

Dissertation

at

International Institute of Health Management Research, New Delhi

**Digital Health Maturity Assessment of High-, Middle-, And Low-Income Countries
Using Global Digital Health Monitor Indicators**

by

Dr. Prachi Tyagi

(PG/23/079)

Under the Guidance of

Dr. Archana Thakur and Dr. Nishikant Bele

PGDM (Hospital & Health Management)



International Institute of Health Management Research

New Delhi

Dissertation training

at

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Dr Archana Thakur and Dr Nishikant Bele

PGDM(Hospital & Health Management)

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International Institute of Health Management Research

New Delhi

(Completion of Dissertation from respective organization)

The certificate is awarded to

Dr. Prachi Tyagi

in recognition of having successfully completed her

Dissertation and project on

**Digital Health Maturity Assessment of High-, Middle-, And Low-Income Countries
Using Global Digital Health Monitor Indicators**

24th February 2025 –26th June 2025

at

International Institute of Health Management Research, New Delhi

She comes across as a committed, sincere & diligent person who has
a strong drive & zeal for learning.

We wish her all the best for future endeavors.



Mentor,
Dr. Archana Thakur
Associate Professor
IIHMR, Delhi

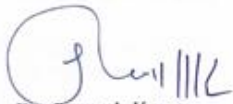
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The Candidate has successfully carried out the study designated to her during internship training and her approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

I wish her success in all her future endeavors.



Dr. Sumesh Kumar
Associate Dean, Academic and Student Affairs
IIHMR, New Delhi



Mentor
Dr Archana Thakur
Associate Professor
IIHMR, New Delhi

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Dissertation Examination Committee for evaluation of dissertation.

Name

Dr. Archana Thakur
Dr. Anmolji Lomchander
Iraeen Kumar

Signature

Archana Thakur
Anmolji Lomchander
Iraeen Kumar

Certificate from Dissertation Advisory Committee

This is to certify that **Dr. Prachi Tyagi**, a graduate student of the **PGDM (Hospital & Health Management)** has worked under our guidance and supervision. She is submitting this dissertation titled **"Digital Health Maturity Assessment of High-, Middle-, And Low-Income Countries Using Global Digital Health Monitor Indicators"** at **"International Institute of Health Management Research, New Delhi"** in partial fulfillment of the requirements for the award of the **PGDM (Hospital & Health Management)**.

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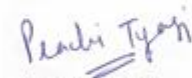


Mentor,
Dr Archana Thakur
Associate Professor
IIHMR, New Delhi

**INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH,
NEW DELHI**

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This is to certify that the dissertation titled **Digital Health Maturity Assessment of High-, Middle-, And Low-Income Countries Using Global Digital Health Monitor Indicators** and submitted by **Dr. Prachi Tyagi**, Enrollment No. **PG/23/079** under the supervision of **Dr Archana Thakur** for award of PGDM (Hospital & Health Management) of the Institute carried out during the period from **24th February 2025 to 26th June 2025**, embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.


Dr. Prachi Tyagi

FEEDBACK FORM

Name of the Student: Dr Prachi Tyagi

Name of the Organisation in Which Dissertation Has Been Completed: IIMR, New Delhi

Area of Dissertation: Health IT

Attendance: 100 %

Objectives achieved: Yes

Deliverables:

- Timely Submission of Dissertation presentation & Reports
- Presented well on time & appreciated by salomah

Strengths:

Success, hardworking, punctual

Suggestions for Improvement:

Focus on learning.

Suggestions for Institute (course curriculum, industry interaction, placement, alumni):

Archana
Thakur

Appropriate evaluation measure, should be able to assess skills & practical learnings.

Dr Archana Thakur
Organization Mentor (Dissertation)

Date: 16/2/2025

Place: IIMR, Delhi.



**INTERNATIONAL INSTITUTE OF HEALTH
MANAGEMENT RESEARCH (IIHMR)**

Plot No. 3, Sector 18A, Phase- II, Dwarka, New Delhi- 110075

Ph. +91-11-30418900, www.iihmrdelhi.edu.in

CERTIFICATE ON PLAGIARISM CHECK

Name of Student (in block letter)	Dr. PRACHI TYAGI		
Enrollment/Roll No.	PG/23/079	Batch Year	2023-2025
Course Specialization (Choose one)	Hospital Management	Health Management	Healthcare IT
Name of Guide/Supervisor	Dr. Archana Thakur		
Title of the Dissertation/Summer Assignment	Digital Health Maturity Assessment of High-, Middle-, And Low-Income Countries Using Global Digital Health Monitor Indicators		
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Guide/Supervisor

Name: Dr. Archana Thakur

Signature:

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Student

Name: Dr. Prachi Tyagi

Signature:

Dean (Academics and Student Affairs)

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Date:

(Seal)

ABSTRACT

Digital health has emerged as a transformative force in global health systems, with the potential to improve accessibility, efficiency, and quality of care across diverse contexts. However, progress toward digital maturity varies widely among countries, particularly across income levels. This study conducted a comparative assessment of digital health maturity in nine countries—Finland, Ireland, Portugal (high-income); Malaysia, Ghana, Morocco (middle-income); and Ethiopia, Mali, Liberia (low-income)—using the Global Digital Health Monitor (GDHM) framework developed by the World Health Organization. The GDHM evaluates national digital health ecosystems across 23 sub-indicators grouped under seven enabling domains: governance, strategy and investment, services and applications, standards and interoperability, infrastructure, legislation and compliance, and workforce.

A secondary analysis was undertaken using publicly available data from government health portals, WHO repositories, national digital health strategies, and academic literature. Each sub-indicator was scored on a five-phase maturity scale and supported with evidence and rationale. Scores were synthesized into radar charts and comparative matrices to evaluate performance across income groups and identify replicable success factors and persistent barriers.

Findings revealed stark digital health disparities. High-income countries such as Finland and Portugal demonstrated advanced maturity, marked by integrated electronic health records, strong governance structures, national interoperability frameworks, and citizen-facing services. Middle-income countries like Malaysia showed steady progress in infrastructure and service delivery but faced challenges related to interoperability and legal frameworks. Among low-income countries, Ethiopia stood out for its relatively high maturity, attributable to centralized digital health leadership, coordinated donor support, and successful deployment of DHIS2 and eCHIS platforms. Conversely, Liberia and Mali lagged behind due to fragmented digital governance, limited ICT infrastructure, and absence of data protection frameworks.

The study highlights that income level alone does not determine digital health maturity; rather, political commitment, institutional leadership, and regulatory readiness are key

determinants. Successful countries employed strategies such as establishing national digital health authorities, integrating health identifiers, and embedding digital solutions into broader health reforms. Meanwhile, countries with lower maturity often relied on vertical, donor-driven digital programs with limited scalability or sustainability.

In conclusion, this research underscores the importance of using structured tools like the GDHM to benchmark digital health progress and guide investment. Cross-country learning, south-south collaboration, and context-sensitive adaptation of high-maturity strategies are critical to closing the digital divide and advancing global health equity.

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Sincerely,

Dr. Prachi Tyagi

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Acronyms/ Abbreviations

AI	Artificial Intelligence
DHMA	Digital Health Maturity Assessment
EHR	Electronic Health Record
GDHI	Global Digital Health Index
GDHMI	Global Digital Health Monitor Indicators
ICT	Information Communication Technology
HIC	High Income Countries
HIE	Health Information Exchange
LIC	Low Income Countries
MIC	Middle Income Countries
UHC	Universal Health Coverage
WHO	World Health Organisation

Section 1: Introduction

1.1 Background

1.1.1 Digital Health

Digital health—the application of digital technologies to improve health outcomes—has become a critical pillar in global health system transformation. Defined by the World Health Organization (WHO) as the use of digital, mobile, and wireless technologies to support the achievement of health objectives, digital health encompasses a broad spectrum of tools including electronic health records (EHRs), health information exchanges (HIEs), telemedicine, mHealth apps, artificial intelligence (AI), cloud-based analytics, and remote monitoring systems (1). These tools are integral to enhancing care quality, improving efficiency, reducing disparities, and accelerating progress toward Universal Health Coverage (UHC) (2).

Digital transformation in health systems has become a cornerstone of global efforts to achieve Universal Health Coverage (UHC) and strengthen health security. The WHO's Global Strategy on Digital Health 2020–2025 emphasizes that digital health, when strategically implemented, can address persistent barriers to health access, enhance service delivery efficiency, and generate reliable data for decision-making (6). Digital health encompasses a broad range of information and communication technologies (ICTs) applied in health promotion, disease surveillance, patient care, health workforce training, and system management. Its emergence offers the potential to increase accessibility, equity, efficiency, and quality of health services.

The COVID-19 pandemic acted as a catalyst, bringing digital health to the forefront of public health systems worldwide. From remote triage to contact tracing, digital platforms played a critical role in sustaining essential services and monitoring disease outbreaks (3). Globally,

governments responded with rapid investments: Estonia expanded its interoperable national EHR system; India launched the Ayushman Bharat Digital Mission to create a unified health ID system for the population; Brazil integrated its e-SUS and ConecteSUS platforms to monitor vaccinations; and Rwanda deployed drone-based delivery systems and mobile health initiatives to reach rural populations (4–7). These initiatives highlight the diversity and scalability of digital solutions across income groups. Nonetheless, the journey toward digital maturity is not uniform. High-income countries benefit from robust infrastructure, digital literacy, established health financing systems, and long-standing institutional capacity. In contrast, resource-constrained settings often initiate digital health projects as pilot interventions, lacking the scalability, interoperability, or legal frameworks required for sustainable integration into national systems.

High-income countries (HICs) such as Finland, Denmark, and Estonia have achieved near-complete digital integration of their health systems with strong governance and citizen engagement. Middle-income countries (MICs) like Malaysia, Brazil, and South Africa have built large-scale digital registries and mobile applications but face challenges in standardization, rural connectivity, and long-term financing. Meanwhile, many low-income countries (LICs), including Mali, Liberia, and Chad, continue to depend heavily on vertical donor-driven programs with limited interoperability or scalability (12–14).

This digital divide is not solely about access to technology, it also reflects disparities in legal frameworks, workforce readiness, institutional capacity, and infrastructure maturity. Bridging this divide requires robust, context-sensitive assessments to guide policy and investment. This is where Digital Health Maturity Assessment (DHMA) becomes critical.

1.1.2 Digital Health Maturity Assessment (DHMA)

Digital Health Maturity Assessment (DHMA) is the structured evaluation of a country's ability to implement, integrate, and sustain digital health solutions at scale. A mature digital health ecosystem is not defined merely by the existence of digital tools, but by their national coverage, user adoption, interoperability, integration into care workflows, and alignment with strategic health goals (12).

Maturity models such as the WHO–ITU Digital Health Strategy Toolkit, the Global Digital Health Index (GDHI), the World Bank's Digital Health Assessment Toolkit, HIS

Interoperability Maturity Toolkit, Digital Health Investment Review Tool (by USAID) and PAHO's IS4H (Information Systems for Health) Maturity Model provide useful frameworks for assessment (13–15).

1.1.3 The Global Digital Health Monitor (GDHM)

The Global Digital Health Monitor (GDHM), developed collaboratively by the World Health Organization (WHO) and partner agencies, is a structured framework based on seven core enabling environments that evaluates a country's digital health maturity using 23 sub-indicators grouped under seven enabling environments:

1. Leadership and governance
2. Strategy and investment
3. Services and applications
4. Standards and interoperability
5. Infrastructure
6. Legislation, policy, and compliance
7. Workforce

Each sub-indicator is scored on a five-phase scale: from Phase 1 (no formal presence) to Phase 5 (fully integrated and optimized).

This maturity model allows countries to benchmark their progress across critical areas such as leadership and governance, infrastructure, strategy, investment, services, and workforce.

Assessing maturity using GDHM provides strategic insights into both successes and bottlenecks in national digital health ecosystems. For example, understanding how Finland and Portugal have achieved high maturity can offer valuable lessons for LICs like Mali and Liberia. At the same time, studying countries like Ethiopia—despite being a LIC but demonstrating relatively higher maturity—can help identify context-appropriate interventions and policy frameworks that are transferable to similar settings.

This study employs the GDHM framework to conduct a comparative assessment of digital health maturity in nine countries, three from each income group as defined by the World Bank. The countries selected are Finland, Ireland, Portugal (HICs); Malaysia, Ghana, Morocco (MICs); and Ethiopia, Mali, Liberia (LICs). These countries were chosen based on geographic diversity, data availability, and relevance in global digital health discussions.

1.2 Rationale for the Study

Most comparative digital health research focuses on either high-income countries or isolated low-income case studies. There remains a significant gap in comparative research across income levels using a standardized tool like GDHM. Moreover, while global organizations have supported maturity assessments at national levels, few studies consolidate this data across countries to generate comparative insights.

A systematic assessment of digital health maturity across different income levels is essential for strengthening the global health system. Such a study can shed light on the specific challenges faced by marginalized countries in leveraging digital systems to achieve their health goals. Furthermore, by identifying successful models in high-maturity countries, it can highlight replicable strategies and targeted interventions, ensuring that resources are allocated optimally for maximum impact.

1.3 Research Aim and Objectives

Aim: To assess and compare the digital health maturity of selected high-, middle-, and low-income countries using the Global Digital Health Monitor (GDHM) indicators and derive insights.

Objectives:

1. To assess the existing state of digital health infrastructure and maturity in selected high-, middle-, and low-income countries using GDHM indicators.
2. To identify successful strategies and policies from high maturity countries that can be adopted by low maturity countries to enhance their digital health systems.
3. To examine gaps or challenges faced by low maturity countries in attaining optimum levels of digital maturity.

Section 2: Review of Literature

2.1 Digital Health

Digital transformation has become a defining priority for health systems globally. Over the last two decades, the use of digital tools—including electronic health records (EHRs), telemedicine, mHealth applications, and data analytics—has expanded rapidly. This evolution, referred to broadly as “digital health,” is seen not just as a technical upgrade but as a strategic enabler for strengthening health system performance and achieving universal health coverage (UHC) (1). The COVID-19 pandemic further catalysed global investments in digital solutions, highlighting their role in health system resilience, equity, and efficiency (2).

2.2 The Role of Digital Health in Strengthening Health Systems

Digital health has been associated with improvements in data quality, service delivery, patient safety, and system-level planning. In high-income countries such as Finland and Estonia, integrated health information exchanges have enabled near real-time surveillance and coordinated care (3). In low- and middle-income settings, digital health tools—particularly DHIS2, mHealth, and telemedicine—have improved coverage and data visibility for primary care and community health programs (4).

However, the literature consistently shows that digital health benefits are not automatic. They require enabling environments that include supportive policy frameworks, digital literacy among health workers, infrastructure investments, and robust governance (5). Moreover, failure to integrate digital solutions into care workflows can lead to duplication, inefficiencies, and underutilization (6).

2.3 Maturity Models in Digital Health

The concept of “maturity” in digital health assesses how well countries integrate and institutionalize digital tools. Several maturity models exist:

- The Global Digital Health Index (GDHI) developed by HealthEnabled measures country performance across seven domains, including leadership, legislation, and infrastructure (7).

- PAHO’s Information Systems for Health (IS4H) model focuses on Latin American countries, incorporating institutional capacity and data governance (8).
- The World Bank’s Digital Health Assessment Toolkit emphasizes infrastructure, financial sustainability, and institutional readiness (9).
- USAID’s HIS Interoperability Toolkit assesses readiness for health data sharing and technical integration (10).

While these models are informative, many rely on self-reported data or are regionally specific, limiting comparability across countries.

2.4 The Global Digital Health Monitor (GDHM)

To standardize and scale maturity assessments, the World Health Organization introduced the Global Digital Health Monitor (GDHM). GDHM evaluates national digital ecosystems using 23 sub-indicators grouped under seven categories: governance, strategy, services, standards, infrastructure, compliance, and workforce (11). Each is rated across five phases of maturity. Unlike previous tools, GDHM encourages evidence-based reporting using publicly accessible documentation and government sources.

Literature applying the GDHM framework is emerging. A 2023 WHO technical report using GDHM profiles found significant variability in digital health maturity among countries in the same income group (12). Notably, countries like Ethiopia—classified as low-income—scored higher than some middle-income peers due to early strategic investments and donor coordination (13).

2.5 Comparative Cross-Country Studies

Few published studies conduct systematic GDHM-based comparisons across income tiers. One comparative study by the Asia eHealth Information Network highlighted disparities in interoperability and legal protections across ASEAN countries (14). Meanwhile, Nordic countries—particularly Finland—have been featured in WHO and OECD literature as models of digital maturity due to their implementation of unified patient portals, e-prescriptions, and AI readiness (15).

However, progress is possible. For example, Ethiopia’s Digital Health Blueprint (2020–2025) provides a scalable, phased approach to implementation and has attracted global

attention for its coordination, governance, and early success in digitizing community health information (16).

Section 3: Methodology

3.1 Research Design

The digital health maturity levels of the selected countries were evaluated through a **structured secondary analysis**. It was conceptualized to assess and compare the digital health maturity of selected countries representing different income levels based on the World Bank classification.

The assessment was guided by the Global Digital Health Monitor (GDHM), an evidence-based maturity framework developed by the World Health Organization (WHO) and partner institutions, which allows standardized evaluation of national digital health ecosystems.

3.2 Country Selection

A total of nine countries was selected for the study using stratified random sampling across three income categories. The World Bank classification of countries on basis of Gross National Income (GNI) per capita was used. The selection criteria included:

- Geographic diversity (Africa, Asia, Europe)
- Availability of data related to digital health policies and practices

High Income Countries	Middle Income Countries	Low Income Countries
1. Portugal	1. Ghana	1. Mali
2. Finland	2. Malaysia	2. Ethiopia
3. Ireland	3. Morocco	3. Liberia

Table 3.1 Country Selection Details

3.3 Data Collection and Sources

This study is based entirely on secondary data. Country-specific information was collected from:

- Government health ministry portals and national digital health strategy documents
- WHO Digital Health Atlas
- WHO digital health resources (Global Repository on Digital Health resources)
- Global Health Observatory
- WHO country profiles and regional reports.
- International Reports and Databases

3.4 Study Framework: The Global Digital Health Monitor

The GDHM framework comprises seven core enabling environments that reflect key pillars of a digital health system:

1. Leadership and governance
2. Strategy and investment
3. Services and applications
4. Standards and interoperability
5. Infrastructure
6. Legislation, policy, and compliance
7. Workforce

Each enabling environment is further divided into a total of 23 sub-indicators. Each sub-indicator is assessed using a five-phase maturity scale:

Scoring scale across 23 key indicators

- 1: Non-existent**
- 2: First initial steps taken**
- 3: Existing but not in working order**
- 4: Existing in working order but not implemented at organizational level, or scaled at developmental level**
- 5: Fully developed, implemented, and is scalable**

Figure 3.1 Scoring Scale

3.5 Data Extraction and Scoring Procedure

Each of the 23 sub-indicators was assessed individually for all nine countries. A detailed scoring matrix was developed based on the GDHM scoring rubric. The procedure included:

- Extraction of publicly available documents (strategies, acts, evaluation reports, dashboards)
- Classification of evidence under relevant sub-indicators
- Assignment of maturity phase (1–5) based on evidence criteria outlined by GDHM indicators.
- Documentation of rationale and source reference.

3.6 Data Analysis

After scoring all 23 sub-indicators for each country, mean scores were computed to obtain an overall maturity phase.

- 1: Very beginning stage**
- 2: Early stage, with foundational elements in development**
- 3: Moderate level of progress**
- 4: Advanced stage with most enablers in place**
- 5: Highest maturity level**

Figure 3.2 Maturity Phase

Results were then grouped by income category to identify trends, disparities, and transferable strategies.

Findings were visualized using summary tables, radar maps and bar charts to facilitate comparative analysis.

3.7 Limitations

- Data availability was varied by country. LICs often lacked updated or detailed documentation, which may affect score accuracy.
- Some indicators (e.g., secondary data use, workforce policy) were under-reported globally.
- Language barriers may have limited access to full documents.

Section 4: Results

4.1: High Income Countries:

4.1.2 Finland

Socio Demographic Data:

1. Total area (sq km) - 338 145 km²
2. Total population - 5 637 214
3. Urban population - 4 044 568
4. Literacy rate (ages 15+) - 99.5%
5. Age dependency ratio (% dependents per 100 working-age) - 62.6%
6. Total unemployment (% labor force) - 7.0%



Health Finance Data:

1. GDP (nominal) - USD 319.99 billion
2. GDP growth (annual %) - - 0.5%
3. Health expenditure (% of GDP) -10.3%
4. Public health exp. per capita (Gov't) - ~USD 6 860
5. Private health exp. per capita - ~USD 5 574
6. External health expenditure p.c. - Not applicable
7. Out-of-pocket health exp. p.c. - ~USD 1 380

ICT Data:

1. Mobile cellular subscriptions - ~129 per 100 people
2. Internet users (% of population) - ~89% internet penetration

(30-38)

SCORING OF FINLAND : 5			
Category	Indicator	Score	Total
Leadership & Governance	Indicator 1 -Digital health prioritized at the national level through dedicated bodies / mechanisms for governance	4	5
	Indicator 2 -Digital Health prioritized at the national level through planning	5	
	Indicator 2a -Health is prioritized in national digital transformation and data governance policies	5	
	Indicator 3 -Readiness for emerging technologies adoption and governance	5	
	Indicator 4 -Diversity, Equity, and human rights analysis, planning and monitoring included in national digital health strategies and plans	4	
	Indicator 4a -Gender considerations accounted for in digital health strategies and digital health governance	4	
	Indicator 5 -National eHealth/ Digital Health Strategy or Framework	5	
Strategy & Investment	Indicator 5a -National digital strategy alignment with Universal Health Coverage (UHC) Core Components	5	5
	Indicator 6 -Public funding for digital health	4	
	Indicator 6a -Private sector participation and investments in digital health	4	
	Indicator 7 -Legal Framework for Data Protection (Security/ Cybersecurity)	5	
Legislation, Policy, & Compliance	Indicator 8 -Laws or Regulations for privacy, consent, confidentiality and access to health information (Privacy)	5	4
	Indicator 9 -Protocol for regulating or certifying devices and/or health services- including provisions for AI and algorithms (at higher stages of maturity)	5	
	Indicator 9a -Protocol for regulating and certifying AI within health services	4	
	Indicator 10 -Cross-border data security and sharing	4	
	Indicator 11 -Digital health integrated in health and related professional pre-service training (prior to deployment)	3	
Workforce	Indicator 12 -Digital health integrated in health and related professional in-service training (after to deployment)	4	4
	Indicator 13 -Training of digital health workforce	4	
	Indicator 14 -Maturity of public sector digital health professional careers	4	
	Indicator 15 -National digital health architecture and/or health information exchange	5	
Standards & Interoperability	Indicator 16 -Health information standards	5	5
	Indicator 17 -Network readiness	5	
Infrastructure	Indicator 18 -Planning and support for ongoing digital health infrastructure maintenance	4	5
	Indicator 19 -Nationally scaled digital health systems	5	
Services & Applications	Indicator 20 -Digital identity management of service providers, administrators, and facilities for digital health, including location data for GIS mapping	5	5
	Indicator 21 -Digital identity management of individuals for health	5	
	Indicator 21a -Digital identity management of individuals for health	5	
	Indicator 22 -Secure Patient Feedback Systems	5	
	Indicator 23 -Population health management contribution of digital health	5	

Figure 4.1 Scoring of Finland

(39-50)



Figure 4.2 Radar Chart: Scoring of Ireland

4.1.2 Ireland

Socio-Demographic Data:

1. Total area (km²) - 84,421 km²
2. Total population (2023) - 5.38 million
3. Urban population (% of total) - 162% (approx.)
4. Adult literacy rate (15+) - 99%
5. Age dependency ratio - ≈62% (2023)
6. Unemployment (May 2025) - 4.0% total, 10.9% youth (15–24)



Health Finance Data:

1. GDP nominal (2025) - USD 560 billion
2. GDP per capita (nominal, 2025) - USD 103,500
3. Health expenditure (% GDP, 2023) - 6.6% (11.5% of GNI*)

ICT & Digital Indicators:

1. Mobile cellular subscriptions - 5.76 million (2023)
2. Internet usage (% population) - 95% (2022)
3. Broadband coverage (100 Mbps) - 84% households VHCN; 72% FTTP; 98% mobile broadband
4. 5G mobile coverage - 84% of populated areas (2022)

Universal Health Coverage:

1. UHC Service Coverage Index - ~85

(30-38)

SCORING OF IRELAND : 3			
Category	Indicator	Score	Total
Leadership & Governance	Indicator 1 -Digital health prioritized at the national level through dedicated bodies / mechanisms for governance	3	3
	Indicator 2 -Digital Health prioritized at the national level through planning	3	
	Indicator 2a -Health is prioritized in national digital transformation and data governance policies	3	
	Indicator 3 -Readiness for emerging technologies adoption and governance	3	
	Indicator 4 -Diversity, Equity, and human rights analysis, planning and monitoring included in national digital health strategies and plans	3	
	Indicator 4a -Gender considerations accounted for in digital health strategies and digital health governance	3	
Strategy & Investment	Indicator 5 -National eHealth/ Digital Health Strategy or Framework	3	3
	Indicator 5a -National digital strategy alignment with Universal Health Coverage (UHC) Core Components	3	
	Indicator 6 -Public funding for digital health	4	
	Indicator 6a -Private sector participation and investments in digital health	3	
Legislation, Policy, & Compliance	Indicator 7 -Legal Framework for Data Protection (Security/ Cybersecurity)	3	3
	Indicator 8 -Laws or Regulations for privacy, consent, confidentiality and access to health information (Privacy)	3	
	Indicator 9 -Protocol for regulating or certifying devices and/or health services- including provisions for AI and algorithms (at higher stages of maturity)	3	
	Indicator 9a -Protocol for regulating and certifying AI within health services	2	
	Indicator 10 -Cross-border data security and sharing	3	

Category	Indicator	Score	Total
Workforce	Indicator 11 -Digital health integrated in health and related professional pre-service training (prior to deployment)	2	3
	Indicator 12 -Digital health integrated in health and related professional in-service training (after to deployment)	3	
	Indicator 13 -Training of digital health workforce	3	
	Indicator 14 -Maturity of public sector digital health professional careers	2	
Standards & Interoperability	Indicator 15 -National digital health architecture and/or health information exchange	2	3
	Indicator 16 -Health information standards	3	
Infrastructure	Indicator 17 -Network readiness	4	4
	Indicator 18 -Planning and support for ongoing digital health infrastructure maintenance	3	
Services & Applications	Indicator 19 -Nationally scaled digital health systems	2	2
	Indicator 20 -Digital identity management of service providers, administrators, and facilities for digital health, including location data for GIS mapping	2	
	Indicator 21 -Digital identity management of individuals for health	2	
	Indicator 21a -Digital identity management of individuals for health	2	
	Indicator 22 -Secure Patient Feedback Systems	2	
	Indicator 23 -Population health management contribution of digital health	3	

Figure 4.3 Scoring of Ireland

(39-50)

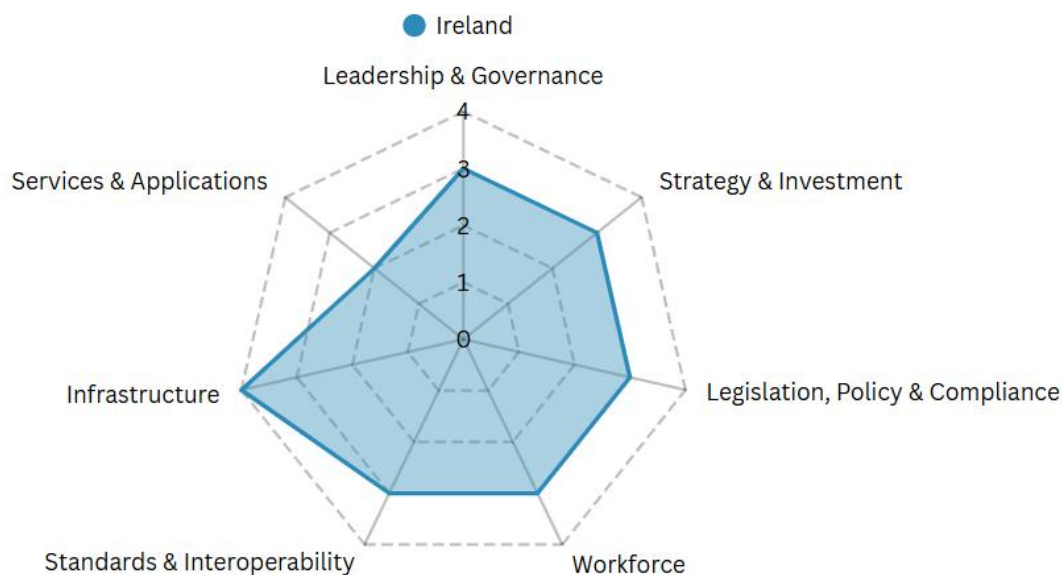


Figure 4.4 Radar Chart: Scoring of Ireland

4.1.3 Portugal

Socio-Demographic Data:

1. Total area 92,230 km²
2. Total population (2024) 10.75 million
3. Urban population (%) 67.9%
4. Literacy rate (15+) 99.44%
5. Age dependency ratio 57.0%
6. Unemployment rate 6.6%



Health Finance Data:

1. GDP (nominal, 2025 est.) - USD 321.4 billion
2. GDP (PPP, 2025 est.) - USD 536.1 billion
3. GDP per capita (nominal, 2025) - USD 30,002

4. GDP annual growth - 1.9% (2024); 2.0% (2025)
5. Health expenditure (% of GDP, 2021) - Not directly stated
6. Gov't share of health expenditure - 63.1% of CHE
7. Out-of-pocket share of CHE - 29.0% of CHE

ICT Data:

1. Internet users (% of pop.) - 94% households fixed broadband; high use
2. Fixed broadband (100 Mbps+) - 68% households

Universal Health Coverage:

1. UHC Service Coverage Index - 84

(30-38)

SCORING OF PORTUGAL : 5

Category	Indicator	Score	Total
Leadership & Governance	Indicator 1 -Digital health prioritized at the national level through dedicated bodies / mechanisms for governance	5	5
	Indicator 2 -Digital Health prioritized at the national level through planning	5	
	Indicator 2a -Health is prioritized in national digital transformation and data governance policies	5	
	Indicator 3 -Readiness for emerging technologies adoption and governance	5	
	Indicator 4 -Diversity, Equity, and human rights analysis, planning and monitoring included in national digital health strategies and plans	5	
	Indicator 4a -Gender considerations accounted for in digital health strategies and digital health governance	3	
Strategy & Investment	Indicator 5 -National eHealth/ Digital Health Strategy or Framework	5	5
	Indicator 5a -National digital strategy alignment with Universal Health Coverage (UHC) Core Components	5	
	Indicator 6 -Public funding for digital health	4	
	Indicator 6a -Private sector participation and investments in digital health	4	
Legislation, Policy, & Compliance	Indicator 7 -Legal Framework for Data Protection (Security/ Cybersecurity)	5	4
	Indicator 8 -Laws or Regulations for privacy, consent, confidentiality and access to health information (Privacy)	5	
	Indicator 9 -Protocol for regulating or certifying devices and/or health services- including provisions for AI and algorithms (at higher stages of maturity)	4	
	Indicator 9a -Protocol for regulating and certifying AI within health services	1	
	Indicator 10 -Cross-border data security and sharing	5	

Category	Indicator	Score	Total
Workforce	Indicator 11 -Digital health integrated in health and related professional pre-service training (prior to deployment)	3	4
	Indicator 12 -Digital health integrated in health and related professional in-service training (after to deployment)	4	
	Indicator 13 -Training of digital health workforce	4	
	Indicator 14 -Maturity of public sector digital health professional careers	3	
Standards & Interoperability	Indicator 15 -National digital health architecture and/or health information exchange	5	5
	Indicator 16 -Health information standards	5	
Infrastructure	Indicator 17 -Network readiness	4	5
	Indicator 18 -Planning and support for ongoing digital health infrastructure maintenance	5	
Services & Applications	Indicator 19 -Nationally scaled digital health systems	5	5
	Indicator 20 -Digital identity management of service providers, administrators, and facilities for digital health, including location data for GIS mapping	4	
	Indicator 21 -Digital identity management of individuals for health	5	
	Indicator 21a -Digital identity management of individuals for health	5	
	Indicator 22 -Secure Patient Feedback Systems	4	
	Indicator 23 -Population health management contribution of digital health	4	

Figure 4.5 Scoring of Portugal

(39-50)

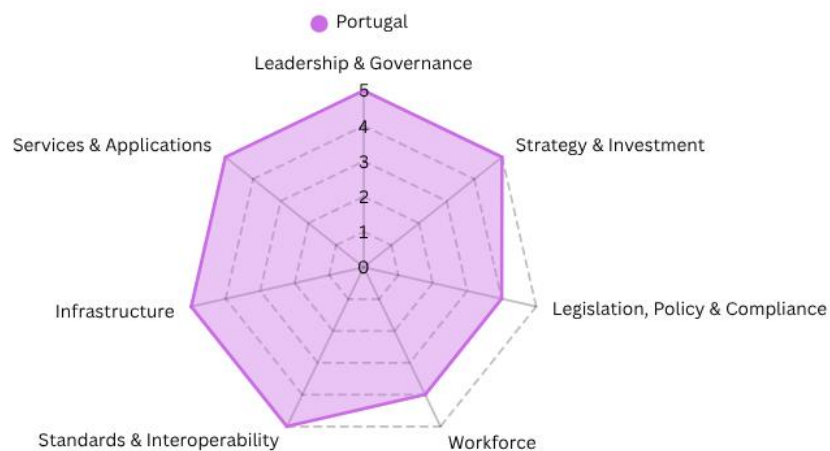


Figure 4.6 Radar Chart: Scoring of Portugal

4.2 Middle Income Countries

4.2.1 Ghana

Socio-Demographic Data:

2. Total area (sq km) - 239,567 km²
3. Total population - ~34.4 million
4. Urban population - ~74% (~25.5 million)
5. Literacy rate, adult (15+) - ~79%
6. Age dependency ratio - ~61%
7. Total unemployment - ~3.9%



Health Finance Data:

1. GDP (nominal) - USD 88.03 billion
2. GDP growth (annual %) - 5.7% (2024), 3.1% (2023)
3. Current health expenditure (% of GDP) - 4.13% (2021); 3.95% (2022)
4. Domestic private health expenditure per capita (US\$) - ~26% of CHE

5. Government health expenditure per capita (US\$) - ~USD 83.4
6. External health expenditure per capita (US\$) - ~12.8% of CHE
7. Out-of-pocket health expenditure per capita (US\$) - ~25% of CHE; ~USD 21

ICT Data:

1. Mobile cellular subscriptions (per 100) - ~68%
2. Internet users (% of population) - 69.9%
3. Individuals using internet (%pop.) - 69.9%

(30-38)

SCORING OF GHANA : 3

Category	Indicator	Score	Total
Leadership & Governance	Indicator 1 -Digital health prioritized at the national level through dedicated bodies / mechanisms for governance	4	4
	Indicator 2 -Digital Health prioritized at the national level through planning	4	
	Indicator 2a -Health is prioritized in national digital transformation and data governance policies	3	
	Indicator 3 -Readiness for emerging technologies adoption and governance	3	
	Indicator 4 -Diversity, Equity, and human rights analysis, planning and monitoring included in national digital health strategies and plans	4	
	Indicator 4a -Gender considerations accounted for in digital health strategies and digital health governance	3	
Strategy & Investment	Indicator 5 -National eHealth/ Digital Health Strategy or Framework	5	4
	Indicator 5a -National digital strategy alignment with Universal Health Coverage (UHC) Core Components	4	
	Indicator 6 -Public funding for digital health	3	
	Indicator 6a -Private sector participation and investments in digital health	2	
Legislation, Policy, & Compliance	Indicator 7 -Legal Framework for Data Protection (Security/ Cybersecurity)	4	3
	Indicator 8 -Laws or Regulations for privacy, consent, confidentiality and access to health information (Privacy)	4	
	Indicator 9 -Protocol for regulating or certifying devices and/or health services- including provisions for AI and algorithms (at higher stages of maturity)	3	
	Indicator 9a -Protocol for regulating and certifying AI within health services	2	
	Indicator 10 -Cross-border data security and sharing	2	
Category	Indicator	Score	Total
Workforce	Indicator 11 -Digital health integrated in health and related professional pre-service training (prior to deployment)	3	3
	Indicator 12 -Digital health integrated in health and related professional in-service training (after to deployment)	3	
	Indicator 13 -Training of digital health workforce	4	
	Indicator 14 -Maturity of public sector digital health professional careers	2	
Standards & Interoperability	Indicator 15 -National digital health architecture and/or health information exchange	2	3
	Indicator 16 -Health information standards	3	
Infrastructure	Indicator 17 -Network readiness	3	4
	Indicator 18 -Planning and support for ongoing digital health infrastructure maintenance	4	
Services & Applications	Indicator 19 -Nationally scaled digital health systems	3	2
	Indicator 20 -Digital identity management of service providers, administrators, and facilities for digital health, including location data for GIS mapping	2	
	Indicator 21 -Digital identity management of individuals for health	1	
	Indicator 21a -Digital identity management of individuals for health	1	
	Indicator 22 -Secure Patient Feedback Systems	3	
	Indicator 23 -Population health management contribution of digital health	4	

Figure 4.7 Scoring of Ghana

(39-50)



Figure 4.8 Radar Chart: Scoring of Ghana

4.2.2 Morocco

Socio-Demographic Data:

1. Total area - 446,550 km²
2. Total population - 36.8 million
3. Urban population - ~67 %
4. Adult literacy (15+) - ~99.2 %
5. Age dependency ratio - ~76.8 %
6. Unemployment rate - 16.9 %, youth ~36 %



Health Finance Data:

1. GDP (nominal) - USD 165.8 billion
2. GDP annual growth (%) - 3.2 %
3. Health expenditure (% of GDP) - 5.74 %
4. OOP/external/private per capita (approx.) - Private ~40 %, govt ~60 % of CHE

ICT Data:

1. Mobile subscriptions - smartphone adoption ~68 %

2. Internet users (% of pop.) - Not specified (likely >70%)

(30-38)

SCORING OF MOROCCO : 3

Category	Indicator	Score	Total
Leadership & Governance	Indicator 1 -Digital health prioritized at the national level through dedicated bodies / mechanisms for governance	3	3
	Indicator 2 -Digital Health prioritized at the national level through planning	4	
	Indicator 2a -Health is prioritized in national digital transformation and data governance policies	4	
	Indicator 3 -Readiness for emerging technologies adoption and governance	3	
	Indicator 4 -Diversity, Equity, and human rights analysis, planning and monitoring included in national digital health strategies and plans	3	
	Indicator 4a -Gender considerations accounted for in digital health strategies and digital health governance	3	
	Indicator 5 -National eHealth/ Digital Health Strategy or Framework	3	
Strategy & Investment	Indicator 5a -National digital strategy alignment with Universal Health Coverage (UHC) Core Components	4	3
	Indicator 6 -Public funding for digital health	3	
	Indicator 6a -Private sector participation and investments in digital health	3	
	Indicator 7 -Legal Framework for Data Protection (Security/ Cybersecurity)	3	
Legislation, Policy, & Compliance	Indicator 8 -Laws or Regulations for privacy, consent, confidentiality and access to health information (Privacy)	3	3
	Indicator 9 -Protocol for regulating or certifying devices and/or health services- including provisions for AI and algorithms (at higher stages of maturity)	3	
	Indicator 9a -Protocol for regulating and certifying AI within health services	3	
	Indicator 10 -Cross-border data security and sharing	3	
	Indicator 11 -Digital health integrated in health and related professional pre-service training (prior to deployment)	3	
Workforce	Indicator 12 -Digital health integrated in health and related professional in-service training (after to deployment)	3	3
	Indicator 13 -Training of digital health workforce	3	
	Indicator 14 -Maturity of public sector digital health professional careers	3	
	Indicator 15 -National digital health architecture and/or health information exchange	2	
Standards & Interoperability	Indicator 16 -Health information standards	3	3
	Indicator 17 -Network readiness	4	
Infrastructure	Indicator 18 -Planning and support for ongoing digital health infrastructure maintenance	3	3
	Indicator 19 -Nationally scaled digital health systems	3	
Services & Applications	Indicator 20 -Digital identity management of service providers, administrators, and facilities for digital health, including location data for GIS mapping	3	2
	Indicator 21 -Digital identity management of individuals for health	2	
	Indicator 21a -Digital identity management of individuals for health	2	
	Indicator 22 -Secure Patient Feedback Systems	1	
	Indicator 23 -Population health management contribution of digital health	1	

Figure 4.9 Scoring of Morocco

(39-50)

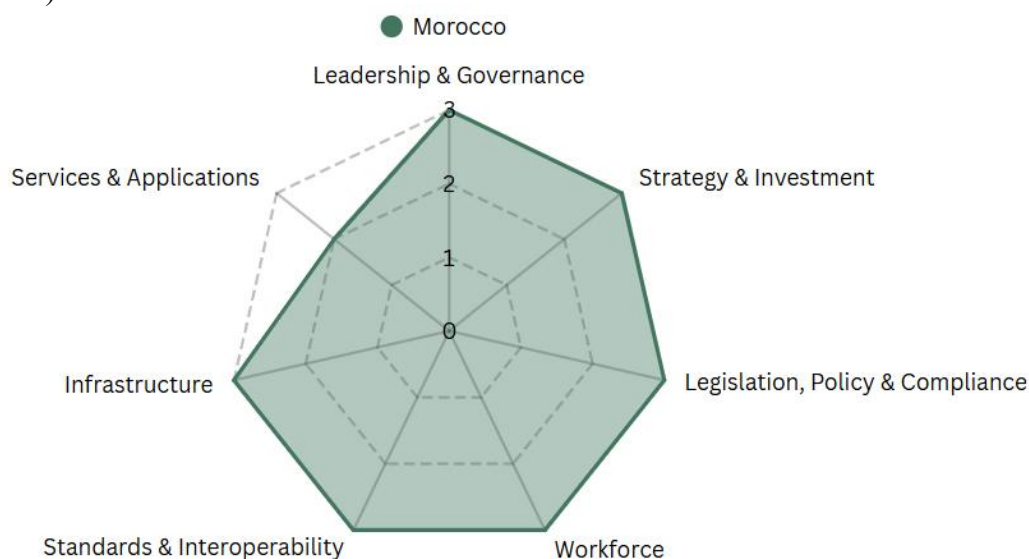


Figure 4.10 Radar Chart: Scoring of Morocco

4.2.3 Malaysia



Socio-Demographic Data:

1. Total Area - 330,803 km²
2. Total Population - 34.56 million
3. Urban Population - 74.7% (≈25.8 million)
4. Literacy Rate (15+) - >95%
5. Age Dependency Ratio - ~53%
6. Unemployment Rate - ~3.4%

Health Finance Data:

1. GDP (Nominal) - USD 445 billion
2. GDP Growth (annual %) - (estimated ~3–4%)
3. Current Health Expenditure (% of GDP) - ~4.0%
4. External Health Exp./capita - USD 0 (negligible)
5. Out-of-Pocket Exp./capita - ~35% of total health spending

ICT Data:

1. Mobile Cellular Subscriptions - 142.7 per 100 people
2. Internet Users (% of population) - (likely ≥90%)
3. 5G Coverage - ~82% of populated areas

Universal Health Coverage (UHC):

1. UHC Service Coverage Index – 76

(30-38)

SCORING OF MALAYSIA : 4

Category	Indicator	Score	Total
Leadership & Governance	Indicator 1 -Digital health prioritized at the national level through dedicated bodies / mechanisms for governance	4	4
	Indicator 2 -Digital Health prioritized at the national level through planning	5	
	Indicator 2a -Health is prioritized in national digital transformation and data governance policies	3	
	Indicator 3 -Readiness for emerging technologies adoption and governance	4	
	Indicator 4 -Diversity, Equity, and human rights analysis, planning and monitoring included in national digital health strategies and plans	3	
	Indicator 4a -Gender considerations accounted for in digital health strategies and digital health governance	2	
Strategy & Investment	Indicator 5 -National eHealth/ Digital Health Strategy or Framework	5	4
	Indicator 5a -National digital strategy alignment with Universal Health Coverage (UHC) Core Components	3	
	Indicator 6 -Public funding for digital health	3	
	Indicator 6a -Private sector participation and investments in digital health	3	
Legislation, Policy, & Compliance	Indicator 7 -Legal Framework for Data Protection (Security/ Cybersecurity)	5	4
	Indicator 8 -Laws or Regulations for privacy, consent, confidentiality and access to health information (Privacy)	4	
	Indicator 9 -Protocol for regulating or certifying devices and/or health services- including provisions for AI and algorithms (at higher stages of maturity)	4	
	Indicator 9a -Protocol for regulating and certifying AI within health services	2	
	Indicator 10 -Cross-border data security and sharing	4	

Category	Indicator	Score	Total
Workforce	Indicator 11 -Digital health integrated in health and related professional pre-service training (prior to deployment)	3	3
	Indicator 12 -Digital health integrated in health and related professional in-service training (after to deployment)	3	
	Indicator 13 -Training of digital health workforce	4	
	Indicator 14 -Maturity of public sector digital health professional careers	2	
Standards & Interoperability	Indicator 15 -National digital health architecture and/or health information exchange	3	3
	Indicator 16 -Health information standards	3	
Infrastructure	Indicator 17 -Network readiness	4	4
	Indicator 18 -Planning and support for ongoing digital health infrastructure maintenance	4	
Services & Applications	Indicator 19 -Nationally scaled digital health systems	3	3
	Indicator 20 -Digital identity management of service providers, administrators, and facilities for digital health, including location data for GIS mapping	4	
	Indicator 21 -Digital identity management of individuals for health	3	
	Indicator 21a -Digital identity management of individuals for health	3	
	Indicator 22 -Secure Patient Feedback Systems	3	
	Indicator 23 -Population health management contribution of digital health	4	

Figure 4.11 Radar Chart: Scoring of Malaysia

(39-50)



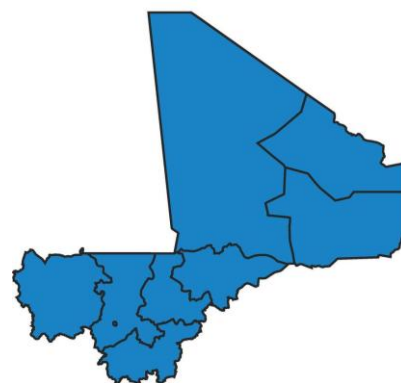
Figure 4.12 Radar Chart: Scoring of Malaysia

4.3 Low Income Countries

4.3.1 Mali

Socio-Demographic Data:

1. Total area (sq km) - 1,240,192 km²
2. Total population (2024 est.) - 21.99 million
3. Urban population (%) - Estimated 36.4%
4. Literacy rate (15+ years) - 35.5%
5. Age dependency ratio - 95.6%
6. Unemployment rate (2021) - 1.7% (adult)



Health Finance Data:

1. GDP (nominal) - USD 21.3 billion (2023)
2. GDP per capita (nominal) - USD 912
3. GDP PPP - USD 61.6 billion
4. GDP PPP per capita - USD 2,639

ICT Data:

1. Internet users (% of population, 2022) - 23% (est.)

Universal Health Coverage:

1. UHC Service Coverage Index (2021) – 41

(30-38)

SCORING OF MALI : 3

Category	Indicator	Score	Total
Leadership & Governance	Indicator 1 -Digital health prioritized at the national level through dedicated bodies / mechanisms for governance	4	3
	Indicator 2 -Digital Health prioritized at the national level through planning	4	
	Indicator 2a -Health is prioritized in national digital transformation and data governance policies	3	
	Indicator 3 -Readiness for emerging technologies adoption and governance	2	
	Indicator 4 -Diversity, Equity, and human rights analysis, planning and monitoring included in national digital health strategies and plans	4	
	Indicator 4a -Gender considerations accounted for in digital health strategies and digital health governance	3	
Strategy & Investment	Indicator 5 -National eHealth/ Digital Health Strategy or Framework	5	4
	Indicator 5a -National digital strategy alignment with Universal Health Coverage (UHC) Core Components	4	
	Indicator 6 -Public funding for digital health	3	
	Indicator 6a -Private sector participation and investments in digital health	2	
Legislation, Policy, & Compliance	Indicator 7 -Legal Framework for Data Protection (Security/ Cybersecurity)	3	3
	Indicator 8 -Laws or Regulations for privacy, consent, confidentiality and access to health information (Privacy)	3	
	Indicator 9 -Protocol for regulating or certifying devices and/or health services- including provisions for AI and algorithms (at higher stages of maturity)	3	
	Indicator 9a -Protocol for regulating and certifying AI within health services	2	
	Indicator 10 -Cross-border data security and sharing	2	

Category	Indicator	Score	Total
Workforce	Indicator 11 -Digital health integrated in health and related professional pre-service training (prior to deployment)	2	3
	Indicator 12 -Digital health integrated in health and related professional in-service training (after to deployment)	3	
	Indicator 13 -Training of digital health workforce	4	
	Indicator 14 -Maturity of public sector digital health professional careers	2	
Standards & Interoperability	Indicator 15 -National digital health architecture and/or health information exchange	3	3
	Indicator 16 -Health information standards	3	
Infrastructure	Indicator 17 -Network readiness	3	3
	Indicator 18 -Planning and support for ongoing digital health infrastructure maintenance	3	
Services & Applications	Indicator 19 -Nationally scaled digital health systems	3	2
	Indicator 20 -Digital identity management of service providers, administrators, and facilities for digital health, including location data for GIS mapping	2	
	Indicator 21 -Digital identity management of individuals for health	1	
	Indicator 21a -Digital identity management of individuals for health	1	
	Indicator 22 -Secure Patient Feedback Systems	3	
	Indicator 23 -Population health management contribution of digital health	4	

Figure 4.13 Scoring of Mali

(39-50)

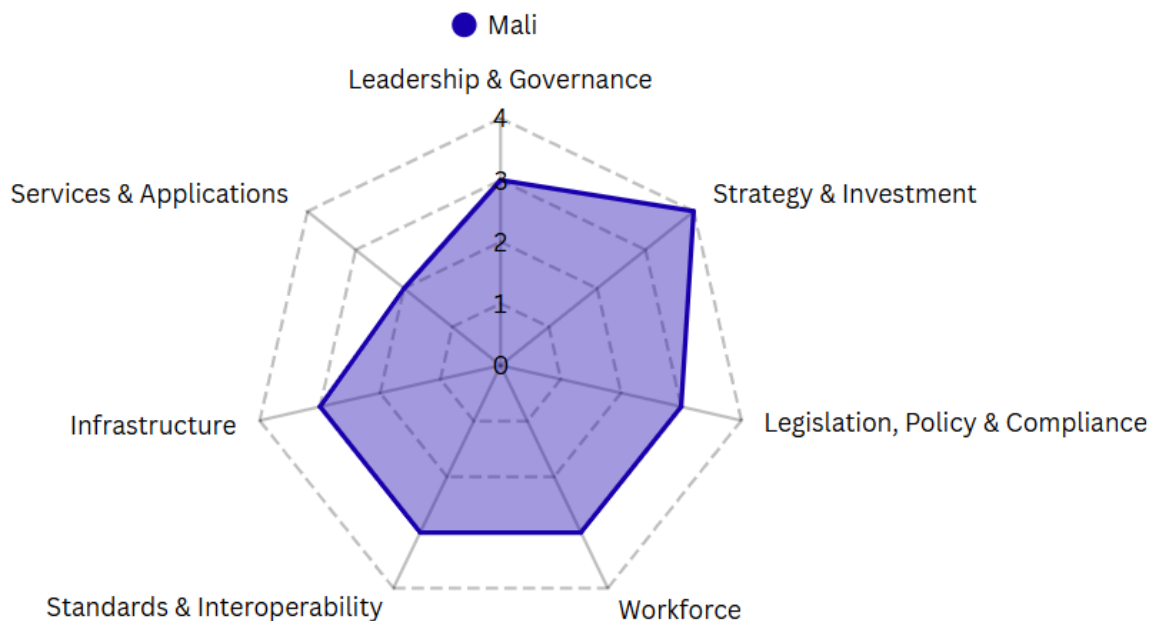


Figure 4.14 Radar Chart: Scoring of Mali

4.3.2 Liberia



Socio-Demographic Data:

1. Total area (sq km) - 43 000 km²
2. Total population (2024 est.) - 5.43 million
3. Urban population - ~2.23 million (~41%)
4. Literacy rate (15+ years) - ~60.8% (2010)
5. Age dependency ratio - ~62% (2023)
6. Total unemployment rate - ~2.8% (2014)

Health Finance Data:

1. GDP (nominal, 2023) USD 4.35 billion
2. GDP per capita (nominal) USD 800
3. GDP per capita (PPP) USD 1,789
4. Current health expenditure (% of GDP, 2021) 16.62%

ICT Data:

1. Mobile cellular subscriptions (%/100) - ~40% penetration
2. Internet usage (% of population) - Not clearly reported; likely low
3. ICT Policy Framework (2019–2024) - Updated national ICT policy exists

(30-38)

SCORING OF LIBERIA : 2

Category	Indicator	Score	Total
Leadership & Governance	Indicator 1 -Digital health prioritized at the national level through dedicated bodies / mechanisms for governance	3	2
	Indicator 2 -Digital Health prioritized at the national level through planning	3	
	Indicator 2a -Health is prioritized in national digital transformation and data governance policies	2	
	Indicator 3 -Readiness for emerging technologies adoption and governance	2	
	Indicator 4 -Diversity, Equity, and human rights analysis, planning and monitoring included in national digital health strategies and plans	2	
	Indicator 4a -Gender considerations accounted for in digital health strategies and digital health governance	2	
	Indicator 5 -National eHealth/ Digital Health Strategy or Framework	2	
Strategy & Investment	Indicator 5a -National digital strategy alignment with Universal Health Coverage (UHC) Core Components	2	2
	Indicator 6 -Public funding for digital health	1	
	Indicator 6a -Private sector participation and investments in digital health	2	
	Indicator 7 -Legal Framework for Data Protection (Security/ Cybersecurity)	2	
Legislation, Policy, & Compliance	Indicator 8 -Laws or Regulations for privacy, consent, confidentiality and access to health information (Privacy)	2	2
	Indicator 9 -Protocol for regulating or certifying devices and/or health services- including provisions for AI and algorithms (at higher stages of maturity)	2	
	Indicator 9a -Protocol for regulating and certifying AI within health services	1	
	Indicator 10 -Cross-border data security and sharing	2	
	Indicator 11 -Digital health integrated in health and related professional pre-service training (prior to deployment)	2	
Workforce	Indicator 12 -Digital health integrated in health and related professional in-service training (after to deployment)	2	2
	Indicator 13 -Training of digital health workforce	3	
	Indicator 14 -Maturity of public sector digital health professional careers	2	
Standards & Interoperability	Indicator 15 -National digital health architecture and/or health information exchange	2	2
	Indicator 16 -Health information standards	2	
Infrastructure	Indicator 17 -Network readiness	2	3
	Indicator 18 -Planning and support for ongoing digital health infrastructure maintenance	3	
Services & Applications	Indicator 19 -Nationally scaled digital health systems	3	2
	Indicator 20 -Digital identity management of service providers, administrators, and facilities for digital health, including location data for GIS mapping	2	
	Indicator 21 -Digital identity management of individuals for health	1	
	Indicator 21a -Digital identity management of individuals for health	1	
	Indicator 22 -Secure Patient Feedback Systems	2	
	Indicator 23 -Population health management contribution of digital health	3	

Figure 4.15 Scoring of Liberia

(39-50)

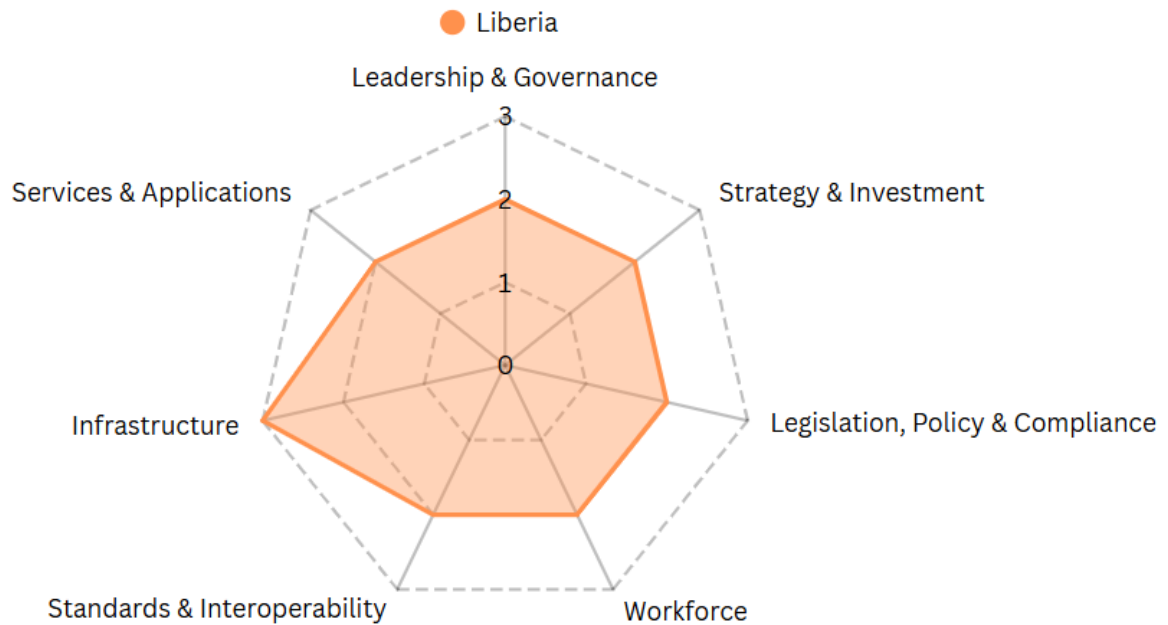


Figure 4.16 Radar Chart: Scoring of Liberia

4.3.3 Ethiopia

Socio-Demographic Data:

1. Total area (sq km) - 1,104,300 km²
2. Total population - 126.5 million (2023 est.)
3. Urban population - 28 million (23% of total) (2023)
4. Literacy rate (ages 15+) - ~52% (2017)
5. Age dependency ratio (% per 100 working age) - ~85% (2023)



Health Finance Data:

1. GDP (nominal) - USD 120.9 billion
2. GDP growth (annual %) - ~0.4%
3. Current health expenditure (% of GDP) - ~3.0%
4. Domestic private health exp. per capita - Approx. 33% of total CHE
5. Government health exp. per capita - Approx. 30% of total CHE
6. External health exp. per capita - ~36% of CHE
7. Out-of-pocket health exp. per capita - ~31% of CHE

ICT Data:

1. Mobile cellular subscriptions - 56.96 per 100 people

Universal Health Coverage:

1. UHC Service Coverage Index - 38

(30-38)

SCORING OF ETHIOPIA : 4

Category	Indicator	Score	Total
Leadership & Governance	Indicator 1 -Digital health prioritized at the national level through dedicated bodies / mechanisms for governance	5	4
	Indicator 2 -Digital Health prioritized at the national level through planning	5	
	Indicator 2a -Health is prioritized in national digital transformation and data governance policies	3	
	Indicator 3 -Readiness for emerging technologies adoption and governance	2	
	Indicator 4 -Diversity, Equity, and human rights analysis, planning and monitoring included in national digital health strategies and plans	4	
	Indicator 4a -Gender considerations accounted for in digital health strategies and digital health governance	3	
Strategy & Investment	Indicator 5 -National eHealth/ Digital Health Strategy or Framework	5	4
	Indicator 5a -National digital strategy alignment with Universal Health Coverage (UHC) Core Components	4	
	Indicator 6 -Public funding for digital health	3	
	Indicator 6a -Private sector participation and investments in digital health	2	
Legislation, Policy, & Compliance	Indicator 7 -Legal Framework for Data Protection (Security/ Cybersecurity)	3	3
	Indicator 8 -Laws or Regulations for privacy, consent, confidentiality and access to health information (Privacy)	3	
	Indicator 9 -Protocol for regulating or certifying devices and/or health services- including provisions for AI and algorithms (at higher stages of maturity)	3	
	Indicator 9a -Protocol for regulating and certifying AI within health services	2	
	Indicator 10 -Cross-border data security and sharing	2	

Category	Indicator	Score	Total
Workforce	Indicator 11 -Digital health integrated in health and related professional pre-service training (prior to deployment)	5	5
	Indicator 12 -Digital health integrated in health and related professional in-service training (after to deployment)	4	
	Indicator 13 -Training of digital health workforce	5	
	Indicator 14 -Maturity of public sector digital health professional careers	4	
Standards & Interoperability	Indicator 15 -National digital health architecture and/or health information exchange	3	3
	Indicator 16 -Health information standards	3	
Infrastructure	Indicator 17 -Network readiness	3	4
	Indicator 18 -Planning and support for ongoing digital health infrastructure maintenance	4	
Services & Applications	Indicator 19 -Nationally scaled digital health systems	4	3
	Indicator 20 -Digital identity management of service providers, administrators, and facilities for digital health, including location data for GIS mapping	2	
	Indicator 21 -Digital identity management of individuals for health	1	
	Indicator 21a -Digital identity management of individuals for health	1	
	Indicator 22 -Secure Patient Feedback Systems	3	
	Indicator 23 -Population health management contribution of digital health	4	

Figure 4.17 Scoring of Ethiopia

(39-50)

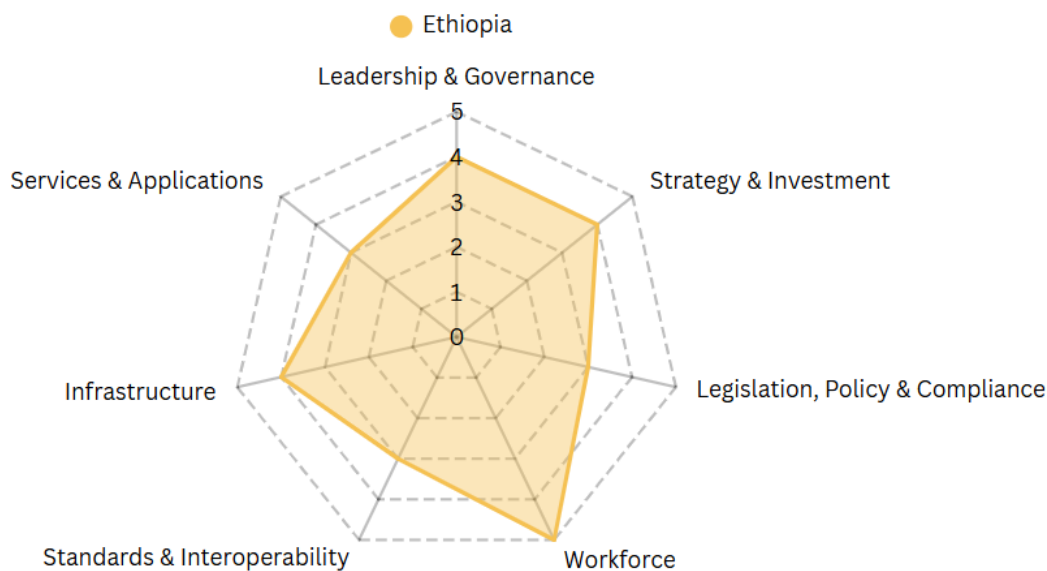


Figure 4.18 Radar Chart: Scoring of Ethiopia

4.4 Findings:

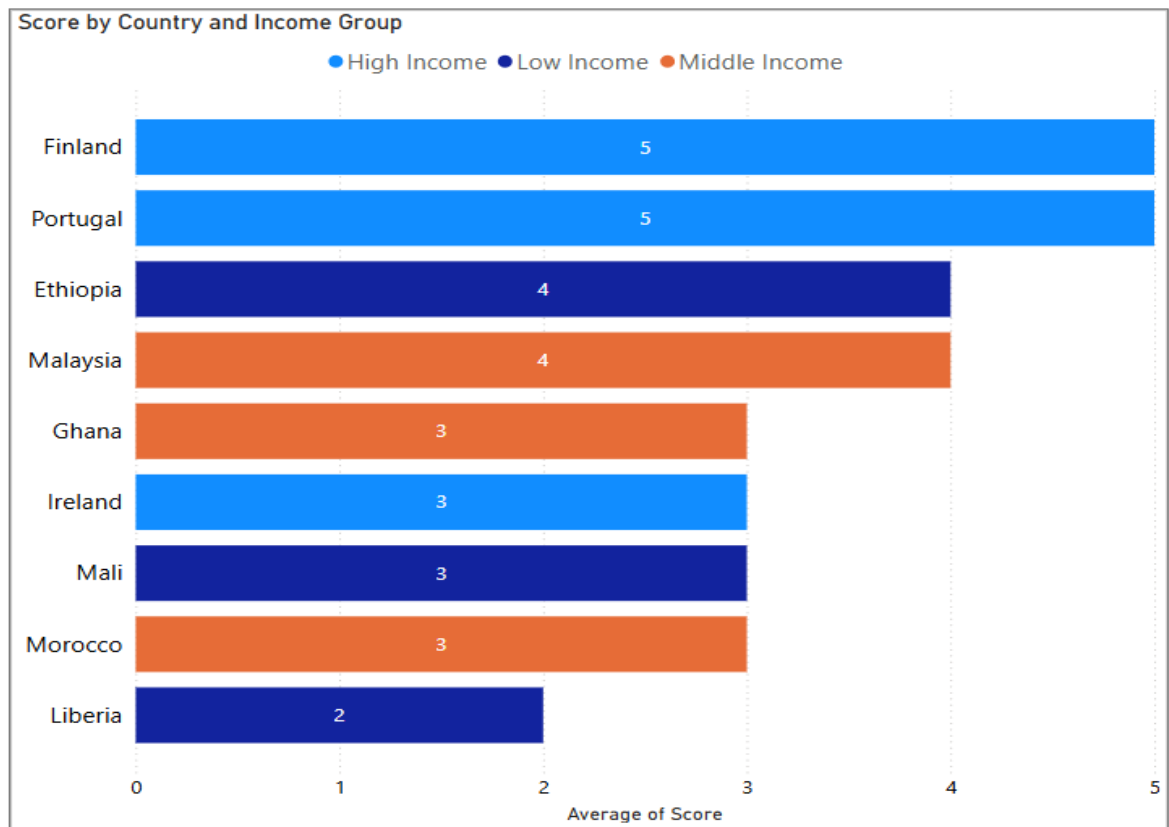


Figure 4.19 Score by country and income group

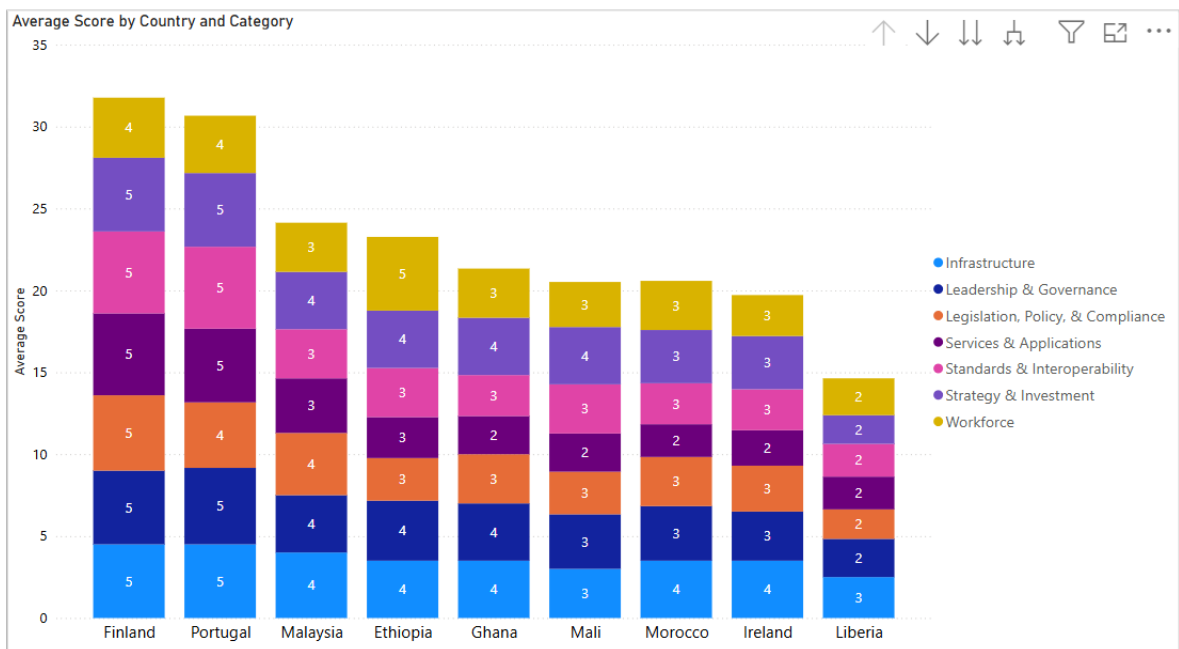


Figure 4.20 Average Score by country and category

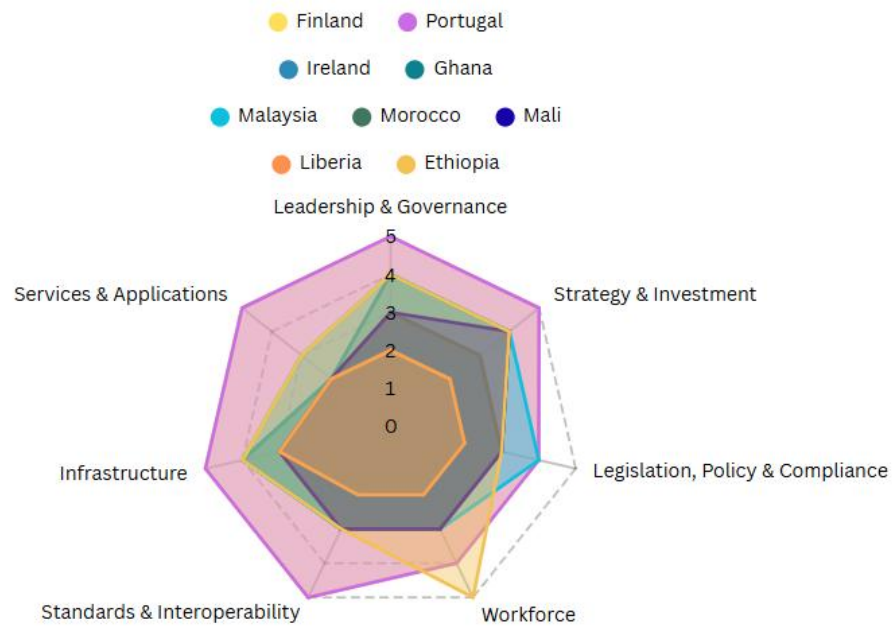


Figure 4.21 Radar Chart: Scores of all countries

Section 5: Discussion

5.1 Digital Health Maturity Score of India:

Socio-Demographic Data:

1. Total area (sq km) - 3,287,263 km²
2. Total population (2023) - 1,428,627,663
3. Urban population - 37.1% (~529 million in 2025)
4. Literacy rate (age 15+) - 80.9% (2023–24)
5. Age dependency ratio - 47.01% (2023)
6. Unemployment rate – 5.6%

Health Finance Data:

1. GDP (nominal, 2025 est.) - USD 4.74 trillion
2. GDP growth (annual %) - ~6% (2024–25)
3. Health expenditure (% of GDP) - 4.7%
- 4.

ICT Data

1. Mobile cellular subscriptions - ~1.17 billion (~85 per 100 people)
2. Internet users (% of pop.) - 65.9% (2023)
3. Rural vs Urban Internet - Urban 110%, Rural 41.7% penetration (2023)

SCORING OF INDIA : 4

Category	Indicator	Score	Total
Leadership & Governance	Indicator 1 - Digital health prioritized at the national level through dedicated bodies / mechanisms for governance	4	4
	Indicator 2 - Digital Health prioritized at the national level through planning	5	
	Indicator 2a - Health is prioritized in national digital transformation and data governance policies	5	
	Indicator 3 - Readiness for emerging technologies adoption and governance	4	
	Indicator 4 - Diversity, Equity, and human rights analysis, planning and monitoring included in national digital health strategies and plans	4	
	Indicator 4a - Gender considerations accounted for in digital health strategies and digital health governance	3	
	Indicator 5 - National eHealth/ Digital Health Strategy or Framework	5	
Strategy & Investment	Indicator 5a - National digital strategy alignment with Universal Health Coverage (UHC) Core Components	5	5
	Indicator 6 - Public funding for digital health	4	
	Indicator 6a - Private sector participation and investments in digital health	4	
Legislation, Policy, & Compliance	Indicator 7 - Legal Framework for Data Protection (Security/ Cybersecurity)	4	4
	Indicator 8 - Laws or Regulations for privacy, consent, confidentiality and access to health information (Privacy)	5	
	Indicator 9 - Protocol for regulating or certifying devices and/or health services- including provisions for AI and algorithms (at higher stages of maturity)	3	
	Indicator 9a - Protocol for regulating and certifying AI within health services	4	
	Indicator 10 - Cross-border data security and sharing	2	
Category	Indicator	Score	Total
Workforce	Indicator 11 - Digital health integrated in health and related professional pre-service training (prior to deployment)	4	3
	Indicator 12 - Digital health integrated in health and related professional in-service training (after to deployment)	4	
	Indicator 13 - Training of digital health workforce	3	
	Indicator 14 - Maturity of public sector digital health professional careers	3	
Standards & Interoperability	Indicator 15 - National digital health architecture and/or health information exchange	5	5
	Indicator 16 - Health information standards	5	
Infrastructure	Indicator 17 - Network readiness	4	4
	Indicator 18 - Planning and support for ongoing digital health infrastructure maintenance	4	
Services & Applications	Indicator 19 - Nationally scaled digital health systems	4	4
	Indicator 20 - Digital identity management of service providers, administrators, and facilities for digital health, including location data for GIS mapping	3	
	Indicator 21 - Digital identity management of individuals for health	3	
	Indicator 21a - Digital identity management of individuals for health	3	
	Indicator 22 - Secure Patient Feedback Systems	4	
	Indicator 23 - Population health management contribution of digital health	4	

Figure 4.22 Scoring of India

5.2 Comparison of Scores:

Countries	GDHM Scores(2023)	Current Scores(2025)
Finland	5	5
Portugal	5	5
Ireland	2	3
Ghana	3	3
Malaysia	4	4
Morocco	2	3
Mali	3	3
Ethiopia	4	4
Liberia	2	2

Ireland's Digital Maturity Score increased from 2(early stage) to 3 (moderate level of progression) due to the nationwide rollout of the Individual Health Identifier (IHI), which enabled consistent patient data linkage across care settings, and the expansion of digital service delivery through e-referrals, e-prescriptions, and telehealth. The government also published the “Digital for Care: A Digital Health Framework for Ireland 2024–2030” (May 2024) outlining six principles to digitally transform health and social services. Key initiatives include the rollout of a patient-facing health app, procurement of a shared care record platform, expansion of e-prescribing and telehealth, and the strengthening of cyber resilience and data governance. (28)

Morocco's digital health maturity score improved between 2023 and 2025 due to the government's launch of a national digital health reform plan in 2023, which prioritized the implementation of a unified hospital information system and the introduction of a shared medical record across public healthcare institutions .In addition, the development of a national health data platform to centralize and secure patient records marked a critical advancement in data infrastructure and governance.(29)

5.3 Successful Strategies from high maturity countries:

Finland

Finland's digital health maturity is driven by its national integration of services through the Kanta platform, which offers a unified system for electronic health records, e-prescriptions, and citizen access via MyKanta. Strong government leadership, GDPR-compliant data governance, universal eID authentication, and high broadband penetration have enabled secure health information exchange and seamless continuity of care. Public-private partnerships and early adoption of interoperability standards like HL7 and FHIR have further reinforced the digital infrastructure.

Portugal

Portugal has achieved high maturity through centralized governance under SPMS, which manages nationwide interoperability and clinical data exchange via the National Interoperability Platform. The country has implemented SNOMED CT, adopted ePrescription lifecycle management, and established citizen-facing portals such as SNS24. Portugal's strategy emphasizes secure cross-border data exchange, integration of primary and secondary care, and alignment with EU-wide digital health frameworks, ensuring consistent progress across digital governance, infrastructure, and patient services.

Malaysia

Malaysia's success lies in its early adoption of national-scale digital tools like MySejahtera for contact tracing and health records, and the development of the Malaysian Health Data Warehouse (MyHDW) for analytics. The Ministry of Health has issued a national eHealth blueprint emphasizing interoperability, EMR adoption, and data governance. While some systems remain fragmented, consistent public investment, growing private-sector involvement, and evolving data privacy regulations (PDPA) have contributed to steady maturity progress.

Ethiopia

Ethiopia stands out among LICs for its proactive and government-led approach to digital health through the Digital Health Blueprint (2020–2025). The Ministry of Health established

a Digital Health Directorate, scaled DHIS2 for national reporting, and introduced eCHIS at the community level. Strategic donor coordination, capacity-building programs, and alignment with UHC goals have enabled Ethiopia to make significant progress in interoperability, governance, and workforce readiness despite infrastructure limitations.

5.4 Challenges faced by Low Maturity countries:

Liberia

Liberia exhibits very low digital health maturity across GDHM indicators due to the absence of a fully implemented digital health strategy, limited institutional governance, and weak ICT infrastructure. Many health facilities rely on manual data systems, and digital initiatives are donor-driven and siloed. The country lacks a national eHealth unit, health data protection laws, and interoperability standards. Additionally, there is no formal training program in health informatics, resulting in minimal workforce readiness for digital health system adoption.

Mali

Mali faces significant challenges in scaling digital health, including unreliable electricity and internet connectivity, particularly in rural areas. Although a national eHealth policy exists, the country lacks a dedicated digital health governance body and an interoperability framework. Health data systems such as DHIS2 function in isolation, and there are no policies governing digital health data protection. Human resource capacity remains low, with most digital tools used in vertical, donor-supported programs rather than integrated national systems.

Ghana

Despite being a middle-income country, Ghana demonstrates only moderate digital health maturity due to fragmented system architecture and insufficient legal frameworks. The absence of a national health identifier and central interoperability layer limits the integration of EHRs and public health data. While DHIS2 is widely used, clinical systems remain disjointed. Digital health training exists in academic institutions, but rural areas face staffing shortages. Moreover, the lack of a comprehensive data protection law undermines trust in digital solutions.

Morocco

Morocco has initiated a national digital health strategy but struggles with uneven implementation across urban and rural settings. The country lacks a national EHR platform, a patient identifier, and a unified interoperability framework. Limited investment in workforce training and digital infrastructure hampers system adoption, especially in remote areas. Furthermore, while general data protection laws exist, there are no specific provisions for health data governance, which restricts secure information sharing and secondary data use.

Ireland

Ireland, though a high-income country, shows gaps in digital health maturity due to historical underinvestment, delays in digital infrastructure projects, and fragmented systems across public hospitals. The absence of a fully operational national EHR and limited citizen access to health records are persistent issues. Staff training and change management have lagged, contributing to resistance toward system adoption. While Ireland adheres to GDPR, it lacks a comprehensive national health data governance framework to support interoperability and secondary data use.

Section 6: Conclusion

Using the Global Digital Health Monitor paradigm, this study illustrates the differences and opportunities that high-, middle-, and low-income nations have in pursuing digital health maturity. Countries like Liberia, Mali, and Ghana still have structural issues with infrastructure, legal frameworks, and labor capacity, whereas Finland and Portugal exhibit sophisticated, citizen-centric digital ecosystems based on robust governance and interoperability. But the rise of successful approaches in places like Ethiopia shows that, with the right national leadership, long-term planning, and coordinated donor support, digital maturity is attainable for all income levels. In order to ensure inclusive, gender-responsive, and context-specific digital health policy, nations at all stages of maturity should make investments in fundamental enablers, including national health identifiers, strong data governance, interoperable architecture, and workforce development. To create digital health ecosystems that are robust, sustainable, and egalitarian, it will be essential to enhance cross-

national information sharing and integrate digital health into larger health systems transformation.

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