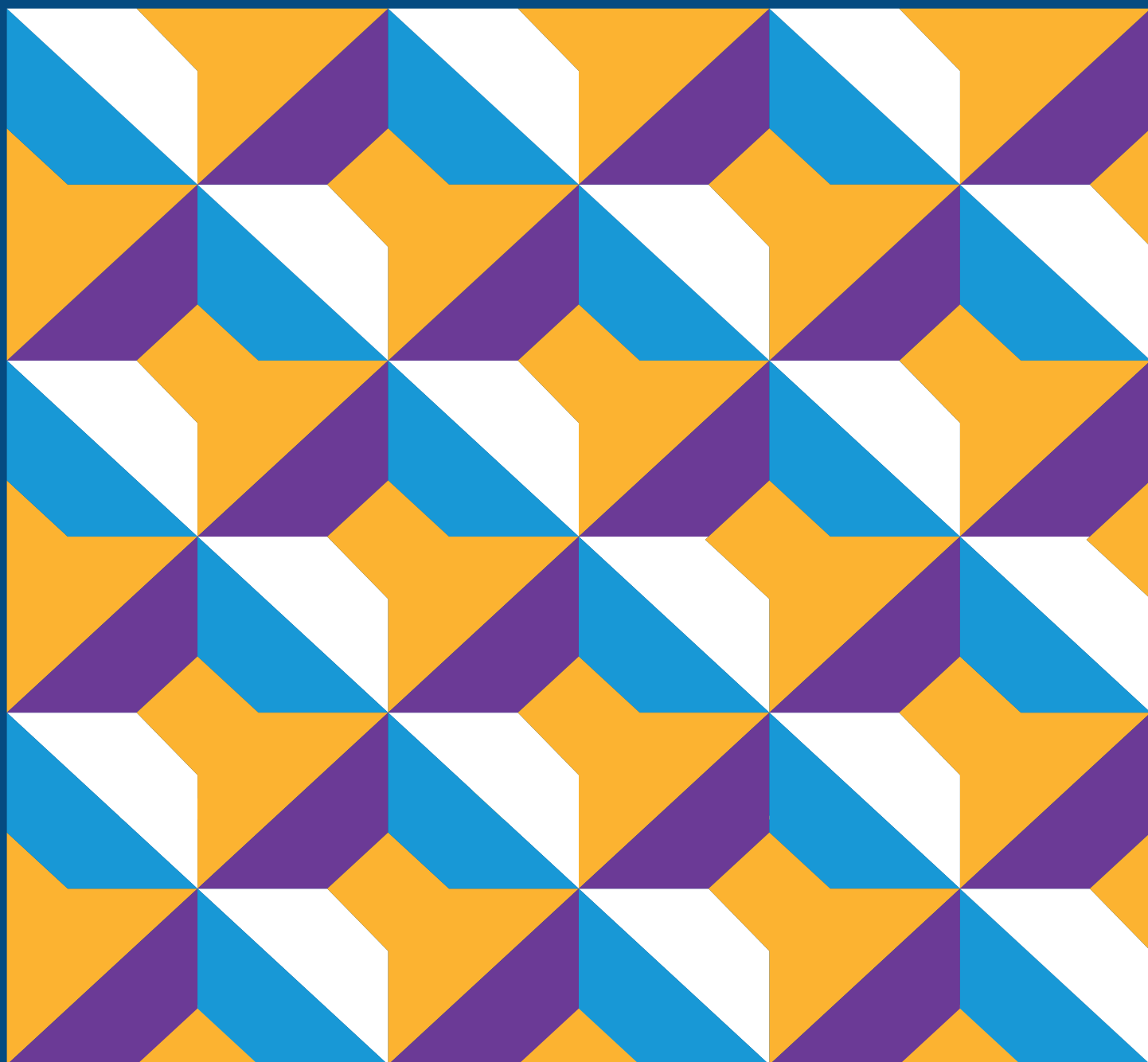




World Health
Organization

European Region

Innovation agenda for public health in the WHO European Region 2025–2030



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ABSTRACT

The *Innovation agenda for public health in the WHO European Region 2025–2030* is a strategic blueprint developed to accelerate transformative innovation across public health systems in the Region. The Agenda responds to converging demographic, epidemiological, environmental and technological challenges that demand urgent, systemic change through innovation. It identifies four high-impact “mega shifts”, each targeting key barriers and opportunities for health innovation. These shifts prioritize mission-driven partnerships, ethical and inclusive data digital infrastructure, workforce empowerment and the realignment of incentives to ensure that public and private sector efforts are coordinated for maximum health impact, equity and sustainability. The Agenda provides actionable guidance for policy-makers, health authorities and partners, supporting the implementation of the European Programme of Work 2025–2030 and positioning the Region to achieve measurable improvements in health outcomes, system resilience and equity for all populations.

KEYWORDS

ORGANIZATIONAL INNOVATION; HEALTH POLICY; PUBLIC HEALTH; HEALTH EQUITY; PUBLIC-PRIVATE SECTOR PARTNERSHIPS; FINANCING, GOVERNMENT

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Declaration of interests

In developing the *Innovation agenda for public health in the WHO European Region 2025–2030*, all members of the Technical Advisory Group on Building and Innovation Ecosystem for Public Health completed and submitted declarations of interest in accordance with WHO requirements. Following a thorough review process, no conflicts of interest were identified among the contributors. The development of this Agenda was conducted with full adherence to WHO policies on transparency and independence, ensuring that the content reflects the best available evidence and expert consensus, free from undue influence by any individual or organization.

Abbreviations

AI	artificial intelligence
AIS	Agence de l’Innovation en Santé [French Health Innovation Agency]
COVID-19	coronavirus disease
EHDS	European Health Data Space
EU	European Union
HIHI	Health Innovation Hub Ireland
HSE	Health Service Executive
LLS	Lighthouse Life Science
NCDs	noncommunicable diseases
OPTICA	Organizational PerspecTive Checklist for AI solutions adoption
R&D	research and development
SMEs	small and medium-sized enterprises



Executive summary

The *Innovation agenda for public health in the WHO European Region 2025–2030* is a strategic, action-oriented blueprint designed to foster public health innovation across the Region. It focuses on select “mega shifts”: high-impact priorities likely to deliver progress within five years, ensuring coordinated resource use, avoiding fragmentation and supporting Member States in achieving early, scalable successes that build confidence for future expansion. Developed in close collaboration with the Technical Advisory Group on Innovation, the Agenda draws on extensive consultations with Member States and other stakeholders. It emphasizes developing and applying new processes, policies, products or programmes to address unmet health needs, aiming for improvements in quality, impact, equity and sustainability. Guiding principles such as equity, co-production, health value creation, adaptability, continuous evaluation, transparency and climate resilience underpin its approach.

The first mega shift, Quantum collaboratives, advocates a move from fragmented, profit-driven innovation towards mission-driven, cross-sector partnerships for a public health purpose. The establishment of a WHO Regional Public Health Innovation Coordination Hub aims to bridge the gap between breakthroughs and public health, fostering collaboration and scaling solutions to address the WHO European Region’s most complex health challenges. The second mega shift, Digital solidarity, seeks to democratize data for innovation by investing in ethical, inclusive data infrastructure, exemplified by the European Health Data Space. It also operationalizes artificial intelligence governance through practical frameworks to ensure safe, equitable and contextually appropriate artificial intelligence solutions.

The third mega shift, Accelerated capacity, aims to amplify human potential within health systems by establishing dedicated Health Innovation Clusters within health authorities, integrating innovation training and leadership programmes. It places the health workforce at the centre of innovation empowerment and promotes the use of artificial intelligence to support clinical decision-making, reduce administrative burdens and extend care to underserved populations. The fourth mega shift, Incentive revolution, focuses on building an end-to-end health-industrial ecosystem in which public and private finance is mobilized and used in innovative ways to improve population health through reimagined public-private-people co-creation. Moving beyond traditional public-private partnerships, it emphasizes mission-aligned collaborations for a public health purpose, with appropriate incentives to bring all required partners to the table. In addition to mobilizing increased public investments for health, including through effective corporate taxation and stopping illicit financial flows, it can also adopt financing instruments such as Health Impact Bonds, blended finance and advanced market commitments that, if well-designed, can attract private sector engagement and align industry-driven innovation with public health goals, while mobilizing public and community capacity and leadership towards innovative partnerships. It requires the development of frameworks for co-creation and incentive alignment between all stakeholders to ensure priority health needs are met, including successful scaling and affordable, equitable access.

This document serves as an actionable blueprint to support the implementation of the Innovation Strategy and the European Programme of Work 2025–2030 – which allocates 30% of its efforts toward innovation to address major public health trends affecting the Region.



Context

The *Innovation agenda for public health in the WHO European Region 2025–2030* for WHO European Region was conceived in direct response to the rapidly evolving landscape of health innovation. Recognizing that the pace and complexity of change in the innovation space make it impractical and ultimately ineffective to attempt an all-encompassing approach, the Agenda deliberately focuses on a selected number of actionable priorities known as “mega shifts”. These mega shifts were identified as areas where, within the next five years, tangible impact can be achieved. Attempting to be all-encompassing risks diluting resources and impact, leading to fragmented efforts and limited results. By focusing on carefully selected shifts, the Agenda ensures that Member States and partners can mobilize around clear priorities, coordinate resources and demonstrate early, scalable successes.

This approach aligns with the broader goals of the Second European Programme of Work, which emphasizes innovation, trust-building and health system preparedness for future challenges. By targeting shifts where public health impact is imminent, the Agenda supports Member States in delivering meaningful change, building confidence in innovation and laying the groundwork for future expansion as new needs and opportunities arise

Defining innovation in the context of the WHO European Region

A clear and context-specific definition of innovation is critical for guiding strategic action. For the purposes of this Agenda, public health innovation is defined as:

The development and application of new processes, policies, products, or programmes that address unmet health-related needs of patients, populations, or communities. These innovations aim to enhance the quality, impact, and efficiency of both population health and living environments in an equitable and sustainable way (1).

This definition was carefully adapted to reflect the unique challenges and needs of public health in the Region, emphasizing solutions that respond to real-world gaps and drive improvements in health outcomes and system performance.

Guiding principles of public health innovation

The Agenda’s definition of innovation is underpinned by a set of guiding principles that ensure flexibility, relevance and impact in the innovation process:

- **Equity:** innovations must aim to reduce health divides and ensure benefits are accessible and affordable to all, particularly marginalized and underserved populations.
- **Bold creativity:** solutions should be new or creatively applied, moving beyond incremental improvements to transformative change.

- **Alignment with public health transformation:** innovations must support the broader goals of health system transformation and resilience.
- **Co-production and collaboration:** emphasis is placed on collaborative development with stakeholders, including patients, communities and cross-sector partners.
- **Health value creation:** innovations should address unmet health needs, delivering measurable improvements in health and well-being, rather than solely pursuing profit motives.
- **Adaptability and scalability:** solutions should be designed for affordable and sustainable adoption, adaptation and scaling, where appropriate, across diverse contexts.
- **Continuous evaluation:** ongoing assessment and refinement are essential to ensure solutions remain effective and relevant.
- **Open source and transparency:** where applicable, open-source technologies and transparent governance are encouraged to maximize access and trust.
- **Climate resilience:** innovations should contribute to sustainable, climate-resilient environments that support healthy living.

These principles provide a robust framework for guiding public health innovation, while acknowledging the inherent unpredictability and spontaneity of the innovation process.



The challenge: why incremental change is no longer enough

The perfect storm: converging crises demanding urgent transformation

The WHO European Region faces a catastrophic convergence of systemic challenges that demand immediate, radical transformation of public health paradigms. Long considered a global leader in health innovation, the Region now confronts a perfect storm of demographic shift; epidemiological complexity; environmental crises; and economic, financial and geopolitical instability that weakens multilateralism and exposes the fragility of global health. This polycrisis creates compound risks that cannot be addressed through incremental reforms or siloed interventions (2).

Demographic timebomb meets chronic disease tsunami

The WHO European Region's population structure has undergone irreversible transformation, with those aged 65 and over now outnumbering children under 15 – a historic first with profound health system implications (3). This demographic shift is coupled with longer life expectancy, but also more years lived in poor health, as noncommunicable diseases (NCDs) claim one in six lives before age 70 in the Region (2,4). The epidemiological transition has created a triple disease burden: cardiovascular conditions dominate in eastern Europe and central Asia, accounting for around 15.8% of deaths under 70 (5), while cancer dominates premature mortality in western and northern Europe, accounting for 7.2–9.2% of deaths before age 70 (6,7). These disparities reflect entrenched health inequalities, with under-5 mortality rates also varying dramatically – by as much as 27-fold – between the best and worst performing countries in the Region (2,8). Compounding these challenges, the Region faces rapidly rising health-care costs, driven in part by the unsustainably high prices of novel therapies and technologies, such as new cancer drugs.

Climate-health collision accelerates

The WHO European Region is the fastest-warming region globally, with temperatures rising at about twice the global average rate (9). The continent recorded an estimated 175 000 heat-related deaths annually in recent years, with the highest rates among older adults and those with pre-existing conditions (2,9,10). Air pollution remains a major health threat, responsible for over 357 000 deaths in the European Union (EU) in 2022 alone, primarily from cardiovascular and respiratory diseases (11). Extreme weather events, such as heatwaves and floods, disrupt chronic disease management and disproportionately affect vulnerable populations, including the elderly and those with limited mobility (9,12). Paradoxically, the health sector itself contributes about 5% of global greenhouse gas emissions, creating a self-reinforcing cycle of environmental degradation and disease burden (13).

Climate-conflict nexus exacerbates health emergencies

The convergence of climate disasters and geopolitical instability is creating an unprecedented strain on health systems across the Region. The International Rescue Committee has identified 16 countries globally where climate and conflict converge to create severe public health emergencies, and similar patterns are emerging in eastern Europe (14). In 2023, the mpox outbreak in conflict-affected areas of Ukraine saw transmission rates more than three times higher than in non-conflict zones, exacerbated by disrupted vaccination programmes and population displacement (15). Flooding in the Republic of Moldova during the 2024 Danube River overflow displaced more than 12 000 residents, overwhelming trauma care capacities already strained by refugee inflows from neighboring conflicts (16). These events mirror trends seen in other regions where climate change, conflict and migration act as threat multipliers, undermining essential social determinants of health and disproportionately impacting vulnerable populations (14,17).

Demographic-climate convergence intensifies vulnerabilities

The WHO European Region's ageing populations face disproportionate risks from climate shocks. During the 2022 and 2024 Mediterranean heatwaves, mortality rates for those over 75 were several times higher than for younger cohorts, with countries like Greece and Italy experiencing the highest excess deaths (10,12). Rural depopulation trends further intensify these risks; for example, 23% of Balkan villages have lost more than half of their working-age residents since 2020, leaving elderly populations isolated and particularly vulnerable during climate disasters, which compounds risks of heatstroke and medication supply disruptions (18).

Post-pandemic fragility persists

The legacy of the coronavirus disease (COVID-19) pandemic includes depleted health workforces, with vacancy rates in primary care across the EU States reaching 18% and projections of a 4.1 million health worker shortage by 2030 (19). Public finances remain strained, with health budget cuts averaging 4.7% post-2023. Vaccination coverage, already suboptimal before the pandemic, has deteriorated further; measles cases surged 30-fold in 2023, with 58 000 cases across 41 Member States (2). This immunity gap coincides with antimicrobial resistance rising 28% faster than therapeutic innovation since 2020, leaving Europe increasingly vulnerable to emerging pathogens.

Geopolitical fracturing undermines collective action

The WHO European Region's 53 Member States face growing policy divergence on issues from vaccine mandates to climate mitigation (20). Eastern European states report 40% higher premature NCD mortality than western counterparts, reflecting widening disparities in health system investments and preventive strategies (6). Cross-border collaboration is further strained by competing political priorities and

resource constraints, with only 31% of EU cohesion funds allocated to health system modernization in 2024 compared to 49% in 2019 (20). Most critically, current geopolitical tensions – characterized by the withdrawal of major funders such as the United States of America from WHO – now threaten the very foundation of the multilateral approach to global health challenges, risking a fragmented and less effective response to future crises.

This convergence of crises exposes the fundamental mismatch between 20th-century health system architectures and 21st-century population needs. Climate change acts as a risk multiplier, exacerbating NCD burdens while creating new zoonotic disease threats through shifting vector habitats; for example, dengue fever cases tripled in southern Europe between 2020 and 2024 (9). Ageing populations require lifelong health maintenance rather than episodic care, yet systems remain oriented toward acute interventions (3,12). Fiscal constraints post-pandemic limit traditional expansion of services, demanding radical efficiency gains through prevention-focused models (19).

Failures of traditional approaches: the innovation-implementation gap

The persistent chasm between proven public health innovations and their systemic adoption has become a defining failure of 21st-century health systems. Despite 89% of countries in the WHO European Region adopting digital health strategies by 2024, only 34% have fully implemented artificial intelligence (AI)-driven preventive care models at scale (21). This disconnect arises from structural rigidities that are not well-suited for modern challenges, with legacy health systems often remaining focused on disease-specific verticals. This fragmentation persists even though 73% of premature mortality involves multimorbidity (22). For instance, cardiovascular prevention programmes often operate independently from diabetes management initiatives, despite shared metabolic risk factors – a siloed approach costing €12.7 billion annually in duplicated services and missed early interventions (23). Mental health integration lags most severely, with 68% of primary care centres lacking embedded psychiatric support, despite depression being a recognized risk multiplier for cardiovascular diseases (24).

The economic toll of reactive care models further exacerbates systemic inefficiencies. Hospital-centric systems consume 52% of health budgets while addressing only 18% of preventable mortality drivers (25). Post-pandemic data reveals stark consequences: 40% of chronic obstructive pulmonary disease hospitalizations could be prevented through community-based pulmonary rehabilitation (26), coordinated podiatry networks could reduce diabetic amputations by 58% (23) and scaling hospital-at-home models might save €9.3 billion annually (27). Yet perverse incentives endure, with 78% of EU health systems prioritizing procedure-based reimbursement over

outcome-driven models, creating systemic disincentives for prevention (25).

Equity erosion has accelerated since 2020, as implementation delays disproportionately affect vulnerable populations. Eastern Europe's 40% higher premature NCD mortality correlates with a 5.3-year lag in adopting digital therapeutics compared to western counterparts (28). Migrant populations face a 63% lower access to telehealth despite a 22% higher prevalence of chronic diseases (29), while rural areas exhibit a 47% slower uptake of WHO-recommended interventions (30). Culturally, top-down health promotion campaigns fail to engage digitally native demographics: only 12% of Generation Z respondents find traditional public health messaging effective (31), despite social media-delivered interventions showing a 3.2 times higher engagement (32). Algorithmic biases in health apps further exclude 38% of non-English speakers and 29% of elderly users, deepening disparities (33).

The cost of inertia is staggering. Delayed human papillomavirus vaccine scale-up results in 28 000 preventable cancer deaths annually (34), while unmanaged NCDs contribute to €514 billion in productivity losses (35). Outdated hypertension protocols account for 5.1 million disability-adjusted life years lost yearly (36). These figures underscore the urgent need to bridge the innovation-implementation gap through systemic reforms.

The innovation paradox: why health transformation lags other sectors

While technology sectors reinvent themselves every 3.5 years on average, health systems require 8–12 years to adopt proven innovations – a paralysis rooted in interconnected systemic barriers (21). Regulatory frameworks designed for pharmaceutical products struggle to accommodate digital health solutions, with medicine agencies processing digital health approvals 42% slower than pharmaceuticals, despite 89% lower risk profiles (37). The average EU medical AI approval takes 4.7 years, compared to 1.3 years for fintech innovations (37), while rigid General Data Protection Regulation interpretations block 68% of cross-border health data initiatives (29).

Risk-averse organizational cultures compound these challenges. A 2024 WHO survey found 73% of health administrators prioritize avoiding failure over achieving breakthroughs, while 58% of clinicians resist workflow changes lacking immediate patient-facing benefits (21). Only 12% of hospitals allocate more than 0.5% of operating budgets to innovation (21). Misaligned incentives further stifle progress: 89% of EU payment models remain volume-based, despite evidence that health value-based contracts reduce chronic care hospitalizations by 17% (27), prevention-focused incentives could save €94 billion annually by 2030 (35) and bundled payments improve surgical outcomes 23% faster than fee-for-service models (23).

Funding fragmentation reveals critical imbalances. Seventy-eight percent of public innovation funds target treatment over prevention (25), while digital health receives just 0.9% of EU health budgets, compared to 14% in the banking sector (37). Venture capital flows exacerbate urban-rural divides, with 92% of investments directed toward urban-focused solutions (33). Workforce shortages – 18% vacancy rates in primary care (30) – limit capacity for new care models, compounded by inadequate training: only 9% of medical schools teach AI implementation (37) and 43% of nurses report insufficient digital health competencies (32).

Four mega shifts to transform public health

Mega shift 1: Quantum collaboratives – re-imagined partnerships for impossible problems

This shift represents a decisive move from recognizing the limits of incremental change to actively forging new, mission-driven partnerships that can address the Region's most complex and persistent public health challenges. Rather than allowing innovation to remain the domain of fragmented, profit-driven actors, this approach positions public health as both a driver and beneficiary of innovation, ensuring that transformative solutions are co-created, implemented and scaled in a sustainable way and with equitable access at its heart.

Establishing the WHO Public Health Innovation Coordination Hub

The WHO European Region is uniquely positioned for a new era of public health innovation. Its landscape is dotted with world-class science parks, digital health clusters and research institutions, yet these assets often operate in silos, limiting their collective impact on public health. For example, the Region has a unique opportunity to harness the potential of existing institutions, such as innovation hubs, science parks and research and development (R&D) centres (38), that actively seek to engage with public health initiatives and contribute to improving public health outcomes. These institutions, often supported by government funding, foster dynamic networks that promote creativity and technological advancements. Examples of innovation hubs in the Region include those located in Belarus (39), Bulgaria (40), Estonia (41), Finland (42), Germany (43,44), Hungary (45), Ireland (46), Kazakhstan (47), Luxembourg (48), Sweden (49) and the United Kingdom of Great Britain and Northern Ireland (50–52). These innovation hubs possess diverse expertise, abundant resources and extensive networks that can be effectively leveraged to address public health challenges.

While these innovation institutions and R&D centres have achieved remarkable breakthroughs, their efforts are frequently disconnected from the pressing needs of health systems and public health authorities are too often passive recipients rather than active partners. This fragmentation,

combined with a prevailing profit motive among many innovation actors, has perpetuated the innovation-implementation gap that Chapter I identified as a core barrier to transformation.

Recognizing this, the Quantum collaboratives shift calls for a bold, deliberate strategy: the establishment of a WHO Regional Public Health Innovation Coordination Hub. This Hub is envisioned as a flagship where innovation and public health truly meet – a bridge uniting the region's innovation institutions with public health authorities, mission-driven coalitions and communities to co-create solutions for the megatrends shaping Europe's future. By breaking down silos between countries, sectors and disciplines, the Coordination Hub fosters a culture of solidarity and shared purpose. It ensures that the benefits of innovation are equitably distributed, reaching marginalized and underserved populations, and that public health systems are equipped to respond to both current and future challenges. Therefore, this calls for formal partnerships between the WHO Regional Office for Europe and institutions such as innovation hubs and science parks, in line with the Framework of Engagement with Non-State Actors (53).

Annual convenings: shaping shared priorities and showcasing impact

To ensure that innovation efforts are aligned with public health needs, the Coordination Hub will institutionalize annual convenings that bring together innovation hubs, science parks, public health leaders and implementers from across the Region. These forums serve as crucibles for knowledge exchange and cross-sector networking, allowing participants to showcase success stories, learn from real-world implementation and develop shared innovation priorities that reflect the Region's most urgent health challenges. By providing a structured space for dialogue and collaboration, these events will help break down institutional and disciplinary silos, catalysing new partnerships and accelerating the adoption of effective solutions.

Collaborative working groups

A cornerstone of the Hub's approach is the formation of targeted, multidisciplinary working groups focused on the Region's most pressing public health challenges, including antimicrobial resistance, climate health impacts, NCDs and demographic aging. These groups blend technical expertise with implementation knowledge, drawing inspiration from models such as Tehnopol's Lung cancer patient pathway project (54) and Denmark's Life Science Cluster's Lighthouse Life Science (LLS) initiative (55) (Box. 1) where they have pioneered a multistakeholder, multisector collaboration model that unites health and economic growth within a single strategic framework.

By leveraging structured innovation cycles, these multistakeholder working groups move quickly from ideation to pilot, using shared data and resources to validate a portfolio of new solutions and approaches in real-world settings. The collaborative model ensures that solutions are not only technically sound but also contextually relevant and system-ready, addressing both immediate needs and long-term structural challenges. This approach has already proven effective in initiatives like Innovation Networks for Scaling Active and Healthy Ageing (56), which scaled healthy aging solutions across borders through co-design and stakeholder engagement.

Building contextual tools: from needs assessment to scaling and monitoring

Bridging the persistent gap between pilot projects and system-wide adoption requires practical tools that can assess innovation readiness, guide contextual adaptation, develop sustainable scaling models and monitor implementation progress. The Coordination Hub will draw on the expertise and resources of initiatives like the Needs Examination, Evaluation and Dissemination assessment framework (57) and tapping into expertise of organizations such as the International Development Innovation Alliance (58), which has developed frameworks for clustering and scaling health innovations. By tailoring these tools to the WHO European Region context, the Hub ensures that Member States have access to standardized methods for evaluating scalability, adapting solutions to local needs and tracking impact over time.

Capacity-building: empowering the public health workforce and policy-makers

To ensure that public health systems are equipped to lead and sustain innovation, the Coordination Hub will implement comprehensive capacity-building programmes for policy-makers, health professionals and frontline workers. Drawing on digital learning models, the Hub will deliver blended learning modules on innovation management and leadership. These programmes will foster a culture of evidence-based experimentation and continuous improvement, empowering professionals at all levels to assess, implement and lead innovation efforts. By investing in capacity-building, the Hub not only enhances individual competencies but also strengthens institutional readiness for change. This approach is aligned with WHO's vision of supporting health transformation at all system levels, ensuring that innovation is embedded in both policy and practice (59).

Building a regional digital innovation platform

At the heart of the WHO Regional Public Health Innovation Coordination Hub is a comprehensive digital ecosystem designed to map innovation assets, identify barriers and align priorities across the Region. This platform goes beyond simply cataloguing technologies; it actively connects public health authorities with leading innovation hubs to facilitate cross-border collaboration and knowledge exchange.

Through this digital platform, stakeholders can access a real-time map of promising technologies, pilot projects and implementation frameworks, creating a one-stop shop for public health innovation. The platform also supports the identification of shared priorities, such as NCDs, climate resilience and healthy aging, and enables the rapid dissemination and adaptation of solutions across diverse health systems. In this way, the Hub transforms the Region's fragmented innovation landscape into a collaborative powerhouse, where digital infrastructure underpins both the discovery and scaling of public health solutions.



Box 1. Case study: LSS – transforming public health through mission-driven partnerships in Denmark

Background and context

Denmark, like much of Europe, faces a mounting burden from NCDs such as obesity and mental health disorders, which contribute to health inequities and rising health-care costs. Traditional, fragmented approaches have struggled to deliver the necessary impact. Recognizing this, Danish stakeholders launched the LLS initiative in 2022 – a pioneering public-private partnership designed to address these complex challenges by uniting health improvement and economic growth within a single, strategic framework.

Development process

LLS was established as a broad coalition, bringing together more than 300 partners from public authorities, municipalities, regions, pension companies, private industry and knowledge institutions. The initiative's initial focus was on "Healthy Weight" – tackling rising obesity through prevention, early detection and innovative treatment pathways. In 2023, LLS expanded to include "Mental Health," supporting Denmark's 10-year action plan for psychiatric care improvement (60).

The partnership's design leverages Denmark's strong tradition of public-private collaboration and robust life science ecosystem. LLS set out to create an enabling framework for innovation, emphasizing data-driven evidence, rapid implementation and international scalability. The approach combined technological solutions – such as digital self-monitoring and gamification – with strong community engagement to promote health equity and sustainable change.

Adoption strategies and challenges

A key adoption strategy was the creation of a multistakeholder collaboration platform, ensuring that public institutions, private companies and research entities could co-design and test new solutions. Funding pools were established to support both large-scale projects and rapid, small-scale pilots, with a particular emphasis on supporting small and medium-sized enterprises (SMEs). For example, a €2 million development pool was made available in 2022 to support projects focused on health equity and obesity reduction.

Challenges included harmonizing diverse organizational cultures, aligning incentives and ensuring that innovations addressed the needs of both the public sector and commercial partners. Transparent governance, open communication and shared evaluation metrics were critical to building trust and overcoming initial skepticism.

Scaling approaches and results

LLS was designed for scalability from the outset. Pilot projects – such as digital health interventions for weight management and mental health – were rigorously evaluated and, if successful, rapidly scaled across the capital region and beyond. The initiative's structure allowed for quick adaptation and extension to other NCD areas, with a focus on solutions that could be implemented nationally and potentially exported internationally.

Sustainability measures

To ensure long-term impact, LLS embedded capacity-building for health professionals and researchers, fostering a culture of continuous innovation. Funding streams were diversified, combining government grants, EU funds and private investment. Ongoing stakeholder engagement, annual convenings and public reporting on outcomes ensured accountability and maintained momentum.

Quantifiable impacts and outcomes

The impacts and outcomes of the LLS initiative have included that:

- over 40 collaborative projects were launched within the first two years;
- early pilot projects demonstrated concrete health improvements, including weight loss, enhanced mental well-being and increased physical activity;
- SMEs reported strengthened positions in national and international markets due to participation in LLS projects;
- the "Healthy Weight" initiative with €11 million of funding provided financial support to both major and fast-track projects, enabling rapid innovation and testing; and
- the "Mental Health" phase received €9.75 million in funding, supporting the nationwide scaling of effective solutions.

Box 1. *contd***Key lessons learned**

Key lessons learned from the LLS initiative include that:

- multistakeholder collaboration accelerates innovation and implementation, breaking down traditional silos;
- combining technology with community engagement is essential for promoting health equity and achieving sustainable behavioural change;
- clear governance and shared evaluation metrics are vital for building trust and ensuring alignment among diverse partners; and
- dedicated funding pools and support for SMEs drive both health and economic growth, making innovation accessible to a wide range of actors.

Highlighting the innovation ecosystem

LLS exemplifies how a mission-driven partnership can mobilize government, industry, academia and civil society to co-create solutions with measurable public health impact. The initiative's collaborative platform and focus on real-world needs have made Denmark a beacon for life science innovation, with lessons applicable across the WHO European Region.

Addressing challenges and transferability

The Danish experience demonstrates the importance of aligning incentives, fostering trust and building robust governance structures. While Denmark's context – characterized by high trust and strong digital infrastructure – facilitated rapid progress, the LLS model offers transferable elements including:

- establishing clear, mission-driven partnerships
- investing in digital and human capital
- creating transparent, inclusive governance mechanisms.

Actionable takeaways

Countries aiming to replicate LLS's success should prioritize broad, inclusive partnerships, invest in both technological and community-based solutions, and ensure that innovation efforts are closely aligned with national health priorities and equity goals. This approach can help transform fragmented innovation assets into a unified force for public health improvement.

Source: Danish Life Science Cluster, personal communication, 19 May 2025.

The call to action

The establishment of the WHO Regional Public Health Innovation Coordination Hub is more than an institutional upgrade; it is a strategic imperative for the future of health in the WHO European Region. By transforming fragmented innovation assets into a unified, mission-driven force for public health, the Hub accelerates the adoption and scaling of proven solutions, reduces duplication and inefficiency, and fosters cross-border solidarity and resilience in the face of shared threats. It empowers public health professionals with the tools and knowledge needed for 21st-century challenges and delivers measurable improvements in health outcomes, system efficiency, and equity.

In this era of unprecedented challenge and opportunity, Member States are called to champion a bold, coordinated approach to public health innovation. The WHO Regional Innovation Coordination Hub stands as the flagship where innovation meets public health – a beacon for the Region and a model for the world.

By investing in this initiative, Member States can turn the Region's formidable challenges into a launchpad for a healthier, more equitable and more resilient future.

The agenda for action is to:

- 1. establish a Regional Health Innovation Coordination Hub** by formalizing partnerships with innovation hubs, science parks and R&D centres, to collectively address complex public health challenges through innovation;
- 2. accelerate equitable access to transformative technologies and innovations** by providing open-access resources for sustainable scaling models, monitoring dashboards and deploying contextual tools and guidance to ensure these innovations reach all populations, particularly underserved communities;
- 3. institutionalize annual multistakeholder convenings** by hosting structured forums where public health leaders, innovation hubs and frontline workers co-prioritize challenges, foster collaboration and transfer knowledge; and

4. launch targeted collaborative working groups

by creating multidisciplinary teams to tackle specific challenges using structured innovation cycles.

Mega shift 2: Digital solidarity – democratizing data for public health intelligence and innovation

The urgency for Member States to invest in robust, ethical and inclusive data infrastructure has never been greater. In an era marked by converging public health crises, fragmented data systems and siloed information flows have become some of the most significant barriers to innovation, efficiency and equity in health. The COVID-19 pandemic and ongoing NCD epidemics have exposed the limitations of outdated, disconnected health data systems, resulting in duplicated diagnostics, delayed interventions and missed opportunities for prevention (61,62). The European Health Data Space (EHDS) offers a transformative solution, providing a harmonized, interoperable framework that will enable Member States to unlock the full value of health data for both individuals and society (63).

Centralized, ethically governed data infrastructure ensures that all regions and populations benefit from the latest innovations, whether that means accelerating cancer diagnosis pathways, targeting preventive interventions to communities most at risk or ensuring that digital health solutions reach migrants, the elderly and other digitally invisible populations (64). The EHDS and similar initiatives are designed not only to facilitate research and innovation but also to democratize access to health data, enabling researchers, policy-makers and innovators to tackle complex health challenges more effectively while maintaining strong privacy protections and ethical standards.

Digital and data solidarity: overlapping and reinforcing approaches

In this context, the principle of digital solidarity – where the benefits and risks of digital health are shared collectively and equitably – underpins the shift from viewing data as a commodity to recognizing it as a public good that serves the interests of all citizens. Closely aligned with this is the emerging concept of *data solidarity for health*, which has been developed to address the collective dimensions of data governance (65).

Data solidarity goes beyond individual data rights by emphasizing collective control, oversight and ownership of digital data and resources, alongside respect for individual autonomy. It seeks to ensure a more equitable distribution of the benefits and risks that arise from digital practices, particularly in health.

Both digital and data solidarity should be grounded in the core values of social justice, collective responsibility and democratic participation. They challenge prevailing power asymmetries in digital health – where tech giants and other powerful actors often control data infrastructure and its monetization. So by advocating for stronger collective

rights, democratic oversight and the development of alternative governance models such as data commons and cooperatives, digital and data solidarity provide the ethical imperative for collective benefit and practical governance mechanisms that promote public value, transparency and civic control.

Public skepticism toward digital health and AI remains high, particularly among younger generations, with lower percentage of Generation Z expressing trust in traditional public health messaging (66). Transparent data governance, citizen-centred control, and community ownership models – such as those piloted in the EHDS and by leading health data platforms across Europe – are essential to rebuilding public confidence (66). When citizens are empowered to see, control and understand how their data is used, and when they witness tangible benefits flowing back to their communities, trust and engagement rise dramatically.

Moreover, data-driven approaches are critical for addressing the social determinants of health, as advanced analytics can reveal hidden disparities, inform targeted interventions, and ensure that no community is left behind (66,67).

Estonia's experience offers a compelling best practice for how the EHDS can be realized in practice, serving as a model for other Member States aiming to build equitable, resilient and citizen-centered data infrastructures. Nearly all Estonian citizens – 98% – actively participate in the national health data commons through the Patient Portal (68), which gives individuals granular control over who accesses their health data and enables them to contribute anonymized information for public health research. This approach is rooted in citizen-centred governance, where individuals are empowered to voluntarily donate their health records and to contribute to a larger ecosystem of collaborative health research and innovation. By enabling citizens to donate their health data for research, Estonia fosters an environment in which health outcomes can be improved through participatory science, while ensuring that data is used for the collective benefit of society.

Digital inclusion revolution: bridging the equity gap in health innovation

The rapid digital transformation of health systems risks deepening existing health disparities unless intentionally designed to include populations often rendered “digitally invisible.” Older adults, migrants, nonnative speakers and rural communities face persistent barriers to digital health access: for example, digital exclusion among older adults in Europe ranges from 21% to nearly 97% depending on the country, and culturally and linguistically diverse groups are consistently less likely to use digital health tools due to language, literacy and infrastructure challenges (69,70). Critically, a recent longitudinal study found that digitally excluded older adults had a 30–37% higher risk of developing depressive symptoms than their connected peers, even after adjusting for socioeconomic factors (69).

These findings underscore the urgent need for inclusive digital health strategies to ensure innovation bridges – rather than widens – the equity gap.

Efforts to address these barriers have focused on strengthening interpreter services, cultural mediation and the translation of health information, as well as providing guidance and training for health providers to improve communication with migrants and refugees (71,72). Initiatives such as the EU's MHEALTH4ALL project are working to address linguistic barriers, developing an open-access platform to guide clinicians in delivering mental health to migrants with limited language skills (71).

To truly bridge the digital equity gap, health systems must combine user-centric design with trust-building outreach and robust support for linguistic and cultural diversity. This means not only advancing technology but also ensuring that innovations are accessible, relevant and responsive to the diverse needs of Europe's population. As digital health tools proliferate, context-specific strategies – accounting for local infrastructure, digital literacy and cultural attitudes – are essential to ensure that no one is left behind in the digital inclusion revolution.

AI governance for the public good: operationalizing ethics through the Organizational Perspective Checklist for AI solutions adoption (OPTICA) framework

AI governance in health has entered a new era, driven by the urgent need to ensure that AI solutions are not only innovative but also safe, equitable and contextually appropriate. While international and national regulatory bodies such as the United States Food and Drug Administration and the EU have established frameworks for the assessment of AI-based medical devices (73–76), these efforts often fall short when it comes to the unique challenges posed by AI in health. Unlike traditional medical technologies, AI solutions are highly sensitive to variations in local data, clinical practices, and information technology infrastructure, which means that strong performance in one context does not guarantee similar outcomes elsewhere. Furthermore, the risk of subtle and complex biases in AI-driven health tools is significant and often difficult to detect without systematic, context-specific evaluation. Recognizing these challenges led to the development of the OPTICA framework: a comprehensive, actionable approach that empowers health organizations to take an active role in the governance and evaluation of AI solutions within their own settings (77).

The OPTICA framework is anchored by a 77-item checklist that guides health providers through a stepwise evaluation of AI solutions, ensuring that each tool is rigorously assessed for clinical relevance, data representativeness and equity impact before deployment. The checklist is organized into four domains – clinical appropriateness, data exploration, development and performance evaluation, and deployment and monitoring plan – and

is designed for practical use by multidisciplinary teams, including clinical experts, AI developers and organizational data leads. Each item addresses a specific risk or concern, from the availability and quality of required input data to the need for stratified performance evaluation across demographic groups. This structured process not only helps identify potential drops in accuracy or performance mismatches – as seen in real-world examples where models underperformed with certain patient populations – but also systematically addresses the risk of bias. For instance, the OPTICA checklist prompts the identification of subgroup mis-representativeness in the training data and mandates a subgroup performance evaluation to detect disparities before they can impact patient care.

Importantly, the OPTICA framework does not stop at pre-deployment evaluation. It embeds requirements for ongoing monitoring and impact assessment, ensuring that AI solutions continue to perform as intended as real-world conditions evolve. The framework can also be completed according to risk stratification, allowing organizations to tailor the depth of evaluation to the potential impact of each AI solution, and can be integrated into digital platforms for streamlined collaboration and tracking.

This approach is closely aligned with WHO guidance *Ethics and governance of artificial intelligence for health* (78), which emphasizes the principles of equity, transparency, accountability and sustainability. By operationalizing these principles through a practical, auditable process, OPTICA enables health organizations to move beyond abstract ethical commitments and establish robust, context-sensitive safeguards for AI deployment. The end result is a governance model that not only protects patient safety and promotes fairness but also fosters trust and adaptability as AI becomes an integral part of modern health systems – not only in service provision, but also in predictive applications (Box 2).



Box 2. Case study: harnessing AI for hepatitis C elimination – the Clalit Health Services experience

Background and context

Hepatitis C remains a significant public health challenge globally, including in Israel, with many carriers remaining undiagnosed and untreated despite the availability of highly effective therapies. Early detection is critical, as timely treatment can prevent severe complications such as liver cirrhosis and cancer. However, traditional screening approaches, even when aligned with WHO and the Centers for Disease Control and Prevention guidelines, have struggled to identify a substantial proportion of undiagnosed cases. At Clalit Health Services – the largest health-care provider in Israel, serving over 5 million people – the annual screening of approximately 50 000 individuals in recent years has identified only a few dozen positive cases, highlighting the inefficiency of conventional methods and the need for innovation.

Development process of the innovation

Recognizing these limitations, Clalit Innovation developed and implemented an AI-driven predictive model to transform hepatitis C screening. Leveraging Clalit's unique, interoperable electronic health record system – comprising 25 years of comprehensive patient data across hospitals and clinics – the team trained machine learning algorithms to identify individuals at highest risk of undiagnosed hepatitis C. The model synthesized a wide array of clinical, demographic and behavioural data to generate personalized risk scores, enabling a shift from broad, guideline-based screening to highly targeted, proactive case finding.

Adoption strategies and challenges

The adoption of AI in clinical workflows required careful integration to ensure usability and clinician trust. Clalit addressed this by embedding the AI recommendations directly into a unified clinical interface, providing explainable and actionable insights. Clinicians can see not only which patients are flagged as high risk, but also the rationale behind each recommendation, fostering transparency and acceptance. Key challenges included providing clinically convincing reasoning behind the predictions of AI “black boxes”, ensuring data privacy and aligning the new workflow with existing clinical routines. Clalit's longstanding culture of innovation, supported by an in-house hub for AI research and development, facilitated this transition.

Scaling approaches and results

The pilot implementation of the AI model demonstrated remarkable efficiency: by screening just 500 individuals identified by the algorithm, Clalit detected 38 positive hepatitis C cases; the same yield previously achieved by screening 50 000 people under standard protocols. This represented a 100-fold improvement in screening efficiency, dramatically reducing resource use and enabling more rapid progress toward hepatitis C elimination goals. The approach is now being scaled across the organization, with the potential to be adapted for other conditions where undiagnosed disease burden is high.

Sustainability measures

Sustainability is underpinned by several factors, including:

- data infrastructure: Clalit's interoperable electronic health record and robust data governance ensure ongoing access to high-quality data for model refinement and monitoring;
- workforce engagement: continuous training and feedback loops help clinicians adapt to AI-augmented workflows; and
- iterative improvement: the AI models are regularly evaluated and updated based on real-world performance, ensuring relevance and accuracy as population health dynamics evolve.

Quantifiable impacts and outcomes

The impacts and outcomes of the Clalit Health Services experience have included:

- a 100-fold increase in screening efficiency for hepatitis C (38 cases detected from 500 targeted screens versus 50 000 under standard protocols);
- a “safety net” to ensure that the highest-risk patients do not go unnoticed;
- enhanced capacity to move toward WHO hepatitis C elimination targets by 2030; and
- improved clinician satisfaction through streamlined, actionable decision support.

Box 2. *contd***Key lessons learned**

Key lessons learned from the Clalit Health Services experience include that:

- targeted AI-driven screening can vastly outperform and augment traditional guideline-based approaches, particularly for conditions with a high proportion of undiagnosed cases;
- integration and explainability are crucial for clinician acceptance and effective adoption;
- robust data infrastructure and organizational culture of innovation are key enablers of success; and
- iterative evaluation and adaptation ensure that AI models remain effective and equitable as contexts change.

Innovation ecosystem and stakeholder collaboration

This initiative was made possible by the collaborative efforts of data scientists, clinicians, information technology specialists and leadership within Clalit. The organization's integrated payer-provider model, combined with a unified electronic health record, created an environment where innovation could be rapidly developed, tested and scaled. Clalit's experience underscores the value of aligning incentives, infrastructure and culture to drive meaningful public health transformation.

Addressing challenges and transferability

While Clalit's integrated structure and data assets are unique, the core principles – leveraging AI for targeted screening, embedding explainable decision support and fostering a culture of continuous innovation – are transferable. Health systems seeking to replicate this success should invest in data infrastructure, prioritize clinician engagement and adopt iterative, evidence-based approaches to AI deployment.

Actionable takeaways

Actionable takeaways from the experience include to:

- invest in interoperable health data systems to enable advanced analytics
- prioritize transparency and explainability in AI tools to build trust
- engage clinicians early and provide ongoing support for new workflows
- use targeted, data-driven approaches to maximize the impact and efficiency of public health interventions

Source: Clalit Health Services, personal communication, 21 May 2025.

The call to action

The cost of inaction is simply too high. Without investment in data infrastructure, Member States risk perpetuating inefficiencies, widening health inequities and missing the opportunity to transform public health for the digital age. The EHDS and similar frameworks offer a path toward a future where every byte of health data serves the public good, every citizen has a stake in the system and every innovation is accountable to the highest standards of equity and ethics.

The agenda for action is to:

1. establish a harmonized, ethical, and inclusive health data infrastructure by developing and implementing interoperable data systems modeled on the EHDS, ensuring all Member States can securely share, access and utilize health data for public health intelligence and innovation;

2. advance digital inclusion to bridge the health equity gap, through targeted digital inclusion initiatives that address barriers faced by digitally excluded populations, including older adults, migrants, non-native speakers and rural communities;

3. operationalize AI ethics and governance through practical frameworks by adopting and adapting comprehensive AI governance frameworks, enabling health organizations to systematically evaluate, monitor and govern AI solutions for safety, equity and contextual appropriateness; and

4. build public trust through transparent governance and community engagement by implementing transparent data governance policies that clearly communicate how health data and AI are used, ensuring citizens have visibility and control over their data.

Mega shift 3: Accelerated capacity – amplifying human potential in resource-constrained health systems

National innovation capacity: a systemic foundation

Accelerated capacity refers to the rapid enhancement of health-care system capabilities, including infrastructure, workforce and service delivery mechanisms. It revolutionizes how public health systems extract maximum value from limited resources. The development of robust national innovation capacity is contingent upon a multifaceted and systemic approach. Essential components include the establishment of comprehensive innovation policies that articulate a clear strategic vision, the implementation of effective governance structures aligned with national health priorities, the provision of sustainable financing mechanisms to facilitate both experimentation and scale-up and the maintenance of a resilient infrastructural backbone – encompassing digital platforms and data systems – that enables the rapid dissemination and adoption of novel solutions. Collectively, these systemic enablers foster an environment in which innovation is integrated as a continuous, embedded process within the health system, rather than as a series of isolated initiatives.

Accelerated capacity integrates technological innovations with behavioural and social sciences: an often overlooked but crucial aspect of health innovation. Research confirms that interventions are most effective when tailored to individuals' needs and motivations, particularly for addressing NCDs and mental health challenges, where understanding user behaviour (driven by culture-related, age-related and diverse population needs, opinions and varying requirements across public health systems) can significantly enhance engagement and adherence. It can also optimize health communication and support workforce development.

The central role of the health workforce

The 21st-century health landscape is defined by a striking paradox: rapid advances in medical knowledge and technology coexist with persistent health workforce shortages, care inequities and systemic inefficiencies. At the core of the innovation systemic enablers lies the health workforce, the most critical asset for any health system. Owing to their direct engagement with patients and communities, health professionals are uniquely positioned to identify operational challenges, co-develop and implement innovative interventions, and assess their real-world impact. Realization of this potential necessitates comprehensive support structures.

Evidence consistently demonstrates that workforce-driven innovation thrives in contexts characterized by strong organizational capability, visionary leadership and a culture that supports experimentation and learning. Countries investing in ongoing workforce development – including targeted innovation training, leadership programmes

and the formalization of innovation roles – report marked increases in both the volume and quality of internally generated innovations. For instance, the Spark Innovation Programme in Ireland empowers staff across all levels to propose, pilot and scale new solutions, yielding measurable improvements in care processes and patient outcomes (Box 3) (79).

Building innovation capability: cultivating a culture of change

Innovation in public health transcends the mere adoption of new technologies; it fundamentally requires the cultivation of a culture that prioritizes evidence-based experimentation, continuous learning and adaptive problem-solving at all levels (80). Achieving such cultural transformation demands a deliberate shift from risk aversion to an ethos that values learning from both success and failure. Widespread innovation literacy training equips staff to contribute to and implement novel approaches, while rapid learning and adaptation systems enable health systems to respond expeditiously to emerging challenges and opportunities. The learning health system model exemplifies how iterative cycles of training, feedback and process refinement can establish a feedback loop that drives ongoing improvement and fosters trust among staff and patients (81).

Efforts to build innovation capability must be grounded in operational realities. Financial constraints, workforce shortages and deficits in innovation-related knowledge and skills represent substantive barriers to the scaling of innovation. Accordingly, mechanisms should be instituted to enable health providers, clinical staff, patients and end users to participate actively in innovation initiatives, while safeguarding against excessive workload and disruption to core service delivery. The establishment of dedicated Health Innovation Clusters, acting as centralized units within ministries of health or public health agencies, may serve as specialized, cross-functional teams charged with identifying health priorities, evaluating emerging solutions, piloting interventions, fostering partnerships and building internal innovation capacity through targeted training. Centralizing innovation activities in this manner facilitates strategic resource management, minimizes disruption to frontline services and ensures alignment with national health priorities and system capabilities. These local level Health Innovation Clusters will link into the proposed WHO Regional Health Innovation Hub, ensuring alignment and collaboration across the Region.

AI-augmented health workforce: transforming constraints into opportunities

The integration of AI into the health workforce represents a transformative strategy to address resource limitations, with the potential to enhance both the quality and equity of health and care delivery. However, the successful adoption of AI is contingent not only on technological innovation but also on addressing behavioural and cultural factors that influence both health professionals and patients. AI-driven clinical decision support systems, when rigorously calibrated for equity, can mitigate rather than exacerbate health disparities. Intelligent automation reduces administrative burdens, allowing health professionals to devote more time to direct patient care. AI-powered continuous learning systems ensure that health professionals remain current with the up-to-date clinical evidence and best practices by dynamically updating clinical guidelines, treatment protocols and drug interactions based on the latest scientific literature, clinical

trials and real-world data. Importantly, models of human–AI collaboration are designed to preserve the essential human dimension of care, balancing technological efficiency with compassion and empathy. By embedding AI as a supportive partner, health systems can extend specialist care to underserved populations, support less-experienced clinicians and enhance the reach and effectiveness of health services, particularly in resource-constrained settings (82,83).

A further imperative for an Health Innovation Cluster is the development of a national AI roadmap for the health workforce, delineating strategies for the safe, ethical and effective integration of AI into clinical workflows, training and decision-making. Such a roadmap should articulate clear objectives for AI adoption, ensure ongoing stakeholder engagement, establish guidelines for human-centred and equitable deployment and incorporate mechanisms for continuous evaluation and adaptation.

Box 3. Case study: Health Innovation Hub Ireland (HIHI) and the Health Service Executive (HSE) Spark Innovation Programme – enabling health workforce capacity and collaboration through intrapreneurship and entrepreneurship for health system transformation

Background and context

Ireland's health system, like many across the WHO European Region, faces mounting pressures: rising demand, workforce constraints and the urgent need to translate innovation into clinical frontline impact. Historically, innovation efforts were fragmented, with limited pathways for health workers or start-ups to pilot and scale solutions within the public system. Recognizing this gap, two complementary initiatives – HIHI and the HSE Spark Innovation Programme – emerged to catalyze a new era of collaborative, workforce-supported health innovation.

HIHI, established in 2016 as a joint initiative of the Department of Business, Enterprise and Innovation and the Department of Health, with support from Enterprise Ireland and the HSE, serves as a national bridge between the health service and enterprise. Its mission: to create a dynamic ecosystem where start-ups, SMEs and health professionals can co-develop, test, and implement solutions that address real-world health-care challenges.

The HSE Spark Innovation Programme, launched in 2017 is an internal organizational function of Ireland's publicly funded national health service. It was designed to empower frontline health workers—including doctors, nurses, midwives, pharmacists and members of the 26 health and social care professions to identify challenges within the health-care system and lead the development of innovative solutions. Together, these initiatives represent a systemic approach to amplifying capacity and embedding innovation into the fabric of Irish health care.

Development process of the innovation

HIHI operates as a national network with hubs in Cork, Dublin and Galway, leveraging Ireland's world-class medtech and clinical research infrastructure. It offers a structured pathway for innovators: matching companies with clinical teams, overseeing pilot and validation studies, and supporting the commercialization and adoption of new products and services. HIHI also works directly with health-care staff, mentoring them from ideation through to proof-of-concept and clinical implementation, and delivers university accredited education programmes and a Clinical Innovation Award to embed an innovation mindset within the health workforce.

The HSE Spark Innovation Programme takes a “bottom-up”, frontline driven approach, encouraging health-care workers to surface challenges and propose solutions. The Programme supports and leverages frontline innovation capabilities to deliver value in all its forms to patients, service users, health-care staff and the wider health-care system. Through workshops, bootcamps, competitions, and funding calls, the HSE Spark Innovation Programme provides resources, mentorship and a platform for staff-led projects to move from concept to implementation.

Box 3. *contd***Adoption strategies and challenges**

Both HHI and HSE Spark Innovation Programme have prioritized collaboration and inclusivity. HHI's open-door policy welcomes engagement from any company or health-care professional, while HSE Spark Innovation Programme's grassroots model ensures that innovation is driven by those closest to patient care. Strategic partnerships with academic institutions, industry and the HSE have been key to building credibility and momentum.

Challenges have included overcoming cultural resistance to change, building system capacity for clinicians to engage in innovation activity, navigating procurement and regulatory barriers, and ensuring that successful pilots are not siloed but diffused and scaled nationally. Both initiatives have addressed these challenges by fostering strong leadership buy-in, aligning projects with national health priorities and demonstrating tangible value; whether through improved patient outcomes, cost savings or enhanced staff satisfaction.

Though distinct in their focus on entrepreneurship and intrapreneurship respectively, the two entities also work synergistically, leveraging each other's strengths to deliver the goal of enabling innovation in health care. For example, the HHI and HSE Spark Innovation Programme teams co-deliver the annual Spark Ignite programme to health-care staff with ideas that could be developed into commercial products.

Additionally, HSE Spark and HHI work collaboratively, referring innovators to the correct supports as appropriate. HHI directs system-focused ideas to the HSE Spark Innovation Programme for early-stage development and pilot support, while the Programme refers commercially viable innovations to HHI for their expertise in market validation and industry engagement.

Scaling approaches and results

HHI's model is inherently scalable, providing a national platform for pilot studies and validation and facilitating the spread of proven innovations across Ireland's hospital and primary care networks. HHI offers an online portal for innovators to submit ideas and requests for support, and provides a portfolio of solutions that have been supported by HHI. Since 2016, HHI has received more than 800 ideas from health-care staff, supported more than 100 start-ups with novel health-care products and has delivered thematic calls for innovation in areas such as women's health, green health care, living with chronic illness and AI in health care. Notably, HHI's role as Ireland's first European Institute of Information and Technology Health Bridgehead Catalyser now enables European start-ups to test and adapt their solutions within the Irish system, further strengthening Ireland's position as a hub for health innovation.

The HSE Spark Innovation Programme supports health-care innovation through a structured pipeline that guides clinicians from early-stage idea development through validation, proof of concept and pilot testing, towards verification and system readiness. The programme tailors support to the stage and scale of each innovation, from small-scale validation to larger pilots, creating a flexible internal model for scaling innovation efforts. HSE Spark ensures ideas are rooted in clinical need and tested in real-world settings, working with health-care leaders to identify high-potential projects aligned with strategic priorities. Once verified, the HSE Spark Innovation Programme assists innovators in pursuing sustainable funding and system-level sponsorship to support wider adoption. This approach has enabled hundreds of clinician-led innovations, many of which are now embedded locally or nationally, contributing to a scalable, impact driven innovation ecosystem.

Sustainability measures

Both HHI and Spark have embedded sustainability by:

- building innovation capacity through education and mentorship
- securing multisource funding (government, enterprise and EU programmes)
- creating formal mechanisms for enabling, scaling and knowledge transfer
- embedding evaluation and continuous improvement into all projects.

Box 3. *contd***Quantifiable impacts and outcomes**

The impacts and outcomes of HIHI and the HSE Spark Innovation Programme have included that:

- HIHI has engaged with over 1000 companies and 800 health-care employees, supporting idea assessments, pilot studies and clinical validation across the country;
- The HSE Spark Innovation Programme has engaged with over 8000 health-care workers through live projects and professional development opportunities to date, supporting point of care innovation across the Irish health service; and
- Ireland stands out for its growing policy-level commitment to clinician-led innovation, exemplified by the inclusion of a protected annual innovation fund for doctors under the recently renegotiated public-only consultant contract.

Key lessons learned

Key lessons learned from HIHI and the HSE Spark Innovation Programme include that:

- workforce-driven innovation is essential for meaningful, sustainable change – frontline staff are best positioned to identify problems and co-create solutions;
- collaboration between health services, enterprise and academia accelerates the translation of innovation from concept to practice;
- dedicated funding and support structures (like HIHI and the HSE Spark Innovation Programme) and are critical to overcoming systemic barriers, implementing and scaling successful innovations; and
- embedding innovation literacy and capacity within the health workforce ensures that change is continuous, not episodic.

Highlighting the innovation ecosystem

Both the independent and the collaborative efforts of HIHI and the HSE Spark Innovation Programme have created a robust, ecosystem where health workers, start-ups and system leaders can co-design and implement solutions. This ecosystem approach has positioned Ireland as a leading testbed for health innovation, attracting international partnerships, research and investment.

Addressing challenges and transferability

Key challenges – cultural resistance, capacity-building, procurement barriers and scaling – are being addressed with solutions developed through leadership engagement, alignment with national priorities and a focus on measurable impact. The Irish model offers transferable lessons for other countries: invest in workforce capacity, foster cross-sector partnerships and create national platforms for piloting and scaling innovation.

Actionable takeaways

Actionable takeaways from HIHI and the HSE Spark Innovation Programme include to:

- establish national innovation hubs to bridge health services and enterprise
- empower frontline staff through dedicated innovation programmes and funding
- foster a culture of experimentation, learning and collaboration
- align innovation efforts with national health priorities and sustainability goals.

Source: HIHI, personal communication, 22 May 2025.

The call to action

The establishment of national health innovation teams or hubs is a critical step towards building the capacity for systemic transformation in public health across the WHO European Region. By centralizing innovation activities and prioritizing collaborative, iterative approaches, these teams can enable health systems to respond proactively to emerging challenges, improve patient outcomes and ensure the sustainability of health delivery. The integration of AI and digital technologies with behavioural science, underpinned by robust governance and continuous workforce development, will facilitate the transition from isolated innovations to systemic transformation: realizing the vision of resilient, efficient and equitable health systems for all.

The agenda for action is to:

- 1. launch a National Health Innovation Cluster with multidisciplinary mandates** to establish centralized units within ministries of health to coordinate innovation pipelines, aligning with national priorities like AI integration and workforce development;
- 2. institutionalize workforce innovation capacity-building** that delivers mandatory innovation literacy training for health professionals; incentivize frontline staff to lead innovation projects; and implement AI-augmented continuous learning systems; and
- 3. transition to learning health systems with embedded feedback loops** using real-time data from electronic health records and staff/patient feedback, deploy innovation impact dashboards to track metrics like time-to-adoption for new protocols and equity outcomes across socioeconomic groups.

Mega shift 4: Incentive revolution – aligning public and private markets with population health

This mega shift represents a systemic reimagination of financial architectures, regulatory paradigms, governance modalities and public and private market dynamics to drive a comprehensive approach including private sector engagement and success with measurable improvements in population health. This transformation addresses chronic misalignments where profit motives often diverge from public health priorities. In redesigning incentives across sectors, this mega shift calls for a genuinely transformative approach. The aim is to mobilize public and private resources in ways that are mission-driven, holistic and fundamentally aligned with the public interest, while avoiding the pitfalls of financialization and profit-first logic that have undermined equity and system resilience elsewhere.

The promise and pitfalls of innovative health financing instruments

Recent years have witnessed a surge in novel financing mechanisms aimed at mobilizing capital for public health, each offering both opportunities and challenges. Advanced Market Commitments, such as those pioneered by the Global Alliance for Vaccines and Immunization's pneumococcal vaccine programme (84), were designed to guarantee markets for essential vaccines by leveraging public sector commitments, thereby incentivizing manufacturers to supply low- and middle-income countries. Health Impact Bonds, exemplified by Israel's diabetes prevention programme (85), create outcome-based contracts in which private investors are repaid only if specific health targets are met, theoretically aligning financial returns with population health gains. Blended finance approaches combine concessional public funding with private capital to address market failures, as seen in the International Finance Facility for Immunisation (86), which has frontloaded billions in donor pledges to rapidly expand vaccine access through the issuance of bonds. Debt swaps and buy-downs offer countries a pragmatic route to redirect fiscal flows from debt repayment toward health investment, thus expanding fiscal space for reform, while product development partnerships and pay-for-performance contracts seek to share risk and reward, accelerating the development and uptake of critical health innovations.

While these instruments have enabled headline-grabbing deals and mobilized significant resources for public health, critical analyses – including those by Médecins Sans Frontières – and recent academic reviews reveal persistent limitations that challenge their transformative potential. Advanced Market Commitments, blended finance and impact bonds, for instance, often entail substantial transaction and intermediation costs, which tend to favor large corporate actors and financial intermediaries, and often fail to address the needs of the most vulnerable populations (87–89). Despite the intention to leverage public funds to attract private capital, profit-seeking investment continues to flow primarily toward commercially viable projects, leaving many critical health needs unaddressed and failing to deliver systematic, needs-driven innovation (88,90). Rather than accelerating R&D or systematically improving access, such models have sometimes locked in high prices, prioritized commercially attractive populations and left major health needs unmet. The logic of “socializing risks and privatizing gains” is inherent in many blended finance models, which use public funds to derisk private investment but rarely deliver broad, sustainable health impact (91). Furthermore, the growing influence of financial actors in health has raised concerns about the risks of financialization, including rising costs, short-termism and entrenched inequities (92).

The imperative of an end-to-end approach

The limitations of current incentive models – evident in their high costs, equity gaps and susceptibility to financialization – underscore the urgency of adopting a systemic, end-to-end approach that reshapes incentives across the entire innovation value chain, from research and development to access and delivery. This requires moving beyond fragmented, transactional partnerships and static financing tools toward dynamic, context-specific strategies anchored in public health purpose and equity. The path forward for the WHO European Region lies in a whole-of-government strategy that integrates innovative financing mechanisms into a broader public-interest framework. Governments are encouraged to lead in setting missions and investing directly in high-risk, high-impact areas where private capital alone cannot or will not venture, such as antimicrobial resistance therapies (93) or climate-resilient health infrastructure (Box 4).

Simultaneously, fiscal space for health must expand through structural reforms – combatting illicit financial flows, enforcing equitable taxation, and negotiating debt

relief – rather than relying solely on attracting private investment. Critically, safeguards against financialization must be embedded at every stage: transparent governance, public oversight and accountability mechanisms (91).

On the other hand, true incentive alignment with the private sector requires a nuanced understanding of what drives specific private sector entities and whether the outcomes of public health initiatives advance those objectives, such as, where possible, the need for commercial viability of the private sector partner (94).

Too often, the public health sector has excelled at measuring success through its own metrics yet has struggled to translate these achievements into value propositions that resonate with external stakeholders whose priorities may be defined by economic, operational or strategic imperatives (95). This means co-designing incentive structures that reward equity-adjusted health outcomes, such as linking royalty payments to reductions in health disparities, while ensuring public authorities retain stewardship over priority-setting and evaluation.

Box 4. Case study: The *Agence de l'Innovation en Santé* (AIS) [French Health Innovation Agency] – incentives and public-private partnerships for needs-driven health innovation

Background and context

France, despite its strong biomedical research and health technology sectors, has faced persistent challenges translating scientific breakthroughs into scalable, needs-driven public health solutions. Fragmented funding, complex regulatory pathways and misaligned incentives slowed the adoption of innovations targeting real-world health priorities, particularly in prevention and healthy ageing. The COVID-19 pandemic further exposed these gaps, prompting the government to launch AIS in 2022 as a flagship of the €7.5 billion France 2030 Health Innovation Plan. AIS was established to unite ministries, hospitals, startups and academia, and to realign incentives so that both public and private actors could cocreate and scale solutions with measurable population health impact.

AIS was designed as a cross-sectoral, agile body with a mandate to coordinate and accelerate health innovation across the value chain: from research and technology transfer to industrialization and market access. Its roadmap was co-developed with over 500 stakeholders, including patient groups, researchers and physicians, regional authorities and private industry, and focused on twelve strategic priorities including digital health, AI and preventative care. AIS's "Tour de France de l'innovation" engaged local and regional actors to ensure that national priorities were grounded in real-world needs.

Adoption strategies and challenges

AIS's core strategy was to realign incentives to promote needs-driven innovation, using a suite of mechanisms, including:

- dedicated innovation funding: AIS allocated €170 million to preventative health innovations in 2024, with a focus on digital and AI-powered solutions for elderly care, chronic disease management and mental health;
- temporary reimbursement pathways: France's unique "innovation funding" scheme allows promising technologies to receive temporary reimbursement from national health insurance, de-risking early adoption and accelerating real-world validation;
- public-private co-creation: startups and SMEs received tailored support, including technical guidance, regulatory navigation and access to clinical validation sites, often in partnership with academic hospitals and regional health agencies; and
- cluster and talent incentives: investments in bioclusters and university hospital institutes fostered interdisciplinary teams and attracted top talent.

Box 4. *contd*

Key challenges included skepticism about adding another agency, ensuring incentives truly rewarded public health impact rather than just commercial viability and harmonizing diverse stakeholder interests. AIS addressed these by acting as a connector and catalyst – not a duplicator – within the ecosystem and by making support conditional on alignment with national health priorities and measurable outcomes.

Scaling approaches and results

AIS's approach is systemic and scalable as a result of its:

- ecosystem engagement: over 180 digital health projects were funded in 2024, involving more than 250 partners and 150 SMEs, with a focus on therapeutic strategy, diagnostics and care coordination;
- infrastructure and capacity: the creation of 12 new university hospital institutes and five bioclusters, for a total investment of €1 billion further strengthened France's innovation pipeline and public-private collaboration; and
- use of innovation to foster a preventive health-care system: AIS launched a €100 million investment to deploy innovative solutions in prevention, with the objective of demonstrating their value at a large scale and defining an adequate funding model.

Sustainability measures

AIS embeds sustainability through:

- continuous needs assessment: ongoing foresight and horizon scanning also aims to anticipate regulatory, economic or organizational impacts of innovation, in order to anticipate their adoption;
- capacity-building: education and training programmes equip health professionals and innovators with skills for emerging technologies and new care models; and
- ecosystem partnerships: strong links with regional authorities, industry, academia and patient organizations maintain alignment and shared ownership of outcomes.

Key lessons learned

Key lessons learned from AIS include:

- incentive alignment: systemic, outcome-based incentives – such as temporary reimbursement, outcome-based procurement and public-private co-creation – are essential for scaling needs-driven innovation;
- ecosystem building: sustained collaboration between government, industry, academia and civil society is critical for long-term impact;
- measurable impact: tying support and reimbursement to quantifiable health outcomes, such as reduced hospitalizations, ensures innovations deliver real public value; and
- adaptability: the AIS model demonstrates the importance of continuous evaluation and adaptation to maintain relevance and effectiveness.

Highlighting the innovation ecosystem

AIS exemplifies a modern innovation ecosystem where incentives, funding and regulatory support are aligned around measurable public health goals. By acting as a neutral broker and catalyst, AIS connects diverse stakeholders, reduces duplication and ensures that innovations are designed for real-world impact and equity.

Addressing challenges and transferability

While France's scale and resources are unique, the AIS model offers transferable lessons including to:

- establish a central agency to coordinate needs-driven innovation across the value chain;
- use public investment and procurement to de-risk and accelerate solutions that address priority health challenges;
- embed continuous needs assessment and stakeholder engagement to maintain alignment and relevance; and
- prioritize capacity-building and ecosystem partnerships for sustainability.

Box 4. *contd***Actionable takeaways**

Actionable takeaways from the AIS include that:

- governments should lead in setting missions and aligning incentives for health innovation, using public investment to drive solutions that serve the public good;
- incentive structures must reward measurable health impact, not just commercial viability; and
- dedicated innovation agencies, acting as connectors and catalysts, can accelerate the translation of research into scalable, equitable health solutions.

Source: AIS, personal communication, 20 May 2025.

The call to action

Governments across the WHO European Region must seize this moment to fundamentally realign health innovation with the public good. Building on the recommendations of the WHO Council on the Economics of Health for All (91), governments are called to drive a mission-oriented agenda that puts population health, equity and long-term value at the centre of every investment and incentive. This means adopting whole-of-government strategies that integrate fiscal, regulatory and governance reforms: rejecting approaches that socialize risk while privatizing gains. Governments are encouraged to design and implement financing structures that reward measurable health impact, transparency and accountability, such as equity-adjusted royalties and outcome-based bonds. They must also learn from past failures by embedding safeguards against financialization and ensuring that public resources flow to innovations that address real health needs, not just market opportunities.

The agenda for action is to:

- 1. design targeted fiscal incentives for priority health investments**, for instance, increasing effective corporate tax rates while linking tax rebates to private sector investments and measurable impact in underserved areas, providing subsidies and grants for innovations by public and private sector actors addressing defined health priorities;
- 2. prioritize public leadership in high-impact health innovation** by directing public investment into areas where private capital is insufficient, such as antimicrobial resistance therapies and climate-resilient health infrastructure, using tools like sovereign green bonds, public venture funds and redesigned Advanced Market Commitments that guarantee affordability, local manufacturing and equitable access;
- 3. invest in a robust regional knowledge-sharing platform such as the WHO Public Health Innovation Coordination Hub** to accelerate the adoption and scaling of effective financing models – these platforms should provide capacity-building for the procurement

of innovations, covering needs assessment, contracting and impact evaluation; and

- 4. institutionalize safeguards against financialization** through transparent governance, public oversight and rigorous accountability mechanisms to ensure that public resources are not used to simply de-risk private profit but instead deliver broad, sustainable health impact.



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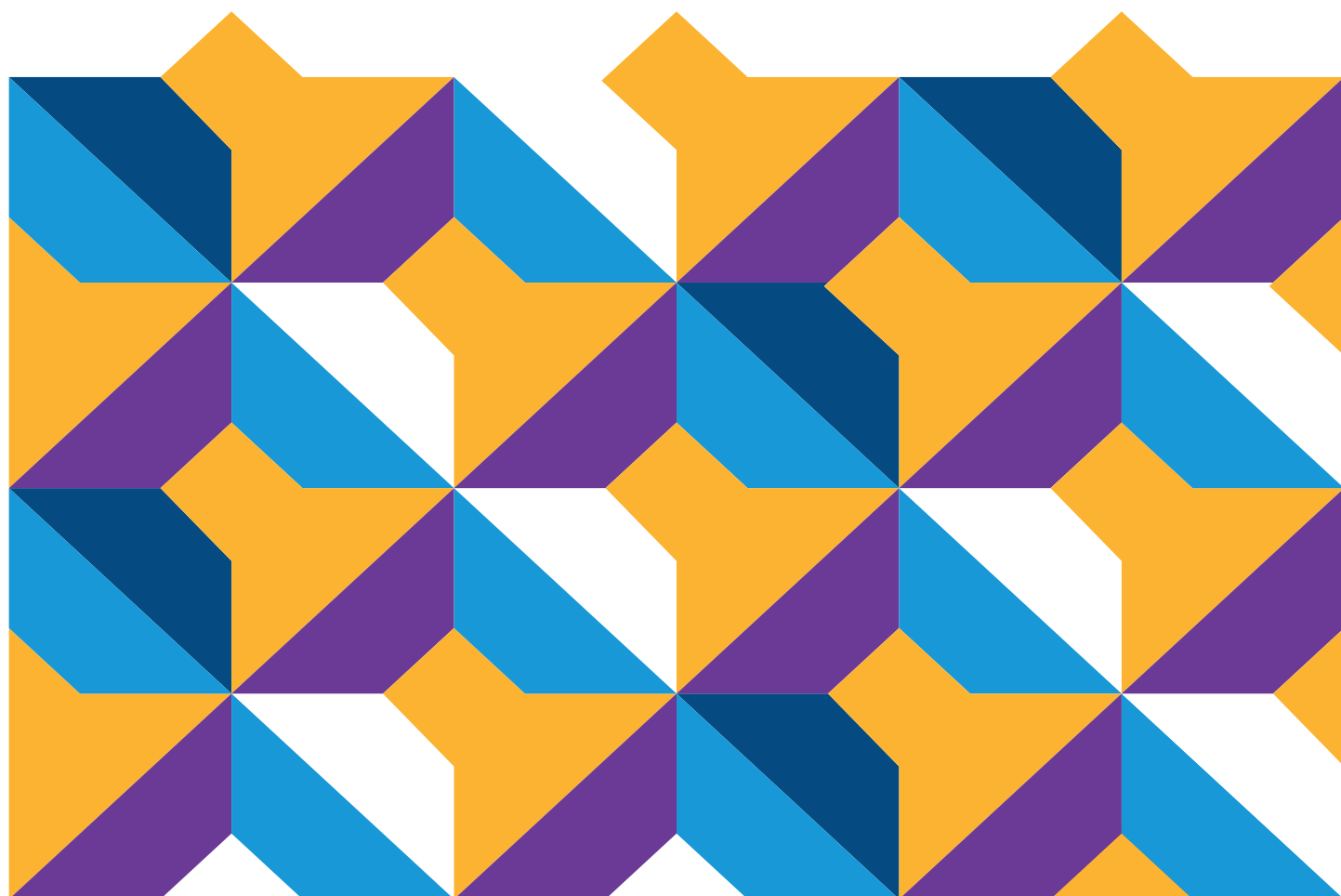
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The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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