International Environmental Scan of Public Health Surveillance Functions

November 17, 2023

Appendix C:
Profiles of Australia, Denmark, Israel, New Zealand, Norway, the United Kingdom, the United States, and the European Centre for Disease Prevention and Control

National Collaborating Centre for Methods and Tools

Centre de collaboration nationale des méthodes et outils

Centre de collaboration nationale sur les politiques publiques et la santé

National Collaborating Centre for Healthy Public Policy

About

ABOUT THE NATIONAL COLLABORATING CENTRE FOR METHODS AND TOOLS

The National Collaborating Centre for Methods and Tools (NCCMT) facilitates and scales evidence informed decision-making in public health organizations in Canada. This is achieved by providing high-quality resources, real-world training and practical mentorship that evolves with, and responds to, the ever-changing needs of public health. The NCCMT is part of a network of six National Collaborating Centres for Public Health financed by the Public Health Agency of Canada. It is hosted by McMaster University, a leader in research and innovation in Canada.

ABOUT THE NATIONAL COLLABORATING CENTRE FOR HEALTHY PUBLIC POLICY

The National Collaborating Centre for Healthy Public Policy (NCCHPP) seeks to increase the expertise of public health actors across Canada in healthy public policy through the development, sharing and use of knowledge. The NCCHPP is one of six centres financed by the Public Health Agency of Canada. The six centres form a network across Canada, each hosted by a different institution and each focusing on a specific topic linked to public health. The National Collaborating Centre for Healthy Public Policy is hosted by the Institut national de santé publique du Québec (INSPQ), a leading centre in public health in Canada.

National Collaborating Centre
for Methods and Tools
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Foreword

The National Collaborating Centre for Methods and Tools (NCCMT), in collaboration with the National Collaborating Centre for Healthy Public Policy (NCCHPP), undertook an international environmental scan of public health surveillance functions for the Public Health Agency of Canada (PHAC). This environmental scan aims to describe characteristics of national public health surveillance functions from countries with comparable contexts to Canada to provide a global perspective on corporate surveillance system coordination functions at a national level.

PHAC conceptualized the original idea by outlining 6 key domains, with key questions for each. PHAC also identified 7 countries (Australia, Denmark, Israel, New Zealand, Norway, the United Kingdom, the United States) and the European Centre for Disease Prevention and Control (ECDC) for which to scan surveillance functions.

The results of this international environmental scan of public health surveillance functions are presented in a synthesis of information extracted from public documents, published literature, and key informants.

This appendix presents the information collected from grey and peer-reviewed literatures for each of the 7 countries under study and for the ECDC. The appendix may be of interest for readers who wish to know more about public health surveillance in a specific country, according to public documents.

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Introduction

This document includes summaries of information on public health surveillance functions for each of the 7 countries under study (Australia, Denmark, Israel, New Zealand, Norway, United Kingdom, United States) and the European Centre for Disease Prevention and Control (ECDC).

The aim was to obtain information regarding the following characteristics of national (i.e., corporate level) public health surveillance functions according to 6 guiding domains:

1. General description;
2. Policies and strategic plans;
3. Governance of organizational structures and processes;
4. Surveillance Performance Monitoring and Evaluation;
5. Engagement structures and processes; and
6. Knowledge synthesis.

During the months of August to December of 2022:

i.   Grey literature search
In August-September 2022, we conducted a Google search based on the name of the included countries and ECDC, along with key terms such as public health surveillance, health surveillance, disease surveillance, health monitoring, or health protection. Content from the first two pages of results were reviewed for relevance. Any relevant links on the web pages were followed, and the content of those web pages was scanned for relevant documents in English or French. The link for each relevant document or web page was captured in a spreadsheet, and the source document was downloaded when available.

ii.   Peer-reviewed article search
In October 2022, after a preliminary review and content collection from the relevant documents, links and webpages, we performed an additional search for peer-reviewed journal articles related to surveillance functions and system evaluations on PubMed and Google Scholar for the years 2017 – 2022. Relevant search terms such as governance, policies, strategic plans, performance monitoring and evaluation of public health surveillance systems were used to search for published literature in English or French related to public health surveillance functions for the seven included countries and ECDC. We also performed a limited ancestry search from the relevant references of the included papers.

Each document, website, and article were reviewed to identify content related to the six guiding domains. For each country/organization, the findings from the relevant sources

related to each characteristic of interest were extracted into a spreadsheet and the reference source. Generally, relevant text was captured verbatim from the source. We returned to the relevant organization and government-related websites to complete the data extraction as needed.

The information presented in each summary provides insights according to the following:

1. Characteristics of the public health surveillance functions; and
2. Contexts in which these surveillance systems operate.

For Australia, Denmark, Israel, New Zealand, Norway, the United States, and ECDC, the table of content will fall under the 6 domains: general description; policies and strategic plans; governance of organizational structures and processes; surveillance performance monitoring and evaluation; engagement structures and processes; and knowledge synthesis.

For the United Kingdom (UK), a major Public Health system reform took place in 2020, and UK formally left the European Union (EU) on 31 January 2020. For this reason, the information presented in this summary is organized differently than in the other seven summaries.

It is important to note that:

- For some domains, only one document was found. Therefore, to keep the contextual factors and use the same terminology, many relevant texts were captured verbatim from the source and presented in grey and italics.
- Each summary reflects the information available during the data collection, as the websites' contents may have been reviewed and changed. Some links may have also been deactivated.
- The COVID-19 pandemic often resulted in changes in public health surveillance systems that were not always reflected in the websites consulted. Recent changes in public health surveillance functions might not have been captured in the document search if available documents had not been updated to reflect current policy or practice.
- Furthermore, given the available data for each country and the ECDC, producing uniform profiles of the characteristics of public health surveillance systems related to the six guiding domains was impossible. Thus, the formats of the summaries vary and are adapted according to the information collected and analyzed. Also, it was not possible to compare the public health surveillance systems under study to

determine which one produces preferred outcomes. Finally, incorporated hyperlinks may be used to complete, validate or update the presented information.

- Although the document and website searches followed a methodology that allowed many relevant documents to be found, other sources may not be identified.

Australia Public Health Surveillance Systems

1. Background

As a federation, Australia (1) is comprised of six states and two territories. The country has a population of over 24 million and a life expectancy that exceeds 80 years for both men and women. Public health surveillance activities lie across all levels of government (federal, state, territory, and local), with different, often shared, roles.

According to the Kirby institute – University of New South Wales (2), a close partner of the Australian Government Department of Health and Aged CAre, public health surveillance is: "*The systematic collection of health data for analysis and interpretation. It is essential to inform health planning, policy, and services, and to evaluate if the responses to health problems are effective.*"

Public health surveillance systems in Australia are conducted by:
- The Australia Government's Department of Health and Aged Care (3) for communicable disease surveillance at the national, state, and local levels.
- The Australian Institute of Health and Welfare (AIHW) (4) for chronic diseases and psychosocial, socioeconomic, behavioral, and biomedical risk factors.
- The Kirby Institute (2) for HIV, viral hepatitis, STIs, and specific risk factors in trends in Aboriginal populations through the Aboriginal and Torres Strait Islander Report.
- Another specificity in Australia is the One Health initiative in the Department of Foreign Affairs and Trade. This initiative is part of the Indo-Pacific Centre for Health Security (5), which involves other countries to reinforce health information systems, disease surveillance and modeling, infection prevention and control, vector surveillance and control, emergency operations, laboratory capacity and workforces.

Under Australia's constitution, each State has its own program dedicated to health surveillance: Australian Capital Territory (6), New South Wales (7), Northern Territory (8), Queensland (9), South Australia (10), Tasmania (11), Victoria (12), and Western Australia (13).

Lastly, The Communicable Diseases Network Australia (CDNA) (14) has been in charge of the overall strategic direction and coordination of COVID-19 surveillance at the national level. Through this effort and in order to support national policy responses, a national framework for the collection, analysis and reporting of COVID-19-related data was put in place. Policies and decisions have been informed through the adopted plan in order to have

close to real-time surveillance, anticipate future epidemics, monitor the severity of diseases and the impact of health services and evaluate specific interventions. Several stakeholders are engaged through strong partnerships: the Australian Government, the state and territory governments, the health research institutions, clinicians, public and private laboratories and the community.

2. Policies and strategic plans

The Australia Government's Department of Health and Aged Care (3) conducts national, state, and local communicable disease surveillance, guided by a National Framework for Communicable Disease Control. At the national level, the Communicable Diseases Network Australia (14) performs:

- outbreaks detection
- national trends identification
- national disease control programs monitoring
- national or multi-state outbreaks response coordination
- epidemiology of rare diseases description
- transfer of data to the WHO
- quarantine activities support
- National Notifiable Disease List and sentinel surveillance programs review

Sentinel surveillance: directed through the Discipline of General Practice at the University of Adelaide, the Australian Sentinel Practices Research Network (ASPREN) (15) involves general and nurse practitioners who report de-identified information on various diseases. These activities are important to help the government, and the states and territories, identify and respond to outbreaks.

According to the nationally notifiable diseases (3) pathologies are classified into 9 types: *"Bloodborne diseases, gastrointestinal diseases, listed human diseases, sexually transmissible infections, vaccine-preventable diseases, vector-borne diseases, zoonoses, other notifiable diseases, and diseases under national surveillance by other bodies (that is, not the Australian Government Department of Health and Aged Care)."*

According to the New South Wales Population Health Surveillance Strategy 2011 to 2020 (16), *"surveillance outcomes should stimulate policy development and research by identifying issues requiring action or further information needs".* See the population health surveillance drive and response cycle on page 2 of the New South Wales Population Health Surveillance Strategy 2011 to 2020.

The [Australian Institute of Health and Welfare](#) (4) is an independent statutory Australian Government agency with more than 30 years of experience working with substantial health and welfare data in more than [150 datasets (4)](#):

*"Information reported indicated that the institutes hold valuable data on a wide range of health and welfare topics, including expenditure, hospitals, disease, injury, mental health, ageing, homelessness, housing, disability, child protection and the needs of Aboriginal and Torres Strait Islander people. In doing so, they ensure that data privacy and confidentiality are maintained and the requirements of the **Privacy Act 1998** (Cth) and the **Australian Institute of Health and Welfare Act 1987** (Cth) are met."*

The [Kirby Institute (2)](#) is specialized in health infectious diseases data collection, analysis and reports production in partnership with the Australian Government Department of Health and the health departments in all states and territories.

"The Public Health Surveillance research strengths: [Aboriginal and Torres Strait Islander Health](#); [Biostatistics and Databases](#); [Global Health](#); [Sexual Health](#); [Surveillance and Evaluation](#); [Viral Hepatitis Epidemiology and Prevention](#)."

Specifically, for COVID-19 surveillance, a plan was established by [The Communicable Diseases Network Australia (CDNA)](#)(14). In the latest revised version of June 2022, the goals of the Plan are to:

- *"Monitor trends in cases, infections and immunity, morbidity and mortality, impact on the health system, and the effectiveness of interventions.*
- *Outline the breadth of surveillance intelligence which Australian governments at the national and jurisdictional level consider necessary to support responses that are proportionate to the ever-evolving level of risk.*
- *Recognise that disease transmission and impact, and therefore surveillance requirements, may vary across the country, between population groups and over time."*

3. Governance structures and processes

In the [Making Decisions on public health: a review of eight countries](#) (17) published by the WHO, Governance structures are organized with several levels:

- National level: the federal government provides broad policy leadership and financing.
- Local level: the states and territories deliver public sector health services and regulate health workers in the public and private sectors.
- Several supporting agencies

    o The National Public Health Partnership
    o The Public Health Association of Australia

- o The Public Health Research Advisory Group
- o The National Health and Medical Research Council
- o The Australian Health Ministers' Advisory Council
- o The Australian Institute of Health and Welfare

Information gathered from the consulted resources demonstrated that:

"The *Australian Institute of Health and Welfare* was established as a Commonwealth Government statutory authority in 1987. The composition, functions, powers and obligations of the Institute are set out in its enabling legislation, the Australian Institute of Health and Welfare Act 1987 (AIHW Act). The Australian Institute of Health and Welfare Act establishes a Board as the governing body. The Board is accountable to the Parliament of Australia through the Minister for Health. The Act requires the Board to appoint an Ethics Committee. The Australian Institute of Health and Welfare (Ethics Committee) Regulations (2018) prescribes its functions and membership. The data governance arrangements apply to all data held, including those collected and/or enhanced by the institute, collected on its behalf (for example under agreements) or obtained from any third party."

Under the Australia Government's Department of Health and Aged Care, additional surveillance programs are run to monitor other diseases:

- The Australian National Creutzfeldt-Jakob Disease Registry (ANCJDR) monitors for Creutzfeldt-Jakob disease (CJD) as a notifiable disease in all states and territories.
- The Kirby Institute oversees infectious diseases.
- OzFoodNet is responsible for foodborne diseases.
- As a subcommittee of the Communicable Diseases Network of Australia (CDNA), the National Arbovirus and Malaria Advisory Committee (NAMAC) helps detect, manage and control outbreaks of arboviruses and malaria.
- The Australian Paediatric Surveillance Unit (APSU) is responsible for studying uncommon conditions, including rare infectious and vaccine-preventable diseases, genetic disorders, mental health problems, rare injuries and other rare chronic childhood conditions in children under the age of 15.

The Communicable Diseases Network of Australia (CDNA) (14) is responsible for the strategic direction and national coordination of COVID-19 surveillance, including developing and monitoring the national framework for the collection, analysis and reporting of health-related data on COVID-19.

4. Surveillance performance monitoring and evaluation

Although no established performance and monitoring evaluation plans and schedules were found, the search revealed two important exercises using the CDC guidelines for evaluating public health surveillance systems. The first is a peer-reviewed article published in 2020,

and the second is described from the government of South Australia's website. Both evaluations were conducted using the [CDC Guidelines for Evaluating Public Health Surveillance Systems (18):](#)

1- [An evaluation of enhanced surveillance of hospitalized COVID-19 patients to inform the public health response in Victoria (19)](#)

"In response to the coronavirus disease (COVID-19) pandemic, an enhanced surveillance system of hospitalized COVID-19 patients was established by the Victorian Department of Health and Human Services (DHHS) and the Victorian Healthcare Associated Infection Surveillance System Coordinating Centre. The system aimed to reduce workforce capacity constraints and increase situational awareness on the status of hospitalized patients. Using guidelines from the United States Centers for Disease Control and Prevention, the system was evaluated against eight attributes: acceptability; data quality; flexibility; representativeness; simplicity; stability; timeliness; and usefulness. Evidence was generated from stakeholder consultation, participant observation, document review, systems review, issues log review and audits. Data were collected and analyzed over up to three months, covering pre- and post-implementation from March to June 2020. This system was rapidly established by leveraging established relationships and infrastructure. Stakeholders agreed that the system was important but was limited by a reliance on daily manual labor (including weekends), which impeded scalability. The ability of the system to perform well in each attribute was expected to shift with the severity of the pandemic; however, at the time of this evaluation, when there were an average 23 new cases per day (0.3 cases per 100,000 population per day), the system performed well."

2- [Evaluation of the South Australian Monitoring and Surveillance System](#)

"The South Australian Monitoring and Surveillance System (SAMSS) was evaluated using the following steps:
- Consultation with a broad range of stakeholders, who provided feedback on the SAMSS, with a particular focus on the questions.
- A document review was conducted, which included:
  - *other population health surveys around Australia*
  - *national metadata standards*
  - *National guidelines*
  - *The information available from the current data collector and previous data custodian.*

The results of the consultation and document review were used in developing a set of recommendations pertaining to the surveillance system and the survey questions. Surveillance system recommendations:
  - *Use non-landline telephone survey techniques such as web platforms or mobile phones.*

5. Engagement structures and processes

Several engagement approaches with national, international and regional partners were found:

- The [Australian Institute of Health and Welfare (4)](#) operates in partnership with various stakeholders. Through agreements and memorandums of understanding, it is part of more than 100 committees operating with the Australian Bureau of Statistics and other government agencies, state & territory governments, local governments, universities, research centers, non-government organizations, and international organizations.
- Diseases of international concern: the National Incident Centre (NIC) responds and reports to the WHO if a disease arises.
- The [Indo-Pacific Centre for Health Security (5)](#) is strongly involved in Australia's regional COVID-19 response by helping member states develop and implement COVID-19 response plans. Partnerships devote to laboratory strengthening, surveillance, disease impact modeling, medical supplies, health emergency response training, and COVID-19 vaccine access support to the countries of the Pacific and Southeast Asia, with funding of $623 million up to mid-2023. Consultations with key partners also took place to discuss future investments in regional health security, taking into account the impacts of and lessons learned during the COVID-19 pandemic response.

6. Knowledge Synthesis

Several initiatives were presented and described through various sources to support knowledge synthesis. They are reported here:

"At the Australian [Government's Department of Health and Aged Care (3),](#) the [National Notifiable Diseases Surveillance System](#) (NNDSS) (3) coordinates data on over 70 diseases that present a risk to public health in Australia. This helps them identify disease trends,

assess the impact of disease control programs and develop policies to reduce the impact of these diseases. The state and territory health authorities daily supply the NNDSS with de-identified notification data about new cases of notifiable diseases. The NNDSS continuously aims to improve the national consistency of reporting by working with the state and territory health authorities and national committees, such as the Communicable Diseases Network Australia (14) and National Surveillance Committee."

"The Australian, state, territory, and local governments share responsibility (20) for running the health system and public health surveillance under national agreements such as the Council of Australian Governments (COAG). Several key institutions, committees and networks help with the works. As an example, for communicable diseases these are the: Communicable Diseases Network Australia (CDNA), CDNA subcommittees, Public Health Laboratory Network, Australian Health Protection Principal Committee, Australian Technical Advisory Group on Immunisation, Blood Borne Viruses and Sexually Transmissible Infections Standing Committee and Ministerial Advisory Committee on Blood Borne Viruses and Sexually Transmissible Infections. Additional supporting agencies include: the National Public Health Partnership (NPHP) that develops national agenda for public health, improves collaboration, coordinates strategies and strengthens public health infrastructure. The NPHP group comprises one senior representative from the commonwealth and each of the states and territories, along with the Director of the Australian Institute of Health and Welfare (AIHW) and the Chair of the Health Advisory Committee of the National Health and Medical Research Council (NHMRC); The Public Health Association of Australia is an evidence-based advocacy group used as a reference point for governments at all levels as well as other interested parties; The Public Health Research Advisory Group promotes and advocates public health research; The National Health and Medical Research Council (NHMRC) has played a key role as an authoritative standard- and priority-setting body; The Australian Health Ministers' Advisory Council helps consolidate priorities and reach consensus; The Australian Institute of Health and Welfare (AIHW) provides authoritative reports on the health and welfare of Australians to inform community discussion and decision-making."

"The National Framework for Communicable Disease Control (21): • Brings together government, agencies and committees under the goal of strengthening the defences against communicable diseases. • Recommends outcomes required to achieve the two key objectives: 1. Improved communicable disease prevention, detection and response 2. Improved organisation and delivery of CD control."

"The Indo-Pacific Centre for Health Security (5) works in collaboration and in consultation with all partners in the region and Australia to help determine the best ways Australia can contribute to the region's health security. The Australian Government's Health Security Initiative for the Indo-Pacific region, launched by the Minister for Foreign Affairs on 8

October 2017, contributed to the avoidance and containment of infectious disease threats with the potential to cause social and economic harms on a national, regional or global scale. The Health Security Initiative aimed to inform evidence-based planning, help prevent avoidable epidemics, strengthen early detection capacity, and support rapid, effective national and international outbreak responses. It did this by accelerating research on new drugs and diagnostics, expanding partnerships at the national, regional and global level to strengthen human and animal health systems, and deepening people-to-people linkages that build national and regional health security capacity."

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Denmark Public Health Surveillance Systems

1. Background

Located in northern Europe, Denmark (1) is a country with an area of 42,926 sq Km, made up of the Jutland Peninsula and more than 400 islands in the North Sea. With a 5.9 million population, life expectancy is 79 years for men and 83 years for women.

Guided by the Danish Ministry of Health (2), the Statens Serum Institut (SSI) (3) is responsible for Denmark's national surveillance system (4), whose main duties are to:

"Ensure preparedness against infectious diseases and biological threats and control congenital disorders."

SSI (3) is also responsible for the following:

- specialized diagnostics,
- research,
- surveillance and disease preparedness tasks in the human and veterinary fields as part of a one health (5) approach,
- vaccine supply, and
- Danish National Biobank & Biomarkers.

Diseases are reported to the Danish surveillance registers. The Danish Health Data Authority is responsible for the national health registers (6) that contain population health data and information related to the healthcare system.

2. Policies and strategic plans

Based on the information provided by the SSI (3), the surveillance system is based on three pillars: mandatory notification systems, individually notification diseases and laboratory notification system.

Mandatory notification systems

The prior regulatory community framework for the national surveillance in Denmark is The National Board of Health Statutory Order on Physicians' Notification of Infectious Diseases etc, including later amendments:

- *Statutory Order on Physicians' Notification of Infectious Diseases No 277 of 14 April 2000*
- *Statutory Order on Physicians' Notification of Severe Acute Respiratory Syndrome (SARS) No 616 of 27 June 2003*

- *Statutory Order on Physicians' Notification of Methicillin-resistant Staphylococcus aureus (MRSA) No 1002 of 6 October 2006*

Individually notifiable diseases

The Statutory Order states that a number of diseases are individually notifiable for physicians and GPs. The notifications are also called "clinical notifications." They include relevant information on the patient and are notified on a paper form to the MOH and to SSI, respectively.

There are special forms for gonorrhea & syphilis, HIV infection, and Methicillin-resistant Staphylococcus aureus (MRSA)

Laboratory notification system

A laboratory notification system for a large number of microorganisms has also been established. The clinical-microbiological laboratories must notify findings of certain microorganisms and information on the patient."

Technically, the SSI (3) works on performing:

- *"Disease outbreaks detection,*
- *estimation of trends and development over time,*
- *identification of population groups with special risks of certain diseases,*
- *estimation of the impact of preventable measures,*
- *detection of antibiotics and pathogenic resistance, and*
- *identification and solutions to research questions and hypotheses on infectious diseases."*

It is also important to note that in terms of preparedness and infection control (7), outbreak management includes:

- *"Confirmation of suspected outbreaks,*
- *elaboration of case definitions,*
- *diagnosis verification,*
- *elucidation of the descriptive epidemiology of the outbreak, including spread and possible area or population at risk,*
- *development of a hypothesis as to the source of infection and risk factors,*
- *testing of this hypothesis by means of microbiological examinations and analytical epidemiology,*
- *development of a prognosis, and, finally,*
- *evaluation of the effect of countermeasures."*

Finally, when it comes to COVID-19, SSI releases COVID-19 (8) surveillance data on a regular basis and is available to the public.

3. Governance structures and processes

In terms of governance, the SSI (3) is administered by the Danish Ministry of Health and Prevention[2] under the minister of health[2].

"The Danish Health Data Authority (9) is a part of The Ministry of Health and was established in November 2015. It is made up of Executive Management, an Executive Secretariat and seven departments with approximately 300 employees. Danish health data is collected, stored and managed in national health registers at the Danish Health Data Authority (9)."

- *The health registers contain information about diseases, treatments, finances, and employees in the healthcare system.*
- *Each register has been established to serve a particular purpose, for instance, to monitor a disease's development or treatment's effect.*
- *The National Patient Register is the largest register and contains information about all examinations and treatments in Danish hospitals in the last 40 years.*

One Health (6): As of January 1, 2020, SSI has been in charge of overseeing both the national animal disease preparedness for the Danish Ministry of Environment and Food in close cooperation with the University of Copenhagen as well as the Danish preparedness against infectious diseases affecting humans under the auspices of the Danish Ministry of Health. As a result, SSI is now a recognized One-Health-Institute. At the source, data from One Health programs are gathered.

4. Surveillance performance monitoring and evaluation

According to the SSI (3), the number, validity, and flow of the basic reports are directly tied to the quality and benefit of surveillance, but the SSI is constantly working to enhance all aspects of surveillance.

Along with conducting research and developing analytical techniques and data processing tools, SSI hopes to open the door for the Health Service System to more easily, quickly, and efficiently report on, analyze, and use digital data through the use of the increasingly popular and improved communication media.

The Institute has evaluated data and taken part in the development of hospital hygiene quality standards that, when correctly implemented, are predicted to lower the number of hospital-acquired infections further. In addition, a cutting-edge system for tracking infections acquired in hospitals was introduced in 2015.

5. Engagement structures and processes

In terms of engagement, structures, and processes, the One Health Surveillance (5), The European & Developing Countries Clinical Trials Partnership (EDCTP) (10), and the Joint action on Antimicrobial Resistance and Health Care Associated Infections (JAMRAI) (11) are relevant examples:

One Health Surveillance:
The National Food Institute, the National Veterinary Institute, and SSI work together to manage the scheme. Monitoring and managing zoonoses in animals used for food has been a tradition in Denmark for ten years. In keeping with the Danish Way, organizations comprising representatives from the public sector, academia, business, and government coordinate and oversee monitoring and control projects. Several major programs, including reducing the prevalence of campylobacter in broilers and chicken meat, is the main goal of the Danish action plan on campylobacter in food and environment. Learning about infection sources other than chicken meat is a crucial problem. Denmark's health information technology framework complements the European Health Data Space concept.

The European & Developing Countries Clinical Trials Partnership (EDCTP):
The European Union, countries in Europe, and sub-Saharan Africa have joined forces to form the EDCTP, which seeks to foster cooperative study that quickens the clinical development to improve HIV/AIDS, TB, malaria, and other neglected infectious illnesses interventions in sub-Saharan Africa. Through partnership contributions from SSI and The Ministry, Denmark actively supports EDCTP.

Joint action on Antimicrobial Resistance and Health Care Associated Infections (JAMRAI)
The three-year European Union project supports several initiatives run by the 44 institutions of member states. It aims to strengthen and consolidate the work in the 28 EU Member States to control antibiotic resistance and minimize infections linked with healthcare. Both the EU's Health Programme and the member states contribute to the funding of JAMRAI.

6. Knowledge Synthesis

Based on the information from the SSI (3), there are several annual reports on diseases. The list can be found here (8) Also, several other initiatives have been going on:

"National data exchange is possible through electronic medical records accessible to individuals and health professionals at all levels. The system facilitates digital referrals, prescriptions and visits, and access to laboratory test results. Providers can also use the national online health information portal to communicate with other providers regarding referrals, discharges and prescriptions. Unique electronic personal identifiers connect data across registries and databases."

"During COVID-19, this infrastructure made real-time epidemiological surveillance possible. Denmark is one of only six countries in Europe that make healthcare data readily and securely available to the research community through real-time remote access services or a research data center. The Danish Health Data Authority, a subdivision of the Ministry of Health established in 2015, provides access to health data related to service, quality, utilization and clinical registries for clinicians, the public, and researchers."

"In March 2021, a unified data portal was launched to strengthen access to health data for researchers. Therefore, several features of the Danish health information system complement the European Health Data Space initiative, which aims to promote a better exchange of and access to health data for research and policy purposes."

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Israel Public Health Surveillance Systems

1. Background

According to the Health Systems in Transition 2015 (1), Israel is a country with over 9.5 million citizens (2022) and a modern market-based economy. Since implementing a gradually funded statutory health insurance system in 1995, it has had universal health care. All hospitals and Health Plans have cutting-edge information systems with electronic medical records, information on activity levels, services rendered, and quality of treatment, as well as a number of methods for collecting data from different providers, such as national registries.

Although no set definition was found, public health surveillance is under the responsibility of the Israel Center for Disease Control (ICDC) (2), which was established in 1994 by the Ministry of Health with the primary goal of providing policy-makers within the health system with the evidence base necessary for making informed decisions.

2. Policies and strategic plans

The main activities of the Israel Center for Disease Control (ICDC) (2) include:
"1) Carrying out periodic national surveys on the health of the population,
2) Establishing and maintaining national disease registries,
3) Surveillance of infectious diseases and unusual morbidity,
4) Research on health behaviors and lifestyles,
5) Carrying out population-based nutrition surveys,
6) Studying chronic diseases and their determinants,
7) Training students and physicians in Public Health, and
8) Preparing books and articles for publication."

No recent strategic plans were found, except for:
- The 2011-2014 Health Policy Plan (3)
  The plan aimed to assess the state of the health system in Israel to form the Ministry's policy for dealing with it in the short and long term. The process was carried out in collaboration with broad circles within the Ministry and various other stakeholders in the health system and was accompanied by an external strategic consultancy company.

- Strategic planning process (4):
  In view of the enormous developments anticipated to influence the future of medicine, the ministry's administration organized a process to converge and update the plan during 2018. To generate insights into the potential future of 2030, the

process started with a thorough understanding of the trends in medicine and health systems.

- Related to COVID-19, Elad Yom-Tov reported on a rapidly deployed active syndromic surveillance system for tracking COVID-19 in Israel through an article: "Active syndromic surveillance of COVID-19 in Israel (5)" published in 2021. *"The system was a novel combination of active and passive components: Ads were shown to people searching for COVID-19 symptoms on the Google search engine. Those who clicked on the ads were referred to a chatbot which helped them decide whether they needed urgent medical care."*

3. Governance structures and processes

According to a case study, "Israel country snapshot: the role of public health agencies and services in the response to COVID-19"(6), published on May 2022 by Ruth Waitzberg, as a division of the Ministry of Health, the Israeli Public Health Services Unit is in charge of providing and supporting public health services (apart from curative care) using a budget independent from the National Health Insurance budget. The Public Health Headquarters unit, housed in the Ministry of Health building in Jerusalem, and the seven District Health Bureaus, dispersed throughout the country's seven regions, comprise the public health services system.

The Ministry of Health (7) is a ministry in the Israeli government responsible for formulating health policies, including the Israel Center for Disease Control (ICDC) (2), which Units and Project Areas (8) are:

- *"**Publications Unit**: writes, edits and publishes various publications on the population's health status, which serve as an important data resource for the Israeli health system.*
- ***Health Surveys Unit**: Conducts periodic national health surveys which supply important data on the population's health status and health-related behaviors.*
- ***Disease Registries Unit**: Manages and maintains national registries such as the Israel National Cancer Registry, the Juvenile Diabetes Registry, the National Dialysis Registry and more.*
- ***Infectious Diseases Unit**: Conducts clinical and laboratory surveillance of seasonal influenza and other infectious diseases. Performs research on infectious diseases.*
- ***Reference Laboratories Unit**: Conducts laboratory-based surveillance of acute enteric diseases based on a network of sentinel laboratories. Responsible for management of national sera bank and conducts seroepidemiological surveys describing the immune status of the population vis-a-vis vaccine-preventable diseases.*
- ***Cancer Unit**: Conducts data quality control for National Cancer Registry. Runs training programs for cancer registrars, including principles of recording, coding, and reporting to the National Cancer Registry.*

- **_Nutrition Surveys (MABAT) Unit_**: _Collects data on the health and nutrition status of the population by means of extensive population surveys_
- **_Mother and Child Health Unit_**: _Collects data for the purpose of preparing programs for the promotion of maternal, child, and adolescent health, with an emphasis on high-risk populations._
- **_Data Management Unit_**: _Responsible for establishing and maintaining databases; provides statistical support for ICDC researchers and collaborators; ongoing maintenance of communication systems._"

4. Surveillance performance monitoring and evaluation

No relevant documents found.

5. Engagement structures and processes

Engagement structures and processes related to COVID-19 are described in this WHO report:

- [The management of COVID-19 in which multiple stakeholders were involved](#) _(5). "The 'Corona Cabinet' is a government body assembled on 27 May 2020 as a forum of 16 ministers to better manage the response to the COVID-19 pandemic. On 26 July 2020, membership of the Corona Cabinet was reduced to 10 (male) government ministers including the Prime Minister and the Ministers of Defence, Internal Security, Health, Finance, Foreign Affairs, Sciences and Technology, Justice, Economy and Industry and Interior. This body, led by the Prime Minister, operates in accordance with the new 'Special Authorities to Combat the Novel Coronavirus' (Temporary Provision) Law, 5780-2020 (the [Coronavirus Law](#))._"

The bodies and stakeholders involved in the response to the COVID-19 pandemic during 2020 are illustrated on the [Israel country snapshot: the role of public health agencies and services in the response to COVID-19](#) (5).

[The establishment of the active syndromic surveillance of COVID-19](#) (5): is described above.

6. Knowledge Synthesis

No relevant documents found.

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New Zealand Public Health Surveillance Systems

1. Background

Located in the southwestern Pacific Ocean, New Zealand (1) consists of nearly 700 tiny islands in addition to the North Island and the South Island, the two main landmasses. There are more than 5 million people, and men and women may expect to live an average of 80 and 83 years, respectively.

The Institute of Environmental Science and Research) ESR (2) undertakes national surveillance systems for communicable diseases and related health events. According to ESR (2): *"Public health surveillance is the ongoing, systematic collection, analysis, and interpretation of data on specific health events for use in the planning, implementation and evaluation of public health programmes. Communicable disease surveillance is the continuous monitoring of the frequency and the distribution of disease and death due to infections that can be transmitted from human to human or from animals, food, water, or the environment to humans, and the monitoring of risk factors for those infections."*

Information for numerous national surveillance systems is coordinated and compiled by ESR (2).

Types of surveillance systems (3):

Numerous types of surveillance are presented in the 2006 Manual for Public Health Surveillance in New Zealand (3) (although this manual may be out of date):

- **Notifiable disease system:** Based on reports from medical professionals and covers around 50 diseases, this system is a type of clinician surveillance. Medical professionals are required to report, which nullifies some privacy legislation prohibitions.
- **Sentinel surveillance:** This strategy is employed in the fight against influenza.
- **Clinic-based surveillance:** This method is employed for some non-notifiable diseases where a significant share of cases is diagnosed at a constrained number of locations such as STIs.
- **Clinical laboratory-based surveillance (CLBS):** This method uses data on communicable diseases that laboratories provide regarding positive test findings. Data generated at ESR for diseases like Haemophilus influenza, where each specimen is analyzed at national laboratories, is included in laboratory-based monitoring.
- **Hospitalizations:** Provide more information on hospitalizations for illnesses like a rheumatic fever with more severe consequences. Additionally, it offers historical

information on diseases like measles and mumps that were not previously adequately covered by other monitoring systems.

- **Immunization coverage surveillance:** This counts the percentage of the population who have had vaccinations to protect them from infectious diseases.
- **Outbreak surveillance** is a technique for tracking outbreak characteristics and research. EpiSurv, a computer system for collecting notifiable disease surveillance data, stores epidemic investigation summaries that can be connected to specific cases by an outbreak reference number.
- **Systems for monitoring arbovirus vectors** (such as recurrent mosquito surveys) and human cases of arboviral disease (all arboviral diseases are reportable, including dengue fever and Ross River virus infection).
- **Antibiotic resistance surveillance** collects laboratory information regarding the antibiotic susceptibilities of significant organisms, such as MRSA and pneumococci. The tuberculosis surveillance notification system is being linked with this system.

2. Policies and strategic plans

According to the 2012 Guidelines for the Investigation and Control of Disease Outbreaks (4), the following institutions' general guidelines and roles are assigned for routine surveillance:

Public Health Service Responsibility:

- *Operation of a comprehensive infectious disease surveillance system at the district level*
- *Collection of notifications and data on laboratory-identified cases*
- *Collection of data on self-reported cases and other 'informal' reporting sources*
- *Integration of local surveillance data from multiple sources*
- *Collection of descriptive information on individual cases of disease with outbreak potential*

Institute of Environmental Science and Research Limited Responsibility:

- *Coordination and development of a comprehensive disease surveillance system at the national level*
- *Collation of EpiSurv data*
- *Collation of results of specialized laboratory tests*
- *Integration of laboratory and surveillance data*
- *Calculation of national and district disease incidence*
- *Dissemination of national surveillance information*
- *Maintaining links with international disease and laboratory surveillance systems*

- *Funding for infectious disease surveillance system*
- *Strategic planning for infectious disease surveillance*
- *International reporting obligations*
- *Providing an appropriate legislative framework*

- *Coordination and development of a comprehensive animal disease surveillance system at the national level*
- *Integration of laboratory and surveillance data for animals and food*
- *Dissemination of national surveillance information*
- *Maintaining links with international zoonotic disease and laboratory surveillance systems*
- *Providing an appropriate legislative framework, including the administration of food-related legislation*

The reporting processes and information flows for the main elements of the surveillance system are illustrated on page 10 of the Manual for Public Health Surveillance in New Zealand (3). Medical practitioners report notifiable diseases to their local public health unit (PHU) by telephone, fax or post. Data are recorded by PHU staff onto a case report form and then transferred to EpiSurv, the computerized local database. Data are transferred from PHUs to ESR Kenepuru Science Centre each week and imported into a data warehouse. Clinical laboratories report data via various electronic systems. Reporting by ESR laboratories is by direct entry onto the specimen management database, ESRLab where possible notifiable disease data are integrated with laboratory records held by ESR. The Population & Environmental Health Group staff at ESR analyzes data.

In order to receive data, conduct analyses, provide synthesis and guide decision-making, the 2006 Manual for Public Health Surveillance in New Zealand (3) specifically states:

- *Under the Health Act 1956 and the Tuberculosis Act 1948, health professionals must inform their local Medical Officer of Health of any suspected or diagnosed notifiable disease. Since December 2007, laboratories have also been required to report notifiable diseases to their local Medical Officer of Health.*

- *Notifiable disease data reported to the Medical Officer of Health at each public health unit (PHU) is entered via a secure web-based portal into the EpiSurv national database. The near real-time data is collated and analysed by the Institute of Environmental Science and Research Ltd (ESR) on behalf of the Ministry of Health.*

3. Governance structures and processes

When it comes to governance structure, several institutions are involved with clear and specific roles:

1) The *Ministry of Health* *(5) is the chief steward of the health system, leading health across the government. It sets direction and policy for the health system, advises the Government on funding and system settings, regulates the health system, and monitors health outcomes.*

2) The *Public Health Agency* *(6) leads and strengthens population and public health, emphasizing equity and the broader determinants of health such as income, education and housing.*

3) *Te Aka Whai Ora – Māori Health Authority* *(7), working in partnership with the Ministry of Health and Health New Zealand, is responsible for ensuring the health system works well for Māori.*

Components of the communicable disease surveillance system (3):
Firstly, at the local level, public health units are tasked with monitoring and containing the disease in their area. Secondly, the ESR, acting on behalf of the Ministry of Health, coordinates system operations at the national level. Data from regional public health agencies and laboratory-based surveillance efforts are combined by ESR. It is also important to note that the Ministry of Health is the primary national end user of data, but other national organizations like the New Zealand Food Safety Authority (NZFSA), the Ministry of Agriculture and Forestry (MAF), and the Occupational Safety and Health (OSH) Service of the Department of Labour, New Zealand, may also use the data on occasion.

4. Surveillance performance monitoring and evaluation

A Joint external evaluation of International Health Regulations core capacities of New Zealand in 2019 provided an (8) overall summary of the country's performance:

Strengths and best practices

- *A comprehensive surveillance program for diseases of public health significance is in place at national and regional levels.*
- *There is a list of notifiable human diseases under the Health Act 1956, and a list of (non-human) biosecurity notifiable organisms and unwanted organisms under the Biosecurity Act 1993.*
- *A sound policy framework, adequate operational capability, a strong laboratory system, and a robust reporting framework supports the surveillance system.*

- *The Ministry of Health has a well-established and tested single point of contact (SPOC) system via a free telephone number to receive exception reporting and weekly emerging health threats and National Security System briefings.*
- *The surveillance system is mainly real-time; most information collected by its different components can be accessed directly from online reports.*

Areas that need strengthening and challenges

- *There is no overarching strategy guiding current work and/or new initiatives on communicable disease surveillance and related areas at national, regional, and local levels.*
- *There is limited capacity to incorporate whole genome sequencing information into the surveillance system.*
- *Although some surveillance system components have been evaluated, there has been no formal technical and systematic review of the system or its components.*
- *Improvements to event-based surveillance methods could lead to earlier reporting and identification of a significant public health event, such as a disease caused by a novelpathogen, or conditions with mild symptoms for which people may not seek health care.*

Quality Assurance Programme for EpiSurv (3): ESR frequently conducts EpiSurv validation checks and asks staff to update and rectify data in order to verify that it is complete or accurate. EpiSurv is a surveillance system emphasizing early case reporting over thorough reporting.

5. Engagement structures and processes

No relevant documents identified.

6. Knowledge Synthesis

EpiSurv-derived surveillance data is made available in a variety of formats, including (3,4):

- Regular surveillance reports:
    - o   a weekly summary of diseases that require reporting,
    - o   a monthly summary of diseases that require reporting,
    - o   an annual summary of diseases that require reporting, and
    - o   an annual summary of outbreaks.
- The New Zealand Public Health Surveillance Report (NZPHSR), a quarterly report, is intended for health professionals in general practice, hospitals, laboratories, and other public health services. It provides integrated notification and laboratory information.

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Norway Public Health Surveillance Systems

1. Background

According to Norway: health system review 2020, the Kingdom of Norway is Europe's northernmost country. With a population of 5.4 million, life expectancy is 81 years (men) and 84 years (women). Norway offers free healthcare to all citizens, primarily supported by general taxes and payroll contributions that employers and employees split equally. Local governments oversee primary healthcare, while the federal government is in charge of specialty care. By changing primary and hospital care, enhancing coordination between various types of care, and modifying medical education to future health requirements, Norway is also trying to develop primary and community care further. (1)

Although no national-level specific definition was found, the Norwegian Institute of Public Health (NIPH) (2) is responsible for Norway's public health surveillance system. The National Immunization Register (SYSVAK), the National Surveillance System for Communicable Diseases (MSIS), the Hospital Acquired Infections Surveillance System (NOIS), and the National Epidemic Intelligence Activities are all handled by the NIPH (2), the Norwegian Surveillance System for Antiviral Resistance (RAVN) (3) and the Norwegian Surveillance System for Antimicrobial Drug Resistance (NORM) (4).

Furthermore, according to Bakken et al., the Directorate of Health (5) is responsible for four nationwide registries. Two of them, the Norwegian Patient Registry (NPR) (5) and the Norwegian Registry for Primary Health Care (NRPHC) (6), together cover all medical care that is paid for by the government.

Finally, Norway: health system review 2020 (1) mentioned that 54 national medical quality registries and 18 additional Norwegian health registries contain a variety of health data that can be used to provide current, secure, and reliable information about the population's health and healthcare quality, as well as comprehensive data for evaluating the effects of various treatments and benchmarking efficiency at the level of hospital wards.

An overview of the statutory and mandatory health registries is presented on page 25 of the Norway: health system review 2020 (1).

2. Policies and strategic plans

In terms of policies and strategic plans the Directorate of Health (5) presents the following information:

- *"The Ministry of Health and Care Services (MOHCS) determines the national health policy, prepares and oversees legislation, and implements national health policy with the help of the directorate of health and other subordinate institutions.*
- *The NIPH responsibilities include monitoring, receiving notifications and reports, contact tracing, vaccine preparedness, advising, information and research.*
- *The directorate of health improves the health of the citizens and the community through targeted activities across services, sectors and administrative levels. It does so by virtue of its role as an executive agency, as a regulatory authority and as an implementing authority in areas of health policy.*
- *Norwegian health registries contain various types of health data for various purposes. The increasing amount of data availability has led to a reform of the legal framework and organization of health registries. The 2014 Act on the Personal Health Data Registries distinguishes between consent-based registries, mandatory registries where patients can opt-out, and statutory registries which do not require consent."*

3. Governance structures and processes

The NIPH (2) and the directorate of health (5) are subordinated to the MOHCS.
NIPH has five scientific divisions:

- o *"Division for Health Services: provides a knowledge base for decision-makers at all levels in the health care services, from central government to the municipal health service.*
- o *Division of Climate and Environmental Health leads research group for health risk assessment of environmental factors in Norway.*
- o *Division of Health Data and Digitalisation has expertise in research and management of health registries, population health studies, biobanks, and IT/e-health/digitalization.*
- o *Division of Infection Control is working to prevent infectious diseases and reduce damage to health. Key activities are emergency preparedness, investigations, consultancy, laboratory services, and research at national and international levels.*
- o *Division of Mental and Physical Health is responsible for developing the institute's expertise in substance use, mental health, and physical health."*

Diseases are categorized in classes A (infectious diseases), B, and C. If a condition is listed as a notifiable condition, no one diagnosed with an infectious disease can stop the condition from being reported to MSIS. Group A reports include complete patient

identifiers from the laboratory and the diagnosing physician. The doctor must also describe the conditions' circumstances, including how the infection occurred, where the patient contracted it, and other factors. When reporting an infectious disease, a doctor is required to let the individual to whom the report pertains know who will be receiving the reports and how they will be used. The registration includes private facilities and medical professionals under contract with local health authorities and all publicly funded specialty healthcare services in Norway.

4. Surveillance performance monitoring and evaluation

A one-year evaluation of the NIPH surveillance system (5) during COVID-19 pandemic revealed that: *"it was flexible enough to accommodate the inclusion of a new disease, stable although stability was affected in April-May 2020, following the inclusion of COVID-19, complete even though completeness was reduced during the COVID-19 epidemic in the primary healthcare. However, reporting timeliness has overall improved as new reporting tools and improved user support are developed."*

The National Service for Validation and Completeness Analyses also routinely examines Data from the NPR (6). This tool offers an analysis that compares information from databases tracking medical quality to related NPR data. The national medical quality registries are obligated to provide data for such studies. Completeness is "*the extent to which information about the patients within the target group is reported to the registry*" in annual reports presenting results. The results demonstrate that the NPR data are highly comprehensive in general.

Only inpatients in somatic hospitals were included by the NPR (6) when it was first formed in 1997; the registry significantly increased in size during the following years. Data from adult mental health facilities were included in 2001, while information from pediatric and adolescent mental health facilities was incorporated in 2003. The Finnmark County infirmaries, specialized interdisciplinary addiction treatment, emergency medical dispatch, and information on injuries handled at hospital emergency departments and municipal emergency rooms were all added to the registry between 2006 and 2010.

Launched in 2018, the National Health Data Programme intends to make health data accessible for government organizations, researchers, management, healthcare providers, and citizens. Every person has a right to access their own health information, including how it is handled. The Health Registry Act applies to the NPR (6) and the NRPHC (7). Studies that make use of data must adhere to the registries' objectives. The requested information must be as little detailed as feasible and relevant and necessary for achieving the goal of the research endeavor.

5. Engagement structures and processes

In terms of health surveillance, research, rules governing international public health, and membership in committees, the NIPH (2) works closely with the World Health Organization. The institute is home to two WHO Collaborating Centres, a number of WHO-affiliated laboratories, and coordinates Norway's involvement in IHR processes. Many of the institute's staff members serve on WHO committees, and it also donates employees and knowledge to the organization.

6. Knowledge Synthesis

No relevant documents were found.

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United Kingdom Public Health Surveillance Systems

1. Background

The [United Kingdom of Great Britain and Northern Ireland (UK) (1)](#), comprises four constituent countries: England, Scotland, and Wales (which collectively make up Great Britain), and Northern Ireland. The population of the UK estimate in mid-2020 was 67.1 million.

UK leaving European Union in December 2020

A Withdrawal Agreement saw the UK formally leave the EU on 31 January 2020. Accordingly, a new [EU-UK trade and co-operation deal (2)](#) took effect from 1 January 2021.

The withdrawal of the UK from the European Union made the UK no longer part of the [European Centre for Disease Prevention and Control (ECDC)](#)(3), the EU agency responsible for monitoring infectious diseases and providing public health advice to member states. A new *UK-EU Trade and Cooperation Agreement* took effect from January 1st, 2021. This had a major impact on Public health and health security co-operation, particularly on the sharing of UK public health surveillance data and information across borders.

Major Public Health System reform in 2020-2021

A major Public Health system reform took place in England in 2020. Public Health England (PHE), an executive Agency of England Department of Health and Social Care (DHSC), established in 2012 to provide leadership for health protection, including emergency preparedness, and health improvement, and to deliver public health services including surveillance, intelligence gathering, risk assessment, scientific and technical advice, specialist health protection and public health epidemiology and microbiology services, was abolished in August 18, 2020.

PHE abolition could be explained by mounting criticisms of its performance during the early stages of the COVID-19 pandemic, especially regarding the inability to test, track, and trace the disease, and due to the general unpreparedness of PHE to cope with a pandemic.

Public Health England (PHE) was replaced by the creation of 2 bodies named UK Health Security Agency (UKHSA) and Office for Health Improvement and Disparities (OHID):

> 1- **UK Health Security Agency** (UKHSA) (4), formally established on March-April, 2021. UKSHA is an executive agency sponsored by the Department of Health and Social Care (4), (5), (6), (7). "… with close ministerial oversight

while still permitting independence in the delivery advice. "(5), (6), (7). UKSHA was previously named National Institute for Health Protection (NIHP). UKSHA brought together Public Health England (PHE), National Health Services Test and Trace (NHS-TT) and the Joint Biosecurity Centre (JBC) (NHS-TT and JBC have the cutting-edge capabilities in data analytics and genomic surveillance with scale testing and contact tracing capability) under a single leadership team.

UKHSA responsibilities-functions:

- UKHSA is responsible for protecting every member of every community from the impact of infectious diseases, chemical, biological, radiological and nuclear incidents and other health threats;
- UKHSA is responsible for providing intellectual, scientific and operational leadership at national and local level, as well as on the global stage, to make the nation's health secure. A so-called system leader for health security with responsibility for pandemic preparedness and external threats across the UK (7).

2- **Office for Health Improvement and Disparities** (OHID), established on October 1, 2021 is located within the Department of Health and Social Care (DHSC). OHID was previously named Office for Health Promotion. OHID has the remaining functions of PHE' functions that are not supported by UKHSA, which regard wider Public Health (health improvement, and population health). OHID is jointly accountable to the Secretary of State for Health and Social Care and the Chief Medical Officer for England.

In November 2022, there were 4 public health Agencies in UK: *UK Health Security Agency (UKHSA, newly established on March-April 2021), Public Health Wales NHS Trust, Public Health Scotland* and *The Public Health Agency -Northern Ireland*. Except for the UKHSA, they are responsible for delivering health protection services for their respective part of the UK, for example surveillance or responding to an infectious disease incident.

There may be confusion [1] "because alongside being England's public health agency, UKHSA also carries out a small number of functions on behalf of all of the UK (England, Wales, Scotland, Northern Ireland). This includes being the UK's designated focal point for receiving alerts on health threats and epidemiological surveillance from the UK's public health agencies and the EU (ex.: to liaise with the European Centre for Disease Prevention and Control) (8, 9).

Because there have been major changes as of 2021 (10–13) and new structures have been put in place, the information presented in this summary needs to be validated as its availability changes as these new structures progress.

An overview of the vision, rationale and plans for the delivery of a surveillance strategy for PHE until its abolition can be found in: Public Health Surveillance, Towards a Public Health Surveillance, Strategy for England, 2012 (10), Guidance - Public Health England: Approach to surveillance (11), PHE Infectious Diseases Strategy 2020-2025, Addressing Urgent to the 21st Century (12) and Bridging the Gaps – Protecting the Nation from Public Health Treats – December 2021 – Deloitte Center for Health Solutions (13).

2. UK Public Health Protection and Health Security since 2021

As the UK left officially European Community in December 2020, the Government of the UK and the Devolved Administrations (England, Scotland, Wales, Northern Ireland) agreed to work together to establish common Public Health Protection and Health Security approaches in some areas that are currently governed by EU law, but that are otherwise within areas of competence of the UK Devolved Administrations or legislatures.

UK Public Health Protection and Health Security Governance

The *UK Public Health Protection and Health Security Framework (9)* (Minister of State for Health by Command of Her Majesty, October 2021) was intended to implement the optimum operating model and governance arrangements to strengthen strategic and operational cooperation between the UK Governments (Scotland, Northern Ireland, Wales and England), the Devolved Administrations and public health agencies of the UK (UK Health Security Agency, Public Health Wales NHS Trust, Public Health Scotland, The Public Health Agency -Northern Ireland).

Public Health Protection policy aims to protect populations from health threats such as communicable diseases and environmental hazards. Health Security policy aims to minimize vulnerability to acute public health events that endanger the collective health of populations living across geographical regions and international boundaries.

The *Framework* takes an "all hazards" approach to public health protection and health security, in particular it addresses the threats arising from infectious disease and non-infectious threats such as chemical and environmental hazards which cross borders. The *Framework* is in line with existing national policies and the International Health Regulations (2005) (9). It presents legislative and non-legislative mechanisms necessary for its implementation. All the details of these legislative and non-legislative agreements can be found in: *UK Public Health Protection and Health Security Framework (9)*. Specifically on page 13, a figure illustrating the proposed framework is provided.

Roles and responsibilities of the Government, the UK Public Health agencies and ministers related to the Governance proposed framework

The following text in light grey is quoted from the *UK Public Health Protection and Health Security Framework (Minister of State for Health by Command of Her Majesty, October 2021)*, only the footnotes are not included (9).

" UK Government and Devolved Administrations

Hold day-to-day discussions on the policy covered by the framework and inform and advise Ministers with the rationale for the approach taken within a policy area (e.g. a UK/GB [Great-Britain]-wide approach), or why divergent policies may be necessary. Officials across administrations should convene to discuss policy issues as appropriate and to keep colleagues regularly informed of any ramifications that policy will have across administrations. If a decision cannot be reached by officials at a working level, issues can be escalated to senior officials in line with the framework's dispute avoidance and resolution mechanism.

Senior officials (e.g. Deputy Directors and Directors) provide strategic direction on the policy areas governed by the framework. Key operational decisions tend to be taken by senior officials working within the UK public health agencies as they are responsible for delivery, however on occasion such decisions may also be taken by officials working for UK Government or the Devolved Administrations. Senior officials may review an issue as per the framework's dispute avoidance and resolution mechanism if officials are not able to decide on an approach, or if UK Health ministers have rejected advice from officials in the first instance, in another attempt to reach a decision. Senior officials should convene to discuss issues as appropriate, either in the bi-annual meetings of the UK Health Protection Committee or on an ad hoc basis.

UK Public Health Agencies

In the development of this framework, UKG [United Kingdom Government]and the Devolved Administrations have carried out extensive engagement and consultation with the corresponding public health organisations. (who are also Parties to the framework).

These are :

- United Kingdom Health Security Agency
- Public Health Wales NHS Trust
- Public Health Scotland
- The Public Health Agency (Northern Ireland)

The listed public health organisations have an integral function in the operational nature of the framework due to their role in surveillance, early alerting, management, prevention and control of serious cross-border threats to health. As such, their inclusion and cooperation are essential to the functioning of the framework.

Officials working within the UK public health agencies provide technical and scientific advice to officials working in UK Government or within Devolved Administrations, who are then responsible for presenting policy recommendations to Ministers for decision. Senior officials within the UK public health agencies are responsible for taking key operational decisions and for discharging their responsibilities as delivery organisations.

Chief Medical Officers

The Chief Medical Officer (CMO) is the most senior government adviser on matters pertaining to public health in each of the four UK nations. There are four Chief Medical Officers (each with deputies) which represent and advise England (and the UK Government), Scottish Government, Welsh Government, and the Northern Ireland Executive.

Ministers

Ministers may receive advice from their officials either concurrently across administrations as issues arise or in the course of business as usual for individual administrations. Ministers may accept advice, or they may reject it. If work is remitted to senior officials and an issue remains unresolved, the issue may be escalated to ministers. Where ministers are considering issues as part of the framework's dispute avoidance and resolution mechanism this could be via several media, including inter-ministerial meetings or by correspondence.

Senior Ministers

Terminology distinguishing ministerial hierarchy is not universal across administrations. Where there is a distinction, it is likely that advice presented to a minister who is not a senior minister, will be copied to a senior minister who may provide an additional steer if needed. In some circumstances the senior minister will also be the most appropriate minister to make a decision and therefore the distinction between senior minister and Minister will not be relevant. In the case of UKG [United Kingdom Government], a senior minister would be a Secretary of State (SofS)."

Role and responsibilities of existing and new bodies of the Governance proposed Framework

The following text in light gray is quoted from the UK Public Health Protection and Health Security Framework (9), only the footnotes are not included.

"There are a number of new and existing groups made up from representatives of the Parties to the framework that will be responsible for ensuring its effective application, including with respect to decision making and dispute resolution. These include:

The Four Nations Health Protection Oversight Group

This is a senior professional and official level oversight group of representatives from all parties to the framework. The Oversight Group will meet quarterly to discuss operational information exchange, mutual support, sharing of best practice and provide oversight to operational working groups to uphold the JMC(EN) [Joint ministerial committee (England)]

framework Principles. The Oversight Group will be the main operational forum responsible for the delivery of the framework. The Oversight Group will also be responsible for the development of work plans to deliver the agreed work programmes, which may involve the oversight of time limited Technical Forums and/or Task & Finish Groups responsible for delivery of relevant work, as well as the UK Emergency Preparedness, Protection and Response (EPRR) Group. The secretariat for this group is currently carried out by Public Health England.

The UK CMOs Group

This group consists of each of the UK's Chief Medical Officers (CMOs). The group meets quarterly and provides a forum for the UK CMOs to discuss matters of mutual interest or areas where four nation coordination is required, including on matters relating to public health protection policy. The secretariat for this group is carried out by the UK Department of Health and Social Care. As set out in section 3.8, the framework will employ a principle of subsidiarity to decision making and dispute resolution. It is not expected that the UK CMOs group will have a prominent role in the application of the framework, this will be carried out by the Four Nations Health Protection Oversight Group with oversight from the UK Health Protection Committee. However, for issues that cannot be resolved in the UK Health Protection Committee, or lower bodies, the UK CMOs group can be drawn upon, where appropriate, to aide in resolving issues. In addition, specific policy areas or topics addressed within the framework could be tabled for discussion, consideration and advice at meetings.

The UK Health Protection Committee

This is a senior official (Director) level committee consisting of representatives from all parties to the framework. The Committee will meet twice a year to discuss health protection policy and make joint decisions that uphold the JMC(EN) [Joint ministerial committee (England)] frameworks Principles. The Committee will be the main senior official committee responsible for the application of the framework and will ultimately be accountable for its delivery. It is proposed that the Committee would fulfil functions under the Health Security (EU Exit) Regulations 2021, for example, reviewing and, where appropriate, making a recommendation to the Secretary of State to amend the list of communicable diseases and related special health matters that are subject to UK-wide surveillance. The Secretariat for the Committee will be carried out by the UK Health Security team at the Department of Health and Social Care."

UK Health Protection Committee (according to more recent data found)

The *UK Health Protection Committee* has been newly established (as of November 2022). It consists of one member for each of England, Scotland, Wales and Northern Ireland representing a relevant Minister and one member from each of the four UK public health

agencies (8). The purpose of this Committee is to provide a forum which allows for the four public health agencies of the UK to collaborate on health protection policy (8). According to some regulations (possibly The Health Security -EU Exit- Regulations 2021), the UK Health Protection Committee's main functions would be (8, 9, 14, 15, 16):

To review and provide advice to the Secretary of State on the list of communicable diseases and related special health matters that are subject to UK-wide surveillance;

- To maintain the list of case definitions to be used when the UK public health agencies share information with each other collected as part of their epidemiological surveillance;
- To establish and review procedures for the collection of surveillance data; and
- To maintain the *UK Focal Point Communications Protocol* (*UK -Focal Point communications protocol on serious cross border threats to health)* (16)*.*

And should:

- Have a main role in determining which diseases are subject to UK-wide surveillance and in ensuring that adequate procedures are in place for the collection of surveillance data.
- Be responsible for ensuring constructive and effective cooperation between all parts of the UK on health security policy.
- Have a very limited role with respect of early alerting, which instead is carried out in line with the operational protocol *UK Focal Point communications protocol on serious cross border threats to health* (16)*.*

Wales Public Health Protection and Health Security

In Wales, there was a *Provisional common Framework : Public health protection and health security* published in July 2022 (17) .

No health protection and health security frameworks on Scotland and Northern Ireland had been found yet.

3. UKSHA Public Health Surveillance Governance

UKSHA establishment in 2020 has led to changes to public health governance in England, particularly surveillance and protection activities functions, and also had implications for those in Scotland, Wales and Northern Ireland (6).

"UKHSA will lead on health protection and security activity for England, and will also take over from the PHE and NHS Test and Trace work those organisations already carry out on a UK basis, either as reserved functions or under collaborative arrangements with the Scottish, Welsh and Northern Ireland administrations (for example, the Joint Biosecurity Centre). It will not replace the public health agencies in the other 3 UK countries, but will operate a close collaborative relationship with them."

UKSHA Governance, structure and processes in 2022

Statutory functions to be exercised by the UKHSA

The following text in light gray is quoted from the [Annex A: statutory functions to be exercised by the UK Health Security Agency (18)](#).

The statutory functions that the UK Health Security Agency (UKHSA) "will" carry out or support on behalf of the Secretary of State for Health and Social Care:

> " Section 2A of the National Health Service Act 2006 ("the 2006 Act") – a duty to take such steps as Secretary of State considers appropriate to protect the health of the public in England
> - Section 2B of the 2006 Act – a power to take such steps as the Secretary of State considers appropriate for improving the health of the people of England
> - paragraph 12 of Schedule 1 to the 2006 Act – a power to provide a microbiological service in England
> - Section 58 of the Health and Social Care Act 2012 – a duty to take such steps as the Secretary of State considers appropriate for the purpose of protecting the public in Scotland, Wales and Northern Ireland from radiation
> - paragraph 13 of Schedule 1 to the 2006 Act – a power (also available to NHS England or a clinical commissioning group) to conduct, commission or assist research in relation to public health in order to benefit the NHS
> - as a Category 1 responder under the Civil Contingencies Act 2004 (CCA) in respect of emergency planning, the response and resilience functions for public health. For the avoidance of doubt, these duties under the CCA shall be delegated from the Secretary of State to officials in UKHSA who are responsible for emergency planning, resilience and response, such that those officers operate as if UKHSA itself were a category 1 responder under the CCA
> - NHS Health Act 2006 – Section 251 (patient identifiable data), insofar as collecting patient identifiable data for disease and vaccine surveillance is concerned"

UKSHA governance structure can be found here:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1112606/UKHSA_Senior_Leadership.pdf (19)

UKSHA leadership structure can be found here:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1112606/UKHSA_Senior_Leadership.pdf (20)

Organization of governance in UK Public Health Surveillance

In 2022, there were 4 main public health bodies in the UK (21):

      1- UK Health Security Agency (UKHSA)
      2- Public Health Scotland

3- Public Health Wales Trust
4- The Public Health Agency Northern Ireland

According to the categorisation of Public Health responsibilities (21), among these 4 Public Health bodies, in figure 1, UK HSA categorises 215 responsibilities into 4 broad groups of Public health surveillance and health protection :

i) exposure to chemicals (82 health conditions responsibilities)
ii) environmental health hazards (16 health conditions responsibilities)
iii) health emergencies (13 health conditions responsibilities)
iv) infectious diseases (104 health conditions responsibilities).

Some of these responsibilities are shared by all four public health bodies; some are shared by fewer; and others fall just to one body. Relationship between UKHSA and 3 others regarding public health activities need to be specified and clarified.

Below provides some detail about how these responsibilities are distributed across the four UK public health bodies: UK health Security Agency (England), Public Health Scotland, Public Health Wales Trust, The Public Health Agency Northern Ireland.

The contrast between infectious diseases and chemicals is most striking. A large number of health hazards are included in each of these two categories. In the case of infectious diseases, the vast majority of the diseases fall within the responsibility of all four bodies. By contrast, UK HSA has responsibility for most of the chemical hazards as shown in the distribution of Public Health responsibilities illustrated by figure 2 (21). The data used in the figure has been extracted from public sources, namely websites, and was in the preliminary stage of validation when extracted.

The following text (21) in light grey is quoted from the blog produced by public health researchers Jacqueline Johnson, Peter Littlejohns and Albert Weale entitled *Designing public health governance: its challenges, consequences and key lessons for the Covid-19 Public Inquiry*.

"The importance of collaboration across organisations and jurisdictions. An important implication of the same responsibility being shared among different organisations is that inter-organisational collaboration becomes important. When a new organisation is created, people often draw attention to the need to meld together the different cultural orientations of its different components, as has happened with bringing together *Test and Trace* and *Public Health England* in the new UK Health Security Agency. This is obviously a major challenge. However, given that health hazards do not recognise administrative and political boundaries, it is just as important that a territorially based organisation be able to work with similar territorially based organisations in other jurisdictions. For example, the UKHSA

provided advice to the Chief Medical Officers in UK jurisdictions on the level of the Covid-19 alert in late May 2022.

Further, the need for inter-organisational collaboration is also relevant in relation to the role of the Office for Health Improvement and Disparities, which was created in the process of setting up the UKHSA and sits within the Department of Health and Social Care. Though still under development, at present, it looks as though much of its work will be devoted to health promotion and issues such as obesity. However, it also has responsibility for air pollution. We know that exposure to the health hazards of urban air pollution has a clear social gradient. In principle, then, responsibility for such social inequalities should feed back into the scientific work of the UK HSA concerned to identify the pathways by which ill heath arises from pollution."

UKSHA Surveillance scheme in 2022

In 2022, there were 4 Public Health Surveillance systems (A, B, C, D) found (of which 3 -A, B, C- belong to UKSHA) and a variety of Health protection reports (E belongs to UKSHA).

> A- Syndromic surveillance: systems and analyses-UKHSA
>
> B- National Flu and COVID-19 report, monitoring COVID-19 activity, seasonal flu and other seasonal respiratory illnesses-UKSHA
>
> C- Environmental Public Health Surveillance System (EPHSS) – UKHSA
>
> D- UK Public Health Rapid Support Team (UK-PHRST) Infectious diseases (funded by UK aid from the Department of Health and Social Care)
>
> E- Health protection report publication (belongs to UKSHA).

A- Real-time syndromic surveillance UKHSA

The UKHSA real-time syndromic surveillance team (ReSST) coordinates 5 national syndromic systems. Collect and analyse anonymised health data from several sources, looking for trends indicating higher-than-usual levels of illness and publish weekly summary (22) of trends and important public health messages draws information from each of the 5 UKHSA syndromic surveillance systems (23), to keep public health professionals up to date. The 5 UKSHA syndromic surveillance systems are:

  i.   Remote health advice syndromic surveillance system
  ii.   General practitioner in hours syndromic surveillance system
  iii. General practitioner out-of-hours syndromic surveillance system
  iv.   Emergency department syndromic surveillance system
  v.   National ambulance syndromic surveillance system

B- National influenza and COVID-19 surveillance system -UKSHA

Report and monitor COVID-19 activity, seasonal flu and other seasonal respiratory illnesses in England. The *Weekly national Influenza and COVID-19 surveillance report (24)* summarises the information from the surveillance systems which are used to monitor coronavirus (COVID-19), influenza, and other seasonal respiratory viruses in England.

C- Environmental Public Health Surveillance System (EPHSS) - UKHSA

The Environmental Public Health Surveillance System (25) (EPHSS) was officially launched in 2020. Environmental public health is concerned with:

- environmental hazards (all the physical, chemical, and biological factors external to a person, capable of causing harm)
- the environmental exposure to those hazards
- the possible resultant health outcomes (for example, asthma caused by air pollution).

EPHSS is one of UKHSA's main surveillance projects. The system develops a comprehensive and systematic approach to identify, acquire, collate and analyse data intelligence and information on environmental hazards, exposures and health outcomes.

For UKSHA, Environmental public health tracking (EPHT) and environmental public health surveillance system (EPHSS) is the use of public health information to support the management of environmental and other hazards. The specific role of EPHT is to collect, collate and analyse environmental health data to inform interventions to reduce the burden of disease. UKHSA's EPHSS receives regular data feeds from selected databases provided by partnering public sector agencies. This data is collated and integrated within the system to provide users a more complete picture. This system helps to collect and collate environmental hazard and health outcome data.

In 2021, EPHSS had 3 modules and additional interfaces with other data systems that are supposed to be developed in the future. The 3 actual modules are:

i) Environmental Events Surveillance (EES): EES provides surveillance of environmental events and incidents with the potential to impact health, occurring from 1 January 2015 onwards, affecting the population in England. Organisations will be able to use this module to feed in data on environmental events and incidents and produce surveillance reports on trends and summaries. Currently, data is imported from UKHSA's Chemical Incident Response and Information System (CIRIS), and used for incident management by UKHSA's Environmental Hazards and Emergencies Department.

ii) Lead Exposure in Children Surveillance System (LEOCSS): LEICSS is a sentinel, passive, laboratory-based surveillance system. Cases are defined as children less

than 16 years and resident in England with a blood lead concentration of greater than or equal to 0.24μmol/L (greater than or equal to 5 μg/dL), with surveillance data available from 2014 onwards. LEICSS can be interrogated to produce reports on the number of cases, demographics, and blood lead concentrations recorded over different time periods

iii) Met Office Data Interface (MODI): MODI allows access to Met Office Integrated Data Archive System (MIDAS) data sets which are derived from observational records, measured and quality-controlled from hundreds of weather stations in the UK. This data stream has been built to provide data for the public health community.

MIDAS covers all of the UK. Data can be prepared by single point site (that is, longitude and latitude coordinates), multiple point sites, or rectangular grid area. Indicators can be processed over time at point sites, or at a given time over a grid area. Data includes multiple meteorological variables, for example temperature, rainfall, wind speed, and pollen count.

UKHSA's Environmental Public Health Tracking (EPHT) programme has led the development of a new web-based surveillance system for environmental exposures called the Environmental Public Health Surveillance System (EPHSS). EPHT work is reported publicly. There is national public health bulletin for England and Wales from the UK Health Security Agency (UKHSA).

D- UK Public Health Rapid Support Team (UK-PHRST) Infectious diseases (funded by UK Aid from the Department of Health and Social Care)

The UK-Public Health Rapid Support Team is a key international partner in infectious disease outbreak detection, prevention, preparedness and response; operational research; and capacity strengthening.

This is an innovative partnership between the UK Health Security Agency and the London School of Hygiene & Tropical Medicine, funded with UK aid by the UK Department of Health and Social Care.

The following text in light grey is quoted from _PHE Infectious Diseases Strategy 2020-2025, Addressing Urgent to the 21st Century (12)_.

"UK-PHRST provides and coordinates the country's public health response to outbreaks of infectious disease in low- and middle-income countries, helping to prevent these events from becoming larger public health emergencies.

The core of the UK-PHRST is a full-time team consisting of specialists in epidemiology, laboratory microbiology, infection prevention and control, clinical case management and

research, social science, data management and logistical support who are available to
deploy to disease outbreaks within 48 hours."

E. Publication of Health Protection Reports

The Health protection reports comprise:

> i) Routine reports, and commentary, on data from health protection surveillance schemes, comprising (reports on infections, vaccine coverage reports, microbiological and epidemiological data and associated commentary;
> ii) reports from UKHSA's Environmental Health Protection Surveillance System
> iii) a digest of news on infections and other health protection topics.

Examples of content published in the Health Protection Reports available from the following sources (26): i)STIs, HIV and other BBVs; Immunisation; ii) Bacteraemia and healthcare associated infections; iii) Respiratory; iv) Zoonoses; v) Chemical and environmental hazards; vi) Enteric; vii)Creutzfeldt-Jakob disease (CJD) ; viii) Emerging infection hazards and outbreak investigation reports

UKSHA Public Health Protection Services Regional Structure in 2022

UKHSA pan-regional local health protection services (27, 28): it provides expert public health advice, support and services tailored to local needs. The postcode has to be used to find a local contact and a Regional Health Protection Teams:

Pan-regional locally-based teams are the gateway to most of UKHSA's local health protection services. They:

- coordinate UKHSA's local activities to improve health outcomes for local populations. The Regional Health Protection Teams can assist with specific health protection enquiries, such as reporting notifiable diseases and causative organisms.
- work across local and national strategies, policies and actions that affect the health of their populations
- are supported by UKHSA colleagues in specialist microbiology services, which provide laboratory analysis facilities and field epidemiology teams

Regional Health Protection Teams :

- provide local health protection services, expertise, response and advice to the local National Health Service (NHS), local authorities and other partners
- lead UKHSA's contribution to emergency planning, resilience and response
- support local action to promote and protect health and wellbeing, and create a health care system which improves health and reduces inequalities
- work with the Association of Directors of Public Health (ADPH) and Local Government Association (LGA) to help spread innovation

- ensure UKHSA staff and partners can access high quality data, statistics and expert knowledge
- provide specialist support to prevent and reduce the effect of infectious diseases, chemical and radiation
- do local disease surveillance and maintain alert systems
- investigate and manage health protection incidents and outbreaks
- deliver and monitor national action plans for infectious diseases at local level.

4. Surveillance performance monitoring and evaluation

No recent data was found about surveillance monitoring and evaluation methods except for an *End-point evaluation of the UK Public Health Rapid Support Team (UK-PHRST) (29)*. Final report, 28 April 2021, Information technology and Agricultural Development (ITAD).

5. Engagement structures and processes

No relevant documents found.

6. Knowledge Synthesis

No relevant documents found.

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United States Public Health Surveillance Systems

1. Background

The United States of America (USA) is a federation of 50 states, a federal district, five major unincorporated territories, and nine Minor Outlying Islands. With a population of over 331 million, life expectancy at birth of 76.1 years in 2021 ([1](#)).

The Centers for Diseases Control and Prevention (CDC) (2) defines public health surveillance as:

"the collection, analysis, and use of data to target public health prevention represents the foundation of public health practice."

According to the Health Systems in Transition – United States Health System Review 2020 (3), The 50 states that make up the United States' federal system of government are given a lot of power, and historically, neither the federal government nor the states have been particularly interested in central planning or control. The USA has a population that is quite diversified and has numerous healthcare systems. Varying population groups experience quite varying levels of health. The Centres for Disease Control and Prevention (CDC) are primarily responsible for public health surveillance systems. However, a number of additional organizations support the efforts in collecting various data:

- Agency for Healthcare Research and Quality (AHRQ)
- Agency for Toxic Substances and Disease Registry (ATSDR)
- Food and Drug Administration (FDA)
- Health Resources and Services Administration (HRSA)
- Indian Health Service (IHS)
- National Institutes of Health (NIH)
- Substance Abuse and Mental Health Services Administration (SAMHSA)
- Veterans Health Administration (VHA)

2. Policies and strategic plans

When it comes to policies and strategic plans, it's relevant to cite the Data User Agreement (4): the National Center for Health Statistics (NCHS) (5) *"conducts statistical and epidemiological activities under the authority granted by the Public Health Service Act (42 U.S.C. § 242k). NCHS survey data are protected by Federal confidentiality laws including Section 308(d) Public Health Service Act [42 U.S.C. 242m(d)] and the Confidential Information Protection and Statistical Efficiency Act or CIPSEA [Pub. L. No. 115-435, 132 Stat. 5529 § 302]. These confidentiality laws state that the data collected by NCHS may be used only for statistical reporting and analysis. Any effort to determine the identity of*

Case surveillance, a cornerstone of public health practice, is also handled by the National Notifiable Diseases Surveillance System (NNDSS) (6). It all begins with local, state, and territorial public health departments. Which diseases and ailments must be reported depends on local laws and regulations.

About 120 of these notifiable illnesses and disorders are monitored nationally by the CDC. Public health officials can utilize the data collected from case surveillance to identify where diseases are spreading, how they might be prevented, and which populations are being affected the most severely. The characteristics of the disease's geographic distribution, its demographic, clinical, and epidemiologic characteristics, as well as its clinical course and the care it got, are all included in this data. To gather the data required to track, manage, and prevent various diseases and disorders in their communities, the health departments collaborate with hospitals, laboratories, and other partners. Infectious infections, foodborne outbreaks, and non-infectious conditions are among these ailments (6).

The national case surveillance process is made up of two components:

1. *"In case reporting, hospitals, healthcare providers, and laboratories report positive lab results or information on people diagnosed with a certain condition to appropriate health departments according to state disease reporting laws. Case reporting is mandatory.*
2. *In case notification, state and local health departments send de-identified data about confirmed cases of certain diseases and conditions that are tracked nationally to the CDC. Case notification is voluntary (6)"*

A list of Surveillance Information for State, Tribal, Local, and Territorial Public Health Professionals (7) includes systems with public-facing websites. In order to achieve early detection and warning, contribute to overall situational awareness of the health aspects of an incident, and facilitate better decision-making at all levels, biosurveillance is the process of gathering, integrating, interpreting, and communicating crucial information related to all-hazards threats or disease activity affecting human, animal, or plant health.

Behavioral Risk Factor Surveillance System (8): **It is** the top national system for health-related telephone surveys that gathers information on state-level risk behaviors, chronic illnesses, and usage of preventative services among Americans.

Technology, Standards, and Regulations Used for Case Surveillance:
- *"Electronic case reporting (eCR) (9) is the automated, real-time exchange of case report information between electronic health records (EHRs) and public health*

agencies. It moves data quickly, securely, and seamlessly from EHRs in healthcare facilities to state or local health departments. eCR enables immediate feedback from public health agencies to healthcare facilities about reportable conditions and possible outbreaks, which is especially critical during public health emergencies.

- *Electronic laboratory reporting (ELR) (10) is the automated transmission of laboratory reports from laboratories to state and local public health departments. ELR improves the reporting of notifiable conditions, benefiting public health response to outbreaks.*
- *National Electronic Disease Surveillance System (NEDSS) (11) sets architectural standards for integrated surveillance information systems in reporting jurisdictions. Systems based on these standards are primary data sources. Jurisdictions use these information systems to receive data on reportable conditions in eCRs from healthcare and ELRs from laboratories. They add information collected during case investigations and disease control activities. Jurisdictions also use these systems to create and send standards-based case notifications."*

3. Governance structures and processes

In terms of governance, it's important to note that the CDC's ability to obtain crucial data required for situational awareness and decision-making is constrained by its data authority and duty to undertake surveillance, although exceptions have been put into place for COVID-19 (12)

"CDC (13) conducts case surveillance through the National Notifiable Diseases Surveillance System (NNDSS) (14). In the case surveillance process, about 3,000 health departments gather and use data on disease cases to protect their local communities. Through NNDSS, CDC receives and uses these data to plan and defend the country from health threats. CDC programs responsible for national surveillance, prevention, and control of infectious and noninfectious conditions are found in the following centers:

• Center for Global Health (CGH);
• National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP);
• National Center for Emerging and Zoonotic Infectious Diseases (NCEZID);
• National Center for Environmental Health (NCEH);
• National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (NCHHSTP);
• National Center for Immunization and Respiratory Diseases (NCIRD); and
• National Institute for Occupational Safety and Health (NIOSH)."

"Furthermore, the Division of Health Informatics and Surveillance (DHIS) (15) provides leadership in surveillance and informatics. It supports CDC and its partners with state-of-the-art information systems, capacity-building services, and high-quality data to guide public health decisions and actions. The Surveillance Programs and Systems include:

- The *National Notifiable Diseases Surveillance System (NNDSS)* *(6) for notifiable disease surveillance systems.*
- The *Electronic Case Reporting (eCR)* *(16) moves data quickly, securely and seamlessly from electronic health records in healthcare facilities to public health agencies.*
- The *National Syndromic Surveillance Program (NSSP)* *(17) and its biosensing platform advance the timely exchange of syndromic data to improve U.S. situational awareness and responsiveness to events.*
- The *National Electronic Disease Surveillance System Base System (NBS)* *(18), is an integrated information system that helps local, state, and territorial public health departments manage reportable disease data and send notifiable disease data to CDC."*

"Lastly, the *National Center for Health Statistics (NCHS)* *(19) collects, analyzes, and disseminates timely, relevant, and accurate health data and statistics. The products and services inform the public and guide program and policy decisions to improve health."*

4.   Surveillance performance monitoring and evaluation

Based on the findings from the strategy to improve the agency's public health data surveillance capabilities over 3 to 5 years (20), the CDC collaborates with thousands of entities at the federal, state, territorial, local, and tribal levels in the United States to collect surveillance data. States are in charge of reporting diseases, and they give the CDC anonymized data. As a result of the CDC's simultaneous maintenance of more than 100 surveillance systems for various purposes, partners are burdened with reporting requirements and duplication of effort, inconsistencies in the data elements, and several information technology systems are required. At the director's request, CDC started developing and implementing a plan in 2014 to enhance the organization's public health data surveillance capabilities over the next three to five years. The decision came in response to demands from interested parties, such as Congress, state public health officials, and federal advisory groups, for a plan to revamp and update the CDC's surveillance methods and systems.

"Three goals and ten specific aims work as building blocks in the strategy:
- *Goal 1 Enhance the accountability, resource use, workforce, and innovation for surveillance at CDC and in support of federal and state, territorial, local, and tribal agencies.*
- *Goal 2 Accelerate the use of emerging tools and approaches to improve the availability of quality and timely surveillance data.*
- *Goal 3 Demonstrate early success through four crosscutting surveillance system initiatives to improve public health surveillance outcomes."*

Several evaluation frameworks are available such as:

- [Framework for Evaluating Public Health Surveillance Systems for Early Detection of Outbreaks](#) (21).

It aims at enhancing the ability to make decisions about the use of surveillance to find outbreaks. It also enhances information sharing about techniques for better early outbreak detection by employing standardized evaluation methodology, including a description of system architecture and operation.

- [Updated Guidelines for Evaluating Public Health Surveillance Systems](#) (22):

Based on the CDC's Framework for Programme Evaluation in Public Health, it offers current recommendations for evaluating surveillance systems. It also describes how epidemiologic surveillance systems are evaluated. To make the best use of available public health resources, it seeks to promote the establishment of effective monitoring systems. It can be used as a reference by individuals who are already familiar with the evaluation process and as a guide for those doing their first evaluation.

Evaluation is based on the following attributes:

- *"Usefulness: A public health surveillance system is helpful if it contributes to preventing and controlling adverse health-related events, including an improved understanding of the public health implications of such events. A public health surveillance system can also be useful if it helps to determine that an adverse health-related event previously thought to be unimportant is actually important. In addition, data from a surveillance system can contribute to performance measures, including health indicators used in needs assessments and accountability systems.*
- *Simplicity: Refers to the system's structure and ease of operation. Systems should be as simple as possible.*
- *Flexibility: Ability to adapt to changing information needs or technological operating conditions with little additional time, personnel, or allocated funds.*
- *Data Quality: Refers to the completeness and validity of the data recorded in the system.*
- *Acceptability: Reflects the willingness of persons and organizations to participate in the system.*
- *Sensitivity: Can be considered on at least 2 levels: at the level of case reporting, sensitivity refers to the proportion of cases of a disease (or event) detected by the system; on another level, it can refer to the ability to detect outbreaks over time. In an evaluation of surveillance systems, completeness is often synonymous with sensitivity.*
- *Predictive Value Positive: The proportion of reported cases that are the event under surveillance.*
- *Representativeness: A representative public health surveillance system provides an unbiased indication over time and distribution of the extent of the problem measured by the surveillance system among the target population.*

- **Timeliness:** *Reflects the speed between steps in a system.*
- **Stability:** *Refers to the system's reliability (ability to collect, manage, and provide data without failure) and availability (ability to be operational when needed)."*

Strategies for Improvement — Public Health Surveillance and Data:

1- Data Modernization Initiative (23)

The modernization of data throughout the federal and state public health environment, a multi-year, multi-billion-dollar endeavor. The main objective of the CDC's Data Modernization Initiative (DMI) is to produce better, quicker, and more useful insights for public health decision-making at all levels. The goal is to establish a single public health community that can interact actively with the healthcare system, engage the public in meaningful dialogue, increase health equity, and possess the tools necessary to safeguard and advance health.

The DMI identifies five major objectives that will improve and harmonize public health data:
- *"Building the Right Foundation by improving data collection, analysis, and sharing at CDC and across a set of core public health data sources used for all diseases and conditions through: - Real-time Data Collection - Cloud-Based Services – Automation - State and Local Capabilities.*
- *Accelerating Data into Action by tapping into more data sources, promoting health equity, and increasing capacities for scalable outbreak response, forecasting, and predictive analytics. CDC is expanding its platform for multiple respiratory illness surveillance to better prepare the USA for the next outbreak or pandemic – including from diseases like flu, measles, mumps, and Legionnaires' Disease.*
- *Developing a State-of-the-Art Workforce by increasing the ability to use next-generation skills for actionable public health insights through recruitment, training, forecasting future needs and state and local support.*
- *Supporting and Extending Partnerships by ensuring transparency, addressing policy challenges, and solving problems together through: Policies: work across the federal government and with partners on policies that support the exchange and use of data between CDC, jurisdictions, partners, and data providers. - Access: increase access to data modernization plans and progress to increase participation and alignment. - Data Use Agreements: increase the use of standardized data use agreements, allowing jurisdictions and partners to seamlessly access more datasets that enable research and inform decision-making nationwide. - Collaboration: work with research and academic partners on innovative projects that streamline information flow, reduce burden on data providers, and accelerate data from the local to the federal level.*
- *Managing Change and Governance by making sure resources are used wisely, monitoring progress, and supporting strategic innovation for new ways of thinking*

and working through governance, monitoring and evaluation, procurement and change management."

2- [Preparing for the Future](#) (24)

The strategic plan concentrated on what CDC must do to increase usage of existing data standards, lessen reporting costs on state and local health departments, and lower the number of stand-alone systems. To adapt to the shifting environment that the agency and public health must navigate, CDC and its partners continue to address current problems as well as broader problems with health data.

Four initiatives—notifiable illnesses, syndromic surveillance, mortality reporting, and electronic laboratory reporting—were noted as needing improvement as part of this investigation. The metrics set in these areas have been fulfilled or even beyond, which is a significant success. This development affects the CDC, the states, and numerous other partners. The approach also inspired the development of new strategic priorities along the road, such as initiatives to assist local electronic case reporting and construct a platform for surveillance data.

5.   Engagement structures and processes

No relevant documents found.

6.   Knowledge Synthesis

Patients, healthcare teams, and public health agencies can benefit from the CDC's case surveillance resources and guidance. These resources include health information for patients in various formats, such as websites, fact sheets, toolkits, brochures, and pamphlets; guidance for healthcare teams, such as clinical information and research; publications like the *[Morbidity and Mortality Weekly Report (MMWR) (25)](#)*; and support for public health agencies, such as guidance. The Health Alert Network (HAN) and Epi-X Network are other channels via which the CDC issues notifications.

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European Centre for Disease Prevention and Control Public Health Surveillance Systems

1. Background

2005 saw the founding of the <u>European Centre for Disease Prevention and Control (ECDC)</u> (1). It is a body established by the European Union (EU) to improve the continent's barrier against infectious diseases.

The ECDC aims to recognize, evaluate, and disseminate present and new communicable disease hazards to human health. To achieve these goals, it: a) looks for, gathers, collates, evaluates, and disseminates pertinent scientific and technical data; b) offers independent scientific opinions and scientific and technical assistance, including training; c) provides information to the European Commission, EU countries, EU agencies (like the European Food Safety Authority and the European Medicines Agency), and international organizations working in the field of public health like the World Health Organization; d) administers specialized surveillance networks; e) shares knowledge, skills, and best practices; and f) enables the creation and execution of cooperative activities.

ECDC collaborates with national health protection organizations from all across Europe to build and develop the continent's disease surveillance and early warning systems in order to accomplish this aim. Working with specialists around Europe, the ECDC combines Europe's health expertise to produce reputable scientific assessments about the dangers posed by ongoing and newly emerging infectious illnesses.

The ECDC disease-specific work is organized into <u>7 horizontal programs</u>:
- *<u>Antimicrobial Resistance and Healthcare-associated Infections</u> (2)*
- *<u>Emerging and Vector-borne Diseases</u> (3)*
- *<u>Food- and Waterborne Diseases and Zoonoses</u> (4)*
- *<u>Influenza and other Respiratory Viruses</u> (5)*
- *<u>HIV, Sexually Transmitted Infections and viral Hepatitis</u> (6)*
- *<u>Tuberculosis</u> (7)*
- *<u>Vaccine-preventable Diseases</u> (8)*

According to the <u>data quality monitoring and surveillance system evaluation document</u> (9), *"public health surveillance is the systematic ongoing collection, analysis, interpretation and dissemination of highly structured information ('indicators') for public health action referred to as Indicator-based surveillance. It is complemented by event-based surveillance, the detection, verification, analysis, assessment and further investigation of potential public health threats ('events')."*

2. Policies and strategic plans

ECDC handles surveillance data from all 27 EU Member States, Iceland, and Norway on about 60 communicable diseases and associated special health issues.

The [Regulation (EC) No 851/2004: establishing a European centre for disease prevention and control](10) creates the ECDC, an organization for the prevention and control of illness in Europe. It outlines the organization, membership, and operational arrangements for the center.

ECDC must receive "in a timely manner the available scientific and technical data relevant to its mission" from EU Member States in accordance with Regulation (EC) 851/2004, the foundation regulation of the organization.

ECDC offers [The European Surveillance System (TESSy)](11) to gather, analyze, and disseminate surveillance information on infectious illnesses throughout Europe. The TESSy, a password-protected pseudonymized database hosted by ECDC, is the technical framework for web-based data submission, storage, and dissemination. Article 11.2 of the establishing legislation mandates that ECDC "develop appropriate procedures to facilitate consultation and data transmission and access" in cooperation with the Commission and the authorized organizations of the Member States. The Management Board accepted the present practices in November 2011 (MB23-17 Policy on data submission, access, and use of data within TESSy).

"General surveillance objectives are to:
- *Monitor trends in communicable diseases over time and across Member States to assess the present situation, respond to rises above warning thresholds and facilitate appropriate evidence-based action;*
- *Detect and monitor any multinational communicable disease outbreaks with respect to source, time, population and place in order to provide a rationale for public health action;*
- *Contribute to the evaluation and monitoring of prevention and control programs targeted at communicable disease surveillance in order to provide the evidence for recommendations to strengthen and improve these programmes at the national and European level;*
- *Identify population groups at risk and in need of targeted prevention measures;*
- *Contribute to the assessment of the burden of communicable diseases on the population using such data as disease prevalence, complications, hospitalisation and mortality;*
- *Generate hypotheses on (new) sources, modes of transmission and groups most at risk and identify needs for research and pilot projects.(10, 11)"*

Data submission and subsequent validation (12) is the responsibility of the ECDC's illness programs, which are coordinated by European networks of disease experts that are nominated by Member States. At the European level, surveillance data are primarily case-based and include demographic, clinical, epidemiological, and laboratory data. They are published annually or more frequently as needed for particular goals, results, and subsequent public health measures. Through the use of standard (externally quality-assured) diagnostic and typing techniques, case definitions, metadata, and reporting protocols, ECDC and the European disease networks enable standardized reporting and data comparability across the EU/EEA.

"Surveillance systems used in the European Union:
- *Passive and Active Surveillance:*
  - *Passive surveillance 'relies on the physicians, laboratory or hospital staff or other relevant sources to take the initiative to report data to the health department'. Active surveillance system, according to TESSy, is a system that is 'based on the public health officials' initiative to contact the physicians, laboratory or hospital staff or other relevant sources to report data'.*
  - *Active surveillance typically generates high-quality data (high levels of completeness, validity and timeliness) through a direct link with data providers. Active surveillance relies on a prompt response from public health professionals, who will usually monitor replies and can respond to low response rates in order to improve external completeness.*
- *Compulsory and Voluntary:*
  - *Some systems make data submission mandatory or quasi mandatory (either by law, professional edict, policy or guidance), whereas others rely on a voluntary approach.*
- *Comprehensive and Sentinel:*
  - *Comprehensive surveillance systems include reports of cases of infectious diseases that occur within the whole population of the geographical area covered by the surveillance system (national, regional). Sentinel systems rely on notifications from a selected group of physicians, hospitals, laboratories, and other institutions. In the case of sentinel systems, representativeness is often established as part of the system design process (12)."*

3. Governance structures and processes

Governance structure (13) comprised of:

- Management Board (14): ECDC is a stand-alone EU agency that is accountable to a Management Board made up of representatives from the EU Member States, the European Parliament, and the EU Commission. The Management Board

serves as the center's governing body by approving and overseeing the execution of the work program and budget and by adopting the annual report and accounts. The management board is made up of a) one representative from each of the 28 EU nations, plus Iceland, Liechtenstein, and Norway; b) two members chosen by the European Parliament; and c) three representatives chosen and nominated by the Commission.

- Advisory Forum (15): The Director of the Centre receives advice from the Advisory Forum regarding the caliber of the research done by ECDC. It consists of a public health official from the European Commission and senior representatives of national public health institutions and agencies chosen by the Member States based on their scientific expertise.

- Competent Bodies (16): A system with a designated Coordinating Competent Body (CCB) in each Member State has been in effect since 2012. Based on a chain of delegations, interactions between ECDC and the CCBs operate at three levels: 1) the National Coordinator level is used for high-level relational and coordinating engagements between ECDC and the CCBs; 2) the National Focal Points are involved in strategic and comprehensive contacts pertaining to a particular disease category or public health function; 3) the Operational Contact Points are the level at which technical and operational exchanges pertaining to a particular region within the domains of a disease group or public health function take place. Each Member State chooses the level to which it will assign the interactions. An explanation of the CCB system's precise regulations can be found in CCB implementation document.

- Audit Committee (17) convenes twice a year and when needed in between. Its role is to support the Management Board in carrying out its oversight duties for the system of internal controls, the audit process, and financial reporting.

- The Public Health Functions Unit (18) controls ECDC's surveillance operations and carries out ECDC's statutory public health tasks. The unit's surveillance branch, which includes wide technical competence, enables prompt detection of threats from communicable diseases, evaluates such dangers, and offers assistance to Member States so they can take steps to mitigate them.

4. Surveillance performance monitoring and evaluation

An ECDC survey of national surveillance coordinators in 2010 indicated significant variations in data quality monitoring practices among EU Member States. The survey's findings were presented in the handbook on monitoring the quality of disease surveillance data for public health professionals (19).

Most guidelines for the evaluation of surveillance systems in the literature use an approach that is attribute oriented. Surveillance systems attributes are:
1) Completeness and validity
Completeness
- Internal completeness
- External completeness
Validity:
- Internal validity
- External validity
2) Sensitivity, specificity, positive predictive value and negative predictive value
3) Timeliness
4) Usefulness
5) Representativeness
6) Simplicity
7) Flexibility
8) Acceptability
9) Stability, reliability and adequacy

The following additional questions guided the approach developed in the handbook:
• What are the components of a surveillance system and how do they interact?
• What triggers the evaluation of a surveillance system?
• Which evaluation methods are appropriate?
• Which components should be evaluated?
• What do the results of the evaluation tell us?
• What are the possible interventions?

The framework for surveillance systems evaluation:
1) Plan the evaluation

       a) Identifying triggers
       b) Selecting the evaluation type and method
       c) Engaging stakeholders
       d) Setting up a team for surveillance evaluation

2) Evaluation of external completeness

       a) Planning the evaluation
       b) Evaluating external completeness
       c) Interpreting the results of the evaluation
       d) Improving external completeness

3) Evaluation of sensitivity, specificity and positive predictive value

4) Evaluation of external validity

      a) Identifying duplicate records
      b) Calculating concordance through record linkage
      c) Calculating concordance via follow-up of notified cases
      d) Validity checks during statistical analysis
      d) Validity of outbreak notifications
      f) Indirect methods to evaluate validity

5) Evaluation of usefulness

6) Evaluation of the costs of disease surveillance

5. Engagement structures and processes

ECDC cooperates with partners all over the world and plays a key role in pooling knowledge, exchanging information, and promoting best practices among public health experts through:

1) Disease and laboratory networks (20) to support sub-networks or consortia of public health microbiology laboratories in EU Member States.
2) Support and services to EU/EEA countries (21) to coordinate disease prevention and control.
3) EU institutions and agencies (22) with daily contacts to advise staff of the European Commission and monitor projects.
4) International cooperation (23) with agencies like the WHO, the US CDC and non-EU countries.

6. Knowledge Synthesis

The ECDC provides several resources for disease prevention & control training, offers fellowship and training programs, and a range of communication materials. More information is provided through these links: ECDC Virtual Academy (EVA) (24), Fellowship programme: EPIET/EUPHEM (25), Training programmes (26), Surveillance and outbreak tools (27), Preparedness, prevention and control tools (28) and Communication materials (29).

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