GIHSN Annual report 2023-2024

Foreword

Further to the establishment of a collaboration with WHO, the GIHSN has accelerated its scale up in 2024, strengthening its position as a key component in the respiratory virus surveillance and pandemic preparedness ecosystem. More than ever, in the current global health context, an agile platform like the GIHSN could have a critically important role in helping to track, report, and openly share data. A solid foundational network of global partners, that also feeds into national and WHO systems (though not funded or governed by then) is an important asset for the global health ecosystem. This aligns with the WHO concept of collaborative surveillance. GIHSN was also glad to be represented in the Intergovernmental Negotiating Body (INB) experts' consultations for the Pandemic Accord.

As of now, GIHSN has expanded to 113 hospitals in 28 sites (24 countries) which are tracking respiratory viruses year-round. Last year, data from more than 33,000 hospitalized patients were collected of which 13,000 were tested positive to one or more respiratory viruses. Demographic, clinical, virology and whole genome sequencing (WGS) data are linked. This is particularly relevant to relate viruses' characteristics with severity and potentially inform antigen design (a report generated twice a year for the influenza Vaccine Composition Meeting). The last years of data collection are now summarized in an interactive dashboard available on the GIHSN website. As of now, our effort focuses on timely data reporting (weekly) and scale up of WGS.

The GIHSN relies on a community of practices combining epidemiologists, virologists and clinicians working together to strengthen respiratory virus surveillance. Sites collaborate with each other but remain the owner of the data they generate. The GIHSN platform can address a wide range of research questions including for example the burden of disease, pathogens discovery etc. It is also a potential platform for rapid clinical countermeasure evaluation.

GIHSN is the first public-private partnership (PPP) catalytic funding instrument privately funded to support surveillance and pandemic preparedness. The catalytic funding provided to sites contributes to reinforce health systems. It is a strong proof of concept of the value for industry in-kind contribution when coordinated through a transparent and balanced PPP governance.

Dr Cedric Mahe

President, Foundation for Influenza Epidemiology

February 2025

Foundation for Influenza Epidemiology

IMPACT Healthcare

I. THE GLOBAL INFLUENZA HOSPITAL SURVEILLANCE NETWORK (GIHSN)

The Global Influenza Hospital Surveillance Network is a platform that collects standardized data from hospitalized patients with Severe Acute Respiratory Illnesses (SARI) across countries, including low-, middle-, and high-income countries from both hemispheres. The GIHSN has evolved over the last 12 years to focus on linking epidemiologic and clinical data with Whole Genome Sequencing (WGS) information to facilitate exploring viral phenotypes as they relate to severity or vaccine breakthrough cases. This information is shared with local public health authorities, the World Health Organization (WHO) and the scientific community at large.

Objectives of the GIHSN

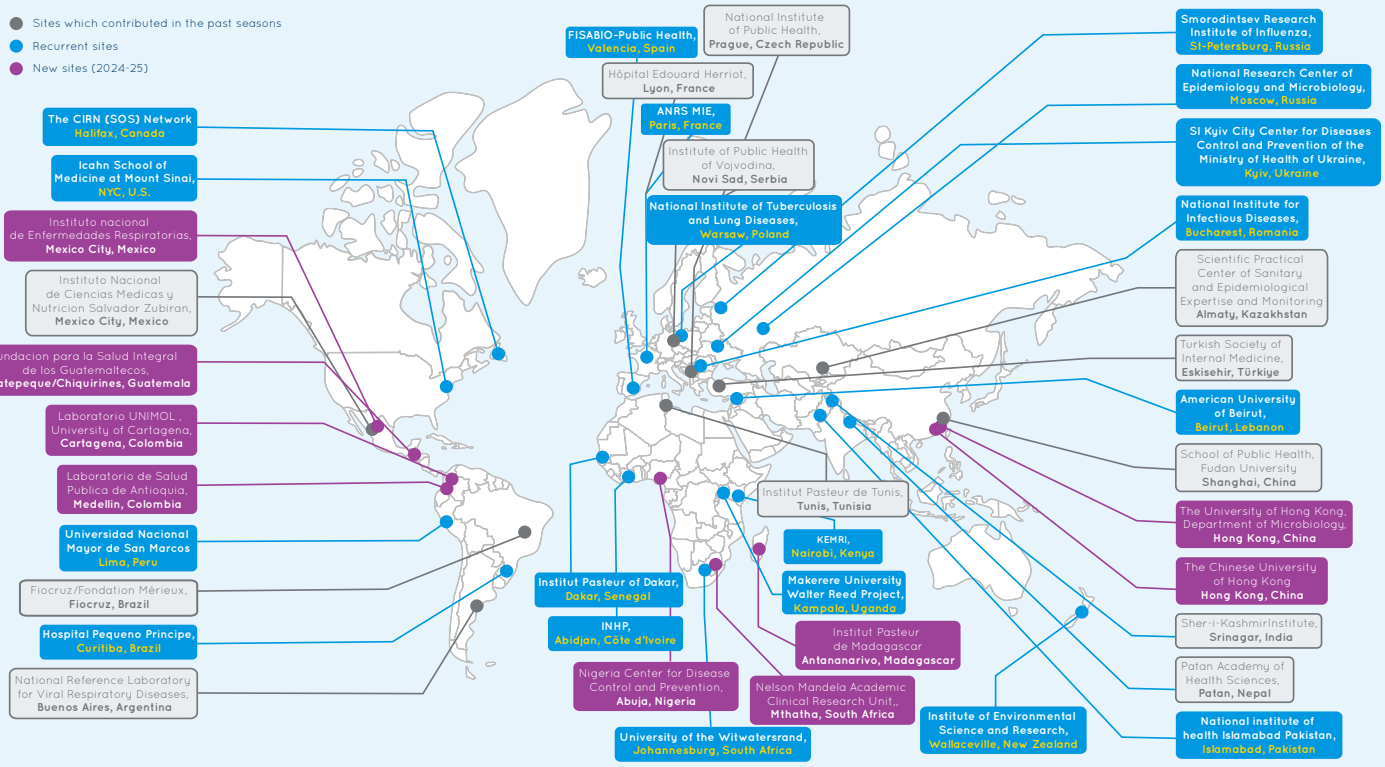
1. Generate strong epidemiological and medical evidence on hospitalized patients with respiratory virus infection to better understand virus circulation, related severity, and risk factors.
2. Support vaccine strain selection improvement through timely sharing of clinical and laboratory data (including whole genome sequencing data) from patients hospitalized with influenza from both northern and southern hemispheres.
3. Contribute as an alert system in case of emerging of novel influenza viruses and other pandemic-prone respiratory viruses that may trigger the need for public health response and/or R&D initiatives.

1. A community of experienced investigators worldwide

The GIHSN started its activity in 2012-2013 and has been collecting data over the seasons. It has contributed to global surveillance of influenza and other respiratory viruses for 12 years now, with over 130 hospitals involved in 32 countries worldwide.

Figure 1 shows the geographic distribution of sites which have collaborated in the GIHSN over the seasons (2012-2013 to 2023-2024).

Figure 1: Geographic distribution of sites which have collaborated in the GIHSN from 2012-2013 onwards



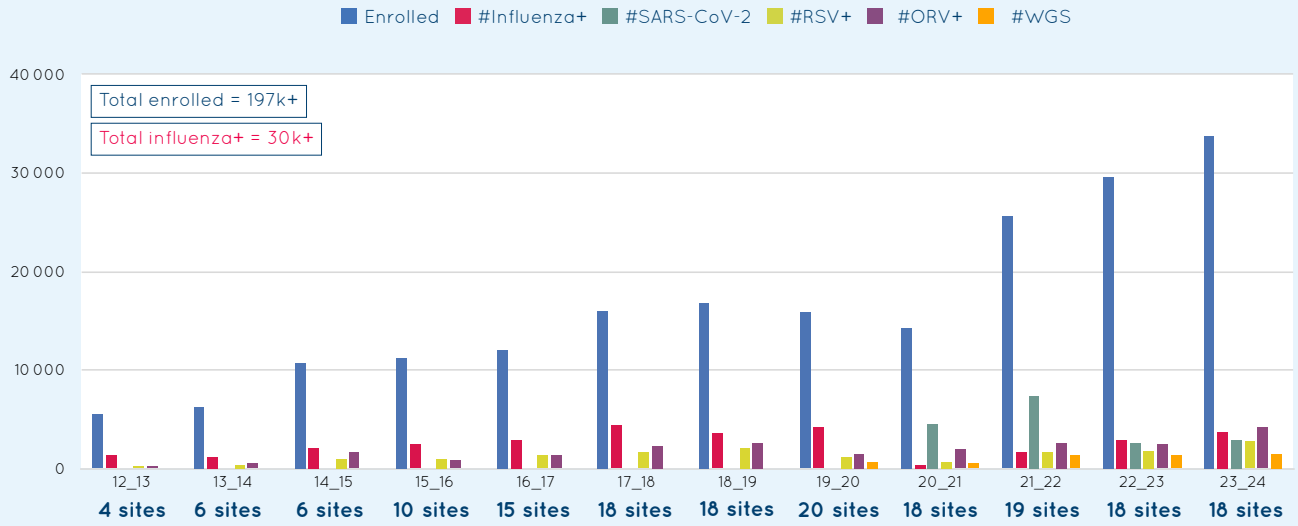
2. A global database of almost 200,000 SARI* hospitalized patients

During the past 12 years, a total of **197,694 patients hospitalized with respiratory illnesses** have been enrolled, including laboratory-confirmation of **30,927 Influenza cases** and 55,613 patients with other respiratory viruses.

Figure 2 shows the number of patients enrolled and number of patients who tested positive to a virus over the seasons since 2012-2013

All GIHSN sites use a common protocol: demographic and clinical information are collected from patients admitted with respiratory illnesses. Respiratory specimens are collected to test for influenza and other respiratory viruses, including SARS-CoV-2 and RSV. RT-PCR tests and whole genome sequencing (on a subset of samples) are performed to provide virological information.

Figure 2: Number of patients enrolled and number of patients who tested positive to a virus over the seasons since 2012-2013



3. Sharing of results and analyses

A Global Annual Meeting of the GIHSN is organized once a year in October-November, with all site investigators and stakeholders of the network, to share results of the year-round surveillance and discuss protocol and analyses. In 2024, the GIHSN held its 12th Annual Meeting at Domaine de Châteauneuf, in the South of France. It has been a great opportunity to meet and discuss the challenges of respiratory virus surveillance with GIHSN sites, epidemiologists, virologists, clinicians and international public health experts, including representatives from the World Health Organization, GISRS, the UK Health Security Agency, the French ANRS-MIE and the US Centers for Disease Control and prevention.

Seasonal results are shared publicly on the GIHSN website.

In 12 years, the network has contributed to more than 20 published manuscripts and numerous local and international meetings and conferences.

GIHSN Annual Meeting 24-26 November 2024

** SARI : Severe Acute Respiratory Infections*

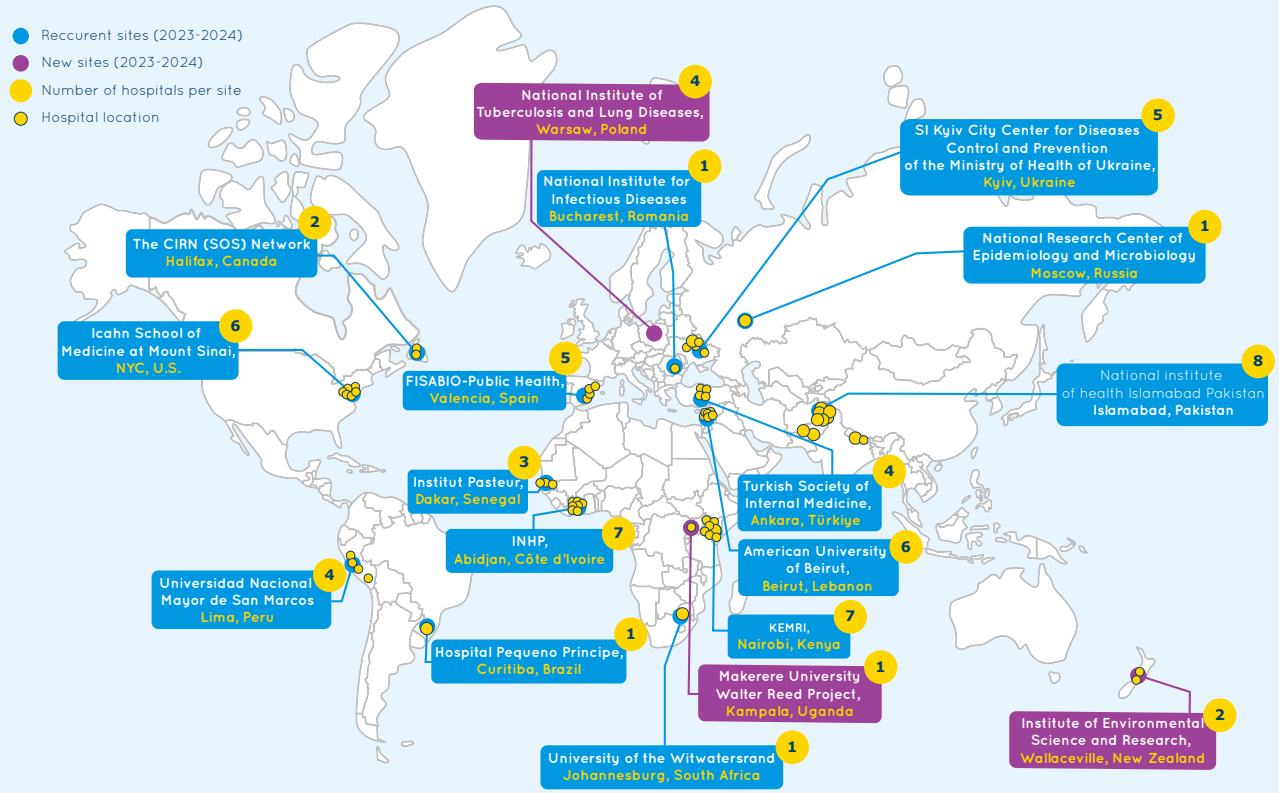
II. SEASON 2023-24: HIGHLIGHTS

1. Participating sites

In the 2023-2024 season, the GIHSN sentinel platform included 68 hospitals from 18 countries, doing surveillance from November 1st, 2023, through October 31st, 2024.

Figure 3 presents the sites which contributed data in the GIHSN in the 2023-2024 season (data closed end of February 2025)

Figure 3: Geographic distribution of sites which contributed data in the GIHSN in the 2023-2024 season



Surveillance population and settings by site can vary significantly from one site to another, depending notably on the number and type of hospitals involved, site case finding approach, laboratory and WGS capacities, site experience in influenza surveillance and within the GIHSN. These specificities by site must be carefully considered when analyzing the data.

→ **Access the map and description of site specificities on the GIHSN interactive Dashboard**

2. Viruses tested

The range of viruses tested beyond influenza can also vary from one site to another. Although influenza virus surveillance is a key priority for the GIHSN, the network indeed encourages sites to include other respiratory viruses as part of their surveillance, if laboratory capacity exists locally. In 2023-24, all sites tested and shared data on SARS-CoV-2 and 17 sites shared data on RSV. Other respiratory viruses were also tested, including human coronaviruses, metapneumovirus, adenovirus, bocavirus, enterovirus, parainfluenza viruses, rhinovirus. Viruses tested by sites are presented in **Table 1** below.

Table 1 : Viruses tested by sites which contributed data (2023-2024)
Based on data reported by sites over the season (data closed end of February 2025)

Country	Site/Institution	Influenza	SARS-CoV-2*	RSV*	AdV*	HBoV*	HCoV*	EV*	EV-D68*	MERS-CoV*	HMPV*	HPIV*	PV*	RhV*	SARS-CoV*
Africa															
Côte d'Ivoire	Institut National d'Hygiène Publique (INHP), Abidjan														
Kenya	Kenya Medical Research Institute (KEMRI), Nairobi														
Senegal	Institut Pasteur of Dakar (IPD), Dakar														
South Africa	University of the Witwatersrand, Johannesburg														
Uganda	University of the Witwatersrand, Johannesburg														
Asia/Pacific															
New Zealand	Institute of Environmental Science and Research, Wallaceville														
Pakistan	National institute of health Islamabad Pakistan														
Middle East															
Lebanon	American University of Beirut, Beirut														
Türkiye	Turkish Society of Internal Medicine, Ankara														
Eurasia															
Poland	The National Institute of Tuberculosis and Lung Diseases, Warsaw														
Romania	National Institute for Infectious Diseases "Prof. Dr. Matei Bals", Bucharest														
Russia - Moscow	FSBI "N.F. Gamaleya NRCEM" Ministry of Health, Moscow														
Spain	FISABIO, Valencia														
Ukraine	SI Kyiv City Center for Diseases Control and Prevention of the Ministry of Health of Ukraine, Kyiv														
North America															
Canada	The CIRN Serious Outcomes Surveillance (SOS) Network, Halifax														
USA	Icahn School of Medicine at Mount Sinai, NYC														
South America															
Brazil	Hospital Pequeno Principe, Curitiba														
Peru	Instituto de Medicina Tropical, Lima														

**RSV: Respiratory Syncitial Virus; HCoV: Human Coronaviruses; HMPV: Metapneumovirus; AdV: Adenovirus; HBoV: Bocavirus; HPIV: Parainfluenza viruses; RhV: Rhinovirus; ORV : Other Respiratory Viruses.*

3. Overview of the GIHSN 2023-2024 SARI* cases

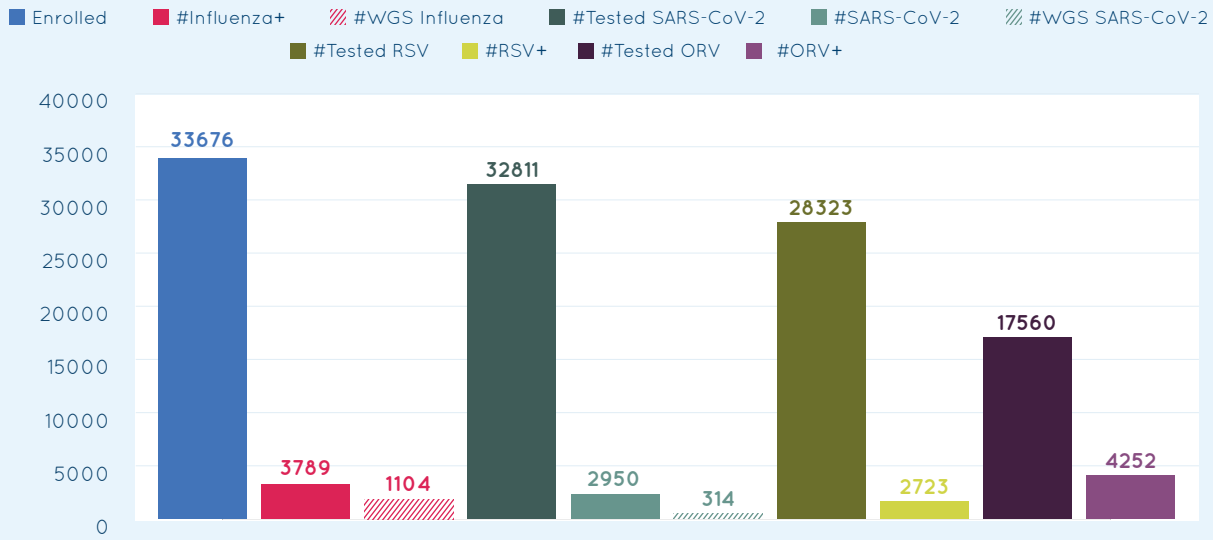
Overall, **33 676 patients were enrolled** in the 2023-2024 season. All 33 676 cases were documented following the GIHSN questionnaire.

As per the GIHSN protocol, all patients enrolled are to be tested by RT-PCR for influenza. In all, **3 789 influenza positives** were detected during the 2023-2024 season. When possible (e.g., available multiplex PCR), specimens collected were also tested for SARS-CoV-2, RSV and other respiratory viruses.

→ **Access the GIHSN Protocol and Questionnaire**

Figure 4 presents the total number of cases tested and positive cases for influenza, SARS-CoV2, RSV and Other respiratory viruses in the 2023-2024 season (data closed end of February 2025).

Figure 4: Overall number of patients enrolled and positive cases for influenza, SARS-CoV2, RSV and other respiratory viruses (2023-2024)



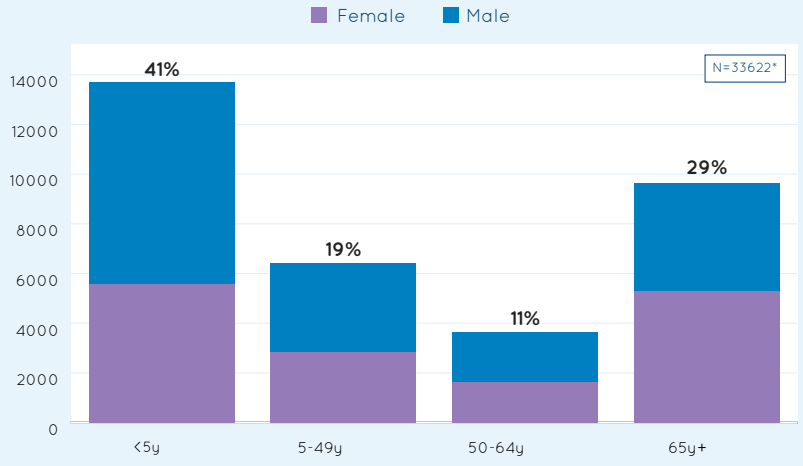
→ **See more on the GIHSN interactive dashboard**

4. Patient distribution by age group

The GIHSN patients enrolled during the season comprise 41% of children <5 years old. The pediatric population mainly comes from the following sites: Kenya, Côte d'Ivoire, Senegal, South Africa, Lebanon, Romania, Brazil and Peru. Some of these sites enroll patients in pediatric hospitals.

Figure 5 presents the distribution of patients enrolled during 2023-2024 season by age group and sex.

Figure 5: Distribution of enrolled patients by age group and sex - All sites (2023-2024)



**54 patients without age or sex entered – information not available))*

→ **See more on the GIHSN interactive dashboard**

** SARI : Severe Acute Respiratory Infections*

5. Whole Genome Sequencing (WGS) - Analysis of influenza viruses

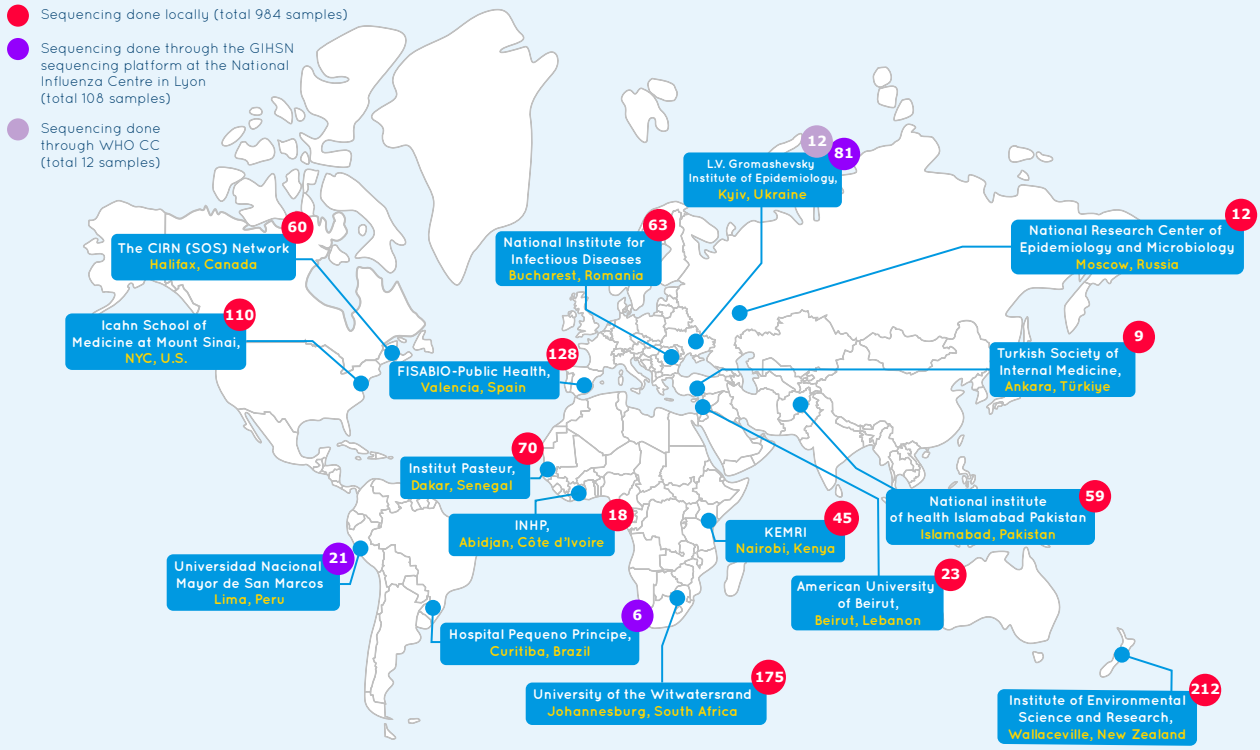
For the 2023-2024 surveillance in GIHSN, influenza A(H1N1) pdm09, A(H3N2) and influenza B viruses circulated.

In total, **1104 influenza positive samples were fully sequenced**, either locally by sites, or through the GIHSN sequencing platform at the National Influenza Centre in Lyon, France (**Figure 6**).

Based on WGS analysis, a GIHSN activity report was shared with WHO in February and September 2024, prior to the WHO Consultations on the Composition of Influenza Virus Vaccines

→ **Access the GIHSN activity reports to WHO**

Figure 6: Geographic distribution of influenza WGS (2023-2024)



III. ABOUT US: THE FOUNDATION FOR INFLUENZA EPIDEMIOLOGY

The GIHSN is supported by a dedicated fund, the Foundation for Influenza Epidemiology (FIE), which was created in September 2015 by Sanofi under the auspices of Fondation de France, a leading philanthropy network in France, to formalize several years of commitment to epidemiological research on severe influenza.

The Foundation for Influenza Epidemiology provides catalytic funding to sites, complementary to national and other sources of funding.

As of February 2025, donors of the Foundation for Influenza Epidemiology include Sanofi, Seqirus, Abbott Diagnostics, Pfizer. Illumina and IFPMA contributed in previous years. All donations collected through this Foundation are dedicated to epidemiological research in the field of severe influenza and other respiratory viral diseases.

Data is published yearly. Donors do not have access to the data and there is no commercial use of the data.

1. Governance

Governance of the Foundation for Influenza Epidemiology relies on the following bodies and organizations:

- **The Executive Committee**, in charge of strategic directions and site selection for funding allocation. The Executive Committee is composed of donors to GIHSN and three independent experts.
- **The Independent Scientific Committee**, ensuring scientific oversight. The Scientific Committee comprises some of the world's top flu epidemiology/virology/policy experts, including representatives from US CDC and WHO.

→ **Learn more on the governance of the Foundation**

- **Coordination of the network and operational implementation**, including data collection and hosting, is supported by an independent organization: Impact Healthcare. The National Influenza Center Lyon (EZUS) is coordinating laboratory activities with sites.
- **Administrative, legal and financial diligence** is supported by Fondation de France.

2. Site selection process

All investigating sites participating in the GIHSN are selected on a yearly basis, through an annual Call for Proposal published in May.

Applications from institutions meeting the eligibility criteria are reviewed and evaluated by the Independent Scientific Committee of the Foundation according to predefined quality criteria. These include scientific and technical criteria, such as the robustness of study settings, case ascertainment strategy/sampling strategy, lab capacities, commitment to timeliness sharing of data besides considerations regarding geographic representativeness.

Final decision is made by the Executive Committee of the Foundation.

3. Data management and ethics

To comply with regulations of data access and privacy, the Foundation set up a data warehouse and a data access framework.

The GIHSN database is hosted in a secure environment (certified secured hosting for health personal data). Data is processed in full accordance with the European General Data Protection Regulation (GDPR) and French data protection regulations.

Data collected by sites receiving funding remains the property of sites. There is no commercial use of the data. Donors of the Foundation for Influenza Epidemiology do not have access to the data.

A data sharing agreement is signed by each site before field implementation starts.

Sites implementing the GIHSN protocol should be compliant with their ethical and national regulations for the conducting of the surveillance.

→ **Learn more on Data collection, Data analysis and Ethics**

4. Reports, Publications and Research activities 2023-2024

A pooled descriptive analysis of yearly surveillance is prepared every year, shared with the GIHSN community and presented in an Annual Report. Data analysis by season is also available in a newly released GIHSN interactive dashboard https://data.gihsn.org/dashboard

Beyond yearly analysis, researchers are offered the possibility to submit research projects to the Foundation. Projects are reviewed by the Independent Scientific Committee, and, if accepted, then an appropriate dataset is made available to the research team (anonymized aggregated data only). Sites are informed upfront of any analysis, and they have the possibility to opt out.

All reports, publications and oral presentations are publicly available on the GIHSN website.

→ **See Publications and on-going Research projects**

5. Cooperation with the World Health Organization (WHO)

GIHSN is part of the WHO Mosaic Respiratory Surveillance Framework with GISRS.

In October 2023, the Foundation signed a Memorandum of Understanding with the World Health Organization. Three key priority areas of collaboration have been highlighted:

- Virus co-circulation and alert mechanisms
- Combination of severity and WGS for strain selection
- Burden of disease estimation and other research activities

→ **Learn more on Cooperation with WHO**

6. Financial report

To date, the Foundation for Influenza Epidemiology has invested more than 19 M€ to set up and scale up the GIHSN platform over the past 12 years.

The yearly budget allocation is endorsed by the Executive Committee in October. Each year the Foundation invests part of its budget in new sites to continue building worldwide surveillance capacity and expands its network for a better representativeness.

Geographical repartition of the sites translates also grants allocation by country income level (high, upper middle, lower middle). The Foundation covers each year around 25% of the overall cost of the GIHSN platform which relies on existing national capacity and infrastructure (co-funding from sites or other sources).

Foundation budget spent for 2023-2024:

- 1,4 M€ was committed for sites implementation of the year-round surveillance from November 1 st , 2023 to October 31 st , 2024. 14% of this budget was dedicated to piloting GIHSN implementation in new sites.
- 285k€ was spent to ensure the coordination and data infrastructure of the GIHSN platform; 180k€ was used for centralized laboratory activities and sequencing.

Acknowledgements

Investigating sites (season 2023-2024):

- Brazil: Hospital Pequeno Principe, Curitiba (Sonia Mara Raboni, MD, PhD; Heloisa Isle Giamberardino, MD, PhD)
- Canada: The CIRN Serious Outcomes Surveillance (SOS) Network, Halifax (Shelly A. McNeil, MD and Melissa K Andrew)
- Côte d'Ivoire: Institut National d'Hygiène Publique (INHP), Abidjan (Daouda Coulibaly, MD)
- Kenya: Kenya Medical Research Institute (KEMRI), Nairobi (Nancy A. Otieno, PhD)
- Lebanon: American University of Beirut, Beirut, (Dr Ghassan Dbaibo, MD)
- New Zealand: Institute of Environmental Science and Research (Sue Hang; Ruth Seeds)
- Pakistan: National Institute of Health, Islamabad (Dr Muhammad Salman; Nazish Badar)

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- Peru: Instituto de Medicina Tropical Universidad Nacional Mayor de San Marcos, Lima (Victor Alberto Laguna-Torres, MD)
- Poland: National Institute of Tuberculosis and Lung Diseases (Joanna Chorostowska-Wynimko)
- Romania: National Institute for Infectious Diseases "Prof. Dr. Matei Bals", Bucharest (Anca Cristina Draganescu, MD, PhD; Oana Sandulescu)
- Russian Federation: Federal Research Budgetary Institute "National Research Center of Epidemiology and Microbiology named after honorary academician N.F. Gamaleya, Moscow (Elena Burtseva, MD, PhD)
- Senegal: Institut Pasteur of Dakar (IPD), Dakar (Ndongo Dia, MD)
- South Africa: Vaccines and Infectious Diseases Analytics Research Unit, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg (Marta Nunes, PhD)
- Spain: Fisabio-Public Health, Valencia (Alejandro Orrico Sanchez; Ainara Mira Iglesias)
- Türkiye: Turkish Society of Internal Medicine, Ankara (Serhat Unal, MD; Mine Durusu Tanriover)
- Ukraine: SI Kyiv City Center for Diseases Control and Prevention of the Ministry of Health of Ukraine, Kyiv (Alla Mironenko; Nataliia Teteriiuk)
- Uganda: Makerere University Walter Reed Project (Denis Karuhize Byarugaba, BVM, PhD)
- USA: Icahn School of Medicine at Mount Sinai, NYC (Viviana Simon, MD)

Members of the Independent Scientific Committee, Members of the Executive Committee.

Fondation de France: Aurélie Mercier.

Foundation for Influenza Epidemiology: Cedric Mahe; Laurence Torcel-Pagnon; Sandra Chaves.

National Influenza Center, Lyon, France: Bruno Lina; Laurence Josset; Antonin Bal; Nathalie Bergaud; Gwendolyne Burfin; Gregory Queromes; Hadrien Regue; Quentin Semanas.

Impact Healthcare: Catherine Commaille-Chapus; Camille Hunsinger; Jean-Yves Robin.

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