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RÉPUBLIQUE TOGOLAISE
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DPPA Report

Digital Pandemic Preparedness Assessment

TOGO

June 2022

Acknowledgements

This report on the assessment of Digital Pandemic Preparedness in Togo reflects the joint effort of the expert team, and national and international partners. We would like to thank all stakeholders for their availability and their multifaceted contributions to the success of this evaluation.

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The Authors apologize to any individuals or organizations inadvertently omitted from this list.

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Acronyms

API	:	Application programming interface
BMZ	:	Federal Ministry for Economic Cooperation and Development
DHIS2	:	District health information system version 2
DPP	:	Digital Pandemic Preparedness
DPPA	:	Evaluation of digital pandemic preparedness
DSNISI	:	Direction du Système National d'Information Sanitaire et de l'Informatique
EDIT	:	Early-Stage Digital Health Investment Tool
EIS	:	Health Information Exchange System
EPI	:	Equipements de protection individuelle
ETL	:	Extract-Transform-Load
FM	:	Global Fund to Fight AIDS, Malaria and Tuberculosis
GAVI	:	Vaccine Alliance
GFA	:	GFA Consulting Group
GIZ	:	German Agency for International Development Cooperation
HISP WCA	:	Health information system program for West and Central Africa
HMIS	:	National Health Information System
HR	:	Human resources
ICD-10	:	International Classification of Diseases and Related Problems version 10
ICT	:	Information and Communication Technology
iHRIS	:	Human resources information system
KFW	:	German Development Bank
MICS6	:	Multiple Indicator Cluster Survey 6th edition
MoH	:	Ministry of Health / Ministère de la Santé
NISD	:	Directorate of National Health Information System and Informatics
ONU	:	Organisation des Nations Unies
OOAS	:	Organisation Ouest Africaine de la Santé
PPE	:	Personal protective equipment
REDISSE	:	Regional Disease Surveillance Systems Enhancement
RH	:	Ressources humaines
RHS	:	Health human resources
SACIDS	:	South African Centre for Infectious Disease Surveillance
SNIS	:	National Health Information System
TIC	:	Technologie de l'Information et de la Communication
UiO	:	University of Oslo
UN	:	United Nations
WAHO	:	West African Health Organization

How to read this report

This report aims to provide an overview of the digital landscape, a narrative and recommendations on the country's digital health preparedness in the event of an epidemic.

The Executive Summary provides an overview of the key findings and conclusions of the report.

The Methodology section explains the configuration of the prototype DPPA tool and the processes that key actors need to follow to generate the results.

The results of the evaluation are elaborated in the country-specific results sections, which are subdivided into five (5) sections:

- The section WP1 preliminary work gives an overview of the key actors involved in this evaluation and to whom the report might be of interest.
- The WP2 Digital Health Ecosystem section provides an overview of the digital health ecosystem in Togo.
- The WP3 opportunities section presents all potential digital tools, including digital global public goods, that could be relevant to prepare the country for a pandemic at national and sub-national level.
- The WP4 gaps section is the result of the mapping of DPP use cases. It provides an overview of the functionalities that could be implemented in the country, with a comment on the importance of these functionalities in the country context.
- The WP5 recommendation section is a set of preliminary recommendations regarding the digital health ecosystem, pandemic preparedness and selected global goods that could be considered a priority by some stakeholders.

The last section is the conclusion, which summarises the evaluation and gives a first overview of how the results have been adapted by the stakeholders.

Executive Summary

A digital pandemic preparedness assessment was conducted from 7 September to 31 December 2021 in Togo on a set of twenty-four (24) identified software packages.

Objective
The objective was to identify the need for digital tools that fit into Togo's existing digital health ecosystem that can modernise overall pandemic preparedness. More specifically, it was to i) assess the different functionalities of the digital health ecosystem in the country's health system; ii) identify gaps and opportunities by functionality and iii) make recommendations for action based on the analysis of each identified gap/opportunity.

Methodology
A literature review and stakeholder interviews based on the Digital Pandemic Preparedness Assessment Tool (DPPA) were conducted. The Map & Match database[1] was used as a starting point to identify a set of existing digital tools in the country. In addition, an important part of the DPPA was an analysis of the status and digital health ecosystem in the country. To complement this aspect of the DPPA, the Initial Stage Digital Health Investment Tool (EDIT) was integrated as an essential part of the process of assessing the country's digital health readiness (infrastructure, strategy).[2]

Results
The analysis of the Global Health Digital Ecosystem with respect to a number of initial and essential parameters (infrastructure, human capacity, standards and interoperability etc.) showed that Togo demonstrates a good average towards overall pandemic preparedness. Nevertheless, gaps and deficiencies were identified that should be addressed to ensure better pandemic preparedness and response.

Recommendations
A number of recommendations were made to address the gaps and deficiencies identified. With these recommendations, the Ministry of Health will be able to prioritise the most urgent or important items for the country and engage its international partners to obtain technical or financial support.

Conclusion
The assessment of Togo's digital pandemic preparedness provided findings in terms of gaps and opportunities for functionality and made relevant and realistic recommendations for the country to implement to ensure optimal digital pandemic preparedness.

[1] https://digitalsquare.org/covid19-map-match
[2] https://katicollective.com/what-were-thinking-1/edit-a-tool-for-the-greater-good

Recommendations

Improving the digital health ecosystem

R1.1 Governmental coordination structure for Digital Health

R1.2 Funding plan for the national digital health strategy

R1.3 Data improvement plan

R1.4. Equipment renewal plan

R1.5. Strengthen the digital skills of staff to ensure the technical maintenance of systems

R1.6 Standards and interoperability

R1.7. Database of health institutions

R1.8. Individual data management

R1.9. Development of a long-term digital health strategy

R1.10. Coordinate donor efforts centrally

R1.11. Define a budget for additional digital tools

R1.12.Implement national digital security regulations

R1.13. Regulate the use of open source systems

R1.14. Introduce a renewable energy policy

R1.15. Address diversity, equity and inclusion issues

Digital pandemic preparedness

R2.1. Online training of health professionals, including for pandemic-relevant functions

R2.2. Development of local digital tools for surveillance and early warning based on data on common symptoms

R2.3. Development of local digital tools to support local and two-way communication or messaging with patients

R2.4 Development of digital tools for self-declaration and anonymous self-detection of proximity

R2.5 Need to integrate a digital epidemiological modelling tool into HMIS Togo to allow monitoring and organised responses based on visualised data

R2.6. Consider the development of a digital data analysis tool along the lines of "Big Data" to improve the analytical capacity of the data

R2.7. Need for digital administrative and human resources management tools at national level

R2.8. Need for digital fiscal management tools at country level for effective coordination of donor contributions

R2.9. Need for an e-learning health platform

R2.10. Introduce a system of public awareness of the risks and key themes of the pandemic.

R2.11. Support the implementation of a digital tool for animal and environmental health management

R2.12. Introduce a system to support micro-planning of immunization campaigns at national and sub-national levels

1 Background and objectives

Digital Pandemic Preparedness (DPP) is becoming crucial not only because paper-based methods have shown their limitations in the face of increasing numbers of cases, but also because epidemics require adequate national, regional and international control measures, strategies and optimal allocation of available resources. Digital tools allow the generation of granular data to identify and model trends in disease evolution and guide policy changes and response strategies. This is becoming increasingly important, especially since the advent of Covid-19, which has highlighted the usefulness of digital tools in public health and epidemiology.

However, there has been an atypical explosion in the digitalisation of the health sector in partner countries, leading to an uncoordinated multiplication of digital tools, sometimes on a very small scale. This phenomenon hinders the consistency of the data collected and reveals major gaps in the capacity to manage and guide informed decision-making in pandemic prevention. Good governance and a shared strategy are therefore needed to enable the alignment of multilateral partners and integrated digital tools. This in turn will support public health administration and effectively help partner countries to better manage the current COVID-19 pandemic, as well as potential future outbreaks.

It is in this context that the GIZ Global Health and Digitalisation Programme and other international stakeholders have sought to identify and map the gaps in the digital health ecosystem of partner countries. By mid 2020, the Programme had successfully defined a DPP context and a prototype digital tool for conducting local assessments. Meanwhile, USAID, in collaboration with Digital Square, has also succeeded in establishing the Map & Match database which provides a good illustration of the digital tools implemented by a large number of stakeholders in the field of public health.

The objective of the Digital Pandemic Preparedness Assessment (DPPA) is to assess the current digital health landscape for pandemic preparedness and response, identify opportunities to further develop this landscape and propose activities to explore these opportunities.

1.1 DPPA

The development of the prototype DPPA tool was commissioned by GIZ to the GFA Consulting Group (GFA). The concept was developed as a framework that provides a digital tool and a systematic methodology to identify gaps and opportunities in existing digital tools in a given country to enable the national health system to be prepared to respond to a pandemic.

The DPPA digital tool integrates and builds on the important work of other partners, including USAID's Map and Match (M&M) database, feedback from various stakeholders such as the Centers for Disease Control and Prevention (CDC), the World Bank, and the UNICEF/WHO-led Digital Center of Excellence (DICE) . In addition, the DPPA digital tool has integrated the Early Stage Digital Health Investment Tool (EDIT), a digital global asset developed by the Kati Collective.

The results of the DPPA digital tool are assessed and interpreted to formulate scenarios for integrating or enhancing interoperability within an existing digital health ecosystem. With the DPPA reports, partner countries and Multilateral Organisations have relevant insights on how to address these gaps or opportunities through digital applications and appropriate measures to modernise public health pandemic preparedness and decision-making.

The first version of the DPPA was finalised in October 2021. It is being piloted in five member countries of the Economic Community of West African States (ECOWAS) : Cote d'Ivoire, Ghana, Nigeria, Togo and Sierra Leone.

1.2 Togo a pilot country

Togo is a coastal country in West Africa, sharing borders with Ghana, Benin and Burkina Faso. It is home to approximately 7.8 million inhabitants (World Bank, 2021) on an area of 56,600km². It has been a member of ECOWAS since 1975[3] and of the West African Economic and Monetary Union (WAEMU) since 1994[4] .

In 1884, the King of Togoville signed a protectorate treaty with Germany, which lasted until the First World War. In 1914, during the First World War, the Germans were expelled, and Togo became a colony jointly occupied by France and the United Kingdom, who shared the territory. The French occupied most of the country, which became French Togo and was equivalent to present-day Togo, while the British administered the western part of the country, British Togo, which was attached to present-day Ghana.

Since 2010, Togo's participation in the IHP+ (International Health Partnership) approach has led to the signing in May 2012 of a national Compact between the Government and several technical and financial partners (World Bank, WHO, UNICEF, UNFPA, UNAIDS, French, German and American cooperation, NGOs and international associations). The problem remains above all the weakness of coordination by the Ministry of Health to improve the alignment and harmonisation of the interventions of the TFPs and better predictability of aid. According to the mapping carried out in 2016, around 365 non-governmental organisations and associations are formally involved in the development of health activities. However, they remain concentrated in the Maritime and Plateaux regions.

Over the past ten years, Togo's epidemiological landscape has been marked by epidemics of cholera, bacterial meningitis, viral haemorrhagic fevers, measles with high lethality and zoonoses including avian influenza, anthrax and swine fever[5] .

Since the declaration of the first case of Covid-19 on 5 March 2020 in Togo, there has been an increasing development of digital tools. In such a context, the assessment of digital pandemic preparedness has become an urgent need for the Ministry of Health. The MoH has worked in partnership with GIZ to guide decision-making on the development and deployment of digital tools based on relevant recommendations from the DPPA assessment.

[3] https://fr.wikipedia.org/wiki/Communaut%C3%A9_%C3%A9conomique_des_%C3%89tats_de_l%27Afrique_de_l%27Ouest

[4] https://www.jeuneafrique.com/114537/archives-thematique/l-uemoa-en-quelques-dates/

[5] http://extwprlegs1.fao.org/docs/pdf/Tog184007.pdf

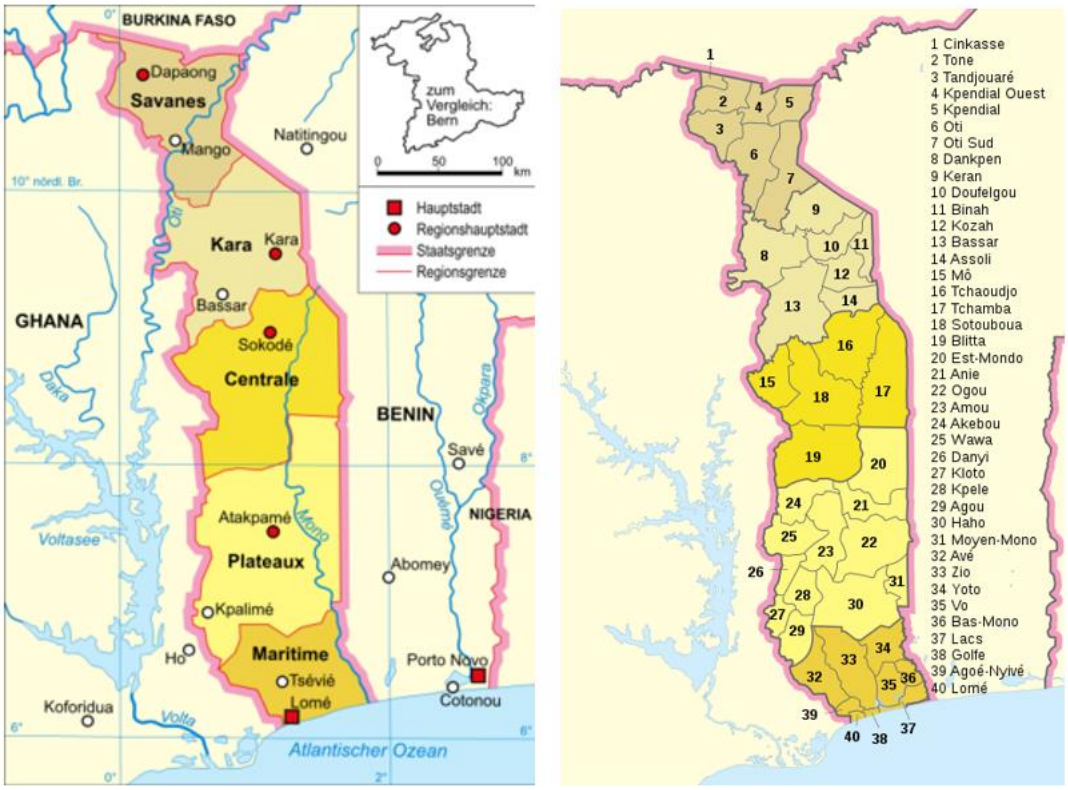

Figure 1: Map of Togo showing the 5 regions and prefectures [6][7]

As shown in Figure 1:

- Togo is divided into five (5) regions (Maritime, Plateaux, Centrale, Kara and Savanes),
- which in turn are divided into 39 prefectures representing districts,
- which are in turn subdivided into 117 communes.

In the south of the country, the municipalities of the Gulf and Agoè-Nyivé prefectures have a slightly different organization from the others.

2 DPPA: tools and methods

The DPPA data collection process can be described in five (5) steps or work packages (WP). After preliminary work (1) and a qualitative assessment of the digital health ecosystem (2), using the Map and Match data as a starting point and validating it in the local context (3), the landscape of existing digital tools has to be mapped (4) and interpreted according to opportunities, gaps and recommendations (5).

2.1 WP1: Preliminary work and stakeholders

Before starting the DPPA process, it is crucial to obtain the support and approval of the country's Ministry of Health and key stakeholders in the health sector. To do this, a few meetings are

[6] Präfekturen Togos – Wikipedia
[7] Togo – Wikipedia

necessary to present the DPPA concept, its objectives and, most importantly, the benefits that the results could bring to digital health strategies and donor-supported activities during the different phases of an epidemic.

For the stakeholder mapping, a simple coding has been defined. The aim is to represent key actors who can contribute to decision-making processes that are very important for the collection of information and the implementation of recommendations.

- Primary**:** key actor for information gathering or decision making;
  For example, some national governmental stakeholders could be primary actors to support the assessment process.
- **Secondary:** key actor for information dissemination.
  For example, multilateral stakeholders might be interested in funding some of the recommendations as part of their programme.

2.2 WP2: Digital Health Ecosystem Analysis and EDIT tool

An important part of the DPPA is to analyse the status of the digital health ecosystem in countries. This should identify key elements of the system that can be reused, exploited and built upon to improve a country's health system before, during and after a pandemic. The tool allows for the capture of basic epidemiological data, qualitative information on the country's digital health preparedness and data sources for potential aggregate data indicators collected and monitored centrally by the country's health authorities.

To complement this aspect of the DPPA, the EDIT tool has been integrated as an essential part of the process of assessing the country's readiness (infrastructure, strategy) for digital health. It is a digital public good developed by the Kati collective. It defines a set of 79 indicators that help describe the digital health landscape at the national level and identify areas that require specific improvements or digital tools. The EDIT indicators are divided into six (6) key blocks: human capacity, investment and financing, data capture and use, infrastructure, standards and interoperability, and governance and policy. EDIT has labelled each indicator as either informative, enabling or critical. In a further process, EDIT allows indicators to be scored according to the country context with a number between 1 (non-existent) and 5 (functional at the optimal level). A minimum score of three (3) as the final score in the overall EDIT assessment should be a good indicator of a country's digital health readiness to conduct activities at the national level.

2.3 WP3: Map and Match Data and existing digital tools

Map & Match is a USAID-funded project that provides a landscape of existing and adaptable digital tools used at the country level. These digital tools are then mapped to potential use cases for COVID-19 and broader pandemic management.

In this context, the Map & Match database is used as a starting point to obtain a set of existing digital tools in the country. Therefore, the first step is to validate the Map & Match data locally in the country context.

The second step, in cases where there is a national database or knowledge of other digital tools in the health sector, is to expand the list of available digital tools before starting the assessment.

With this list of tools, the DPPA digital tool automatically generates a table with all the functional DPP opportunities available in the country. The following information is the minimum information that must be validated locally in the country before starting the assessment.

Table 1: Important information on the digital tools evaluated

Name of Column in DPPA Tool	Description
Project/Tool	The software or project name under which the software was implemented.
Software Name (incl. package, module etc.)	The given name to the software. This is important as it will be used throughout the whole process to describe the solution.
Primary purpose of tool	A short description of the tool and the status in the country is important to evaluate the existing opportunities. In case this information is not available, a simple text describing what effort has been done to get this information will suffice.
Funder	(Organization(s) involved in tool funding)
Implementer	(Organization(s) involved in tool implementation)
Government Contributions	(1) Yes (2) Yes, MOH is fully funding the project (3) Yes, there is a financial contribution through MOH budget (4) Yes, they are contributing in-kind people or time (5) No, they have not yet contributed (6) Unknown In case this status is unknown, a simple text describing what effort has been done to get this information will suffice.
Tool proprietary /Open source	(1) Freemium (2) Non protective free and open-source software (e.g., Apache) (3) Open source (4) Proprietary (5) Protective free and open-source software (6) Public domain (7) Unknown In case this status is unknown, a simple text describing what effort has been done to get this information will suffice.
Scale: National or Sub-National	(1) National (2) Sub-National (3) Unknown In case this status is unknown, a simple text describing what effort has been done to get this information will suffice.
Scale: Scope	(A description of the scale at which the tool is being used)
Link	(website, github) or Developer (Organization(s) involved in tool development)
Scale: Regions	(# of regions the tool is being used in)
GIZ DPP Categories	This refers to the 14 DPPs use cases. In case a tool is added to the list, the corresponding and validated DPPA uses cases if existing need to be listed. Monitoring Laboratory systems

Name of Column in DPPA Tool	Description
	Case management Contact tracing Proximity tracing Coordination & operations Supply chain & health facility logistics Health facility administration Health worker training Risk communication & community engagement One health Interoperability Vaccine delivery Data analytics, visualization & use

2.4 WP4: DPP use cases and mapping process

The use cases and functionalities of the DPP were developed in coordination with USAID's Map & Match use cases, which were defined in a framework describing how digital tools can be adapted and used during different phases of an epidemic (Digital Applications and Tools Across an Epidemiological Curve). The DPP use cases were further broken down into 64 sub-features.

For the pilot phase of the DPPA, the mapping process consists of validating locally with national key stakeholders the use cases of the DPPA against the existing landscape. The process has been documented in an e-learning format to enable stakeholders to understand the process.

For the evaluation, a simple coding was defined:
- (1) Deployed: If a digital tool is deployed, the functionality is used in the country.
- (2) Existing functionality in the software package, but NOT deployed: If not used.
- ( ) Unknown / NA: Empty boxes indicate that the status is unknown or not available.

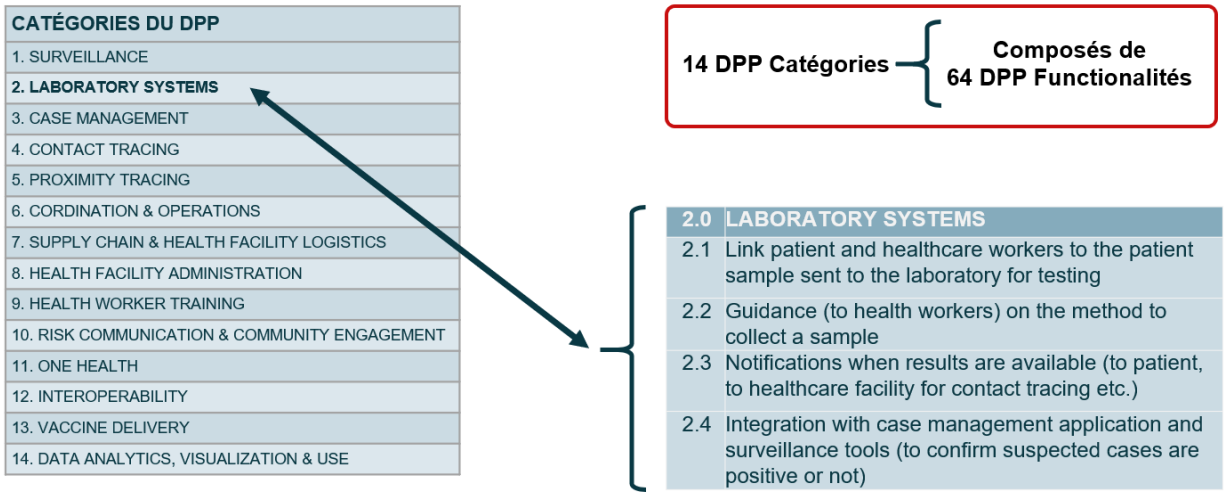

Figure 2: Functionalities of DPP systems to be assessed

2.5 WP5: Recommendations

The DPP assessment developed two types of recommendations:

2.5.1 Towards the digital health ecosystem

Based on the analysis of the Digital Health Ecosystem and the EDIT assessment, a set of recommendations should be formulated to support coordinated donor activities targeted at country-level Digital Health strategies and to improve basic Digital Health infrastructure and country-specific readiness.

2.5.2 Concerning pandemic preparedness

Based on the available DPP opportunities, which ideally display all existing digital tools in the country, and the validated table of DPP functionalities deployed or not deployed in the country context, an assessment can be made to provide an analysis-based recommendation for each gap based on use cases, opportunities and the digital health ecosystem.

- Leverage existing software: Existing software is available as an opportunity identified in the context of the partner country's DPP. Based on the opportunities and the contextual viability analysis, we recommend exploring the use of specific software currently operated by government stakeholders to meet this functionality requirement.
- Recommendation for new software: if no existing software is available for an identified gap in the partner country DPP context. Based on the stakeholders and the analysis of the digital landscape, we recommend exploring options for new software to meet this functionality requirement.

3 DPPA Results for Togo

3.1 WP1: Preliminary work and stakeholders

The first step was to obtain the informed support and approval of the Ministry of Health and key stakeholders. This led to the identification and appointment of a focal point for the DPPA process by the Ministry of Health.

The training of the expert consultant on the DPPA concept took place on 04 October 2021 followed by the stakeholder mapping carried out as a prelude to the briefing meeting held on 09 November 2021. This meeting was attended by the Directorate of the National Health Information System and Informatics, the Division of Information and Communication Technology, the Division of Disease Surveillance and the Savanes Regional Health Directorate on behalf of the Ministry of Health, and other partners including UNICEF, Santé Intégrée, GIZ and GFA. It provided an opportunity to introduce the DPPA process and the local consultant in order to obtain their commitment to support and facilitate data collection, a crucial step in the implementation of this assessment.

The beginning of this phase was marked by a literature review on Togo and the national health development plan, interviews with key actors conducted according to the DPPA concept and a qualitative assessment of the digital health ecosystem. Visits to key stakeholders to complete the collection of additional information within the DPPA framework were carried out if necessary. A list of all persons consulted is presented in ANNEX 1.

The majority of the **primary actors** identified were at the level of the Ministry of Health. These were:

- **Directorate of the National Health Information System and Informatics (MoH)**: this is the directorate responsible for data management and the implementation of applications. It ensures the mobilisation of financial resources and strategic orientation;
- **Information and Communication Technology Division (MoH)**: It is responsible for the development and maintenance of applications, in short it could be involved in the use of the evaluation's recommendations;
- **Health Information System Program (HISP) West and Central Africa**: It provides technical support to the Ministry of Health in the implementation of the DHIS2 and could be involved in resource mobilisation, dissemination and use of the results;
- **Public Health Emergency Surveillance and Response Division (MoH)**: is a key player in the implementation of applications related to disease surveillance and more specifically to the response to epidemics;
- **Integrate Health (NGO)**: has implemented the Community Health Toolkit in the Kara region and able to contribute to some extent to the harmonisation of the digital health system.

Secondary actors come from both the Ministry of Health and multilateral organisations:

- **Directorate General of Planning Studies and Health Information (MoH)**: plays a strategic role in the orientation and adoption of digital tools;
- **Human Resources Department (MoH)**: will contribute to the implementation of the recommendations of the DPPA evaluation on the management of human resources for health;

- **Centre for Telemedicine and Radioprotection (MMoH)**: it plays a decision-making role in the extension of Togo Teledermatology and many other digital telemedicine tools;
- **Direction Générale de l'Action Sanitaire**: this is the department responsible for the implementation of health care policy and other actions to combat diseases such as HIV/AIDS, malaria, etc. It is important in developing the strategies of the Ministry of Health. It is important in the development of the Ministry of Health's strategies;
- **World Health Organization (WHO)**: provides technical and financial support for the implementation of digital tools through expert consultations;
- **World Bank**: is a financial partner that could support the country in implementing the recommendations of the evaluation;
- **Global Fund**: plays the same role as the World Bank, but with the difference that its support is focused on the three killer diseases HIV/AIDS, malaria and TB.
- **GIZ**: is a technical partner and currently has two programmes in Togo. The bilateral health programme (ProSanté) which aims to support and improve the quality of the population, especially in the area of sexual and reproductive health. The regional programme RPPP (Regional Programme Support to Pandemic Prevention) ECOWAS, which aims to support local organisations in setting up a transnational system for the prevention and control of pandemics.
- **UNICEF**: provides technical and financial support for the implementation of digital tools through expert consultations. However, it can to some extent be considered a primary stakeholder in the sense that it is also involved in the implementation of openSRP (not related to surveillance) for monitoring children and pregnant women in the Kara and Savanes regions.

3.2 WP2: Analysis of the digital health ecosystem and EDIT tool

Based on the critical indicators of the EDIT tool and additional qualitative information, the country is assessed with respect to overall pandemic preparedness, digital preparedness and the state of the digital health system, including infrastructure, governance and regulation, data quality and use, and human resources as well as technology adoption, the national architectural framework for digital health and/or health information exchange (HIE) and existing health information standards.

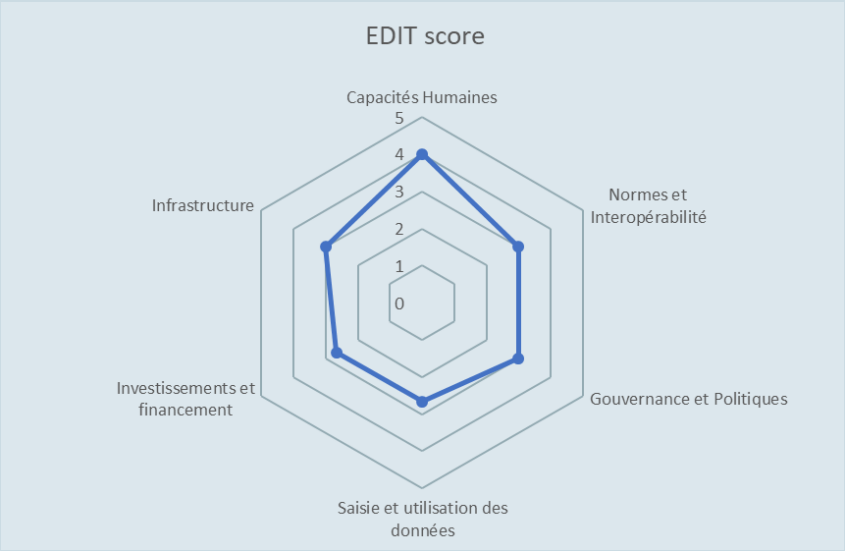

Figure 3: EDIT evaluation

With an overall average score of 3.06 out of 5 for the 17 critical indicators of the EDIT, Togo demonstrates leadership and political will at the highest level of the Ministry of Health and the government in general, as evidenced by the existence of an approved national strategy, a good business climate and a well-structured public-private partnership. However, countries are strongly encouraged to achieve a minimum score of level 3 or higher for all critical indicators.

Table 1 shows a summary of the results, and the details of the evaluation are in ANNEX 2.

Table 2: EDIT assessment of critical indicators for digital health

Subcategory	Indicator	Goal
Human capabilities	Mechanisms for sharing information within the health system	5
	Specialist knowledge to support and maintain the system	4
	Regular supervision of support staff	3
Standards and Interoperability	Main register of facilities	3
	Ability to unambiguously identify an individual	3
Governance and Policy	Leadership and political will	4
	Existence of a digital health strategy	2
Data capture and use	Workload related to data entry	3
	Standardised registers	4
	Data improvement plan	1

Subcategory	Indicator	Goal
Investments and financing	Existence of a costed long-term plan to operate, maintain and support digital health systems	1
	Political interest and support for investment in ICT for service improvement	4
	Existence of sufficient funding to support infrastructure development	3
Infrastructure	Proportion of institutions with functional and accessible computers	3
	Proportion of establishments with functional and accessible mobile phones	5
	National server maintenance capacity	3
	Ability to maintain and troubleshoot hardware and software at the district level	1
Overall average score :		**3,06**

Human capabilities

ICTs are widely used by health workers at all levels. There are multiple channels for sharing information at all levels of the health system and information is shared quickly.

Health workers are adept at using digital tools. The adoption of information and communication technologies has been boosted by the use of social networks. A significant proportion of health staff have adopted the use of technology.

However, health staff in some large hospitals show some resistance to the adoption of technology. The majority of university, regional and district hospitals have IT managers trained in technical areas through formative supervision and existing IT training centres (CIC, IAI, etc.). However, the trained staff have not yet been mobilised for the peripheral care units.

Standards and Interoperability

There are data protection regulations drawn up by the National Institute of Economic and Demographic Statistics (INSEED). Trust in governments is generally satisfactory as there has been no exploitation of digital tools by government agencies to date.

There is also some ability to unambiguously identify an individual within each system due to the existence of a client matching algorithm which can identify clients in 50-75% of cases. The problem arises, however, when one wants to make systems communicate with each other, as there is no unique identifier. This constitutes a real challenge for the interoperability of systems, which must be based on specific protocols, standards or communication rules. There is therefore a need to establish a framework or guidelines for interoperability.

Governance and Policy

The government of Togo, in its reforms concerning the reorganisation of ministerial departments, has created within the Ministry of Health, the General Directorate of Planning Studies and Health Information (DEGPIS), under which the Directorate of the National Health Information System and Information Technology (DSNISI) has been created, which has a division called the Information and Communication Technologies Division (DTIC). This division is responsible for Digital Health and has a strategic plan for the SNIS (2018-2022) and an IT master plan (2018-2022).

The Ministry of Health has a national architectural framework for digital health based on the health pyramid. This health information exchange system is mapped out in the operational manual of procedures (MOP) developed in 2017.

Agreements exist between the Ministry of Health and other agencies for the implementation of digital health, including UNDP support to the Ministry of Health, and a feasibility study for the creation of a telemedicine centre in Togo. Principles and guidelines for structuring Public-Private Partnerships (PPPs) are in place and PPPs are being operationalised.

The subsystem integration reform started in 2012 following the information system assessment with the DHIS2 pilot phase and the development of the eHealth strategy 2013-2015. An IT master plan and a strategic plan for the SNIS have been developed for 2017-2022 and are aligned with the National Health Development Plan. In the National Health Development Plan 2017-2022, Strategy 8.1 includes actions related to:

i. **updating the digital management tools of the NIS in** order to reduce their fragmentation and multiplication currently observed in the field (harmonisation of indicators and revision of data collection methods and digital tools);
ii. **strengthening the computerisation of the SNIS** by scaling up the DHIS2 platform following the pilot experiment conducted in eight health districts;
iii. **Updating the 2013-2017 strategic plan** for strengthening the NIS to address the problems with the NIS identified in the situation analysis, with the aim of eventually having an integrated information system for global knowledge management;
iv. **Promoting e-health through the use of information and communication technologies (ICT)** to support the delivery of care, improve the timeliness and accuracy of public health reporting and facilitate disease monitoring and surveillance (telemedicine, mobile health and electronic patient record management).

Difficulties in coordination by the DSNISI and the lack of budgeting for these different strategic plans are hampering the mobilisation of resources from partners and the government, which has reoriented its funding towards the fight against Covid-19 from 2020.

Data capture and use

Standardised records exist and are available in health facilities, but they are used inconsistently. There is a need to strengthen the skills of staff (especially new recruits) in the use of standardised records.

This information system is secure and confidential with regard to data exchange and information transmission, and messaging with the possibility of two-factor identification connection. There are configurable levels of access to information depending on the type of information and the target of the information. Messaging can be done within the platform and with other messaging providers. The physical security of the hardware is however subject to discussion as there is a lot of damage (including broken hardware).

Since 2012, the Ministry of Health for data management has opted for the implementation of the DHIS2 Platform. A pilot phase was carried out in 2014 in a satisfactory manner. As a result, a process of updating the digital collection tools was undertaken and the nationwide rollout of DHIS2 covering all health facilities and CHWs was effective from January 2018. This is free open source software to which all additional digital tools had to be linked (interoperability). In addition to the data collected in the DHIS2 database, the country has more than 20 additional datasets relevant for pandemic prevention and control[8] .

In addition, an effort is made to make data available in formats that are easy to access, interpret and use at different levels of the health system and at the community level, but they are not widely used for decision-making. Data quality checks are also carried out during supervisory visits to health facilities on a six-monthly basis. But a review of data quality is not carried out in order to adjust as necessary by drawing up a data quality improvement plan.

[8] Available as part of the DPPA raw data

Investments and financing

Digital health is not included in the national health strategy and no budget line is allocated. It is implemented on an ad hoc basis in health programmes. There is no investment framework. However, the plan has obtained probable funding for 3-5 years with a government contribution of around 5%. There is no costed long-term plan to operate, maintain and support digital health systems. However, there is political interest and support for investment in ICT to improve services.

Infrastructure

Investment in ICT is a national priority and the country is exploring sources of funding for the government's P25 project: digitisation of key public services. The project aims at simplifying and digitalising 20 user paths of citizens, businesses/investors and the administration in a government digital factory to be created. In addition, a costed national plan for strengthening and maintaining internet connectivity is likely to be funded, which could extend fixed and mobile internet coverage to 95% of the population by 2025.

However, recent data on internet accessibility indicates that the internet penetration rate is 19.3% in 2019. This means that only 11% of Togolese use mobile internet[9] .

Devices such as smartphones, tablets are used by health facility managers and community health workers for data collection since 2018. At the regional and district level, the focal points of the different health programmes are equipped with laptops for data management.

The interior of the country is disadvantaged by low bandwidth and low mobile internet coverage (e.g. districts such as Est-Mono, Akébou, Mô etc. are poorly covered). Overall, the cost of the internet connection is expensive for the structures. This means that certain partners such as the Global Fund, the World Bank and UNICEF have had to contribute financially to relieve the health facilities and the ASCs.

3.3 WP3: Opportunities

Initially the Map and Match data was assessed against the 14 DPPA categories. Therefore, based on the Map and Match data from Digital Square and the literature review, twenty-four (24) digital tools were identified in total.

1. CommCare ;
2. Community Health Toolkit (Medic mobile) ;
3. Extract-Transform-Load (ETL) Application (DHIS2 ETL) ;
4. SORMAS ;
5. Teledermatology Togo ;
6. Togo HMIS (DHIS2);
7. COVID-19 Auto-Test ;
8. COVID-19 Triage Tool ;
9. Electronic Dispensing Tool - ART Pharmacy ;
10. iHRIS_Togo ;
11. iHRIS Manage_Togo ;
12. ISS: Integrated Supportive Supervision (eSURV - Electronic Surveillance) ;
13. HIV/AIDS Output Tracking Tool (OSPSIDA)_Togo ;
14. Teachme Covid ;

[9] https://donnees.banquemondiale.org/indicateur/IT.NET.USER.ZS?locations=TG

15. The Safe Delivery App ;
16. Togo Health Analytics Platform (THAP) - (Zenysis) ;
17. Vantage (Microsoft Azure|Vantage);
18. Argus ;
19. Monitoring ;
20. Vaccination COVID ;
21. Electronic Immunisation Registry ;
22. Tracker TB ;
23. Community Health ;
24. HIV Tracker .

Argus, Surveillance, Vaccination Covid, Electronic Immunisation Registry, Tracker TB, Community Health and Tracker HIV were not in the Map and Match database and were added to the list of digital tools used nationally in Togo.

The starting digital health ecosystem based on the Map and Match data is summarised in the figure below. It shows the digital tools taking into account each of the 14 DPPA categories. Where there is functionality in the system, then there is an "opportunity".

This list was validated in terms of functionality and the fact that there was at least one pilot phase or local pilot team of the software at national level. Some of the digital tools were abandoned due to non-adoption or lack of funding.

Opportunities can also be interpreted as digital tools that can be adapted very quickly and more easily to the country context if needed.

Table 3 shows a first overview of the opportunities in the digital health ecosystem in Togo. A more detailed view of the existing tool opportunities are in ANNEX 3.

Table 3: High-level assessment of existing opportunities before the validation process

S/N	Catégorie du DPP (1) Actuellement déployé dans la catégorie des fonctionnalités listées (réf. A1 **column Y:** Catégories d'utilisation)	CommCare	Community Health Toolkit	DHIS2 (ETL)	SORMAS	Télédermatologie Togo	DHIS2 (Togo HMIS)	COVID-19 Auto-Test	COVID-19 Triage Tool	Electronic Dispensing Tool - ART Pharmacy	iHRIS_Togo	iHRIS Manage_Togo	eSURV (Electronic Surveillance)	OSPSIDA	Teachme Covid	The Safe Delivery App	Zenysis	Microsoft Azure|Vantage	Argus	Surveillance	Vaccination COVID	Electronic Immunisation Registry	Tracker TB	Santé Communautaire	Tracker VIH
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	SURVEILLANCE	1	1	1	1		1	1	1				1				1	1	1	1	1		1		1
2	LABORATORY SYSTEMS	1	1		1		1													1					
3	CASE MANAGEMENT	1	1		1	1										1				1			1		1
4	CONTACT TRACING	1	1		1															1					
5	PROXIMITY TRACING																								
6	COORDINATION & OPERATIONS		1	1	1		1																		
7	SUPPLY CHAIN & HEALTH FACILITY LOGISTICS						1			1				1							1			1	
8	HEALTH FACILITY ADMINISTRATION										1	1													
9	HEALTH WORKER TRAINING				1																				
10	RISK COMMUNICATION & COMMUNITY ENGAGEMEN	1	1												1										
11	ONE HEALTH																								
12	INTEROPERABILITY		1	1	1		1				1	1								1	1	1	1	1	1
13	VACCINE DELIVERY						1														1	1			
14	DATA ANALYTICS, VISUALIZATION & USE		1		1		1						1				1	1	1	1	1	1	1	1	1

At first sight, only two (2) categories are not served. For all other categories, as shown in Figure 4 below, there is at least one opportunity that could be deployed nationally.

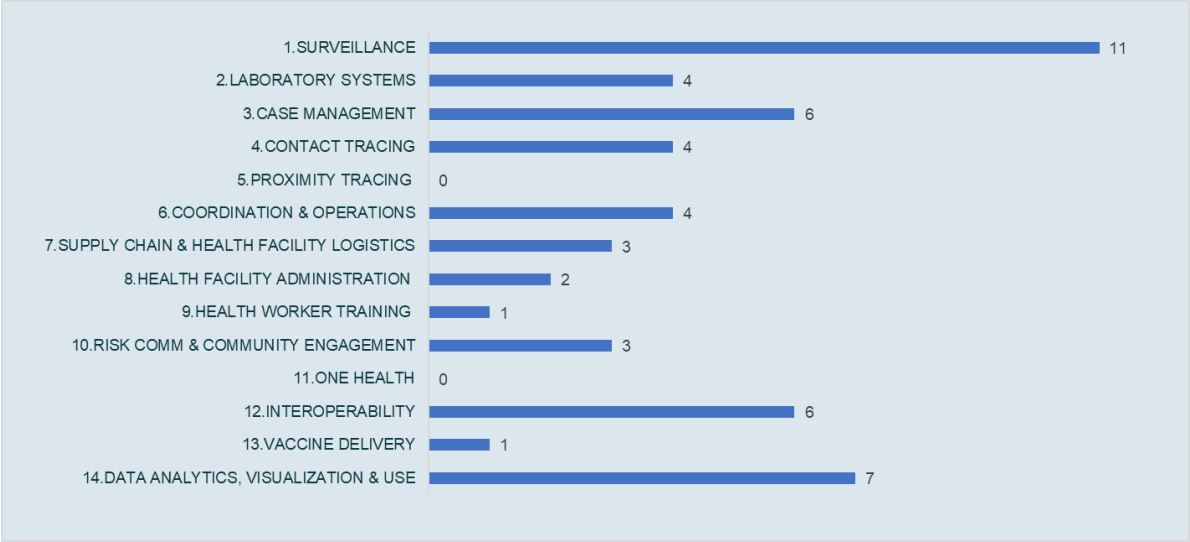

Figure 4: Opportunities in terms of the number of existing software products to meet DPP functionality

3.4 WP4: Gaps

This section presents the validation of opportunities against actual implementations of the digital tools found at national level. To do this, email responses and individual interviews with key informants and stakeholders were analysed according to the methodology for assessing the **14 DPPA Cagoteries and 64 Functionalities described earlier in Chapter *2 DPPA Tool and Methods***.

Figure 4 above shows in detail the gaps identified in relation to the 64 DPP features examined. This shows that for **2 categories** there were no opportunities and for the **other categories some DPP features were** not as well served. In total, there were gaps in **20 functionalities across 10 DPP categories.**

It is also important to note that the gaps were justified by the somewhat difficult and inadequate context of Togo for the implementation of certain digital tools. This also justified the lack of opportunities for these gaps.

Some features have emerged from the pandemic such as the One Health approach and micro-planning of large-scale immunisation campaigns. The country just has not yet had time to adapt adequate digital tools to address these aspects. An overview of the gaps based on the opportunities of existing tools are in ANNEX 4.

Table 4: List of DPP features not served in Togo

S/N	DPP Features	Software packages : DEPLOYED	Software packages: Existing but NOT DEployed
1.3	Early warning monitoring based on data from web searches of common symptoms or social media sentiment analysis (or keywords)	0	1

3.8	Two-way communication with the patient via messaging (e.g. SMS, social media, in-app, WhatsApp)	0	1
4.4	Communication with the patient by phone (via the application)	0	1
4.6	Two-way communication with the patient via messaging (e.g. SMS, social media, in-app, WhatsApp)	0	1
5.1	Automated search for anonymous mass contacts via Bluetooth signals by smartphone (or bracelet)	0	0
5.2	Notification (optional) of positive diagnosis of infection in high-risk contacts via the user's smartphone application	0	0
5.3	Functionality suitable for a generalised epidemic response (not strictly COVID-19)	0	0
6.4	Modelling of epidemic impact scenarios to prepare the response (simulations)	0	1
6.6	Monitoring of response capacity (relevant health personnel, hospital beds, equipment, national or in-house emergency medical teams)	0	1
6.7	Big Data analysis (e.g. mobility monitoring based on mobile phone data, rumour monitoring based on social media analysis)	0	0
8.1	Tax management	0	0
8.2	Donor compliance reporting (fraud prevention, transparent monitoring, etc.)	0	0
9.1	Surveillance for epidemic-specific symptoms	0	4
9.2	Use of personal protective equipment (PPE), provision of vaccines, etc.	0	4
9.3	Safety protocols for facilities	0	4
10.1	Point-of-care communication tools (videos via an application, etc.)	0	2
11.1	Monitoring of infectious disease outbreaks in domestic animals (livestock, etc.)	0	0
11.2	Monitoring of infectious disease outbreaks in wildlife	0	0
11.3	Ecological monitoring of the environment to detect changes that may increase the risk of zoonotic infection	0	0
13.6	Microplanning	0	0

3.5 WP5: Recommendations

The main objective of this assessment was to gain an overview of the digital public health ecosystem and to formulate recommendations and action plans that could contribute to modernising overall digital pandemic preparedness.

3.5.1 Improving the digital ecosystem

The qualitative analysis of the digital health ecosystem and the EDIT tool reveals a number of areas for improvement to which Togo should pay particular attention.

Togo will need to develop its **long-term plan for financing the digital health system** and **its strategic plan for digital health** (essential documents for mobilising resources from partners and the government). It will also be necessary to establish a coordinating body and a framework document that clearly defines roles and responsibilities for digital health functions and activities, as well as the training of female health personnel. These are issues that need to be addressed as Togo develops its digital health landscape (and improves its current overall score on critical indicators). Without this, there are risks of uncoordinated development and siloed digital tools. In addition, attention should be paid to the advantages and disadvantages of open source digital tools versus proprietary digital tools. Low acquisition costs do not necessarily mean that these open source digital tools have the lowest total acquisition cost.

R1.1. Government coordination structure for digital health

Leadership and political will exist at the highest levels of the Ministry of Health and other relevant government agencies. However, a coordinating body or governance structure for digital health is needed to help coordinate the computerisation of the health system.

R1.2. Funding plan for the national digital health strategy

A national strategy or framework is agreed, but there is no costed plan. Develop a budget or financing plan for the national digital health strategy to facilitate advocacy for resource mobilisation.

R1.3. Data improvement plan

There is currently no data improvement plan and it is recommended that a data quality review be conducted and a data quality improvement plan developed. This improvement plan could build on the quality assurance process underway in the Immunization Division of the Ministry of Health for immunization data.

R1.4. Equipment renewal plan

Advocate for the creation of a budget line for the purchase of computers for health facilities; the renewal plan being almost totally financed by the Technical and Financial Partners (TFP).

R1.5. Strengthen the digital skills of staff to ensure the technical maintenance of systems

There is insufficient capacity at district level to maintain and troubleshoot equipment, servers and digital tools. Recruit companies for technical assistance and equipment maintenance at all levels of the health system.

In addition, staff or consultants have the capacity to respond to the most common maintenance problems. Develop a comprehensive plan to build staff skills at the national level.

R1.6. Standards and interoperability

Policies on data protection/security are in place, but are not fully implemented. Furthermore, interoperability aspects do not seem to be sufficiently addressed. There is a need for a national structure with a clear mandate and adequate resources to maintain these standards and monitor their implementation.

R1.7. Database of health institutions

A list of public health establishments, NGOs and private establishments is available, but is not up to date. Through a framework of consultation between the Direction des Etablissements de Soins (DES) and the Direction du Système National d'Information et de l'Informatique (DSNISI), a master list of facilities could be maintained. This list could also be used to identify unauthorised health establishments.

R1.8. Individual data management

Currently, individual data can only be linked in 50-75% of cases. However, the Togolese government is in the process of biometrically identifying the population, which could then be used in the health care system.

R1.9. Development of a long-term digital health strategy

Build on the evidence of political will and leadership highlighted in the EDIT analysis to address some of the key weaknesses, in particular the lack of a digital health strategy, a costed long-term plan and improved data and systems management at district and facility level. The costed long-term plan should include, where appropriate, a statement of standards to be considered to help develop the use and interoperability of systems.

R1.10. Coordinate donor efforts centrally

Investment planning and alignment of the potential contribution of development partners to meet the requirements of Togo's digital tools would require donor harmonisation, and the response to COVID-19 showed the potential for funding and coordination. This should be formalised, at least in terms of pandemic preparedness with appropriate safeguards.

R1.11. Define a budget for additional digital tools

The cost of digital tools for pandemic preparedness should also be taken into account in the different plans (strategic, maintenance, depreciation, training, etc.) and reflect the orientations required for digital health tools in general.

R1.12. Implement national digital security regulations

A key issue underlying interoperability between software is the use of unique identifiers. But this usually raises privacy and security issues; aspects that an updated strategy should take into account.

This implies that the impact of the country's developing data centre on digital health tools in general and on pandemic preparedness in particular should be carefully assessed; for example, guidelines on hosting cloud services that are currently done outside the country.

R1.13. Regulate the use of open source systems

The policy on the use of open source and proprietary systems should be clarified. This is probably an issue for the government of Togo in other sectors than health.

R1.14. Introduce a renewable energy policy

The DPPA assessment also highlighted the challenges of continuous energy supply in some districts. The use of renewable energy would provide relief to these districts.

R1.15. Address diversity, equity and inclusion issues

Finally, digital pandemic preparedness benefits everyone. This raises issues of diversity, equity and inclusion in pandemic planning, and includes consideration of how issues of ethnicity, gender, etc. are addressed. Although not a feature of the DPPA, Togo, in developing its digital health ecosystem, should consider these sometimes-sensitive issues.

3.5.2 Digital pandemic preparedness

R2.1. Online training of health professionals, including for pandemic-relevant functions

It is important to consider e-learning and/or digitally enhanced training/reminders for health and digital health professionals. In this respect, it would be relevant to implement further extended functionalities to address the identified gaps in the digital health ecosystem covering the following areas:

- Monitoring of response capacities,
- Identification of symptoms by disease,
- Use of personal protective equipment, administration of vaccines,
- Security protocols for facilities,
- Digital communication tools at the point of care, and
- Micro-planning of vaccine response campaigns.

R2.2. Development of local digital tools for surveillance and early warning based on data on common symptoms

The examination of local conditions showed a poor suitability for this functionality. Nevertheless there seem to be opportunities or rather attempts to implement digital tools to address this functionality that were abandoned after the pilot phases. The development of a digital tool should take into account the country realities, the local context and the following aspects :

- Functionalities should avoid relying solely on minimal data from a respondent base that is biased towards urban elites.
- Also, given that the literacy rate is low and that there are about 43 dialects in the country, translation and interpretation of symptoms in local contexts will be difficult to accommodate.

R2.3. Development of local digital tools to support local and two-way communication or messaging with patients

There appeared to be local opportunities or rather trials to implement digital tools to address these functionalities at the beginning of the COVID-19 pandemic. But these were abandoned early on due to the unfavourable realities of the country. The development of a digital tool should take into account the realities, the local context and the following aspects

- This type of technology does not have to depend on telephone network connectivity in the regions of the country as it is very limited. (e.g. Bluetooth technology)

- Internet use is very limited in the country outside the major urban areas (26.5% of which Urban: 49.2%; Rural: 8.6%. Source: MICS6, 2017[10]). Price is a limiting factor, with a cost per MB equivalent to USD 7.83 above the UN-defined affordability threshold (source: Alliance for Affordable internet, 2018[11]) making social media adoption low.
- This type of technology would require good telephone network connectivity in all parts of the country or an equivalent alternative that could work in the local context.

R2.4. Development of digital tools for self-declaration and anonymous self-detection of proximity

Given the complexity of this functionality in the national context of Togo, there is a need to review the governance of data protection before exploring software packages for opportunity that can be exploited for quick gain. The development of such a digital tool should take into account the realities of the local context and the following aspects

- Mobile phone location data must not violate privacy and civil liberties in any way.
- Automated mass anonymous contact tracing via Bluetooth signals is an innovative technology that respects privacy and civil liberties, which could be promoted.
- Given that the majority of people in the country do not have a phone, functionality should avoid relying solely on minimal data from a respondent base that is biased towards urban elites.
- A very good strategy needs to be developed in relation to sustainability in the rather complex context of Togo.

R2.5. Need to integrate a digital epidemiological modelling tool to enable monitoring and organised responses based on the visualised data

The deployment of a digital epidemiological modelling tool to help data visualisation needs to be sustainable and compelling in the country context. Moreover, there are sufficient opportunities and data sources to be exploited at the national level to implement this functionality. The development of a digital tool should take into account the realities of the local context and the following aspects

- This is a feature that should be integrated into HMIS Togo to allow for maximum exploitation of the data and cost effective interpretations.
- Estimates of health personnel, hospital beds and equipment through the health map are already integrated and visible at HMIS Togo levels and should be exploited.
- Currently estimates cannot be made in real time due to delays in the aggregation of epidemiological surveillance data and the time taken for incubation and sampling.
- Modelling implies the establishment of a local and national multidisciplinary team specialised in epidemiology, mathematicians and other disciplines important in the Togo context at the level of the Ministry of Health, which should be recruited and trained.
- There is a local development team with the necessary expertise that could accompany technical implementation as part of GAVI funding for support to countries under implementation.

R2.6. Consider the development of a digital data analysis tool along the lines of "Big Data" to improve the analytical capacity of the data

This computer technology allows for advanced data collection functionality using web-scraping from public/private internet resources. The development of a digital tool to support such DPP

[10] MICS6 SFR (mics-surveys-prod.s3.amazonaws.com)
[11] https://a4ai.org/affordability-report/

functionality is not really sustainable in the country context. Nevertheless, the following aspects should be taken into account for the implementation:

- Cooperation with large national and international social media companies or search engine operators would be very important. In the case of mobile phone CDRs, this may require an agreement between the government and the mobile network operator.
- Conceptualise a methodology for extracting large-scale data from frequently changing website structures.
- Bear in mind that digital web scraping tools are not omnipotent and websites can ban IP addresses.
- Bear in mind that there are legal issues that may arise.

R2.7. Need for administrative and human resources management tools at national level

At the national level there is a need to deploy a digital tool that would meet the needs of this identified gap in DPP functionality. Indeed, for this administrative aspect of public health, there was a trial to integrate a digital health tool that was abandoned after the pilot phase. With the pandemic, the Ministry of Health had to make adjustments to its staff on all fronts in order to be able to respond to the needs that were emerging in the short term.

For this reason, the Ministry of Health has again expressed the need for computerisation of HR management and submitted the request for support for a national implementation of the digital tool already piloted.

The development of a digital tool should take into account the local context and the following aspects

- The ability to have a more global but also decompartmentalized and simplified view of available health human resources;
- The possibility to automate procedures, but also to speed up delays and to facilitate the dissemination of information;
- The software used should be open source, free of charge and have the capacity to interoperate with HMIS Togo and be supported by technical and financial partners who can support the requesting countries;
- The existence of human resources trained at the national and regional levels of the health pyramid in the use of the software and the acceptance of the Ministry of Health's field actors are important assets;
- The existence of a team of developers to ensure continuity and local maintenance is another asset.

R2.8. Need for digital fiscal management tools at country level for effective coordination of donor contributions

It is viable to deploy a digital tool to fill this identified gap in the country. Donors are increasingly demanding for risk management and mitigation in all grant management processes to ensure transparent management, prevent fraud etc.

Ensuring transparency in the management of financial contributions from technical and financial partners leads to their confidence by respecting their requirements and minimising risks, particularly fraud. Moreover, transparency is a guarantee for the increased mobilisation of resources, in particular financial resources, and their relevant allocation. This has a positive impact on the achievement of health objectives at all levels of the system.

Such a digital tool should take into account the local context in Togo. The following aspects are relevant for the proposed digital tool :

- Have functionality that is in compliance with tax management regulations;
- Have the possibility to make financial follow-ups and internal as well as external audits easier to carry out;
- Have a feature that saves considerable time due to automation;
- Produce reports in accordance with partners' requirements;
- Have the possibility to centralize and secure data management;
- Enable decentralisation of human resources data entry, access to accounting available at all levels and in as many hospitals as possible;
- Inexpensive multi-user acquisition possibilities;
- Funding possibilities from the Ministry of Health budget.

R2.9. The need for an e-learning health platform

The deployment of a digital tool that would allow health workers to update their skills on a regular basis in relation to a pandemic would address this gap in PPD functionality.

With regard to the digital literacy of staff, ICTs are widely used by health staff at all levels. In addition, the majority of health facilities have ICT equipment and are covered by the internet. A monthly internet package is granted to health facilities from the Global Fund grant. The districts and regions have a state budget line to provide telephone communication and internet. In the context of Covid-19 and the scarcity of health HR, e-learning and/or digitally reinforced training/reminders in the applications not only avoid the risks of conventional face-to-face training but also ensure continuity of services.

Such a digital tool in the country will be sustainable and should consider the following aspects

- As the majority of staff are literate, the understanding and translation aspect does not have to take into account dialects. However, in addition to French and English, 3 national languages should be taken into account.
- Various aspects should be taken into account in the development of content so as not to discriminate or segregate the local community.

R2.10. Introduce a system of public awareness of the risks and key themes of the pandemic.

The roll-out of a national messaging system to the local public to promote awareness messages on key issues and avoid mis-education is important. This will encourage treatment-seeking behaviour and encourage citizens to take appropriate action to promote good health practices.

Such a system will help to support the country in combating all kinds of public health related anomalies and should take into account the following aspects :

- Health facilities need to have good internet coverage and be able to report emerging observations in real time;
- Districts and regions should have an official communication line that allows them to receive detailed and consistent instructions on good health practices for common situations simultaneously.
- Ideally the System should be able to use the web, social media, SMS, robocalls, and others in collaboration with local communication service providers.

R2.11. Support the implementation of a digital tool for animal and environmental health management

In order to ensure holistic management of increasingly frequent health crises that require multi-sectoral concerted actions involving human health, animal health and environmental health, an

application integrated and interoperable with the national platform would be a natural complement to the existing digital health ecosystem.

Furthermore, given that most human diseases are transmitted by animals and vice versa, the need for mechanisms to exchange and share information with each other and to act in a concerted manner has been clearly expressed by stakeholders following recent health crises in the country and in West Africa such as the avian flu, Ebola and Lassa fever epidemics.

The process of setting up a One Health platform is underway in the country. A consultant has been recruited to set up the legal framework that will govern this platform. This is a recommendation from international organisations, notably WHO and WAHO, to member countries. Funding from the World Bank is available through the REDISSE project.

In this particular context, as the country is already engaged in this process, the following aspects could be strengthened

Implementation will require the mobilisation of additional financial resources for capacity building of local developers and users as well as the acquisition of infrastructure.

- Mobilisation of additional financial resources for capacity building of local developers;
- Content development and user support for the One Health concept;
- Acquisition of additional infrastructure for users ;
- Support the development of key elements to enable the monitoring of infectious disease outbreaks in domestic animals (One Health);
- To take into account important aspects for monitoring infectious disease outbreaks in wildlife;
- Implement digital tools that will allow ecological monitoring of the environment for changes that could increase the risk of zoonotic infection.

R2.12. Introduce a system to support micro-planning of immunisation campaigns at national and sub-national levels

WHO has developed a conceptual framework for micro-planning of COVID-19 vaccine response campaigns[12] to guide national authorities responsible for immunization programmes in the prioritization of COVID-19 vaccines. This framework includes eight (8) steps that should be reviewed and updated regularly as key characteristics of COVID-19 vaccines change.

Data related to this micro-planning framework such as target populations, stocks of vaccines and consumables, patients and human resources in health are already integrated in the country's digital information system (HMIS Togo). Therefore, completing the missing functionalities of micro-planning in HMIS Togo can allow a very quick deployment of this framework in Togo.

The deployment of a digital tool to accompany this framework and address this identified gap in DPP functionality is ongoing and should take into account the following aspects

- The ability to have a more global but also decompartmentalized and simplified view of available health human resources;
- The possibility to automate procedures, but also to speed up delays and to facilitate the dissemination of information;
- The digital tool must have the ability to schedule vaccinations according to variables such as the 6-week interval between the initial vaccination and the booster, the collection of data on notable side effects of vaccination must also be taken into account.
- To be able to take into account an electronic vaccination register as well as the digital certificate of vaccination;

[12] Guidance on operational microplanning for COVID-19 vaccination (who.int)

- The software used should be open source, free of charge and have the capacity to interoperate with the national system and be supported by technical and financial partners who can support the requesting countries;
- The existence of human resources trained at the national and regional levels of the health pyramid in the use of the software and the acceptance of the Ministry of Health's field actors are very good assets;
- The existence of a team of developers to ensure continuity and local maintenance is another important lever.

4 Summary

To conclude the evaluation of this pilot study, a meeting was organised to gather comments and suggestions from key stakeholders. The discussion was therefore conducted with the local stakeholders represented below:

- The GIZ ProHealth and RPPP programme;
- UNICEF ;
- The Surveillance Division of the Ministry of Health ;
- NGO Integrated Health ;
- The Health Promotion Division ;
- Teledermatology ;
- And the HISP.

Are there any other stakeholders?

There are six (6) other primary actors who were not interviewed. However, the majority of the software used by these divisions is known and validated by the ICT division of the Ministry of Health in this study in aggregate.

- GIZ with the ProHealth programme and the Global Health and Digital Health Sector programme
- Community Health and Elderly Division;
- Immunisation Division ;
- Public Health Emergency Operation Centre (PHEOC) which is part of the INC;
- West African Health Organization WAHO ;
- CDC West Africa (Center of Diseases Control and Prevention).

Are there any other initiatives underway to assess the ecosystem?

During the course of the research and up to the end of this meeting, no initiative was identified as a study similar to the DPPA.

The World Health Organization (WHO) is considering integrating the validated list of opportunities and implementations validated during this DPPA into their digital platform the Digital Health Atlas[13] .

Do the recommendations cover the needs of the digital health ecosystem?

The recommendations made here were well received by all stakeholders present. In total, additional comments were made to :

- R1.1. and R1.2. a government coordination structure for digital health and the financing of activities and strategies related to such a structure are sustainable and should be discussed at a higher level in the Ministry of Health. Implementation may require support from other MoH entities and local and international partners.

[13] DHA (digitalhealthatlas.org)

- R1.6. The local law for data protection should be observed, initially separately from software interoperability. Also a clear guide should be put in place to define and enforce the lines to be respected by the processes of valid communications and data exchange in the context of Togo.
- R1.11. The need to make a stronger recommendation for support for the purchase and renewal of terminals (Laptop, Smartphone and Tablet) for health staff. But also towards the provision of free connection for health-related activities.

There was also a discussion on the need expressed by the Ministry of Health for local hosting of personal and aggregated data. As the necessary server and energy capacities for an efficient and sustainable implementation of digital solutions are not yet available, proposals for sustainable concepts would be welcome.

Are there other digital health solutions that should have been considered?
During the discussion, UNICEF stated that it was in the process of implementing two (2) digital solutions that were not considered because of the functionalities they cover. These are

- Software based on OpenSRP (Open Smart Register Platform) to enable the monitoring of children and pregnant women.
- A Moodle-based software that should allow for e-training.

How to prioritise recommendations?
In a first instance the Ministry should review the recommendations in an internal round. Then a prioritisation workshop could be organised with the public health implementation partners to see how to address the most urgent, important or easily implementable items. During this workshop a timeframe for further implementation or evaluation and an estimated amount could be suggested for each of the recommendations made. This will facilitate decision making and commitments at the partner level.

How to define a Challenge for the DIPC project?
The GIZ Digital Innovation for Pandemic Control Project (DIPC) aims to address one of the identified gaps at the national level. The project provides a local Innovative Accelerator framework led by the World Food Programme (WFP) and a possibility to grant an innovative organisation up to a ceiling of 250 thousand €. For this purpose, a challenge should be formulated based on a WFP recommendation. This challenge will be published in local and regional networks to ensure implementation by a local or regional organisation. The Ministry should actively support the WFP in choosing the winning solution and organisation.

How can partners be engaged to facilitate the implementation of certain measures?
After prioritising the recommendations, this report should be consolidated to include the prioritised results in the Annex and shared with the partners. This will help define the way forward with each partner in a bi- or multilateral way.

This evaluation is a one-off and should be repeated after the implementation of a number of recommendations to allow an assessment of the improvements and changes made.

ANNEX 1: List of persons consulted

Table 5: Stakeholders List

qqq	Name and surname(s)	Structure of origin	Title
1	Mr OURO-NILE Nassirou	Information and Communication Technology Division MoH	Head of Division and Focal Point DPPA
2	Dr TEOURI Mamouda	SNIS Management	Director
3	Dr PESSINABA NIKIEMA Christelle	Disease Surveillance Division MoH	Head of Division
4	Dr AFLAGAH Kodjo	Savanes Regional Health Directorate	Regional Director of Health CommCare Focal Point
5	Prof. SAKA Barthelemy	Department of Dermatology, CHU SO	Teledermatology Focal Point
6	Mr GNATOU Jacques	GIZ Togo	Technical Advisor Implementing partner
7	Dr SAKPATENOU Kokouda	GIZ Togo	Technical Advisor Implementing partner
8	Mr. KAMARA Dawkin's	Integrated Health	ICT Manager
9	Dr GUIGUI Marie-Thérèse	UNICEF Togo	Implementing partner
10	Dr SILIADIN Koffi	HISP WCA	Implementing partner

ANNEX 2: Qualitative EDIT interviews

Table 6: Qualitative EDIT interviews

Key issues	Evaluations (Sources)
Governance and policies	The subsystem integration reform started in 2012 following the information system assessment with the DHIS2 pilot phase and the development of the eHealth strategy 2013-2015. An IT master plan and an NHIS strategic plan have been developed for 2017-2022 and are aligned with the national health development plan[14] . Difficulties in coordination by the DSNISI and the lack of budgeting for these different strategic plans are hampering the mobilisation of resources from partners and the government, which have moreover redirected their funding towards the fight against Covid-19 from 2020.
Infrastructure	The IT equipment does not cover all the needs of the services (estimated coverage: 95%). Some staff are obliged, regardless of region or district, to use their own digital tools (computers, tablets etc.). The maintenance and depreciation plan for equipment is not developed. Cloud hosting is almost entirely done outside the country; only the backup is done in the country. This raises the issue of personal data management. In addition, there is insufficient funding from donors and the state, as well as the instability or lack of electricity supply in some districts. The country's data centre being built in Lomé[15] , the institution of a state budget line and the adoption of renewable energy could alleviate these difficulties to some extent.
Use of the Internet	Insufficient coverage, instability and the relatively high cost of the internet connection are obstacles to the development of digital health (Source: EDIT interviews). Internet penetration rate in 2019 = 19.3%[16] .
Digital skills	The majority of university, regional and district hospitals have IT managers trained in technical areas thanks to formative supervision and existing IT training centres (CIC, IAI, etc.). However, the trained staff have not yet been mobilised for the peripheral care units.
Licence	With the exception of Teledermatology Togo, all the digital tools evaluated had free and open source licenses. However, the difficulties lay in the completeness of the information on the Global Scale in reference to the Digital Square Global Goods Guidebook. Indeed, even though the Global Scale indicates that an emerging global good is a digital health tool that promises to be used in several countries, but may require additional investment to adapt to a different context, and that an established global good has already been deployed in several countries, the methodology leading to the classification is not easy to assimilate by our respondents.

[14] https://sante.gouv.tg/wp-content/uploads/2021/06/TOGO_PNDS-2017-2022__version-definitive_210217-.pdf
[15] https://numerique.gouv.tg/inauguration-lome-data-centre/
[16] https://donnees.banquemondiale.org/indicateur/IT.NET.USER.ZS?locations=TG

ANNEX 3: Detailed view of digital tool opportunities

Table 7: Overview of digital Tools and their functionalities

NUMERICAL TOOL	DESCRIPTION IN THE CONTEXT OF TOGO	DPP USE CASES
COMMCARE	CommCare is a mobile data collection and offline service delivery platform designed for everything from simple surveys to comprehensive longitudinal data tracking. **The parameterisation of the functionalities available in Commcare was planned. But today, Commcare has been abandoned by the field teams in favour of DHIS2 HMIS Togo.**	Risk communication and community engagement, Case management, Monitoring, Laboratory systems, Contact tracing.
COMMUNITY HEALTH TOOLKIT	Integrate Health (IH) and Medic Mobile have co-developed a mobile application to support CHWs in providing equitable and quality home-based care. Based on IH's model of saving lives in neglected communities, the app supports 32 CHWs in decision making (referral, diagnosis, treatment), targeted follow-ups for closed-loop care and offline data collection. The technology links home and facility-based care through a single patient identification system, longitudinal tracking of care provided, improved data transmission and analysis for evidence-based decision making. At the facility level, health workers are supported to record services provided to patients to facilitate follow-up at the CHW level. The technology will evolve to accommodate iterations of the model. The data will be used to inform iterations on functionality, workflow and features to support goal alignment. The functionalities that this digital tool implements are important for CHWs to better monitor community activities and develop their various (monthly) reports. The DHIS2 Integrated Health platform was being developed to integrate this function and to be able to present performance against key indicators in the form of tables, graphs or maps. This represents a one-way exchange as the data is sent from the Community Health Toolkit to the DHIS2 Integrated Health platform which takes care of the visualisation. **The fact that the Community Health Toolkit has not been fully adapted in Togo HMIS (DHIS2) shows the difficulty of coordination experienced by the Direction du Système national d'Information Sanitaire et de l'Informatique (DSNISI) in data management and the lack of harmonisation between the Ministry of Health and the partners.**	Case management, Monitoring, Laboratory systems, Coordination and Operations, Analysis, visualisation and use of data, Contact tracing, Risk communication and community engagement, Interoperability
EXTRACT, TRANSFORM, LOAD (ETL) APPLICATION	WAHIT has developed an Extract, Transform, Load (ETL) application, which automates the weekly import of Integrated Disease Surveillance and Response (IDSR) data from the Excel form used by countries into the WAHO DHIS2-based regional platform. Using the new process, country data managers are now able to easily provide information to the regional platform so that WAHO can continue to monitor health events across the region.	Coordination and Operations, Monitoring, Interoperability, One Health

NUMERICAL TOOL	DESCRIPTION IN THE CONTEXT OF TOGO	DPP USE CASES
	A process is underway with all West African countries including Togo for the integration of human and animal health data within the framework of One Health.	
SORMAS	SORMAS is a global asset, an open source web and Android application developed for : - disease surveillance, - the notification, - epidemic response and task management, - contact tracing and equipped with a laboratory module for the management of samples and laboratory tests. It enables real-time data reporting through the use of validated real-time monitoring data that encourages users to respond to challenges as they arise. The data visualisation (dashboard) platform on SORMAS is interactive and easy to use. It was designed in a highly interactive and participatory way by those involved in public health surveillance and disease control - using the design thinking approach. Relevant actors in the public health service also benefited from simultaneous access to the data as well as from the security and confidentiality of the data. In addition, the interoperability (application programming interface) layer of SORMAS allows data to be harmonised with a range of data types from common surveillance systems, an important element in pandemic prevention. The system has moved from outbreak response to routine disease surveillance and is now moving towards interoperability with DHIS2. Capturing and analysing electronic medical records through the integrated case management module provides clinicians with a clear data trail that allows them to draw actionable conclusions using both clinical sense and objective data to improve the patient's episode of care. The flexible and modular design of SORMAS allows for the inclusion of new diseases and new technical and functional features, enabling the platform to keep pace with ongoing changes in the clinical field, disease surveillance and outbreak management. The platform already covers epidemic and priority diseases, including COVID-19, as well as an "emerging disease X" for immediate inclusion of diseases as they emerge. The main functional features of SORMAS include - Digital notification at the point of care, - case-based surveillance, - bi-directional information flow, - management of contact follow-up, - management of the task process, - management of the response process, - digital medical record, - monitoring of results,	Coordination and Operations, Case management, Monitoring, Laboratory systems, Contact tracing, Interoperability, Training of health personnel, Analysis, visualisation and use of data.

NUMERICAL TOOL	DESCRIPTION IN THE CONTEXT OF TOGO	DPP USE CASES
	- epidemic detection algorithms, - interoperability with common systems, - open source, - offline mobile capabilities, - inclusion of relevant actors, - point of entry, - multilingual platform, - laboratory use, - event-based monitoring, - user-centred design, - etc. **SORMAS used in Germany, Switzerland, France, Afghanistan, Nepal, Burkina Faso, Ghana, Nigeria, Ivory Coast, Tanzania, Fiji, etc.** **SORMAS provides coverage of more than 300,000,000 people who are under surveillance worldwide.**	
TELEDERMATOLOGY TOGO	The Bogou platform does not allow for the aggregation of patient data entered by the health facilities. The team of experts intervenes on a case-by-case basis according to the requests sent in. The monthly and quarterly reports, etc. are prepared manually and are tedious, especially with the national extension to 5 regions of the country (except Lomé), 50 health facilities and 100 trained health workers. The difficulties lie in the availability of equipment (computers, smartphones etc.), the quality of the images sent and the availability of internet. **The lack of a national ICT team is another handicap for the deployment of this functionality at national level.**	Case management
TOGO HMIS	Implementation of DHIS2 by the Ministry of Health. A software platform for integrated care and management and service data aggregation. Presentation of aggregated data on symptoms, age groups, sex, districts and regions in the dashboards according to the levels of the health pyramid. Confirmation of a laboratory result triggers the sending of an email/SMS to the people indicated for decision-making, particularly for investigation. Links are established between cases and contacts, making it possible to list the contacts of a case and vice versa. Alert or epidemic thresholds have been set taking into account the number of cases of diseases under surveillance and the target population and when these thresholds are reached, an alert is sent to dedicated persons by email/SMS. SMS alerts of vaccination appointments against COVID-19 are also set up. Due to the instability of the network, especially in remote areas, malfunctions occur. The cost of internet and SMS in the country is a hindrance to the sustainability of some functionality. Various data are collected through the following DHIS2 forms and programmes: "Demography, Human Resources (HR) and	Coordination and Operations, Case management, Monitoring, Laboratory systems, Analysis, visualisation and use of data, Interoperability, Administration of vaccines, Contact tracing, Supply chain and health facility logistics.

NUMERICAL TOOL	DESCRIPTION IN THE CONTEXT OF TOGO	DPP USE CASES
	Equipment", "Electronic Immunization Registry", "Vaccination" and "COVID-19 Case-based Surveillance" in its "Investigation of Confirmed Cases" section. **A process of integration is underway through the REDISSE project to integrate the functionalities of a single health system funded by the World Bank** **The side effects of vaccinations (MAPI) are monitored through the ODK application. A process is underway to establish interoperability between ODK and DHIS2. DHIS2 could cover the micro-planning of immunisation campaigns. Micro plans are developed for each immunisation campaign. Planning is underway for the polio immunisation campaign (IPV).** **In addition, other DPP functionalities can be set up in the platform taking into account the existing functionalities.**	
COVID-19 AUTO-TEST	It is a COVID self-assessment application in local languages that advises users by voice message. It uses public identification codes associated with users and their geographical coordinates via Bluetooth, Wi-Fi, audio or QR code to easily and quickly find people in contact with positive cases. The digital tool aims to analyse the Togolese perception of the disease through mobile phone surveys and to make projections on possible new cases; to analyse the impact of the measures taken so far by the government on the living conditions of the poorest; to locate the most vulnerable; and to anticipate from the data the effects of the measures implemented. **This digital tool seems to have been developed in the framework of a COVID-19 project but abandoned after the pilot phase. The contextual sustainability is insufficient to ensure a national scale measure of effectiveness.**	Monitoring
COVID-19 TRIAGE TOOL	The Wellvis app is an application that allows users to self-assess their Covid-19 risk category based on their symptoms and exposure history on a highway. The app also allows for digital healthcare appointments that can be paid for online. Assess how many people in a geographical area are at high, medium and low risk of contracting Covid-19. Provide data for contact tracing of people at high risk. Provide support for planned testing of people in an identified high risk location. Provide the required safety training and assurance. Connect users to doctors for virtual private chat. **This digital tool was no longer used after the pilot phase.**	Monitoring
ELECTRONIC DISPENSING TOOL - ART PHARMACY	This is a Microsoft Access-based digital distribution tool used to store and retrieve information about patients on ART and the online medicines they are taking. Includes drug stock management and distribution; adherence monitoring; pharmaceutical service. **Implementation site: Hospitals**	Supply chain and health facility logistics

NUMERICAL TOOL	DESCRIPTION IN THE CONTEXT OF TOGO	DPP USE CASES
IHRIS	iHRIS is a free, open source digital tool that forms an integrated human resource information system, enabling countries to more easily collect, maintain and analyse health workforce data and manage health workforce resources within a Ministry of Health (MOH), district health offices, and health facilities. **This tool was no longer used after the pilot phase.**	Administration of health care institutions, Interoperability
IHRIS MANAGE	iHRIS' flagship application, Manage, is the health workforce management application that tracks and manages health workers actively engaged in service delivery. **This tool was no longer used after the pilot phase.**	Administration of health care institutions, Interoperability
ISS: INTEGRATED SUPPORTIVE SUPERVISION	ISS (Integrated Supportive Supervision) is an electronic checklist used for supervision during active case finding and routine immunization. It is primarily administered by WHO staff, government staff and partners via smart mobile phones in the field at health facilities and sentinel sites. These support visits are automatically mapped. **This tool was no longer used after the pilot phase.**	Monitoring, Analysis, visualisation and use of data
OSPSIDA	HIV & AIDS Commodity Management Tool for West Africa - Pharmaceutical management information dashboard for the West Africa region; includes data on HIV/AIDS commodities. Managed by the West African Health Organization. The purpose of the dashboard is to capture, track, aggregate and disseminate information on ARVs, RTKs and other HIV and AIDS commodities to support evidence-based decision making in the West African sub-region. The dashboard will help target countries and sub-regional organizations, including USAID/WA, the regional UNAIDS, WAHO, GFATM and other stakeholders, to improve forecasting, supply planning and procurement to support the continued availability of ARVs, RTKs and other HIV and AIDS commodities. **This tool was no longer used after the pilot phase.**	Supply chain and health facility logistics
TEACHME COVID	A website in local languages that provides information on COVID-19 prevention. It can also provide information via telephone messages (SMS). **This site is no longer functional.**	Risk communication and community engagement
THE SAFE DELIVERY APP	As part of PlanBornefonden's larger DI 2018 project, the Safe Delivery app in French was rolled out as a tool for skilled birth attendants in Haho prefecture. A TOT was held in Haho for 6 trainers and district managers in August 2018; baseline knowledge and confidence surveys were conducted in September 2018. As of February 2020, user data confirms strong adoption of the app in service environments (over 350 downloads nationwide), with a strong concentration in Plan International's project district (Haho) as well as use in Lomé and Kara, where the partner organisations that participated in the Maternity Foundation/Plan International trainings are based. For the pilot project of 47 midwives in Haho, at the end of the study, the results indicated that the ADS had a positive effect on clinical knowledge and confidence from the outset.	Case management

NUMERICAL TOOL	DESCRIPTION IN THE CONTEXT OF TOGO	DPP USE CASES
	This digital tool was no longer used after the pilot phase.	
TOGO HEALTH ANALYTICS PLATFORM (THAP)	THAP was a platform developed by Zenysis Technologies and managed by the Ministry of Health that integrates data from a number of siloed systems. By bringing together routine health, inventory and campaign data, THAP helped the Ministry of Health and Social Welfare's National Malaria Control Programme (NMCP) to better understand malaria transmission patterns, target interventions to reduce the disease burden and identify inefficiencies in the supply chain. About Zenysis: Users can analyse millions of data points at sub-second speed and effortlessly combine data from all the systems they can use to continuously improve the delivery of healthcare and other vital public services. Zenysis software platform, analytical training and IT skills development. Countries will use the platform's capabilities to integrate data from their fragmented information systems and help decision makers see where children are not receiving vaccines. The advanced analysis will then help countries decide how to target their limited resources for maximum impact. **This digital tool was no longer used after the pilot phase.**	Monitoring, Analysis, visualisation and use of data
VANTAGE	Vantage is an AI-enabled cloud platform that empowers healthcare professionals to make decisions. The cloud-based platform is capable of instantly analysing data, communicating results and directing meaningful action via automatically generated dashboards and targeted push notifications. **This tool was no longer used after the pilot phase.**	Monitoring, analysis, visualisation and use of data
ARGUS	Argus is a digital tool to facilitate the reporting and management of public health surveillance data. Its components include an Android phone application, used by health facilities to communicate results via SMS; and a central server located at the Ministry of Health, displaying aggregated results on a web platform for the intermediate and central levels. **This tool was no longer used after the pilot phase.**	Monitoring, analysis, visualisation and use of data

ANNEX 4: Overview of gaps and opportunities of existing digital tools

Table 8: List of digital gaps and opportunities

S/N	Categories/Functions of the DPP	Software packages: deployed	Software packages: existing but not deployed
1.0	MONITORING		
1.1	Real-time reporting of aggregated data on individuals with symptoms, laboratory confirmation, etc. (ref. Coordination & Operations)	3 (CommCare, ETL (DHIS2), Togo HMIS (DHIS2))	3 (Community Health Toolkit, SORMAS, Teledermatology Togo)
1.2	Specification of a subset of minimum critical data points for reporting to facilitate rapid analysis and planning	3 (Community Health Toolkit, ETL (DHIS2), Togo HMIS (DHIS2))	
1.3	Early warning monitoring based on data from web searches of common symptoms or social media sentiment analysis (or keywords)		1 (SORMAS)
2.1	Link between the patient and the health care staff and the patient's sample sent to the laboratory for analysis	1 (Togo HMIS (DHIS2))	1 (SORMAS)
2.2	Advice (to health staff) on how to take a sample	1 (Togo HMIS (DHIS2))	1 (SORMAS)
2.3	Notifications when results are available (to the patient, to the health facility to conduct contact tracing, etc.)	1 (Togo HMIS (DHIS2))	1 (SORMAS)
2.4	Integration with case management application and digital surveillance tools (to confirm whether suspected cases are positive or not)	1 (Togo HMIS (DHIS2))	1 (SORMAS)
3.0	CASE MANAGEMENT		
3.1	Registration of patients in the system with a unique identifier	5 (CommCare, Community Health Toolkit, ETL (DHIS2), Togo Teledermatology, Togo HMIS (DHIS2))	1 (SORMAS)
3.2	Patient health history available in the system	5 (CommCare, Community Health Toolkit, ETL (DHIS2), Togo Teledermatology, Togo HMIS (DHIS2))	1 (SORMAS)
3.3	Entering patient details	4 (CommCare, Community Health Toolkit, ETL (DHIS2), Togo HMIS (DHIS2))	1 (SORMAS)
3.4	Recording of patient demographics, vital signs, risk factors and symptoms	4 (CommCare, ETL (DHIS2), Teledermatology Togo, Togo HMIS (DHIS2))	1 (SORMAS)

3.5	Creation of laboratory requests	1 (Togo HMIS (DHIS2))	1 (SORMAS)
3.6	Communication with the patient by phone (via the application)	1 (Togo HMIS (DHIS2))	1 (SORMAS)
3.7	One-way communication with the patient via messaging (e.g. SMS, social media, in-app, WhatsApp)	1 (Togo HMIS (DHIS2))	1 (SORMAS)
3.8	Two-way communication with the patient via messaging (e.g. SMS, social media, in-app, WhatsApp)		1 (SORMAS)
3.9	Monitoring and updating of other patient interactions and outcomes	1 (Togo HMIS (DHIS2))	1 (SORMAS)
3.10	Viewing a summary file and services provided for a client by encounter	1 (Togo HMIS (DHIS2))	1 (SORMAS)
3.11	Modification of the file in case of error	4 (CommCare, ETL (DHIS2), Teledermatology Togo, Togo HMIS (DHIS2))	1 1 (SORMAS)
3.12	Registration of travellers who have visited high-risk locations at ports of entry for surveillance and follow-up (screening and follow-up at ports of entry)	2 (CommCare, (Togo HMIS (DHIS2))	1 1 (SORMAS)
4.0	CONTACT TRACING		
4.1	Documentation of the detailed contact history of when, where and by whom for each high-risk encounter	2 (CommCare, Togo HMIS (DHIS2))	1 (SORMAS)
4.2	Creation of a list of high-risk contacts related to suspected or existing cases	1 (CommCare)	1 (SORMAS)
4.3	Creation of a record to capture the demographics and risk factors of the high-risk contact	2 (CommCare, Togo HMIS (DHIS2))	1 (SORMAS)
4.4	Communication with the patient by phone (via the application)		1 (SORMAS)
4.5	One-way communication with the patient via messaging (e.g. SMS, social media, in-app, WhatsApp)	1 (Togo HMIS (DHIS2))	1 (SORMAS)
4.6	Two-way communication with the patient via messaging (e.g. SMS, social media, in-app, WhatsApp)		1 (SORMAS)
4.7	Update of contact sheets with new changes/symptoms	2 (CommCare, Togo HMIS (DHIS2))	1 (SORMAS)
4.8	Changing the contact record in case of error	2 (CommCare, Togo HMIS (DHIS2))	1 (SORMAS)
4.9	Functionality suitable for a generalised epidemic response (not strictly COVID-19)	1 (Togo HMIS (DHIS2))	1 (SORMAS)
4.10	Allows for the simultaneous management of several types of outbreaks	1 (Togo HMIS (DHIS2))	1 (SORMAS)
4.11	Compatibility with the country's public health management information system (HMIS)	1 (Togo HMIS (DHIS2))	1 (SORMAS)
5.0	PROXIMITY TRACING		
5.1	Automated search for anonymous mass contacts via Bluetooth signals by smartphone (or bracelet)		
5.2	Notification (optional) of positive diagnosis of infection in high-risk contacts via the user's smartphone application		
5.3	Functionality suitable for a generalised epidemic response (not strictly COVID-19)	1 (Togo HMIS (DHIS2))	1 (SORMAS)
6.0	COORDINATION AND OPERATIONS		

6.1	Easy access to real-time aggregate data to guide response	3 (Community Health Toolkit, ETL (DHIS2), Togo HMIS (DHIS2))	1 (SORMAS)
6.2	Clear visualisations of key indicators	2 (ETL (DHIS2), Togo HMIS (DHIS2))	2 (Community Health Toolkit, SORMAS)
6.3	Effective and efficient communication with health facilities and field staff	1 (Togo HMIS (DHIS2))	1 (SORMAS)
6.4	Modelling of epidemic impact scenarios to prepare the response (simulations)		1 (SORMAS)
6.5	Clear visualisation of risk factors (risk index) at sub-national level	1 (Togo HMIS (DHIS2))	1 (SORMAS)
6.6	Monitoring of response capacity (relevant health personnel, hospital beds, equipment, national or in-house emergency medical teams)		1 (SORMAS)
6.7	Big Data analysis (e.g. mobility monitoring based on mobile phone data, rumour monitoring based on social media analysis)		
7.0	SUPPLY CHAIN AND HEALTHCARE FACILITY LOGISTICS		
7.1	Registration of health facilities	1 (Togo HMIS (DHIS2))	
7.2	Collecting and reporting data on epidemic-specific consumables (vaccines, personal protective equipment (PPE), etc.), e.g. storage and stock forecasting, cold chain monitoring (for vaccines)	1 (Togo HMIS (DHIS2))	
7.3	Collection and reporting of data on epidemic-specific equipment (X-ray machines, intensive care beds, respirators, etc.)	1 (Togo HMIS (DHIS2))	
7.4	Collection and reporting of data on epidemic-specific operational parameters (e.g. available ICU capacity, current staffing levels, etc.)	1 (Togo HMIS (DHIS2))	
8.0	HEALTH FACILITY MANAGEMENT		
8.1	Tax management		
8.2	Donor compliance reporting (fraud prevention, transparent monitoring, etc.)		
8.3	Human resources management		
9.0	TRAINING OF HEALTH PERSONNEL		
9.1	Surveillance for epidemic-specific symptoms		4 (CommCare, Community Health Toolkit, SORMAS, Togo HMIS (DHIS2))
9.2	Use of personal protective equipment (PPE), provision of vaccines, etc.		4 (CommCare, Community Health Toolkit, SORMAS, Togo HMIS (DHIS2))
9.3	Safety protocols for facilities		4 (CommCare, Community Health Toolkit, SORMAS, Togo HMIS (DHIS2))
10.0	RISK COMMUNICATION AND COMMUNITY ENGAGEMENT		

10.1	Point-of-care communication tools (videos via an application, etc.)		2 (CommCare, Community Health Toolkit)
10.2	Integrated mass communication tools (web, social media, SMS, robocalls, etc.)		2 (CommCare, Community Health Toolkit)
11.0	ONE HEALTH APPROACH		
11.1	Monitoring of infectious disease outbreaks in domestic animals (livestock, etc.)		
11.2	Monitoring of infectious disease outbreaks in wildlife		
11.3	Ecological monitoring of the environment to detect changes that may increase the risk of zoonotic infection		
12.0	INTEROPERABILIT Y		
12.1	Standardised interface (IHE, OpenHIE, REST API, HL7, HL7- FHIR, which supports the open architecture and workflow of the Health Information Exchange - HIE)	3 (CommCare, ETL (DHIS2), Togo HMIS (DHIS2))	1 (SORMAS)
12.2	Support for Healthcare Coding Standards (e.g. ICD-9, ICD-10, LOINC, SNOMED)	3 (CommCare, ETL (DHIS2), Togo HMIS (DHIS2))	1 (SORMAS)
13.0	PROVISION OF VACCINES		
13.1	(Integration with) the immunisation register	1 (Togo HMIS (DHIS2))	
13.2	Vaccine scheduling (immunisation schedule)	1 (Togo HMIS (DHIS2))	
13.3	Monitoring, recording and follow-up of vaccination/immunisation at patient level	1 (Togo HMIS (DHIS2))	
13.4	Reporting on side effects	1 (Togo HMIS (DHIS2))	
13.5	Digital vaccination certificate	1 (Togo HMIS (DHIS2))	
13.6	Microplanning		
14.0	ANALYSIS, VISUALISATION AND USE OF DATA		
14.1	Integrated data visualisation functions	3 (Community Health Toolkit, ETL (DHIS2), Togo HMIS (DHIS2))	2 (CommCare, SORMAS)
14.2	Multi-level data aggregation and user access to inform decision making	3 3 (Community Health Toolkit, ETL (DHIS2), Togo HMIS (DHIS2))	2 (CommCare, SORMAS)

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