Roder-DeWan, S.; Adeyi, O.; Barker, P.; Daelmans, B.; Doubova, S.V.; et al. High-quality health systems in the Sustainable Development Goals era: Time for a revolution. *Lancet Glob. Health* **2018**, *6*, e1196–e1252. Erratum in *Lancet Glob. Health* **2018**, *6*, e1162. [https://doi.org/10.1016/S2214-109X\(18\)30438-8](https://doi.org/10.1016/S2214-109X(18)30438-8). Erratum in *Lancet Glob. Health* **2021**, *9*, e1067. [https://doi.org/10.1016/S2214-109X\(21\)00250-3](https://doi.org/10.1016/S2214-109X(21)00250-3). [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
65. Loddo, F.; Laganà, P.; Rizzo, C.E.; Calderone, S.M.; Romeo, B.; Venuto, R.; Maisano, D.; Fedele, F.; Squeri, R.; Nicita, A.; et al. Intestinal Microbiota and Vaccinations: A Systematic Review of the Literature. *Vaccines* **2025**, *13*, 306. [[CrossRef](#)]
66. Genovese, C.; Biondo, C.A.; Rizzo, C.; Cortese, R.; La Spina, I.; Tripodi, P.; Romeo, B.; La Fauci, V.; Trimarchi, G.; Prete, V.L.; et al. Knowledge, Propensity and Hesitancy among Pregnant Women in the Post-Pandemic Phase Regarding COVID-19 Vaccination: A Prevalence Survey in Southern Italy. *Women* **2023**, *3*, 374–384. [[CrossRef](#)]
67. Rizzo, C.E.; Venuto, R.; Tripodi, P.; Bartucciottto, L.; Ventura Spagnolo, E.; Nirta, A.; Genovese, G.; La Spina, I.; Sortino, S.; Nicita, A.; et al. From Guidelines to Action: Tackling Risk Factors for Surgical Site Infections. *Antibiotics* **2025**, *14*, 40. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
68. Genovese, C.; Gorgone, M.; Genovese, G.; LA Spada, G.; Balsamo, D.; Calderone, S.M.; Faranda, I.; Squeri, R. Trend of pathogens and respiratory co-infections in the province of Messina: From pediatric age to senescence. *J. Prev. Med. Hyg.* **2024**, *65*, E344–E355. [[CrossRef](#)] [[PubMed](#)] [[PubMed Central](#)]
69. Baldino, G.; Genovese, C.; Genovese, G.; Burrascano, G.; Asmundo, A.; Gualniera, P.; Ventura Spagnolo, E. Analysis of the contentious relating to medical liability for healthcare-associated infections (HAI) in a Sicilian hospital. *Clin. Ter.* **2024**, *175*, 75–79. [[CrossRef](#)] [[PubMed](#)]
70. Genovese, G.; Rizzo, C.E.; Nirta, A.; Bartucciottto, L.; Venuto, R.; Fedele, F.; Squeri, R.; Genovese, C. Mapping Healthcare Needs: A Systematic Review of Population Stratification Tools. *Med. Sci.* **2025**, *13*, 145. [[CrossRef](#)]
71. Genovese, G.; Rizzo, C.E.; Genovese, C. Health Technology Assessment of mRNA Vaccines: Clinical, Economic, and Public Health Implications. *Vaccines* **2025**, *13*, 1045. [[CrossRef](#)]
72. Rizzo, C.E.; Venuto, R.; Genovese, G.; Squeri, R.; Genovese, C. Assessment of Food Hygiene Non-Compliance and Control Measures: A Three-Year Inspection Analysis in a Local Health Authority in Southern Italy. *Foods* **2025**, *14*, 3364. [[CrossRef](#)]
73. Genovese, G.; Rizzo, C.E.; Mistretta, A.; Leonforte, F.; Squeri, R.; Signorelli, C.; Genovese, C.; the Italian Prevalence Group. Multiple Chemical Sensitivity: An Italian prevalence multicentric survey. *Front. Public Health* **2025**, *13*, 1685040. [[CrossRef](#)]

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.