Public Health Surveillance (PHS)

PHS Systems in India

"India's Public Health Surveillance by 2035"[1] is a continuation of the work on Health Systems Strengthening. It contributes by suggesting mainstreaming of surveillance by making individual electronic health records (EHR) the basis for surveillance. Public Health Surveillance (PHS) cuts across primary, secondary, and tertiary levels of care. Surveillance is an important Public Health function. It is an essential action for disease detection, prevention, and control. Surveillance is 'Information for Action'.

In 2035,

- India's Public Health Surveillance will be a predictive, responsive, integrated, and tiered system of disease and health surveillance that is inclusive of Prioritised, emerging, and re-emerging communicable and non-communicable diseases and conditions.
- Surveillance will be primarily based on de-identified (anonymised) individual-level patient information that emanates from health care facilities, laboratories, and other sources.
- Public Health Surveillance will be governed by an adequately resourced effective administrative and technical structure and will ensure that it serves the public good.
- India will provide regional and global leadership in managing events that constitute a Public Health Emergency of International Concern.

India can create a skilled and strong health workforce dedicated to surveillance activities.

- Non-communicable disease, reproductive and child health, occupational and environmental health and injury could be integrated into public health surveillance.
- Morbidity data from health information systems could be merged with mortality data from vital statistics registration.
- An amalgamation of plant, animal, and environmental surveillance in a One-Health approach that also includes surveillance for anti-microbial resistance and predictive capability for pandemics.
- Public Health Surveillance could be integrated within India's three-tiered health system.
- Citizen-centric and community-based surveillance, and use of Point-of-Care devices and self-care diagnostics could be enhanced.
- Laboratory capacity could be strengthened with new diagnostic technologies including molecular diagnostics, genotyping, and phenotyping. To establish linkages across the three-tiered health system, referral networks could be expanded for diagnoses and care.

Four building blocks are envisaged for this vision 2035:

1 An interdependent federated system of Governance Architecture between the Centre and States.
2 Enhanced use of new data collection and sharing mechanisms for surveillance based on unitized, citizen-centric comprehensive Electronic Health Records (EHR) with a unique health identifier (UHID). As well, existing disease surveillance data and information from periodic surveys will complement this information
3 3. Enhanced use of new data analytics, data science, artificial intelligence, and machine learning, and
4 Advanced health informatics.

PHS Systems in the GCC

Surveillance systems evaluation attained paramount importance following the establishment of the Gulf Center of Disease Prevention and Control (Gulf CDC) in 2021, with the approval of Their Majesties and Their Highnesses, Leaders of the 6 Gulf Cooperation States[2]. A core mandate for this entity was the fostering of harmonization in public health data and surveillance efforts through systematic and ongoing surveillance evaluation, as well as the proper use of public health data exchange practices. The Gulf CDC is currently housed within the Gulf Health Council.

The **Ministry of Health in the UAE** has developed a national health agenda in order to manage the health system at the national level based on certain challenges that need improvement: the establishment and continuation of several public health initiatives in the UAE should be resourced adequately; Research funding should be directed toward investigating; **Sufficient numbers of trained health professionals are required to improve the health status of the UAE**; **Increased focus should be placed upon improving population health through primary**

[1] Blanchard J; Washington R; Becker M; Vasanthakumar N; Madangopal K; Sarwal R. et al. Vision 2035: Public Health Surveillance in India. A White Paper. NITI Aayog (with University of Manitoba). December 2020.

[2] Gulf Cooperation Council (GCC) include Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE)

prevention involving health education and awareness programs; Legislation and standards for compliance with public health measures should be reviewed and revised periodically; A number of public health issues, particularly non-communicable diseases, significantly contribute to morbidity, mortality, and economic losses in the UAE. Therefore, the UAE has adopted clear strategic health plans to develop human health as a cornerstone of the nation's development and progress.

The UAE Centennial 2071 (UAE Cabinet, 2021) is based on four pillars as follows:

1. **Future-focused government**: The objectives of the government under the UAE Centennial 2071 include establishing the government of the UAE as the best government in the world, with a long-term vision and inspirational leadership that anticipates and prepares for the future. Other objectives include achieving happiness in society and spreading positive messages internally and to the world and developing mechanisms for monitoring long-term variables in various sectors.
2. **Excellent education**: The UAE Centennial 2071 highlights the importance of excellent quality of education. Certain areas of focus in education include advanced science and technology, space science, engineering, innovation, and health sciences. Other educational measures include teaching students, mechanisms for discovering their individual talents early. At the institutional level, educational institutions are encouraged to be incubators of entrepreneurship and innovation and to be dynamic international research centres.
3. **A diversified knowledge economy**: The UAE's economy is aimed to be competitive and one of the best economies worldwide. This can be achieved by increasing productivity of national economy, support of national companies, investment in scientific research and promising sectors, focus on innovation, entrepreneurship and advanced industries, development of a national strategy to shape the future of the UAE's economy and industry, and place the UAE among international important economies. Knowledge economy can be achieved by a generation of UAE inventors and scientists and supporting them in technical sciences.
4. **A happy and cohesive society**[3]: Community development is an integral part of the UAE Centennial 2071. Some objectives in this regard include establishing a secure, tolerant, cohesive, and ethical society that embraces happiness and a positive lifestyle and a high quality of life. The pillar also focuses on developing programmes to prepare future generations to serve as the UAE's goodwill ambassadors, as well as promoting women's participation in all sectors, making the UAE one of the best places to live in. Its programme includes fortifying the country's reputation; diversifying the imports and the exports by relying less on oil; investing in education focusing on advanced technology; building Emirati values and ethics for the future generations; raising productivity of the national economy; enhancing society's cohesion.

Research has indicated that, by 2040, there will be a fundamental shift from **"health care"** to **"health."** While disease will never be completely eliminated, through science, data, and technology, we will be able to identify it earlier, intervene proactively, and better understand its progression to help consumers more effectively and actively sustain their well-being. The future will be focused on wellness and managed by companies that assume new roles to drive value in the transformed health ecosystem. (WHO, 2021; Health Systems Research, 2021; Moonesar, 2020 & 2021; Telegraph, 2016; Deloitte, 2021).

In this background, the following section describes potential career opportunities for GDPHS graduates.
GDPHS graduates can work on several of the following specific PHS and Research Associate Activities:

1. **Public Health Surveillance (PHS) Established Activities**

Potential PHS activities that could be undertaken by GDPHS Graduates @ RUAS/MBRSG/NMIT/NCOPS/SAMVIT				
Components	**Outcomes**	**PHS Activities**	**Deliverable**	**Time required (Weeks)**
Short-term (within 4 months)				
1. Components of Core Surveillance Activities:	1. Improved quality, completeness, and timeliness of surveillance data	Capacity building of health workers and other agencies at all levels- trainings /workshops (face to face live; virtual platform)	**Capacity building-**	6

[3] Health future is built in this 4th pillar.

Periodic; real-time, collection; analysis; interpretation of demographic; microbiological; pathological; clinical data for detection & reporting; health system management for health security by government - central; state; district; local	2. Improved location specific, event-based, and indicator-based surveillance systems	Capacity building of the hospitals and laboratories (institutional capacity building)		6
	3. Improved information sharing among laboratories networks.	Training manuals for capacity building	**Training manual**	6
	4. Increased awareness of human and animal diseases of national concern indicator-based surveillance systems	Support in Integration with the Global Health Security (GHS), Integrated Disease Surveillance and Response (IDSR), particularly health information through the District Health Information Management System (DHIMS)	**Integration with DHIMS**	4
	5. Improved collaboration and coordination between key global health surveillance (GHS) partners	Need assessment (survey-online/offline) for capacity building and preparedness of health providers/ hospitals/labs etc.	**Need Assessment**	6
	6. Increased number of surveillance workforce trained in data management analysis and reporting.	Operational plan for evaluation of existing surveillance systems	**Operational plan**	6
		Generate Reports		6
	Intermediate term (5-9 months)			
	1. Use of surveillance data for decision making	Platform that stores, analyses, visualize and auto-generate reports for action	**SOPs**	4
	2. A functional system with timely collection and use of data at all levels of health system	Indicators for monitoring the health status (reporting formats)	**Indicators for monitoring the health status-**	3
	3. Improved ability to follow-up on cases or events of public health importance	Support in improving the existing standard operating procedure (SOP's) for case notification and follow ups		
	4. Established standards on minimum data elements collected across diseases of public health threat	Capacity building for data driven decision making Progress reports	**Capacity building-**	6
	Long-term (10-12 month-Last quarter)			
	1. Improved and integrated global networks for real-time bio surveillance	Report on on-going activities, progress, achievements	Reporting	6
	2. Improved capacity to prevent infectious disease transmission	Replication and scaling up of the program to national level	Replication	6
	3. Decreased morbidity and mortality from disease and other public health events	Advocacy for policy making	Policy Briefing	6
2	**Short-term (within 4 months)**			
Components of Reinforcing Emergency Surveillance Preparedness During Small Outbreak Responses:	Strengthened coordination and robust emergency preparedness and response capacities	Capacity building/trainings of health care providers, health institutions (for epidemiological and laboratory analysis) outbreak investigation including environmental determinants	Capacity building	10

On-demand collection; analysis; interpretation of microbiological; pathological; clinical; epidemiological data for detection & reporting; rapid response for health security by government - central; state; district; local health provider - people - physician; nurse; pharmacist; community health worker health provider - institution - laboratory; hospital; clinic; pharmacy; home	Improved disease outbreak case management and infection control	Operational manual for active surveillance, case findings, contact tracing (tools for data collection)	Operation Manual	8
	Shortened time to detect highly infectious disease outbreaks through active surveillance and case finding	Establishing linkages between disease specific programs and reporting systems (HIV, TB, Malaria) for unified reporting		8
	Reduced transmission of highly infectious diseases in clinical and community settings	Establishing linkages between national laboratories for collection and interpretation of microbiological; pathological; clinical; epidemiological data		6
	Increased awareness, knowledge, and support for local disease outbreak response and prevention efforts at the community level	Establish support groups in community and sensitization for disease prevention and management and for other non-outbreak health issues		
	Rapid identification of and containment of highly infectious disease outbreaks			
	Intermediate term (5-9 months)			
	Reduced time to reinvigorated public health activities that have been interrupted or slowed due to outbreak response	Integration of surveillance platform under the IDSR	Surveillance platform	8
	Improved access to health services by individuals in outbreak affected areas			
	Increased capacity of countries for early warning, risk reduction and management of national and global health risks			
	Long-term (10-12 month-Last quarter)			
	Sustained improvements in timeliness of achieving outbreak/epidemic/ pandemic control	Monitoring integrated surveillance platform under the IDSR	Monitor Surveillance platform	8
	Reduced morbidity and mortality attributed to disease outbreaks or other public health threats			
	Reduced spread of infectious outbreaks into other countries			
	Improved preparedness for potential future outbreaks and other highly infectious diseases			

2. Research Associate (or Research Fellow) Activities

A. **Use advanced analytics to improve quality at the point of care.**

2.1 Projects that will test innovative digital healthcare solutions that integrate the use of artificial intelligence (AI) (e.g., Natural Language Processing, Machine Learning) during the provision of healthcare services at the point of care (POC). Such applications should assess and evaluate AI's impact on practice workflow and quality of care.

2.2 Projects that apply machine learning against large health data sets to improve care delivery and quality at the POC.

2.3 Use innovative, patient-cantered, clinician and patient facing digital healthcare technologies to improve patient experiences and healthcare services delivery at the POC.

2.4 Projects that explore understanding how the use of patient-centred digital healthcare technologies (e.g., wearables, sensors, mhealth solutions) impacts patient outcomes, experiences, and healthcare services delivery at the POC. Such applications should assess and evaluate the technology implementation's impact on practice workflow and quality of care.

Of particular interest is:

a. testing innovative digital healthcare technologies that facilitate information sharing and shared decision-making between patients and providers, and
b. evaluating the use of novel digital solutions for patients with multiple chronic conditions.

3. Use evidence-based knowledge and patient-data to augment support for clinical decision-making at the point of care.

3.1 Projects that will test innovative digital clinical decision-making tools that incorporate the use of patient-generated data and patient-reported outcomes at the POC.

3.2 Projects that evaluate a digital point of care solution that combines the use of natural language processing (NLP) with a decision support tool to turn unstructured clinical data into knowledge and facilitate the advancement of the knowledge into practice.

3.3 Enabling clinicians and health system decision makers to effectively and efficiently use standardized computable biomedical knowledge to support clinical decision making is also an interest area.

Interdisciplinary research projects that cross the research categories of interest mentioned above are highly encouraged. For example, a project to study an innovation tool that integrates AI with a clinical decision support solution that incorporates patient-reported outcomes at the POC.

All research projects must:

- Describe the healthcare practice setting(s) for the research;
- Describe the patient population(s) impacted by the research;
- Describe the digital healthcare intervention and the problem indicating its readiness for an exploratory/developmental research project;
- Describe how performance will be measured (expected standards, outcomes, baselines, indicators, etc).
- Describe all users of the digital healthcare solution or system;
- Describe how the solution should be expected to reduce (or at least not exacerbate) disparities;
- Evaluate the reliability, validity, and usability of the digital healthcare solution used at the POC;
- Describe how the digital healthcare intervention will be incorporated into the clinical workflow;
- Describe how technology modifications, systems, or tools will be designed from the outset to be easily adopted by other providers and teams in the organization and how the project will be designed to scale across the organization and beyond to other, similar organizations;
- Clearly demonstrate how the resulting innovation can be sustained and adopted by other settings;
- Develop an innovative and leading-edge dissemination strategy that will be implemented during the subsequent phase of research project;
- Evaluate and report (as applicable):
  - Improvement in the quality of care and reduction in adverse events;
  - Improvement in patient experience;
  - Reduction in provider burden; and
  - Unintended patient safety events.
- Provide a detailed project timeline that shows major milestones.
- **Dissemination**:
  - Describe the approach to disseminate research findings by applying innovative and leading-edge dissemination strategies and methods that enhance the broader applicability, reproducibility, and scalability of the research findings.
  - submit a dissemination plan that describes how the team will effectively communicate and disseminate research evidence and findings to diverse audiences.
  - Consider the following items when developing the dissemination plan:
  - Describe the target audiences, materials that will be developed, plans to disseminate evidence, and the strategy to evaluate the dissemination activities; and
  - Incorporate innovative and novel dissemination methods and strategies to communicate compelling stories, inform policy makers, and educate new audiences who may benefit from the knowledge.