

# Strengthening health security in the ECOWAS Region: A decadal progress assessment of national public health institutes (2015-2024)

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## ABSTRACT

**Introduction:** Over the past decade, the Economic Community of West African States (ECOWAS) region has made significant progress in establishing National Public Health Institutes (NPHIs), increasing from five of 15 countries in 2015 to 11 of 15 countries in 2024. NPHIs play a vital role in strengthening essential public health functions (EPHFs), such as surveillance, laboratory systems, workforce development, and emergency preparedness. This study assessed institutional maturity, core public health capacities, and regional health security trends using the International Association of National Public Health Institutes (IANPHI) Staged Development Tool (SDT) and complementary States Parties Self-Assessment Annual Reporting (SPAR) data. **Methods:** We conducted a multi-source institutional assessment using the IANPHI SDT covering 2015–2024. Data were collected from 11 ECOWAS NPHIs between 2022 and 2024 using a standardized SDT template containing seven domains and 34 indicators. Verification was conducted through a regional workshop attended by 11 NPHI Directors, representatives from emerging NPHIs, West African Health Organization (WAHO), Africa CDC, US CDC, and IANPHI. SPAR data (2021–2023) were used to contextualize regional health security capacities. Ethical approval was not required as no personal data were collected. **Results:** The number of established NPHIs in ECOWAS increased from five (33%) in 2022 to 11 (73%) in 2024. Based on SDT assessments, four NPHIs achieved advanced maturity, while seven were in the developing stage; none achieved “Leading Edge,” aligning with the corrected scoring framework. Domain scores showed the highest performance in governance/leadership and legal frameworks, while significant gaps persisted in financing, laboratory systems, and workforce capacity. SPAR scores increased modestly across the region from 48% (2021) to 51% (2023), reflecting incremental improvements in IHR core capacities but with wide country-level variability. Progress remained uneven due to differences in NPHI establishment timelines, legal mandates, and domestic financing levels. **Conclusion:** NPHI establishment in ECOWAS has expanded substantially over the last decade, yet significant disparities remain in institutional maturity and health security capacities. Strengthening laboratory systems, sustainable financing, and public health workforce development are regional priorities. Targeted investments, stronger political commitment, and structured peer learning mechanisms are essential to accelerate progress.

**KEYWORDS:** Health Security, National Public Health Institutes, ECOWAS, International Health Regulations, Capacity Building, Outbreak Response

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## RECEIVED

01/10/2025

## ACCEPTED

25/11/2025

## PUBLISHED

26/11/2025

## LINK

<https://afenet-journal.org/strengthening-health-security-in-the-ecowas-region-a-decadal-progress-assessment-of-national-public-health-institutes-2015-2024/>

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## CITATION

Virgil Kuassi Lokossou et al., Strengthening health security in the ECOWAS Region: A decadal progress assessment of national public health institutes (2015-2024). *Journal of Interventional Epidemiology and Public Health*. 2025;8(4):97.  
DOI: <https://doi.org/10.37432/jieph-d-25-00217>

## Introduction

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The Economic Community of West African States (ECOWAS), with a population of over 400 million, faces a complex and evolving health security landscape [1]. The region contends with a high burden of infectious diseases (e.g., malaria, Lassa fever, cholera), rising rates of noncommunicable diseases, and persistent challenges related to maternal and child health [2]. These threats are compounded by rapid urbanization, environmental degradation, and climate change, creating a fertile ground for public health emergencies [3].

The 2014-2016 Ebola Virus Disease outbreak and the COVID-19 pandemic starkly exposed systemic weaknesses in the region's health security architecture, particularly in disease surveillance, cross-border collaboration, and health system resilience [4, 5]. In response, the critical role of strong, coordinated National Public Health Institutes (NPHIs) has been emphasized globally. NPHIs serve as central government agencies responsible for providing leadership, technical expertise, and coordination for public health functions, including surveillance, emergency response, and laboratory services [6].

Regional and continental bodies WAHO, Africa CDC, IANPHI, and in some countries US CDC, have played critical roles in providing technical assistance, capacity-building, and institutional development guidance. The IANPHI Staged Development Tool (SDT), in particular, provides a structured framework for assessing institutional maturity and guiding progressive improvement.

Over the last decade, there has been a concerted effort by ECOWAS Member States, supported by the West African Health Organization (WAHO) and partners, to establish and strengthen NPHIs. The establishment of the ECOWAS Regional Center for Surveillance and Disease Control (RCSDC) in 2018 further underscored the commitment to regional collaboration [7]. However, a systematic, region-wide assessment of the progress and remaining capacity gaps of these institutions is lacking.

We evaluated the decadal progress (2015–2024) of NPHI establishment and institutional maturity in ECOWAS, providing a comprehensive assessment of system strengths, gaps, and priority investment areas.

## Methods

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### Study design and setting

A multi-source institutional assessment was conducted between 2022 and 2024 using the IANPHI SDT, complemented by the IHR States Parties Self-Assessment Annual Reporting (SPAR) data (2021–2023) to contextualize broader IHR-related health security capacities. Although primary data were collected from 2022 onward, the analysis reflects a decadal institutional evolution (2015–2024) using documented establishment dates and historical institutional milestones.

### Data sources, SDT tool, and scoring

To assess regional health security capacities, we integrated data across multiple time frames to provide both long-term and recent perspectives. The decadal assessment (2015–2024) offers a broad view of trends in health security over the past ten years. For a more focused evaluation of recent progress, we conducted a baseline comparison covering 2022–2024. Additionally, SPAR data from 2021–2023 were used, representing officially reported country capacities during this period. Together, these time frames enable a comprehensive analysis of both overarching trends and near-term improvements in preparedness and response.

The IANPHI SDT is a structured, internationally recognized self-evaluation tool covering seven domains and 34 indicators: Governance and Leadership, Legal Frameworks, Financing, Workforce, Surveillance and Laboratory Systems, Emergency Preparedness and Response, and Partnership and Coordination. The SDT is intended as a self-evaluation tool to track progress over time and inform capacity-strengthening priorities, rather than for punitive comparison. Its reliance on self-reported data and limited ability to capture contextual factors, such as funding or political dynamics, are important considerations when interpreting results (Table 1).

Complementing the SDT, SPAR data from 2021–2023 provided country-reported measures of IHR core capacities across 13 technical areas such as surveillance, laboratory systems, and emergency response, offering longitudinal insights, offering longitudinal insights. Where available, JEE (Joint External Evaluation) reports were used to validate SPAR findings, providing an independent external

assessment of capacities. Together, these tools enabled a detailed, multi-country assessment of NPHI capacities, highlighting both regional strengths and country-specific gaps that require targeted interventions.

For this assessment, we focused on seven critical domains. For each domain, a pre-defined set of indicators was scored based on evidence provided by the NPHIs. The scoring system was as follows: Advanced (3 points): Fully operational with up to date evidence. Developing (2 points): Operational but missing some functional steps. Basic (1 point): Presence of an understanding of the requirement. Scores for each domain were converted to a percentage of the maximum possible score (3 points) for standardized comparison, presented as score (Percentage).

### **Data collection and validation**

A standardized data collection template (PowerPoint-based) was distributed via email to the Directors of NPHIs or their equivalent entities in all ECOWAS Member States. Follow-up reminders were sent to ensure a high response rate. Only Member States that reported a fully established NPHI were included in the final programmatic assessment (n=11).

To validate the self-reported data, WAHO, in collaboration with IANPHI, Africa CDC, and the U.S. Centers for Disease Control and Prevention (CDC), convened a three-day workshop in Abuja, Nigeria, from March 11-13, 2024. The workshop convened 24 participants, including 11 Directors from ECOWAS National Public Health Institutes (NPHIs), representatives of emerging NPHIs, and technical partners from WAHO, Africa CDC, US CDC, and IANPHI to review, verify, and harmonize the submitted assessments. This composition ensured a diverse range of expertise and facilitated cross-regional learning and collaboration on health security preparedness and response.

### **Data analysis**

Domain-level scores were analyzed using frequencies, medians, and maturity categories. Percentages were used only for comparability across domains and SPAR metrics. SPAR (IHR) indicators were reviewed to contextualize broader health security trends, but were not used to rank countries.

### **Ethical considerations**

This study involved institutional assessments with no personal or sensitive human data; therefore, ethical approval was not required. Approval to use country-reported SDT data was obtained from participating NPHIs, and validation was conducted with the permission and participation of all country representatives.

## **Results**

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### **Growth in the establishment of NPHIs**

There has been significant progress in the institutionalisation of NPHIs in the ECOWAS region. In 2015, only five out of 15 (33%) member states had an established NPHI. By 2024, this number had increased to 11 (73%), indicating a substantial commitment to building foundational public health infrastructure (Figure 1). The remaining four Member States have government organs performing core NPHI functions and are at various stages of formal establishment.

### **Institutional maturity**

The maturity of the 11 established NPHIs varied considerably (Table 2). Five NPHIs (Burkina Faso, Côte d'Ivoire, Liberia, Nigeria, Cabo Verde) were classified at the "advanced" stages, demonstrating robust, multi-functional capabilities. Five NPHIs were in the "developing" stage, indicating established structures with ongoing operational gaps. One NPHI was at the "basic" stage of maturation (Table 2).

### **Programmatic capacity assessment**

A detailed assessment of the 11 established NPHIs across seven core domains revealed a pattern of strengths and weaknesses (Table 3).

**Leadership and governance:** Leadership capacity was consistently strong across the region, with 10 of 11 NPHIs (91%) scoring 3 (100%). Only Benin scored lower (2; 67%), reflecting partial functionality. These results align with the broad political commitment to establishing NPHIs. Similarly, all but one NPHI (Benin) had fully developed legal frameworks, with 10 of 11 countries (91%) scoring 3 (100%), indicating solid foundational mandates for national public health functions.

**Surveillance systems:** Surveillance capacity showed more variation. Six NPHIs (55%) achieved full

scores of 3 (100%), including Burkina Faso, Cabo Verde, Côte d'Ivoire, Ghana, Liberia, and Nigeria. Five countries, Benin, Guinea, Guinea-Bissau, Mali, and Sierra Leone, had moderate capacity (scores of 2; 67%), reflecting incomplete digital systems, limited data integration, or gaps in event-based surveillance.

**Workforce:** Workforce capacity emerged as a major regional weakness. Only three countries, Burkina Faso, Liberia, and Nigeria, scored 3 (100%), indicating fully functional staffing structures. All other NPHIs (8 of 11; 73%) scored 2 (67%), citing shortages of trained epidemiologists, public health analysts, and laboratory personnel. This domain exhibited the greatest consistency of underperformance across the sample.

#### **Emergency preparedness**

**and response:** Emergency response capacities were generally stronger in countries with recent outbreak experience. Six countries (55%) scored 3 (100%), namely Côte d'Ivoire, Ghana, Liberia, Nigeria, Cabo Verde, and Burkina Faso. The remaining NPHIs scored 2 (67%), often reporting gaps in rapid response teams, simulation exercises, or emergency stockpile systems.

**Laboratory systems:** Laboratory capacity showed substantial disparities. Only six countries (55%) achieved full scores of 3 (100%) (Burkina Faso, Côte d'Ivoire, Ghana, Liberia, Nigeria). The remaining countries scored 1–2, with Benin at the lowest end (1; 33%). Lower-scoring NPHIs reported limited molecular testing capacity, dependence on external reference labs, and inadequate biosafety infrastructure.

**Financing and partnership:** Financing was the weakest domain overall. No country scored 3 (100%). Most NPHIs (8 of 11; 73%) scored 2 (67%), indicating partial domestic financing with significant reliance on donor support. Benin, Guinea, and Mali scored 1 (33%), highlighting severe funding constraints that limit operational autonomy and sustainability.

#### **Programmatic capacity – strengths and gaps**

**Strengths:** The Strongest domains were governance, legal frameworks, and partnerships. Three countries (Nigeria, Ghana, Senegal) have formal NPHI

establishing laws, which correlates with higher maturity.

**Gaps:** Financing, workforce shortages, laboratory systems, and emergency preparedness showed the most pronounced weaknesses.

Overall, the domain assessment revealed strong institutional foundations but uneven operational capacities across ECOWAS NPHIs. Leadership and legal frameworks were well established in nearly all countries, reflecting solid political commitment to national public health institutions. However, capacities in human resources, laboratory systems, and financing were markedly weaker, with most NPHIs reporting staffing shortages, limited diagnostic capability, and heavy reliance on external funding. Surveillance and emergency response capacities showed moderate but variable performance, with a small group of higher-capacity countries driving regional progress (Table 3). These patterns illustrate a region where core structures are in place, but critical operational gaps persist that must be addressed to strengthen national and regional health security.

SPAR scores increased modestly from 48% (2021) to 51% (2023). Regional variability remained high. Furthermore, by the end of 2023, only eight of the 15 (53%) member states had successfully conducted a Joint External Evaluation. Figure 2 illustrates IHR core capacity trends; the y-axis now denotes mean SPAR capacity score (%).

#### **Discussion**

This study provides the first comprehensive, multi-country assessment of NPHI capacities in the ECOWAS region over the last decade. Our findings demonstrate unequivocal progress in the formal establishment of these cornerstone institutions, with 73% of Member States now having a dedicated NPHI. This represents a significant political achievement and a foundational step towards regional health security, as called for in the wake of the Ebola epidemic [5, 7].

The assessment reveals that the primary strengths of ECOWAS NPHIs lie in their leadership and legal foundations. This is a crucial enabling environment for public health action, aligning with global studies that identify a clear mandate as the bedrock of an effective NPHI [6, 11]. However, the study also

uncovers a critical disconnect often seen in low-resource settings: strong legal mandates have not consistently translated into operational autonomy or adequate financing. The chronic underfunding of NPHIs, with heavy reliance on external partners, poses the greatest threat to their sustainability and effectiveness. These findings echo broader challenges in health financing across low- and middle-income countries, where domestic allocation for health security often falls short of needs [10]. This reliance on volatile external funding creates a “cycle of panic and neglect,” where capacities built during a crisis erode once attention and funding subside, a pattern well-documented in global health security [12].

The mixed performance in surveillance and laboratory systems highlights a capacity divide within the region. While front-runner NPHIs like those in Nigeria and Ghana have digitalized surveillance (e-IDSR) and are building advanced laboratory functions such as genomic sequencing, many others struggle with basic functionality. This disparity risks creating weak links in the regional health security chain, where a delay in detection in one country can threaten the entire region. This phenomenon, known as the “weakest link” problem in the economics of public goods, is particularly pertinent to health security in interconnected regions [13]. The consistent reports of human resource shortages and understaffing, particularly of highly qualified experts, further exacerbate this gap and reflect the ongoing challenge of “brain drain” within the public health sector. This is not unique to ECOWAS; a study on the public health workforce in Africa found that weak career structures and poor remuneration are primary drivers of this drain, undermining the sustainability of health security investments [14].

Our finding that laboratory capacity, particularly genomic sequencing, is concentrated in a small number of advanced NPHIs has profound implications. The COVID-19 pandemic demonstrated that genomic surveillance is no longer a luxury but a core component of an effective response, enabling tracking of variants and informing public health measures [15]. The inability of most ECOWAS NPHIs to conduct in-country sequencing creates dependency on external reference laboratories, causing critical delays. This mirrors the experience of other regions, where investing in

regional genomic networks has proven to be a cost-effective strategy for enhancing collective security [16].

Furthermore, the persistent gap in sustainable financing directly affects the ability to maintain these advanced capabilities. The situation in several ECOWAS states mirrors challenges faced by NPHIs in Southeast Asia, where, despite high-level political commitment post-SARS and H5N1, long-term predictable funding remained the single largest barrier to achieving IHR core capacities [17]. The progress in ECOWAS, while commendable, therefore sits on a precarious foundation. Without a strategic shift toward domestic investment, the hard-won gains of the last decade are vulnerable to erosion, leaving the region exposed to the next inevitable health shock.

Our results should be interpreted in the context of the study’s limitations. The reliance on self-reported data, even after validation, may introduce bias. However, the use of a standardized tool such as the SDT, which focuses on self-assessment and internal capacity improvement rather than external benchmarking, mitigates this risk and provides a structured basis for comparing progress over time. The non-participation of four Member States without established NPHIs means the overall regional picture may be less optimistic than presented here.

Furthermore, while SPAR scores provide a useful summary, they are self-reported and can be influenced by changes in reporting fidelity or assessment interpretation. This limitation is well-documented in literature critiquing the use of self-assessment tools for direct intercountry comparison [14]. Our analysis, therefore, focuses on broad regional trends and the notable country-level variations, which are critical for identifying specific support needs.

## Recommendations

Based on our findings, we propose the following recommendations:

### Short-term (0–2 years)

- **Strengthen Legal Mandates:** Finalize and enact establishing laws for emerging NPHIs

to solidify their authority and mandate. (*Actors: Governments, WAHO*)

- **Address Critical Workforce Gaps:** Provide targeted funding and programs to expand Field Epidemiology Training Programs (FETP) and public health laboratory fellowships, directly addressing the severe shortages of epidemiologists and lab personnel identified in the results. (*Actors: MOH, Partners like US CDC, Africa CDC*)

### Medium-term (3–5 years)

- **Develop a Regional Benchmarking Tool:** Collaborate with Africa CDC to develop and implement a standardized regional assessment tool, based on the SDT framework, designed specifically for periodic benchmarking and intercountry learning. This addresses the need for comparative analysis while respecting the SDT's primary purpose as a self-improvement tool.
- **Institutionalize Cross-border Collaboration:** Formalize national coordination platforms and information-sharing mechanisms for surveillance and outbreak response. (*Actors: WAHO, Africa CDC*)

### Long-term (5+ years)

- **Secure Sustainable Domestic Financing:** Establish dedicated domestic financing mechanisms (e.g., health security funds) to reduce reliance on external donors and ensure operational autonomy. (*Actors: Governments, Ministry of Finance*)
- **Strengthen Multi-hazard Preparedness:** Integrate NPHIs into national security architectures and build all-hazards emergency preparedness systems. (*Actors: Governments, NPHIs*)

### Conclusion

This study provides the first comprehensive, multi-country assessment of NPHI capacities in the ECOWAS region using the IANPHI SDT as a self-evaluation framework. The SDT proved effective in systematically tracking capacities and identifying strengths and gaps in a structured manner. Our findings demonstrate substantial progress, with most countries having established NPHIs and strengthened leadership and legal foundations. However, the assessment revealed critical gaps in the

workforce, laboratory systems, and sustainable financing that threaten the sustainability of these gains. Addressing these weaknesses through the targeted recommendations outlined above is essential to consolidate a resilient regional health security architecture.

### What is already known about the topic

- The 2014–2016 Ebola epidemic and the COVID-19 pandemic exposed critical weaknesses in West Africa's public health systems, particularly in disease surveillance, emergency response, and cross-border collaboration.
- National Public Health Institutes (NPHIs) are globally recognized as central institutions for providing leadership, coordination, and technical capacity to assure health security.
- Several ECOWAS Member States have initiated efforts, with support from regional and international partners, to establish or strengthen NPHIs.

### What this study adds

- This is the first comprehensive, multi-country assessment of NPHI development in West Africa using the IANPHI Strategic Development Tool maturity model.
- The number of established NPHIs in ECOWAS increased substantially from 5 in 2022 to 11 in 2024, demonstrating significant institutional growth.
- While leadership and legal frameworks have strengthened, critical gaps persist in financing, laboratory systems (particularly genomic sequencing), and workforce capacity.
- The study highlights the urgent need for sustainable domestic investment, cross-border collaboration, and workforce development to secure long-term regional health security.

### Competing Interest

The authors of this work declare no competing interests.

### Funding

The workshop was financially supported by Africa CDC, IANPHI, and WAHO with technical contributions from the US CDC. No direct funding

was received from private organizations or other external sources. The funding covered logistics, materials, and participation of regional NPHI representatives.

### Acknowledgements

The authors sincerely acknowledge the West African Health Organization (WAHO), the International Association of National Public Health Institutes (IANPHI), Africa CDC, and the U.S. CDC for their technical support and collaboration. We also thank the Directors of National Public Health Institutes across ECOWAS Member States for their active participation in the assessment and validation workshop.

### Authors' contributions

AB and VL conceived the study, designed the methodology, and oversaw data collection. AB and AA jointly conducted data analysis and interpretation. AB and AA drafted the initial manuscript, while IS, FA, and MA provided critical intellectual input for its revision. All authors approved the final version of the manuscript.

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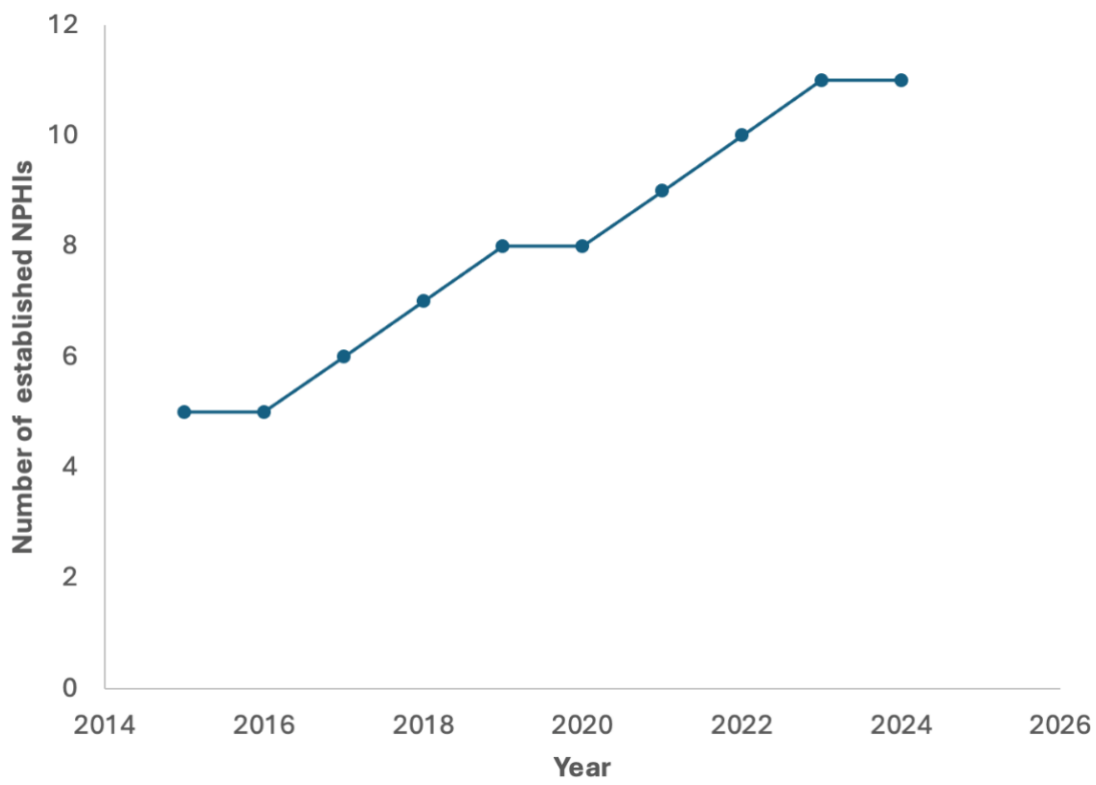
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<b>Table 1: IANPHI Staged Development Tool (SDT) Domains and Key Indicators</b>	
<b>Domain</b>	<b>Indicator</b>
Governance & Leadership	Clear mandate from government; Defined organizational structure; Strategic plan; Functional board/leadership.
Legal Framework	Legal statute establishing the NPHI; Mandate for core public health functions (e.g., surveillance, response).
Financing	Predictable and adequate domestic budget; Diversified funding sources; Financial management systems.
Workforce	Sufficient number of skilled staff (epidemiologists, lab scientists, etc.); Staff training and development plans.
Surveillance & Laboratory Systems	Integrated disease surveillance system (e.g., eIDSR); Laboratory network with testing & referral pathways; Data analysis and reporting capacity.
Emergency Preparedness & Response	Emergency response plan; Trained rapid response teams; Stockpiles; After-action reviews.
Partnership & Coordination	Formal mechanisms for coordination with MoH, other sectors, and international partners.
<i>Note: This is a summary of key indicators. The full SDT provides more detailed sub-indicators for each stage (Basic, Developing, and Advanced).</i>	

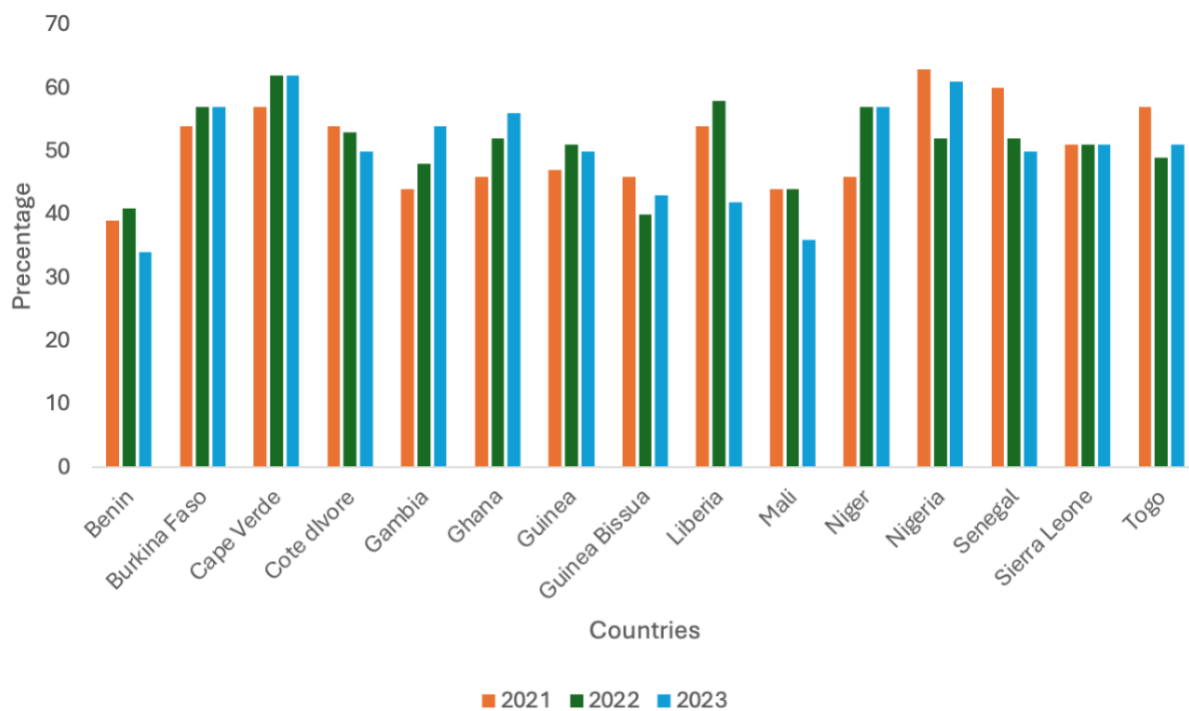
<b>Table 2: Stages of maturation of NPHI in the member states, 2024</b>		
<b>Basic</b>	<b>Developing</b>	<b>Advanced</b>
Guinea	Benin	Burkina Faso
	Ghana	Liberia
	Guinea-Bissau	Nigeria
	Senegal	Cabo Verde
	Sierra Leone	Côte d'Ivoire

**Table 3: Programmatic Assessment Summary for Established NPHIs in the ECOWAS Region**

Country	Leadership	Legal Framework	Surveillance	Workforce	Emergency Response	Laboratory	Financing
Benin	2 (67%)	2 (67%)	2 (67%)	2 (67%)	2 (67%)	1 (33%)	1 (33%)
Burkina Faso	3 (100%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	2 (67%)
Cabo Verde	3 (100%)	3 (100%)	3 (100%)	2 (67%)	3 (100%)	2 (67%)	2 (67%)
Côte d'Ivoire	3 (100%)	3 (100%)	3 (100%)	2 (67%)	3 (100%)	3 (100%)	2 (67%)
Ghana	3 (100%)	3 (100%)	3 (100%)	2 (67%)	3 (100%)	3 (100%)	2 (67%)
Guinea	3 (100%)	3 (100%)	2 (67%)	2 (67%)	2 (67%)	2 (67%)	1 (33%)
Guinea-Bissau	3 (100%)	3 (100%)	2 (67%)	2 (67%)	2 (67%)	2 (67%)	2 (67%)
Liberia	3 (100%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	2 (67%)
Mali	3 (100%)	3 (100%)	2 (67%)	2 (67%)	2 (67%)	2 (67%)	1 (33%)
Nigeria	3 (100%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	3 (100%)	2 (67%)
Sierra Leone	3 (100%)	3 (100%)	2 (67%)	2 (67%)	2 (67%)	2 (67%)	2 (67%)



**Figure 1:** Growth in the number of established NPHIs in the ECOWAS Region (2015-2024)



**Figure 2:** IHR states parties' self-assessment annual reporting in the ECOWAS Region, 2021-2023