

FESTMIH-NEWSLETTER 2025 Q1



WHAT TO EXPECT

April 7th World Health Day

April 14th World Chagas Disease Day

April 24th-30th World Immunization Week

May 31st World No-Tobacco Day

June 7th World Food Safety Day

June 20th World Refugee Day



Dear Readers,

Welcome to the latest edition of our theme-driven newsletter, aligned with the **International Days of the United Nations**.

First and foremost, we would like to express our sincere gratitude for the overwhelmingly positive feedback we received on our previous issue. Your **enthusiasm** and **engagement** have been **incredibly motivating**, and under these encouraging circumstances, we are **pleased to continue** this newsletter as a platform for scientific exchange, global collaboration, and public awareness.

With this edition, we once again aim to bridge the gap between research, medicine, and broader societal discussions. We have carefully selected topics that are not only relevant to professionals in science and healthcare but also to a wider audience interested in global health, equity, and sustainability. We **encourage** all our **readers** to **share** this newsletter with **colleagues**, **friends**, and anyone who might find these topics insightful-raising awareness is a collective effort.

This quarter, we focus on key UN International Days taking place in **Q2 2025**, exploring their significance through the lens of current scientific and medical challenges.

In this issue, we also highlight the importance of interdisciplinary and international cooperation, showcasing collaborations with our valued partners who contribute their expertise and insights. The challenges we discuss transcend national borders, reinforcing the need for global unity in research, healthcare, and policymaking.

We hope that this edition provides both **knowledge** and **inspiration** and that it sparks **meaningful discussions** within and beyond the scientific community. Let us work together to foster medical and social justice, promote global health, and strengthen our collective impact.

Thank you for being part of this journey—let's keep the conversation going and spread the message!

Best regards, **The FESTMIH Newsletter Team**

CELEBRATING GLOBAL HEALTH AND EQUITY





For your convenience, please find below a brief **overview** of the International days. Should you be interested in **reading more** on the topic, you are welcome to **follow the link** (Click on the titel) to the corresponding article.

<u>World Health Day (April 7) – Loneliness & Public Health</u>

Loneliness is more than an emotional state—it poses a significant risk to mental and physical health, increasing susceptibility to cardiovascular diseases, dementia, and early mortality. This article explores the biological mechanisms of social isolation, the societal factors exacerbating loneliness, and the urgent need for community-driven interventions. It highlights the importance of fostering meaningful social connections to improve well-being and public health outcomes.

<u>World Chagas Disease Day (April 14) – Participatory Processes in Chagas</u> <u>Disease Control</u>

Chagas disease continues to be one of the most **neglected tropical diseases**, disproportionately affecting vulnerable populations in Latin America. **Community-based approaches** have proven **effective** in **raising awareness**, improving early diagnosis, and ensuring better long-term care for affected individuals. This article highlights the role of participatory health models, co-creation with patients, and the importance of global partnerships in disease control.

<u>World Immunization Week (April 24-30) – The Global Impact of Vaccination</u>

Vaccination remains one of the most powerful tools in medicine, having **prevented millions of deaths** and nearly **eradicated** diseases like **smallpox** and **polio**. However, **vaccine hesitancy**, **misinformation**, and **disparities in access** threaten continued progress. This article examines the challenges of immunization equity, outbreak risks, and the role of policy interventions in safeguarding global health.

<u>World No Tobacco Day (May 31) – Tobacco, Vaping, and Public Health Policies</u>

Tobacco remains a leading cause of preventable death, with smoking and vaping linked to severe respiratory and cardiovascular diseases. Despite global efforts to reduce tobacco consumption, the rise of e-cigarettes presents new public health challenges, particularly among younger populations. This article explores the effectiveness of tobacco control measures, regulatory gaps, and the shifting landscape of nicotine consumption.

<u>World Food Safety Day (June 7) – Microbial Contamination in Tea</u>

Tea and herbal infusions are among the **most widely consumed beverages worldwide**, often recommended for their **soothing** and **therapeutic** effects. However, concerns about **microbial contamination** pose potential **health risks**, particularly for **immunocompromised** individuals. A recent **study analyzed microbial** loads in various tea types, revealing that while contamination levels remained within WHO-recommended limits, **molds** and other **microorganisms** were present. This highlights the importance of proper preparation and the role of clean water in ensuring tea safety. The findings emphasize the need for global food safety measures and align with **Sustainable Development Goal 6** – Clean Water and Sanitation.

World Refugee Day (June 20) - Health and Equity for all Populations

Refugees and displaced persons face severe **barriers to healthcare access**, from **legal restrictions** to **financial** and **infrastructural challenges**. Addressing these disparities requires inclusive health policies, stronger international cooperation, and community-driven support networks. This article explores the intersection of migration, health equity, and the need for sustainable healthcare solutions in humanitarian settings.

APRIL 7TH



WORLD HEALTH DAY THE SILENT EPIDEMIC OF LONELINESS

Health is more than the **absence of disease**—it is a complex **interplay** of **physical**, **mental**, and **social well-being**. Each year, World Health Day offers the opportunity to highlight pressing global health concerns, from infectious diseases to healthcare accessibility. This year, however, after long, **dark winter months** that often exacerbate **social isolation**, we turn our attention to one of the **most overlooked** yet pervasive **public health challenges** of our time: **loneliness**. Loneliness has quietly emerged as one of the **most pressing health concerns of our time**. Even as **technology** promises to **connect** us at the tap of a screen, an **unsettling paradox** is unfolding: many of us feel more isolated than ever. Public health experts, national governments, and community organizations alike have begun to **recognize loneliness** not just as a fleeting emotional experience, but as a chronic state that can carry serious **risks** for both **mental** and **physical** well-being. Below is an in-depth look at why loneliness has become a significant public health topic, the mechanisms by which it impacts us, and how we might begin to respond.

<u>Modern Connectivity vs. Real-</u> <u>Life Disconnection</u>

At the heart of our modern world is an abundance of digital communication platforms-messaging social apps, media. virtual meeting spacesconnecting billions of people across continents. In principle, these tools can offer unprecedented closeness, bridging time zones and cultural differences. Yet many studies estimate that anywhere from 10% to 15% of the population in industrialized countries feel persistently lonely, with some nations reporting even higher rates. In the UK, for instance, the growing scale of loneliness led to the creation of a dedicated Ministry for Loneliness in 2018. And in other countries, including Germany and the United States, it is often cited as an "invisible epidemic". It seems paradoxical: more connected than ever, yet more isolated in everyday life. While it is easier to chat with someone on the other side of the globe, face-to-face contact appears to be diminishing.



'Global Daily Social Media Usage 2024'. n.d. Statista. Accessed 15 March 2025. <u>https://www.statista.com/statistics/433871/daily-social-media-usage-worldwide/</u>.

Increasing numbers of people live alone in singleperson households, and large segments of the population, particularly in major urban centres, report seldom interacting meaningfully with neighbours. The same social networks that promise constant connection can give rise to "virtual illusions" of closeness—superficial interactions that rarely fulfill the deeper human need for supportive, in-person relationships. Loneliness is not merely a fleeting sadness; when it becomes chronic, it poses a significant threat to physical and emotional health. While it has long been known that loneliness correlates with mental health challenges like depression and anxiety, researchers have uncovered extensive links to physical illnesses as well. One influential meta-analysis by Julianne Holt-Lunstad and colleagues found that individuals with strong social bonds fare considerably better on a range of health metrics and have a lower risk of mortality-effects comparable to managing other major risk factors such as obesity or smoking.



Physical Consequences

- Elevated Stress Hormones: Feeling socially isolated can trigger the body's stress response. Humans evolved to live in groups for mutual safety and resource sharing, so loneliness registers as a threat to survival. This leads to chronically high levels of cortisol, which can raise blood pressure and blood sugar, while compromising immune function.
- **Cardiovascular Disease**: Multiple studies have established a link between loneliness and a heightened risk of developing or exacerbating heart disease and stroke. One study in the journal Heart (2018) concluded that lonely individuals face a 29% higher risk of coronary heart disease and a 32% increased risk of stroke.
- Dementia and Cognitive Decline: Research from the World Health Organization suggests that social isolation can increase the risk of dementia by 50%. While the causal mechanisms are still being explored, ongoing stress and a lack of stimulating social interactions are believed to be major contributing factors.

Mental and Emotional Impacts

- Higher Susceptibility to Depression: Chronic loneliness often spirals into persistent negative self-perception, sometimes culminating in clinical depression. When left unaddressed, this can lead to more severe mental health crises.
- Anxiety and Hypervigilance: Isolation can cause people to become more sensitive to social rejection cues. They may assume the worst of others' intentions and develop selfа ironically protective stance that drives them further away from meaningful human contact.





Looking Ahead

Addressing loneliness means acknowledging that we are not, at our core, independent islands humans are deeply social creatures shaped by millennia of collective living. If we embrace that reality, it becomes clear that forging meaningful relationships is not a luxury but a biological and emotional necessity. As technology reshapes how we live, let us be mindful of ensuring it enhances, rather than replaces, the face-to-face ties that keep our psyches and bodies healthy.

In the end, no one thrives in isolation. Loneliness transcends borders, age brackets, and socioeconomic levels, quietly eroding health and well-being. Yet hope emerges in every community program, every safe space for friendship, and every act of kindness that reconnects us to each other. By prioritizing social cohesion—through personal choices, cultural shifts, and thoughtful public policies—we can reclaim a sense of belonging for ourselves and future generations.

Get Involved in the Next Edition of the FESTMIH Newsletter!

Do you enjoy reading about global health collaborations and inspiring projects? Become a part of the **quarterly FESTMIH Newsletter** and share your insights with our international community!

In our next edition, we'll spotlight the <u>UN Day topic</u> of Q3 2025, and we invite YOU to contribute:

- Choose a Q3 topic: Many interesting themes like World Humanitarian Day (August 19), World Hepatitis Day (July 28), or the International Day of Clean Air for Blue Skies (September 7).
- Share your ideas: Send us articles, short summaries about your organization's projects, inspiring individuals, or other content aligned with these days.

Submission Deadline: 30.05.2025 Where to send: To our <u>E-Mail</u>.

Your contributions help showcase the incredible work being done around the globe and inspire others in the field of health and cooperation. Let's make the Q3 issue as diverse and engaging as possible!



WORLD CHAGAS DISEASE DAY



April 14th

'It's a sound like when you don't eat for a week, like this'

How Can We Listen to the Silenced Reality of

Chagas Disease?

By Leonardo de la Torre Ávila and the <u>ISGlobal Chagas Initiative</u> Team

Some experiences in medical practice remind us how simply **listening** to the people in front of us can **change** the way we **approach healthcare**. We were in Barcelona with a **Bolivian patient** diagnosed with **Trypanosoma cruzi**, the **parasite** that **causes Chagas** disease. She described an **annoying sound** in her ear but struggled to find the right words for it. It wasn't a whistling sound, nor a squeaking, nor the result of ear plugging. Then, almost casually, and even smiling, she told us: **'It's a sound like when you don't eat for a week, like this.'**

We often cite statistics: between 6 and 7 million people worldwide live with Chagas disease, it causes 12,000 deaths per year, and 70 million people are at risk of infection.

However, it is through listening to individual stories and personal descriptions that we truly grasp the origins, realities, and contexts of those affected.

Thanks to the voluntary and determined participation of people like that woman in our office at Hospital Clínic in Barcelona, we **launched** several **initiatives** to **improve** access to **Chagas-related healthcare**, starting with **active listening sessions**. Over time, we realized these approaches could be categorized as participatory projects, co-creation, or other currently popular terms.

CHAGAS DISEASE - KEY FACTS

- Cause: Trypanosoma cruzi parasite
- Transmission: Triatominae (Kissing bugs), blood transfusion, mother-to-child, contaminated food
- Endemic Regions: Latin America, but spreading globally
 - Symptoms:
 - Acute phase: Mild or none (fever, swelling)
 - Chronic phase: Can cause heart failure and digestive issues
- Treatment: Antiparasitic drugs (Benznidazole, Nifurtimox)—most effective in early stages
- Prevention: Vector control, screening in blood banks, early detection

Expanding Access Through Participation

We began by **recognizing** and **empowering informed patients** who **encouraged family** and **friends** to **seek medical care** for Chagas. This initiative, **¡Pasa la voz!**, analyzed the significant **increase** in **first-time visits** to our clinic and proposed a simple, adaptable model in which institutional responses were more open and responsive to **community-driven demand**.

Later, in **Zaragoza**, in collaboration with the association **Raíces Andinas de Bolivia** and a committed medical team, we engaged in a participatory process that established an access route for Chagas care in the city. Together, we explored key questions from civil society, such as:

- What communication strategies can enhance access to healthcare?
- What should we **understand** about the **low demand** for **health services** among **Civil Society Organization partners**, and how can we **support** them in **mobilizing** their **communities** for **Chagas diagnosis** and **treatment**?

Redefining the Role of Affected Individuals

By then, we had learned to see those affected not as "patients" but as agents of change—key partners in expanding access to Chagas care. This realization allowed us to embrace another emerging framework, the Living Lab model. Under this approach, we collaborated with the Association of Friends of People with Chagas Disease (ASAPECHA-Barcelona) and representatives from the Argentine, Brazilian, Paraguayan, Colombian, Salvadoran, Honduran, Nicaraguan, and Bolivian communities in Barcelona. Through this process, we reaffirmed that Chagas disease should not be exclusively associated with poverty and rural settings; it must be understood as a multi-situated global health issue.

Supported by the Unitat de Salut Internacional Drassanes (Vall d'Hebron-PROSICS), the Federación de Entidades Latinoamericanas de Cataluña (FEDELATINA), the Ajuntament de Barcelona, and the Fundación "la Caixa", we launched the campaign <u>#VocesDelChagas</u>. This initiative emerged as an authentic collective effort to destigmatize the disease through first-person testimonies—a crucial step in addressing the silenced reality of Chagas.

From Participation to Structural Change

Recognizing the importance of participatory processes in both research and action, we align with sociological notions of social action and agency the capacity of individuals communities and to influence and transform existing structures.

Once affected individuals are seen as agents rather than passive patients, research and intervention efforts should no longer be designed topdown by medical teams. Instead, they must be developed through cocreation, where the community itself defines priorities, methods, and solutions.



In collaboration with the Ministry of Health and Social Welfare of Paraguay, the Spanish Agency for International Development Cooperation (AECID), the Probitas and CIRD Foundations, and ISGlobal, we have applied these methodologies <u>in the Paraguayan Chaco</u>. There, among indigenous populations facing a <u>Chagas prevalence ten times</u> <u>higher than that of the country's capital</u>, we have worked to integrate participatory approaches into healthcare solutions.

Beyond Token Participation

Opening up processes to **civil society participation** is simple, but it **requires true commitment**. Otherwise, "participation" risks becoming a **mere cosmetic label**, useful for **promotional videos** and **publications** but **lacking real impact**. Our methodology starts with **listening**, as illustrated at the beginning. Then, through iterative workshops, we **systematize** and **share** the **findings** with **participants**, who have the **opportunity to reject**, **refine**, or **validate** them. Once validated, new stakeholders—whether healthcare professionals or policymakers—are invited to **collaborate** in **strengthening** the proposed solutions. These processes, which require **tailored communication** strategies for both internal and external audiences, often result in health promotion materials. However, they can **go far beyond that**. Their impact should not be measured by **external**, **predefined indicators** but **rather** by the **achievement** of the **transformative** objectives set by the **community itself from the outset**.



festmih federation of european societies for tropical medicis and interretional health

Looking Ahead: New Challenges in Bolivia

Recognizing that the impact of **community participation** is a **gradual achievement** and that not all contexts are equally ready for participatory approaches, we now face **new challenges** in the **Bolivian Chaco**. Partnering with local **governments**, **Novartis Global Health**, **AECID**, the **Sanit Foundation**, and **Grassroots Territorial Organizations (OTB)**, we are supporting a participatory process aimed at improving the integrated management of Chagas disease, cardiovascular conditions, and other prevalent illnesses.

In a country where we have worked for years, our partners are advocating for a collective, communitydriven approach to healthcare. We hope that in each workshop of this new initiative, we will continue to listen to the stories, needs, and proposed solutions that people choose to share with us—because true change begins with listening.



<u>The Life Cycle of</u> <u>Trypanosoma cruzi and Its</u> <u>Impact on Chagas Disease</u>

Chagas disease, caused by the protozoan Trypanosoma cruzi, follows complex life а cycle involving insect vectors and mammalian hosts. As illustrated, transmitted the parasite is primarily through the bite of triatomine insects (Triatoma infestans. Rhodnius prolixus, Triatoma dimidiata), which deposit infective metacyclic trypomastigotes onto human skin via their feces. These parasites enter the body through mucosal surfaces or scratches, initiating infection. Once inside, they invade host cells, transform into amastigotes, and replicate. Over time, they differentiate back into trypomastigotes, which burst from cells, spreading the infection.



While the acute phase is often mild, the chronic phase can lead to severe complications such as cardiomyopathy, megaesophagus, and megacolon. Though vector control has reduced transmission, Chagas disease remains a challenge, particularly in non-endemic regions due to migration. Continued efforts in surveillance, early diagnosis, and treatment with benznidazole or nifurtimox are essential in combating this neglected tropical disease.

WORLD IMMUNIZATION WEEK (APRIL 24-30) – THE GLOBAL IMPACT OF VACCINATION

Each year, Immunization Week serves as an opportunity to celebrate the remarkable progress made in global vaccination efforts while also casting a spotlight on pressing challenges that persist. Over the past five decades, **vaccines** have **saved** an estimated **154 million lives worldwide**—equivalent to preventing approximately **six deaths every minute (WHO, 2024)**. From the **eradication** of **smallpox** to the **near elimination** of **polio**, the collective impact of immunization underscores one undeniable truth: **vaccines work**. Yet **recent measles outbreaks**, combined with new insights from the Centers for Disease Control and Prevention (CDC), remind us that **continued vigilance**, **equitable access**, and **robust public trust** are paramount if we hope to sustain and expand these triumphs.

<u>A Legacy of Global Cooperation</u>

The history of vaccination reads like a timeline of humanity's triumphs over formidable infectious diseases. **Smallpox** was declared **eradicated** by the World Health Organization (WHO) in **1980**, following a concerted global campaign that proved a single **disease** could be **completely removed** from human circulation (Fenner et al., 1988). **Polio**, which once affected hundreds of thousands of children every year, has been **reduced by over 99%** since 1988, with fewer than 50 cases typically reported annually (Kalkowska et al., 2020). These successes epitomize what can be accomplished when nations commit their resources and align their goals behind a common objective: saving lives.

Measles, a highly contagious respiratory disease, also saw **dramatic drops** in **incidence** owing to effective vaccines. **Nevertheless**, scattered **outbreaks continue worldwide**, often igniting in regions where coverage has slipped below critical thresholds. The ebb and flow of measles reminds us how quickly public health gains can be reversed when vigilance wanes or vaccine hesitancy takes root.

Alongside these victories, **vaccination** has contributed significantly to **improving life expectancy** and quality of life. By conservative estimates, **immunization programs** from **1974 to 2024** saved about **10.2 billion healthy life-years**, reflecting not only fewer deaths but also the prevention of long-term complications, disabilities, and chronic health burdens (WHO, 2024). These impressive achievements highlight why Immunization Week remains relevant year after year.



<u>New CDC Data: Measles Outbreaks</u> <u>in 2024–2025</u>

While many diseases have been pushed to the margins, recent data from the CDC reveal that measles, declared once eliminated in 2000 in the United States, has reemerged in concerning clusters. The year 2024 saw a total of 285 confirmed measles cases across 33 jurisdictions, resulting in 16 reported outbreaks (defined as three or more related cases). Notably, 69% of those 285 cases were outbreakassociated, underscoring the extent to which pockets of under-vaccination fuel the spread of measles.

Hospitals also felt the impact: **40% of these cases (114 out of 285) required hospitalization** for **isolation** or **complication management**, with very young children (under five) most affected.

Fast-forward to 2025, and the CDC's data show no immediate reprieve. **As of March 13, 2025, 301 confirmed measles cases have been reported in 15 jurisdictions**—among them Alaska, California, Florida, Georgia, Maryland, and New York. Of these cases, 93% (280 out of 301) are linked to 3 significant outbreaks, suggesting that once an outbreak ignites, it can spread quickly among unvaccinated communities.

Alarmingly, **95%** of these newly infected individuals either had an **unknown vaccination status** or had **not received** a single dose of the **measles-mumps-rubella** (MMR) **vaccine**. This highlights an ongoing **gap in immunization** coverage and awareness. Pediatric populations remain especially vulnerable, with 34% of new infections occurring in children under five. Although hospitalization rates in 2025 appear lower overall (17%), children still make up a disproportionate share of severe cases—27% of hospitalized patients were under five. **Two deaths have been reported so far** (one confirmed, one under investigation), emphasizing that measles is far from a benign childhood illness.

These outbreaks illustrate two points with stark clarity: first, measles can and will resurface wherever vaccine coverage drops; second, high vaccination rates remain the linchpin of effective disease prevention.

Persistent Challenges and Disparities

Despite the world's extraordinary immunization milestones, access to vaccines is far from uniform. In high-income countries, coverage for pivotal vaccines such as diphtheria, tetanus, and pertussis (DTP) routinely surpasses 95%. Meanwhile, many low- and middle-income countries struggle to exceed 80% coverage for even the most essential immunizations (Peck et al., 2019).

Global Vaccine Timeline Stretches Beyond 2023

Countries by when they are expected to have vaccinated 60 percent of their population



Fragile healthcare infrastructures, conflict settings, and limited **coldchain logistics** exacerbate these inequalities, leaving millions of children vulnerable to preventable diseases.

Moreover, vaccine hesitancy-rooted in misinformation. distrust. or cultural beliefs-remains a formidable obstacle. Measles' resurgence demonstrates how rapidly an undervaccinated pocket can become the epicenter of an outbreak, even in otherwise well-covered nations. А challenge parallel is financial constraint: underfunded healthcare systems in resource-limited regions simply do not have the capacity to provide comprehensive immunization This funding coverage. gap was tragically illuminated during the COVID-19 pandemic, when highincome nations procured and distributed vaccines at breakneck speed, while poorer countries endured supply shortages and delays (Wouters et al., 2021).



¹Infographic: Global Vaccine Timeline Stretches Beyond 2023², 2021. Statista Daily Data. 30 August 2021. <u>https://www.statista.com/chart/24064/covid-19-vaccination-timeline-</u> global.

Immunization Agenda 2030

The Immunization Agenda 2030 (IA2030), developed by the World Health Organization (WHO), UNICEF, and Gavi, the Vaccine Alliance, outlines a global strategy to ensure that everyone, everywhere, at every age benefits from life-saving vaccines. The initiative is a response to both the significant achievements of past immunization programs and the setbacks caused by the COVID-19 pandemic. Its overarching vision is to build resilient and sustainable immunization systems, ensuring universal vaccine coverage and protection against preventable diseases.

<u>Reaching Zero-Dose Children: A Key Priority</u>

A core focus of IA2030 is reaching "zero-dose" children—those who have never received a single vaccine dose. These children often belong to marginalized, conflict-affected, or hard-to-reach communities. Addressing their needs is not just a question of equity but also a critical step in reducing disease outbreaks, lowering mortality rates, and strengthening global health security.

<u>Strategic Priorities of IA2030</u>

To achieve its ambitious goals, IA2030 operates under seven strategic priorities, designed to ensure high and equitable immunization coverage worldwide:

- **Strengthening Immunization Programs**: Embedding vaccination services within primary healthcare to achieve universal health coverage.
- **Building Commitment and Demand**: Encouraging trust in vaccines through advocacy and transparent communication.
- **Expanding Coverage and Equity**: Ensuring that immunization reaches all communities, particularly the most vulnerable.
- Lifelong Immunization: Expanding immunization beyond childhood, covering adolescents, adults, and the elderly.
- **Preparedness for Outbreaks and Emergencies**: Strengthening response mechanisms for vaccine-preventable disease outbreaks.
- **Ensuring Vaccine Supply and Sustainability**: Enhancing affordability, distribution, and availability of high-quality vaccines.
- **Driving Research and Innovation**: Developing new vaccines and innovative delivery methods to address emerging health challenges.

As we move forward in the decade, the **success** of IA2030 will **depend** on **global collaboration**, strong **political commitment**, and the **engagement** of **local communities**. By prioritizing immunization, the world can not only **prevent future pandemics** but also move closer to achieving the **Sustainable Development Goals** (SDGs) of **health and well-being for all**.



50% the number of children missing out on all vaccines

90% coverage for essential vaccines given in childhood and adolescence 500 new vaccines in low and middle-income countries



'Immunization Agenda 2030: A Global Strategy To Leave No One Behind', n.d. Accessed 13 March 2025. <u>https://www.who.int/publications/m/item/</u> <u>immunization-agenda-2030-a-global-strategy-to-</u> <u>leave-no-one-behind.</u>

#VaccinesWork

IMMUNIZATION AGENDA 2030





<u>The Role of New Technologies in Expanding Immunization</u> <u>Access</u>

Innovative vaccine technologies are set to play a crucial role in achieving the ambitious goals of the Immunization Agenda 2030 (IA2030). From **improving** vaccine **distribution** to **enhancing immune responses**, recent advancements are paving the way for more effective, scalable, and equitable immunization programs worldwide.

mRNA vaccine technology, which proved instrumental during the **COVID-19 pandemic**, continues to evolve as a **game-changer** in immunization efforts. **Unlike traditional vaccines**, mRNA-based immunizations enable **rapid manufacturing**, making them **highly adaptable** for **responding** to emerging infectious diseases. Key developments include:

• Improved Formulations – Research is ongoing to refine mRNA vaccine formulations, reducing side effects while increasing stability and effectiveness. Advances in lipid nanoparticle (LNP) delivery systems enhance cellular uptake, ensuring a stronger immune response.



⁴Immunization Agenda 2030: A Global Strategy To Leave No One Behind'. n.d. Accessed 13 March 2025. <u>https://www.who.int/publications/m/</u> <u>item/immunization-agenda-2030-a-global-</u> <u>strategy-to-leave-no-one-behind</u>.

• **Targeting More Diseases** – The success of mRNA vaccines has inspired new efforts to develop vaccines against **malaria**, **tuberculosis**, and even **HIV**. The adaptability of mRNA platforms allows for **quick modifications** in **response** to **mutating pathogens**.

Nanoparticle-Based and Needle-Free Vaccines

Breakthroughs in **nanoparticle-based vaccine technology** are addressing **major logistical** and **immunological challenges**. In addition to lipid nanoparticles, researchers are **developing proteinbased nanoparticle vaccines**, which **mimic** the **structure** of viruses to elicit **strong immune** responses. Additionally, **needle-free vaccine** administration methods—such as **microneedle patches** and **jet injectors**—are gaining traction as alternatives to traditional injections, particularly in low-resource settings. These innovations offer:

- Easier Storage & Transport Some nanoparticle formulations remain stable at higher temperatures, reducing the need for ultra-cold storage, which has been a major barrier in vaccine distribution.
- Greater Accessibility Needle-free vaccines lower the threshold for mass immunization campaigns by eliminating the need for trained personnel and reducing vaccine hesitancy linked to needle fear.

<u>Our Shared Duty</u>

At FESTMIH, we believe that immunization is not just a medical achievement—it is a promise. A promise that **no one**, **no matter where they live**, **should suffer from a preventable disease**. But this promise can only be kept if **we all take responsibility**.

Governments must ensure access, healthcare workers must be supported, and communities must stand together against fear and misinformation. Social media, educators, and every one of us have a role to play—to spread truth, not doubt. Because in a world where disease knows no borders, neither should compassion, action, and the right to protection.

Let's not look back one day and wonder if we could have done more. **The time is now**.



WORLD NO-TOBACCO DAY

05-31-2025

Every year on May 31, the World Health Organization (WHO) marks World No-Tobacco Day to spotlight the devastating impact of tobacco use on global health, economies, and societies. Despite significant progress in many countries-achieved high-income through measures higher tobacco such as taxes. widespread **smoking bans** in public places, and public-awareness campaignsaggressive smoking remains one of the leading preventable causes of death worldwide. According to WHO estimates, roughly eight million people die each year as a direct or indirect result of tobacco use, with more than one million of these deaths attributable to **secondhand smoke**.

Globally, about 1.3 billion individuals still use some form of tobacco, most commonly in the cigarettes. Although form of smoking prevalence among adults has fallen from about 33% in 2000 to around 22.3% in 2022, this uneven. downward trend is High-income regions have seen more dramatic drops, largely due to robust policy frameworks and public health interventions, whereas low- and middleincome countries face challenges such as aggressive tobacco marketing, weaker regulations, and limited healthcare resources.



Beyond the well-known **dangers** to the **heart**, **lungs**, and overall life expectancy, emerging areas of research-particularly around the **human microbiome**-reveal new dimensions of risk. Studies indicate that **tobacco smoke** can **disrupt** the **composition** of **bacterial communities** in the **gut**, **mouth**, and **respiratory tract** (Roviello, 2022), which may **worsen inflammatory** processes and **compromise immune function**. These insights underscore why tobacco control efforts must continue evolving, especially as novel consumption forms-like e-cigarettes-gain popularity.

<u>The Health Consequences of</u> <u>Smoking</u>

The detrimental health impacts of smoking span virtually every organ system, making it one of the most pervasive threats to global wellbeing. Cardiovascular diseases rank among the top killers of smokers, with toxins in **cigarette** smoke the **endothelium** damaging (the inner lining of blood vessels). promoting plaque buildup. and elevating blood pressure. As а result, smokers are at least twice as likely to suffer a fatal heart attack compared to non-smokers, according to meta-analyses cited by the U.S. Department of Health and Human Services (2020).

Risks from Smoking



'Https://Www.Cdc.Gov/Vitalsigns/Pdf/2010-09-Vitalsigns.Pdf'. n.d. Accessed 15 March 2025. <u>https://www.cdc.gov/vitalsigns/pdf/2010-09-vitalsigns.pdf</u>.



Respiratory conditions are another major concern. **Chronic Obstructive Pulmonary Disease** (COPD)—comprising **chronic bronchitis** and **emphysema**—can be **traced back** to **smoking** in up to **90%** of cases globally. Smokers are also at heightened **risk** for **lung infections** like **pneumonia** and **tuberculosis**, and **secondhand smoke exposure** remains a critical **hazard**, particularly for **children**, **pregnant individuals**, and those with **pre-existing health conditions**.

Furthermore, tobacco use is strongly linked to **various cancers**, including **lung**, **oral**, **esophageal**, **pancreatic**, and **bladder** cancer. Notably, lung cancer remains the leading cause of cancer-related death worldwide, with about **80-85%** of cases **attributable** to **smoking**. The worrying reality is that even small, regular exposures—like **passive smoking—significantly elevate** one's **risk** profile for these conditions. Adding a new layer to the conversation is the role of the microbiome. Recent research indicates that smoking can diminish the diversity of gut bacteria, decreasing the presence of beneficial species like **Bifidobacterium** and **Lactobacillus** while allowing more **pro-inflammatory microbes** to **thrive**. Such shifts may contribute to **chronic inflammatory states** and **metabolic dysregulation**, underscoring the complexity of tobacco's impact on human health.

Pichon-Riviere, Andrés, Ariel Bardach, Federico Rodríguez Cairoli, Agustín Casarini, Natalia Espinola, Lucas Perelli, Luz Myriam Reynales-Shigematsu, et al. 2024. 'Health, Economic and Social Burden of Tobacco in Latin America and the Expected Gains of Fully Implementing Taxes, Plain Packaging, Advertising Bans and Smoke-Free Environments Control Measures: A Modelling Study'. Tobacco Control 33 (5): 611–21. <u>https://doi.org/10.1136/tc-2022-057618</u>.



Annual health and economic burden attributable to tobacco (US\$2020). Years of life lost per 100.000 population and proportion of total adults' (>35 years) deaths attributable to tobacco. (Pichon-Riviere et al. 2024)

Be Part of the Next FESTMIH Newsletter! Celebrate global health by contributing to our Q3 2025 Edition!

Exhibit A. Years of life lost per 100,000 population and proportion of total adults* deaths attributable to tobacco

Choose a <u>UN Day topic</u> and send articles, project summaries, or inspiring stories to our <u>E-Mail</u>.



Deadline: 30.05.2025

<u>Economic and Social Burden – A Focus on Latin America</u>



Beyond the toll on human health, smoking imposes staggering **economic costs**. A comprehensive modeling study by **Pichon-Riviere et al. (2024)** examined the impact of tobacco in eight Latin American countries—**Argentina**, **Brazil**, **Chile**, **Colombia**, **Costa Rica**, **Ecuador**, **Mexico**, and **Peru**. These nations account for around 80% of the regional population, providing a substantial sample for understanding both the direct and indirect burdens of smoking.

According to the study, an estimated **351,000 tobacco-related deaths** occur annually across **these eight countries**, representing approximately **12.4%** of all **adult deaths** (≥35 years). In total, tobacco use leads to around **2.2 million disease events** each year—such as strokes, cardiovascular complications, and lung conditions—and results in the **loss** of about **12.2 million healthy lifeyears** due to premature death and disability.

The economic dimension is equally dire. The cumulative yearly cost of smoking in these Latin American countries approaches **USD 50 billion**, equivalent to about **1.4%** of their combined GDP. These costs derive from three main components:

- Healthcare Expenditures (USD 22.8 billion): Diseases like lung cancer, heart disease, and COPD strain both public and private health systems.
- **Reduced Workforce Productivity (USD 16.2 billion)**: Absenteeism, diminished on-the-job performance, and premature death contribute to significant losses for employers and national economies.
- **Unpaid Caregiving (USD 10.8 billion)**: Relatives, often women, provide care at home, reducing the time they can dedicate to paid work or education.

Notably, tobacco **tax revenues** recover only about **15.1%** of the full **economic losses**. In countries like Peru and Mexico, the gap between the costs of smoking and tax revenues is especially stark—sometimes exceeding a factor of five. The findings emphasize the urgent need to realign fiscal policies with the profound social and health challenges posed by tobacco use.



Annual health and economic burden attributable to tobacco (US\$2020). Economic losses attributable to tobacco and tobacco tax revenues as a proportion of the country's gross domestic product.

(Pichon-Riviere et al. 2024)

<u>Vaping – A "Healthier" Alternative or the</u> <u>Next Addiction?</u>

While public health campaigns continue to reduce smoking rates, an emerging concern is the **rapid uptake** of **e-cigarettes (vapes)**, particularly among **younger populations**. From a purely comparative standpoint, vaping contains fewer toxic chemicals than traditional cigarettes. The hot smoke and tar that make regular smoking so dangerous are largely absent in most vape products. For long-term smokers, therefore, switching to vapes can significantly lower many smoking-related risks.

However, as highlighted in recent studies, there is growing evidence that vaping carries its own set of concerns. E-liquids often contain a base of propylene glycol and glycerol-substances deemed safe in many industries but not necessarily tested for the effects of long-term inhalation. When heated by a metal coil, these liquids can create aerosols that may contain traces of metals (e.g., nickel, lead, or chromium) and form new chemical compounds. The sheer variety of flavors, many of which contain substances like cinnamaldehyde or benzaldehyde, introduces another uncertainty about layer of possible chronic respiratory or cardiovascular effects.

An even bigger worry is the **exceptionally high nicotine content** in many vapes. Nicotine is one of the most addictive substances known, and ecigarettes make it more accessible than ever. Because vaping is often less harsh and doesn't produce lingering odors, individuals—especially teenagers may consume large quantities of nicotine without fully realizing it. Reports from the UK and the US indicate that a growing number of adolescents are taking up vaping, sometimes at a rate that far exceeds prior generations' adoption of regular cigarettes.

Unfortunately, conclusive long-term data on the health effects of vaping in non-smokers remain scarce. Short-term findings include symptoms like coughing, increased mucus production, and chest discomfort. There also indicators are that inflammation in the airways could accelerate existing Nicotine health issues or spawn new ones. dependence itself can lead to withdrawal problems, anxiety, mood swings, and concentration difficulties, making it extremely challenging to quit.



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Adfree Cities [@adfreecities]. 2024. 'More Vape Ads BANNED. Following a Complaint by Adfree Cities the Ad Watchdog Has Banned a Series of Billboard Adverts from Vape Supplier Alfabar Because They Were "Likely to Appeal Particularly to People Aged under 18." Https://T.Co/BpZkJM4txq'. Tweet. Twitter. <u>https:// x.com/adfreecities/status/1770387166172008768</u>.

World No-Tobacco Day stands as a global reminder of both the **progress** achieved and the **serious challenges** that remain in controlling tobacco use. While **smoking** rates have **declined** in some regions, **millions of lives are still cut short** every year, and the **economics** of tobacco continue to **drain healthcare** systems and families. Vaping, once hailed as a safer alternative, now presents a new dimension of risk, particularly for adolescents.

The path forward involves a sustained international commitment to enforcing and expanding proven tobacco control measures, **developing clearer regulations** for emerging products, and investing in cutting-edge research that broadens our understanding of how tobacco and nicotine affect the human body. By acting now, we can hope to see a future where tobacco-related harm—and the toll it exacts on individuals and communities worldwide—is radically reduced.



WORLD FOOD SAFETY DAY MICROBIAL CONTAMINATION OF TEA - A HEALTH RISK FOR PATIENTS WITH IMMUNODEFICIENCY?

This article was kindly provided through the collaboration of Paula Zwicker, Ulrike Helber-Soszynski, and Nils-Olaf Hübner

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Apart from water, tea and herbal infusions are among the most **widely consumed beverages** globally, both in households and medical environments. Herbal infusions, in particular, are often **recommended** when **feeling unwell**, as they are believed to **support** the **recovery** process. They can be used internally as a drink or via **inhalation**, and externally as a **mouth rinse** or applied as a **compress**.

For herbal infusions, the World Health Organization (WHO) recommends a maximum total aerobic plate count—a measure of viable bacterial and fungal **colonies—of 10⁷ colony-forming units** per **gram** (cfu/g) of dry plant material that is intended to be treated with boiling water or a similar preparation method. For **green tea** derived from **Camellia sinensis**, the **European Tea and Herbal Tea Association** (THIE) has set a similar recommendation, limiting the total aerobic plate count to 10^7 cfu/g of dried tea leaves.

Despite these guidelines, there is **limited data** available on the **actual microbial contamination** present in tea products. To address this gap, we conducted an analysis of standard tea varieties, including bagged and loose herbal tea, green tea, black tea, and fruit tea, to assess their microbial load.

To do so, we prepared the tea infusions using a **cold extraction method**, in which the samples were steeped in **sterile peptone water** at **room temperature**, following the standardized procedure outlined in **DIN EN ISO 6887**. A defined volume of each sample was then plated onto **tryptone soy agar** (TSA), a **nutrient-rich medium** used to grow a broad range of bacteria. After incubating the plates for **48 hours**, colony-forming units (cfu) were counted, and microbial load per cup of tea or infusion (250 ml) was calculated.

Preparation Method	Теа Туре	Cold Process [cfu/250 ml]
Tea bag	Herbs	$6.81 \pm 0.8 \times 10^4$
Tea bag	Green	$1.19 \pm 0.6 \times 10^3$
Tea bag	Black	7.35 ± 5 x 10 ³
Tea bag	Fruit	$1.20 \pm 0.3 \times 10^4$
Loose tea	Herbs	2.54 ± 1 × 10 ⁴
Loose tea	Green	$4.9 \pm 3 \times 10^2$
Loose tea	Black	$7.13 \pm 7 \times 10^2$
Loose tea	Fruit	$1.18 \pm 0.8 \times 10^4$
Instant tea	Fruit	$3.44 \pm 3 \times 10^2$
Cold brew	Fruit	$4.03 \pm 2 \times 10^2$

Overall, the bacterial contamination levels in all tested teas and herbal infusions remained below the maximum threshold recommended by the WHO. The most commonly detected microorganisms included molds, aerobic spore-forming bacteria, and some coagulase-negative staphylococci. However, it is important to note that not all microorganisms can be recovered using standard cultivation methods, and molds have the potential to produce mycotoxins, which were not assessed in this study. To ensure product safety, tea should always be prepared according to the manufacturer's instructions.

Furthermore, microbial contamination in tea infusions may also be influenced by the quality of the water used for preparation. This highlights the relevance of ensuring access to clean water, aligning with the United Nations' Sustainable Development Goal 6-safe water and sanitation for all.

Chemical Contaminants in Tea: Pesticide and Heavy Metal Residues

Following our investigation into the microbial contamination of tea and herbal infusions, the FESTMIH Newsletter Team has expanded its research to another crucial aspect of tea safety– chemical contaminants originating from pesticides, fertilizers, and environmental pollutants.

Tea plants are **susceptible** to various pests and **diseases**, leading to the application of pesticides during cultivation. However, **residues** of these chemicals can **persist** in **dried tea** leaves and **potentially** be **released** into **brewed tea**. A study conducted in India found that nearly 94% of tea samples analyzed were **contaminated** with at least **one of 34 different pesticides**, with more than **half containing** a mixture of **over 10 different** pesticides.

Similarly, research has indicated widespread pesticide contamination in tea plants from China, raising concerns about potential health risks associated with consuming such teas.

Beyond pesticides, tea plants can accumulate **heavy metals** from the **soil**, **water**, and **air**. Factors such as **soil composition**, **fertilizer application**, and **environmental pollution** contribute to this accumulation. A comprehensive study summarized heavy metal concentrations from 227 published papers, revealing the following average concentrations in tea leaves:

- Lead (Pb): 1.09 mg/kg
- Cadmium (Cd): 0.14 mg/kg
- Chromium (Cr): 1.17 mg/kg
- Copper (Cu): 14.6 mg/kg
- Mercury (Hg): 0.04 mg/kg
- Arsenic (As): 0.21 mg/kg





A recent investigation into heavy metal contamination in tea plantations found that **lead** (Pb) and **cadmium** (Cd) pose the **highest health risks**. The research highlights that soil composition, fertilizer type, and geological background significantly influence the levels of heavy metals in tea leaves. Notably, tea grown in soils derived from granite, granodiorite, and shale exhibited the highest contamination levels, underlining the importance of monitoring tea cultivation environments.

The presence of pesticide residues and heavy metals in tea underscores the need for stringent quality control measures. Consumers are advised to:

- Choose teas from reputable sources that conduct regular testing for contaminants.
- Consider organic teas, which are less likely to contain synthetic pesticide residues.



INTERNATIONAL REFUGEES DAY

We are deeply honored to present a powerful and insightful interview for this year's World Refugee Day. For this edition, we had the privilege of speaking with Nada Abdelrahman, a Sudanese Medical Laboratory Sciences graduate from the University of Khartoum and a dedicated advocate for public health and laboratory system strengthening in Africa. Nada is the **founder** of the **Parasite** Initiative and an esteemed member of both the British Society for Parasitology (BSP) Council and FESTMIH. Her expertise in Laboratory Medicine, Global Health, and Citizen-Based Science has made her a leading voice in innovative infectious disease management and the empowerment of underserved communities.



What are the main challenges faced by refugees when trying to access higher education and pursue a scientific career in their host country?

Refugees face multiple challenges, particularly recent graduates who struggle to obtain their official academic documents. For example, it took me over a year to receive my graduation certificate. Getting my transcript was even more complicated, as my university faced difficulties accessing its data. In addition, I left behind other essential documents—such as my secondary school certificate, birth certificate, and other legal papers—at my home in Khartoum. I was fortunate to have taken my passport with me when I fled.

There are no exceptions when it comes to these documents; they are essential for accessing higher education in a new country. I was among the top students in my cohort, earning two academic prizes, yet I had no proof of my achievements. As a result, all my efforts during my undergraduate years felt lost. Last year, I attempted to apply for the Rhodes Scholarship, but due to my incomplete documents, I was unable to submit my application. This was my last chance, as I will soon exceed the age limit of 25 and be ineligible.

Furthermore, many of my university's faculty members lost access to their institutional emails, which are crucial for submitting reference letters when applying for academic opportunities. Lastly, building a professional network in a new country takes time, which can significantly impact one's ability to pursue a scientific career.

How can universities and research institutions better support refugees in their academic pursuits and career development?

I have noticed that some universities worldwide offer flexibility for refugees, such as waiving application fees for graduate programs. However, there is a significant lack of fully funded scholarships, particularly in the Gulf region.

Additionally, many academic opportunities in the Gulf require applicants to hold a valid residency permit, which poses a major barrier for displaced individuals who are only able to stay on temporary visas. To address these challenges, universities and research institutions must provide more fully funded scholarships and create inclusive opportunities that accommodate the specific needs of refugees.

The extent to which refugees can integrate into the scientific community depends on how similar the host country's context is to their country of origin. From my experience, I trained in Sudanese laboratories where the primary focus was on tropical diseases. However, after being forced to leave Sudan for Saudi Arabia, I found myself in an entirely different environment—one where tropical diseases are rare.

For example, in Sudan, I would encounter over five malaria cases per day, while in Saudi Arabia, I have yet to see a single one. Here, malaria cases are so rare that a pathologist is needed to diagnose them, whereas in Sudan, I saw such cases daily.

Despite these differences, my training in Sudan's resource-limited settings gave me a strong foundation in the fundamentals of laboratory work. This has helped me adapt more easily to the advanced systems in Saudi Arabia. Although it takes time to adjust, gaining experience in different contexts ultimately enhances scientific expertise and enriches the global scientific community.

To what extent do refugees' prior educational experiences and qualifications influence their ability to integrate into the scientific community of their host country?

What are the long-term impacts of forced migration on refugees' academic and career trajectories, and what support systems are needed to mitigate these effects?

In my view, the greatest long-term impact is a loss of motivation, which can eventually lead to career shifts and a departure from academia altogether.

As refugees, our primary concern is financial stability and supporting our families, often at the expense of pursuing our ideal careers. To mitigate these effects, psychological support is crucial. Recognizing the valuable experiences of displaced professionals and treating them as assets—rather than liabilities—can help maintain their motivation. Their diverse backgrounds contribute to the academic and scientific community in meaningful ways.

Additionally, institutions should implement policies that consider the challenges refugees face, such as missing documentation, and develop alternative evaluation methods to assess their qualifications fairly.





A NOTE OF GRATITUDE AND LOOKING AHEAD



As we close this edition of the FESTMIH Newsletter, we reflect on the **incredible journey** of crafting this **collaborative publication**. It has been a true pleasure working with such a **passionate and diverse group of contributors** who have shared their stories, insights, and projects to bring this issue to life. Your commitment to health equity, scientific progress, and global cooperation is evident in every word and idea that graces these pages.

This newsletter is more than just a compilation of articles—it is a reflection of collective effort, shared knowledge, and a deep commitment to meaningful change. With a focus on the UN International Days of the upcoming quarter, we have explored critical topics, from the fight against vaccine-preventable diseases to the challenges of reintegrating refugees into academia . We have shed light on the impact of tobacco control, participatory approaches in healthcare, and the silent crisis of loneliness, which continues to shape public health worldwide.

A Quarterly Commitment to Connection

We are excited to **continue** this journey **with you**. The FESTMIH Newsletter is a **quarterly publication**, and each issue is carefully **curated around** the **United Nations International Days**, celebrating their relevance to global health and cooperation. We aim to foster a **platform** where our **community** can **share**, **learn**, and **inspire** action.

Do you have a story, project, or initiative to share? Or perhaps you know an inspiring individual or organization that deserves the spotlight? We would **love** to **hear from you**! The next edition will focus on the **UN International Days of Q3 2025**, such as World Refugee Day, among others.

To explore the **full list** of upcoming observances, visit the <u>UN International Days page</u>. If you're ready to contribute, send your ideas, articles, or summaries to our team at this <u>E-Mail</u>.

Your Voice Matters

We believe that every voice in our community holds the power to inspire and create change. By participating in the newsletter, you are not only showcasing your work but also contributing to a global conversation that addresses critical challenges and celebrates successes in health and science.

We are grateful for your ongoing support and engagement, which make this newsletter possible. Let's continue to grow this platform together, fostering an even stronger community dedicated to health equity, collaboration, and innovation.

Thank you once again for being part of this endeavor. We look forward to your contributions and to celebrating the many ways we can impact the world-**together**.

Warm regards, **The FESTMIH Newsletter Team**

MEET ONE OF THE AUTHORS OF THE FESTMIH NEWSLETTER



It is truly a pleasure for me to finally put a face to News of the Month and the FESTMIH Newsletter. My name is Maximilian Olaf Förster, and I am a PhD student at the Saarland University Medical Center. My research focuses on the metagenomic analysis of the microbiome in correlation with different treatment strategies for cancer, as well as the link between cytostatic-induced side effects and the microbiome.

I am genuinely excited to be part of FESTMIH's science communication efforts and feel especially honored to have had the opportunity to contribute to the second edition of our newsletter—in collaboration with you, research groups outside of FESTMIH, and, most importantly, Dr. Sophie Schneitler. Of course, putting together News of the Month and the newsletter takes time, but to me, it feels like time well spent on a project like this.

If you have any suggestions regarding the newsletter, feel free to reach out to us via <u>email</u> at any time. We truly appreciate any kind of feedback, whether it's praise or constructive criticism—only through this can we continue to improve our work.

I hope you enjoyed reading this edition and are looking forward to the third issue just as much as I am!

Best regards, Maximilian



SOURCES

Rassi, Anis, and José Antonio Marin-Neto. 2010. 'Chagas Disease'. The Lancet 375 (9723): 1388–1402. <u>https://doi.org/10.1016/S0140-6736(10)60061-X</u>. 'Digital 2023: Global Overview Report'. 2023. DataReportal – Global Digital Insights. 26 January 2023. <u>https://datareportal.com/reports/digital-2023-global-overview-report</u>.

Franck, Annika. 2019. 'So sehr kann uns Einsamkeit krank machen'. quarks.de (blog). 26 April 2019. <u>https://www.quarks.de/gesellschaft/psychologie/so-sehr-kann-uns-einsamkeit-krank-machen/</u>.

'Global Daily Social Media Usage 2024'. n.d. Statista. Accessed 15 March 2025. <u>https://www.statista.com/statistics/433871/daily-social-media-usage-worldwide/</u>.

Holt-Lunstad, Julianne, Timothy B. Smith, and J. Bradley Layton. 2010. 'Social Relationships and Mortality Risk: A Meta-Analytic Review'. PLOS Medicine 7 (7): e1000316. <u>https://doi.org/10.1371/journal.pmed.1000316</u>.

'Infographic: Global Vaccine Timeline Stretches Beyond 2023'. 2021. Statista Daily Data. 30 August 2021. <u>https://www.statista.com/chart/24064/covid-19-vaccination-timeline-global</u>.

'Loneliness-and-Social-Isolation-Are-Health-Risks.Png (PNG-Grafik, 1080 × 1080 Pixel)'. n.d. Accessed 15 March 2025. <u>https://cdn.who.int/media/images/</u> <u>default-source/groups/who-commission-on-social-connection/loneliness-and-social-isolation-are-health-risks.png</u>?sfvrsn=a4a9ea91_5.

'Social Isolation and Loneliness among Older People: Advocacy Brief'. n.d. Accessed 13 March 2025. <u>https://www.who.int/publications/i/</u> item/9789240030749.

Valtorta, Nicole K., Mona Kanaan, Simon Gilbody, Sara Ronzi, and Barbara Hanratty. 2016. 'Loneliness and Social Isolation as Risk Factors for Coronary Heart Disease and Stroke: Systematic Review and Meta-Analysis of Longitudinal Observational Studies'. Heart (British Cardiac Society) 102 (13): 1009–16. <u>https://doi.org/10.1136/heartjnl-2015-308790</u>.

CDC. 2025. 'Measles Cases and Outbreaks'. Measles (Rubeola). 14 March 2025. <u>https://www.cdc.gov/measles/data-research/index.html</u>.

Dabbagh, Alya, Rebecca L. Laws, Claudia Steulet, Laure Dumolard, Mick N. Mulders, Katrina Kretsinger, James P. Alexander, Paul A. Rota, and James L. Goodson. 2018. 'Progress Toward Regional Measles Elimination - Worldwide, 2000-2017'. MMWR. Morbidity and Mortality Weekly Report 67 (47): 1323–29. https://doi.org/10.15585/mmwr.mm6747a6.

Fenner, Frank, Donald A. Henderson, Isao Arita, Zdenek Jezek, Ivan Danilovich Ladnyi, and World Health Organization. 1988. Smallpox and Its Eradication. World Health Organization. <u>https://iris.who.int/handle/10665/39485</u>.

'Global Immunization Efforts Have Saved at Least 154 Million Lives over the Past 50 Years'. n.d.-a. Accessed 13 March 2025. <u>https://www.who.int/news/item/24-04-2024-global-immunization-efforts-have-saved-at-least-154-million-lives-over-the-past-50-years</u>.

'---'. n.d.-b. Accessed 13 March 2025. <u>https://www.who.int/news/item/24-04-2024-global-immunization-efforts-have-saved-at-least-154-million-lives-over-the-past-50-years</u>.

'How do mRNA vaccines work?' n.d. Accessed 17 March 2025. https://scienzenaturali.ch/id/HZ9yS.

'Immunization Agenda 2030: A Global Strategy To Leave No One Behind'. n.d. Accessed 13 March 2025. <u>https://www.who.int/publications/m/item/immunization-agenda-2030-a-global-strategy-to-leave-no-one-behind</u>.

'Immunization Coverage'. n.d. Accessed 13 March 2025. <u>https://www.who.int/news-room/fact-sheets/detail/immunization-coverage</u>.

Kallenberg, Judith, Wilson Mok, Robert Newman, Aurélia Nguyen, Theresa Ryckman, Helen Saxenian, and Paul Wilson. 2016. 'Gavi's Transition Policy: Moving From Development Assistance To Domestic Financing Of Immunization Programs'. Health Affairs (Project Hope) 35 (2): 250–58. <u>https://doi.org/10.1377/ hlthaff.2015.1079</u>.

Lee, Alex. n.d. 'Immunization Agenda 2030'. Immunization Agenda 2030. Accessed 15 March 2025. <u>https://www.immunizationagenda2030.org/</u>. Mangla, Bharti, Shamama Javed, Muhammad H. Sultan, Waquar Ahsan, Geeta Aggarwal, and Kanchan Kohli. 2022. 'Nanocarriers-Assisted Needle-Free Vaccine Delivery Through Oral and Intranasal Transmucosal Routes: A Novel Therapeutic Conduit'. Frontiers in Pharmacology 12 (January):757761. <u>https:// doi.org/10.3389/fphar.2021.757761</u>.

Mathieu, Edouard, Hannah Ritchie, Esteban Ortiz-Ospina, Max Roser, Joe Hasell, Cameron Appel, Charlie Giattino, and Lucas Rodés-Guirao. 2021. 'A Global Database of COVID-19 Vaccinations'. Nature Human Behaviour 5 (7): 947–53. <u>https://doi.org/10.1038/s41562-021-01122-8</u>.

'Measles New Cases Rate U.S. 1919-2024'. n.d. Statista. Accessed 18 March 2025. <u>https://www.statista.com/statistics/186409/cases-of-measles-in-the-us-since-1950/</u>.

Pardi, Norbert, and Florian Krammer. 2024. 'mRNA Vaccines for Infectious Diseases – Advances, Challenges and Opportunities'. Nature Reviews Drug Discovery 23 (11): 838-61. <u>https://doi.org/10.1038/s41573-024-01042-y</u>.

Shattock, Andrew J., Helen C. Johnson, So Yoon Sim, Austin Carter, Philipp Lambach, Raymond C. W. Hutubessy, Kimberly M. Thompson, et al. 2024. 'Contribution of Vaccination to Improved Survival and Health: Modelling 50 Years of the Expanded Programme on Immunization'. Lancet (London, England) 403 (10441): 2307–16. <u>https://doi.org/10.1016/S0140-6736(24)00850-X</u>.

Wouters, Olivier J., Kenneth C. Shadlen, Maximilian Salcher-Konrad, Andrew J. Pollard, Heidi J. Larson, Yot Teerawattananon, and Mark Jit. 2021. 'Challenges in Ensuring Global Access to COVID-19 Vaccines: Production, Affordability, Allocation, and Deployment'. The Lancet 397 (10278): 1023–34. <u>https://doi.org/10.1016/S0140-6736(21)00306-8</u>.

Adfree Cities [@adfreecities]. 2024. 'More Vape Ads BANNED. Following a Complaint by Adfree Cities the Ad Watchdog Has Banned a Series of Billboard Adverts from Vape Supplier Alfabar Because They Were "Likely to Appeal Particularly to People Aged under 18." Https://T.Co/BpZkJM4txq'. Tweet. Twitter. <u>https://x.com/adfreecities/status/1770387166172008768</u>.

'Https://Www.Cdc.Gov/Vitalsigns/Pdf/2010-09-Vitalsigns.Pdf'. n.d. Accessed 15 March 2025. <u>https://www.cdc.gov/vitalsigns/pdf/2010-09-vitalsigns.pdf</u>.

Kurzgesagt - In a Nutshell, dir. 2024. Vaping Is Too Good To Be True. https://www.youtube.com/watch?v=cHEOsKddURQ.

Pichon-Riviere, Andrés, Ariel Bardach, Federico Rodríguez Cairoli, Agustín Casarini, Natalia Espinola, Lucas Perelli, Luz Myriam Reynales-Shigematsu, et al. 2024. 'Health, Economic and Social Burden of Tobacco in Latin America and the Expected Gains of Fully Implementing Taxes, Plain Packaging, Advertising Bans and Smoke-Free Environments Control Measures: A Modelling Study'. Tobacco Control 33 (5): 611–21. <u>https://doi.org/10.1136/tc-2022-057618</u>. 'Tobacco'. n.d. Accessed 14 March 2025. <u>https://www.who.int/health-topics/tobacco</u>.

Hu, Chenglin, Xiuying Zhang, Nan Zhan, and Youcun Liu. 2023. 'Current Status and Health Risk Assessment of Heavy Metals Contamination in Tea across China'. Toxics 11 (8): 662. <u>https://doi.org/10.3390/toxics11080662</u>.

Kaczyński, Piotr, Piotr Iwaniuk, Magdalena Jankowska, Karolina Orywal, Katarzyna Socha, Maciej Perkowski, Jakub Ali Farhan, and Bożena Łozowicka. 2024. 'Pesticide Residues in Common and Herbal Teas Combined with Risk Assessment and Transfer to the Infusion'. Chemosphere 367 (November):143550. <u>https://doi.org/10.1016/j.chemosphere.2024.143550</u>.

Siraj, Jafer. 2021. 'Organochlorine Pesticide Residues in Tea and Their Potential Risks to Consumers in Ethiopia'. Heliyon 7 (7): e07667. <u>https://doi.org/10.1016/j.heliyon.2021.e07667</u>.

Tao, Chunjun, Yinxian Song, Zhong Chen, Wanfu Zhao, Junfeng Ji, Nengping Shen, Godwin A. Ayoko, and Ray L. Frost. 2021. 'Geological Load and Health Risk of Heavy Metals Uptake by Tea from Soil: What Are the Significant Influencing Factors?' CATENA 204 (September):105419. <u>https://doi.org/10.1016/j.catena.2021.105419</u>.