TECH 4 GLOBAL HEALTH

OBSERVATORY ON GLOBAL HEALTH

UNIVERSITÀ CAMPUS BIO-MEDICO DI ROMA

INTESA SANPAOLO

GLOBAL HEALTH AND THE NEED FOR INNOVATIVE TECHNOLOGIES

Jointly promoted by Intesa Sanpaolo and Università Campus Bio-Medico di Roma (UCBM), the Observatory aims to create a collaborative ecosystem that engages key stakeholders in the healthcare innovation sector to promote the safe, effective and sustainable adoption of innovative technologies.

Objectives of the Observatory

The Observatory fosters the adoption of innovative and sustainable healthcare technologies, which can enhance health systems, making them more safe, effective, resilient and sustainable against global challenges. We aim at identifying adoption and deployment models that can be generalized across different regions and nations.

The first study

After setting the scene analyzing global challenges, with a focus on Europe, and the opportunities for the healthcare system and Italian companies, identifying solutions for the sustainable dissemination of innovation, over the next year, the Observatory will focus on three key actions:

- **Interviews with relevant stakeholder** to map challenges and opportunities related to the real adoption of innovative technologies in healthcare.
- **Awareness-raising activities** on key technological trends (AI, AIoMT, big data, digital therapies, and personalized medicine).
- **In-depth studies and cross-sector projects** to encourage collaboration and the responsible adoption of new technologies.

GLOBAL HEALTH CHALLENGES ARE INCREASINGLY INTERCONNECTED AND URGENT, REQUIRING AN UNAVOIDABLE SHIFT IN FOCUS FOR THOSE ENGAGED IN RESEARCH AND INNOVATION IN HEALTHCARE TECHNOLOGIES AND BIOMEDICAL ENGINEERING.

CLIMATE CHANGE

Global Warming:

Increased Frequency of Heatwaves, Droughts, Torrential Rains, and Unusual Flooding.

Impact on Human Health:

- Cardiovascular mortality and respiratory diseases due to heatwaves.
- Malnutrition caused by crop failures.
- Increased transmission of infectious diseases.
- Spread of infectious diseases such as dengue, malaria, and West Nile virus in non-tropical areas.

In 2023:

- 167% increase in mortality among individuals over 65 due to high temperatures compared to the 1990s.
- 6% reduction in sleep hours compared to the 1986-2005 average.
- The basic reproduction potential (R0) of dengue increased by 31% in 2020 compared to the 1950-1954 period in Italy.

PUBLIC HEALTH EMERGENCIES

Healthcare Emergency Management:

- A global priority to address unexpected events.
- COVID-19 highlighted the need for more resilient healthcare systems.

Emerging and Re-emerging Diseases:

- Dengue and malaria worsened by climate change and ecosystem disruptions.
- Vector proliferation (mosquitoes, ticks) favored by these changes.

Disaster-Related Emergencies

- Increase in earthquakes, floods, hurricanes, and extreme weather events.
- Greater Impact on Vulnerable Populations:
  - Higher risk of infectious diseases.
  - Scarcity of healthcare resources.
  - Challenges in emergency response.

DEMOGRAPHIC CHANGES

Global Aging:
Rapid Increase in the Elderly Population
UN estimate: People aged 60+ will reach 2 billion by 2050.

Health Impacts:

- Increased disability.
- Higher prevalence of chronic diseases.
- Reduced quality of life and well-being.

Key Challenges:

- Adequate healthcare services.
- Management of chronic diseases.
- Prevention and treatment of malnutrition.

INFECTIOUS DISEASES

Threat of Infectious Diseases:

- Zoonoses and vector-borne diseases (e.g., malaria) require new prevention strategies in non-endemic areas.
- Persistent diseases: Tuberculosis, HIV/AIDS, viral hepatitis, avian influenza, Ebola.

COVID-19 pandemic:
Exposed vulnerabilities in healthcare systems; highlighted the need to improve global preparedness and response

Antimicrobial Resistance (AMR):

- Drug-resistant pathogens increase mortality and treatment challenges.
- Projections: Up to 10 million deaths per year by 2050 without intervention.
- Risk of making currently treatable infections fatal.

NON COMMUNICABLE DISEASES (NCDS)

Diseases on the Rise:
among the many increasing diseases, the main ones are diabetes, cardiovascular diseases, and cancer.
These conditions may be linked to other widespread medical issues such as obesity and hypertension.

Main Causes:

- Individual factors (age, sex, genetic predisposition).
- Unhealthy lifestyles: unbalanced diet, physical inactivity.
- Environmental, socioeconomic, and cultural factors.

GLOBAL HEALTH CHALLENGES IN THE EUROPEAN CONTEXT.

Rising temperatures led to a 33% increase in heat-related mortality in 2018 compared to 2000.

From 1950 to 2018, the transmissibility of dengue and chikungunya increased by 60%.

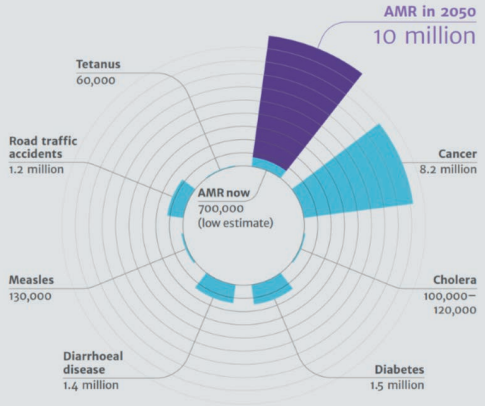
From 2020 to 2023, health crisis preparedness levels in EU countries improved, with compliance with WHO international health regulations increasing from 75% to 78%.

Up to 45% of dementia cases could be prevented by addressing 14 modifiable risk factors.

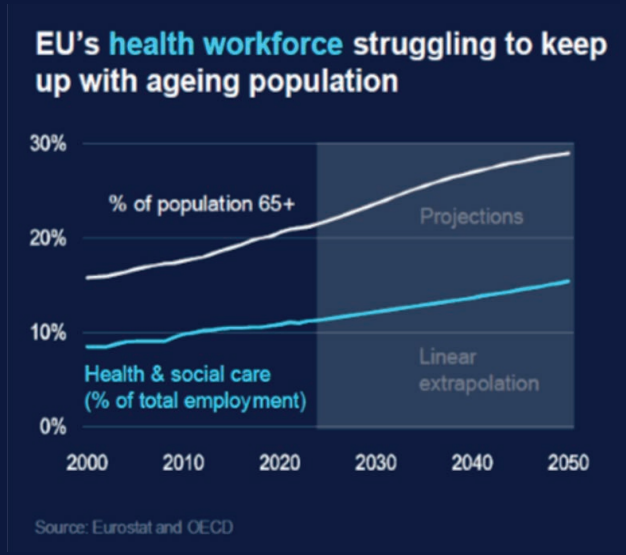
Obesity peaks at 20% among individuals aged 65 to 74.

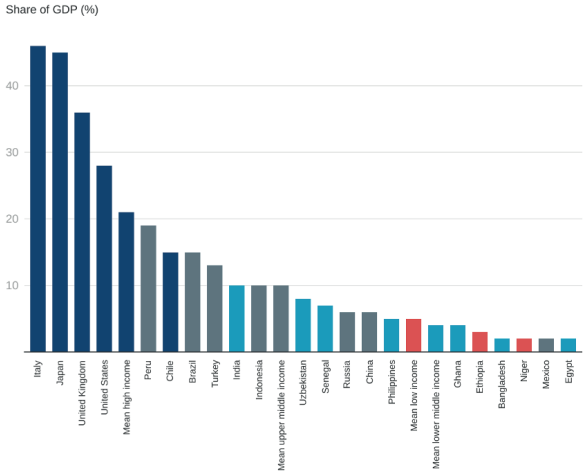
The proportion of people aged 65+ in the EU will rise from 21% in 2023 to 29% by 2050.

Life expectancy at 65 now exceeds 20 years, but more than half of this period is marked by chronic diseases and disabilities.



Number of deaths from AMR compared to other causes of death per year (AMR Review)





Fiscal response to COVID-19 in selected countries (World Bank)

IT IS ESSENTIAL TO ENHANCE THE DIGITAL SKILLS OF HEALTHCARE PROFESSIONALS AND MANAGERS, AS 42% OF EUROPEANS AND 37% OF HEALTHCARE WORKERS LACK BASIC DIGITAL COMPETENCIES. AT THE SAME TIME, RESEARCH AND DEVELOPMENT OF INNOVATIVE SOLUTIONS SHOULD BE PROMOTED TO REVOLUTIONIZE PUBLIC AND GLOBAL HEALTH, JUST AS THEY HAVE TRANSFORMED BIOLOGY AND CLINICAL PRACTICE IN RECENT DECADES

CLIMATE CHANGE

It is necessary to make European healthcare systems more resilient to such changes and reduce their environmental impact, which contributes to 5% of CO2 emissions, thus contributing to climate change itself.

By 2050, climate change could cause economic losses of $12.5 trillion. Healthcare systems will bear a burden of $1.1 trillion, with heatwaves being the major source of economic losses.

NON COMMUNICABLE DISEASES (NCDS) AND INFECTIOUS DISEASES

The convergence of healthcare technologies and consumer electronics (e.g., smartwatches, health and wellness apps) enables the personalization of prevention, diagnosis, and treatment, maximizing safety, effectiveness, and sustainability, including environmental sustainability.

According to the WHO, between 2011 and 2030, non-communicable diseases will cost the global economy over $30 trillion. For OECD countries, the cumulative loss of economic output caused by AMR (Antimicrobial Resistance) by 2050 will amount to a value between $20 trillion and $35 trillion.

PUBLIC HEALTH EMERGENCIES

The recent pandemic demonstrated that clinical practices for infection prevention and control have not substantially benefited from technological advances in recent decades. In contrast, enabling technologies such as AI, big data, IoT, and the development of new point-of-care solutions provide safe, effective, and sustainable tools that can revolutionize how we prevent and contain infectious diseases and pandemics.

The costs to improve emergency health preparedness range from $1.6 billion per year to strengthen capacities in 139 low- and middle-income countries, to $43 billion per year to support national activities and implement global initiatives, such as the research and development of health technologies (diagnostics, treatments, and vaccines).

DEMOGRAPHIC CHANGES

The adoption of enabling technologies for optimizing and automating healthcare processes, such as AI and robotics, can partly offset the shortage of healthcare personnel, freeing up healthcare workers from bureaucratic and administrative tasks, allowing them to focus more on patient care, listening, and continuous education.

Public health spending has averaged 7.8% of GDP. The age dependency ratio is expected to rise from 34.4% in 2019 to 59.2% in 2070, reducing the number of people funding public healthcare and increasing the demand for healthcare services for the elderly.

WHAT ARE THE LEGAL FOUNDATIONS FOR THE DEVELOPMENT AND USE OF INNOVATIVE TECHNOLOGIES IN GLOBAL HEALTH?

To address this issue, we have analyzed United Nations resolutions, particularly those of the World Health Organization (WHO), which establish the legal foundations for the use of such innovations for global well-being and health. We systematically examined the documents of the World Health Assembly* (WHA) over the past 25 years.

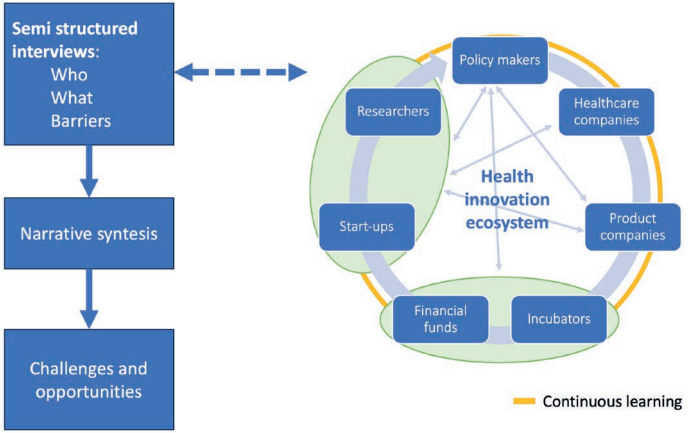
RESOLUTIONS	
WHA77.6	2024 - Promotes investments in new antibiotics and diagnostic tools for AMR
A/78/L.49	2024 - Calls for regulations for safe AI, public-private collaborations, inclusion
WHA76.5	2023 - Strengthens diagnostics and integration of digital technologies in health systems
WHA76.6	2023 - Promotes access to essential medications for NCDs in low-income settings
WHA76.2	2023 - Emphasizes the integration of surgical care in primary health systems
WHA76.5	2023 - Recognizes the potential of AI in health diagnostics
WHA77.3	2023 - Integrates psychosocial support and mental health into emergency plans
WHA75	2022 - Access to technologies for non-communicable diseases (NCDs)
WHA74.8	2021 - Emphasizes the need for access to health technologies, role of digital health during the COVID-19 pandemic
WHA74.13	2021 - Adopts the Global Patient Safety Action Plan (2021-2030)
WHA73.1	2020 - Defines global response to COVID-19, focusing on testing and vaccinations
WHA72.6	2019 - Establishes World Patient Safety Day
WHA72.16	2019 - Calls for resilient health systems for emergencies and natural disasters
WHA71.7 e .8	2018 - Integrates digital technologies in health systems, including telemedicine and mobile health
WHA70.12	2017 - Highlights the need for technologies for cancer prevention and treatment
WHA69.11	2016 - Links technological innovation to Sustainable Development Goals
WHA68.15	2015 - Improves access to essential surgical care within UHC
WHA67.25	2014 - Calls for surveillance systems to combat antimicrobial resistance (AMR)
WHA67.23	2014 - Encourages capacity building in HTA for evidence-based decision making
WHA60.29	2007 - Promotes data collection and national strategies for health technology management

The decision-making body of the WHO is the World Health Assembly, composed of representatives from the 194 member countries and over 200 Non-Governmental Organizations in official relations with the WHO, who meet annually to agree on the priorities and policies of the WHO. The WHA makes decisions through resolutions adopted if voted by at least 2/3 of those entitled to vote.

World Health Organization

IDENTIFICATION OF STRENGTHS AND BARRIERS REFRAINING THE ADOPTION OF SAFE, EFFECTIVE, AND SUSTAINABLE TECHNOLOGICAL INNOVATION IN THE ITALIAN HEALTHCARE SYSTEM: RATIONAL AND RESEARCH METHOD

From the research conducted in the early months of the Observatory's existence, it has emerged that the ecosystem for the research, development, and adoption of innovative technologies in healthcare presents differences compared to that of other leading countries in the field of technological innovation. The Observatory is conducting a systematic study involving dozens of researchers, start-uppers, investors, incubators, sector companies, healthcare companies, and policy-makers to promote strengths, identify barriers, and define possible actions for their mitigation. The focus of the study goes beyond the simple technological dimension and centers on organizational aspects, training needs, regulatory, economic, and other factors that, if not properly considered, reduce the impact and thus the sustainable adoption of innovative technologies for health and well-being.



Phase 1: Literature Review

- Analysis of barriers and opportunities in healthcare innovation to define the theoretical framework and formulate interview questions.

Phase 2: Semi-structured Interviews

- A diverse sample of stakeholders for a holistic perspective.
- Duration: 45-60 minutes, with thematic questions and space for further insights.
- Recording and transcription for subsequent analysis.

Phase 3: Qualitative Analysis

- Coding and thematic analysis with software (e.g., NVivo).
- Identification of key concepts (e.g., technological gaps, regulatory obstacles).
- Validation of results with stakeholders through workshops or focus groups.

Phase 4: Quantitative Analysis

- Questionnaire based on interviews, with a Likert scale (1-5).
- Delphi method to reach consensus on healthcare innovation priorities in Italy.

DO YOU WANT TO TAKE PART IN THE RESEARCH OF THIS OBSERVATORY?

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REFLECTIONS EMERGED FROM THE FIRST SIX MONTHS OF WORK OF THE OBSERVATORY TO MAKE THE NHS SAFER, MORE EFFECTIVE, AND SUSTAINABLE THROUGH THE ADOPTION OF INNOVATIVE MEDICAL DEVICES, ON WHICH TO WORK TOGETHER OVER THE NEXT TWO YEARS.

1. Medical device policies must be integrated into international, national, and regional health policies and include clear requirements in terms of funding, qualified human resources, and infrastructure, promoting technological innovation, including emerging innovations such as AI and digital therapies.
2. Health policies on innovative technologies must be quickly aligned with WHO resolutions and European policies, containing unnecessary regional fragmentation and heterogeneity, particularly on aspects with the greatest impact such as patient safety, technological advancement, combating infectious diseases, and reducing their environmental impact. Ensuring equitable access to essential medical devices.
3. To effectively implement European regulations on medical devices and maximize compliance throughout the lifecycle of medical devices, it would be appropriate to consider the creation or identification of an organization or agency that oversees the entire lifecycle of devices, including maintenance and management, in addition to regulatory, evaluation, and planning aspects, constantly dialoguing with sector operators, researchers, industries, and patient associations.
4. The safe and sustainable adoption of innovative medical devices requires careful planning of physical, infrastructural, and human resources, with particular attention to the role of qualified experts such as biomedical and clinical engineers and their associations.
5. It is necessary to strengthen both research and development (R&D) and well-defined mechanisms for the adoption of innovative health technologies in order to ensure their safe, effective, and sustainable management, as well as the data they generate, including robust cybersecurity measures to protect sensitive information and digital infrastructures.
6. Medical device policies should promote environmental sustainability practices that reduce their impact throughout the lifecycle, including responsible management of waste production and supply chains, making them shared and harmonized merit criteria.
7. It is essential to continuously monitor the effectiveness of medical device policies through clear and shared indicators that feed evidence-based evaluation systems.
8. Health emergency policies must ensure timely, appropriate, and equitable access to essential medical devices to effectively respond to health crises. Italy and Europe should implement policies to become independent from third countries for the production of essential medical devices and personal protective equipment during emergencies.
9. In Italy and Europe, it is necessary to adopt rapid pathways for the experimentation and adoption of innovative medical devices to close the competitive gap with competing countries, which are currently more attractive to innovators and investors in the sector due to uncertainty related to the time and costs for experimentation and adoption, due to the fragmentation of European countries' health systems.
10. An urgent training plan is needed to provide healthcare operators and allied professions with the appropriate skills to maximize the adoption of safe, effective, and sustainable innovative technologies, also useful to address the shortage of healthcare personnel in the coming years.

ONGOING PROJECTS – [funding body]

ODIN [Horizon Europe]
Hospital of the Future

AI4RIRD [PNC]
AI for rare diseases (eye and heart)

EPoCA [Horizon Europe]
Ebola Point of Care for Africa

ENKORE [Horizon Europe – IHI]
Greening, medical device and pharma

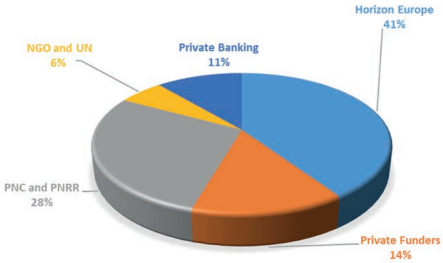
GRACE [Horizon Europe – IHI]
AI, telemedicine and Congestive Health Failure

Afya Moja [PNRR]
One Health in Africa

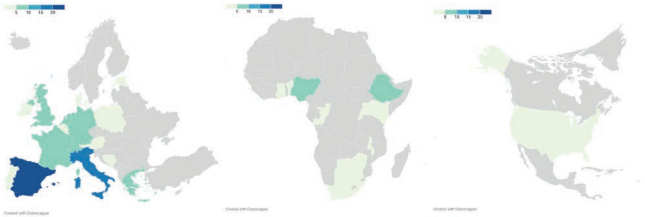
WHO Medical Device Policy [WHO]
Rewriting WHO device national policies

WHO Medical Device Donation [WHO]
Rewriting WHO device donation guidelines

Main funders



Institutional partners of the laboratory



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