OHIAT
Maturity Model

STOP Spillover

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STOP Spillover

"One Health* is "a collaborative, multisectoral and transdisciplinary approach — working at the local, regional, national and global levels — with the goal of achieving optimal health outcomes, recognizing the interconnection between people, animals, plants and their shared environment".[6] One Health is both an approach and an outcome – optimal health for people, animals, plants and their shared environment – that is a public good."

One Health is not a new concept, but its adoption has been hampered by fragmented policy-making and financing, and by siloed organizational structures. One Health is an umbrella concept that encompasses all disciplines that broadly deal with human health, animal health, and the surrounding environment. The modern origins of One Health date back to 2004. One Health was introduced as part of the 12 Manhattan Principles, which called for an international, interdisciplinary approach for preventing diseases [4], specifically animal-human transmissible and communicable diseases. Therefore, systematic perspectives on life sciences and the environment (ie, interactions and coinfluences within the environment) were brought together to design and implement programs, policies, and regulations for achieving better public health outcomes.

ODH aims to facilitate and improve collaboration among practitioners in One Health and digital health communities. This collaboration will allow both communities to benefit from efficient interactions over time and the delivery of near–real-time, data-driven contributions to systems medicine [16] and systems ecology [17]. This will also allow citizens to engage with their individual health and well-being.

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Move beyond the classical One Health topics, going beyond reactively identifying and controlling disease threats, but aiming to understand and tackle the root causes of the increasing zoonotic spill-over risks by looking into land-use changes, environmental degradation, agricultural practices, community behaviour and animal welfare. One Health requires interdisciplinary expertise and political commitment to move from concept to policy and from policy to practice. Capacity building and educational programmes are growing globally, creating the One Health workforce urgently required to effectively control and prevent the health challenges at the human-animal-environment interface.

https://www.euro.who.int/en/health-topics/health-policy/european-programme-of-work/pan-european-commission-on-health-and-sustainable-development/publications/drawing-light-from-the-pandemic-a-new-strategy-for-health-and-sustainable-development-2021

4. Mackenzie JS, Jeggo M. The one health approach-why is it so important? Trop Med Infect Dis 2019 May 31;4(2):88 [FREE Full text] [doi: 10.3390/tropicalmed4020088] [Medline: 31159338]

The concept of environment refers to the consideration of all living and nonliving things in an ecosystem. This accounts for issues that are related to biodiversity conservation and the intimate links among the health, care, and well-being of all components in any given ecosystem

STOP Spillover

One-Health (OH) Information Maturity Stages

OH Key Enabling Areas	OH Core Domains	OH Components	OH Subcomponents	Nascent (1)	Emerging (2)	Established (3)	Institutionalized (4)	Optimized (5)
One Health	I. Human and Veterinary Healthcare	Public health Impact (Governance / Leadership)	Organizational structure and functions *Objectives:* *- Establish structures, incentives and a supportive environment to develop coherent cross-government One Health strategies, building on the concept in All Policies and the SDGs.* *- Coordinated action at all levels to reduce environmen-tal risks to health, including biodiversity and climate-related risks, and to enhance One Health reporting systems.*	- OH High level Steering Committee does not exist - Different Ministries are managing zoonotic diseases issues and spillover on their own without institutionalized mechanism of coordination - The OH leadership and coordination body's functions are not clearly defined. - Formal intersectorial OH zoonotic diseases surveillance meeting are not happening at the national level.	- There are efforts to formalize a OH high level steering committee or the steering committee exists but is not fully functional. - The different ministries are still managing the OH issues on their own but there is an ongoing coordination effort with the creation of an inclusive OH technical working group - There are some efforts to define the OH coordination body functions but not yet institutionalized - Intersectorial zoonotic disease surveillance coordination Meetings happen infrequently or on an ad hoc basis.	- The OH High level Steering Committee exists, is fully functional and oversees policies, scope of work, roles, and responsibilities for coordinating OH activities centrally. - A OH technical coordination body is established and depends on an entity above the ministries involved in OH approach - OH Technical working groups are established and are meeting on a regular basis - OH Intersectorial zoonotic disease surveillance meeting are happening on a regular basis.	- The OH High level Steering Committee meets regularly (at minimum annually and when needed) - The OH technical coordination body has a national-level oversight and is part of the OH strategy as an institutional structure and facilitates the implementation of OH strategies. - There is an established process for sharing and reviewing OH information with all OH stakeholders within the OH technical working groups. - All OH stakeholders action plans are coordinated and aligned with the national OH strategy within the OH technical working groups.	- The OH High level steering committee is reporting to the government and OH priorities are part of the Government roadmap. - There is ongoing review by the OH technical coordination body of OH activities, purpose, process, resources, team composition, attention to gender and equity, and communications for continuous improvement to meet changing OH strategy and/or health goals. - Goals are aligned with those of regional and global health coordination entities.

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One Health	I. Human and Veterinary Healthcare	Public health Impact (Governance / Leadership)	**OH Innovations** *Objectives:* *- Conduct a strategic review of areas of unmet needs for the innovations required to improve One Health* *- Establish mechanisms to align research, development and implementation of policies and interventions to improve One Health, based on a true partnership between the public and private sectors in which both risks and returns are shared.* *- Continue efforts to develop a mechanism for constant generation of knowledge, learning and improvement.*	- No OH assessment to provide an overview of OH status and needs in the country has been conducted yet. - No clear mechanisms or strategy has been developed or implemented to align OH public and private partnership research and development efforts.	- There are efforts to assess the OH landscape and provide an overview of unmet OH needs that are taking place within individual ministries or organizations. - Ministry or organization specific global strategies or mechanisms are developed and/or implemented to align to OH public and private partnership and development efforts but not yet adopted globally at the government or country level.	- At least one Strategic review or assessment of areas of unmet need for the innovations required to improve One Health was conducted this year or within the last two years and the result was used to inform global strategies or mechanisms to develop and maintain policies to strengthen public and private partnership research and development efforts	- There is an established process of strategic reviews of areas of unmet need for the innovations, required to improve One Health that is conducted regularly and used to inform global strategies or mechanisms to develop and maintain policies to strengthen public and private partnership research and development efforts. - The resulting policies and guidelines are widely spread and used to foster innovation in the OH area.	- There is an established and on-going mechanism in place for constant generation of knowledge, learning and improvement of OH interventions. - There is a continuous effort to include Gender considerations in the OH innovation and research activities - OH innovations are aligned with Regional and Global OH interventions and recommendations.

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One Health	I. Human and Veterinary Healthcare	Public health Impact (Governance / Leadership)	Policy, legal and regulatory framework and compliance and finance *Objectives:* *- Develop and implement a national gender inclusive One Health policy and regulatory framework to guide interventions across actors and sectors* *- Scale up investment in measures to reduce threats, provide early warning systems and improve the response to crises.* *- Increase the share of development finance spent on global public goods, long-standing cross border externalities, and health more generally.* *- Incorporate health-related considerations into economic forecasts, business strategies and risk management frameworks at all levels.*	- There is an awareness of the zoonotic diseases endemic to the area but a list of national priority zoonotic diseases has not yet been defined and shared with with all actors - A One Health policy and / or regulatory framework coordinating and defining interventions across sectors doesn't yet exist or is under development but not yet implemented - A clear One Health budget line is not yet included in the Government expenditure list to support development of an integrated disease surveillance and response targeting priority zoonotic diseases.	- A general consensus building meeting on OH has happened leading to the prioritization of zoonotic diseases in the Country - The national list of priority zoonotic diseases is validated by the Government and available to all to guide the implementation of the disease surveillance interventions - A OH policy and / or regulatory framework coordinating and defining interventions across sectors exist but not yet widely implemented - The OH strategic planning process and costed operation plans are available or under development but still siloed and ministry / entity specific - A OH budget line is under review for inclusion in the Government expenditure list aimed at supporting the development of an integrated disease surveillance and response targeting priority zoonotic diseases.	- A One Health policy and / or regulatory framework coordinating and defining interventions across actors exist and is widely implemented - The One Health strategic planning process and costed operation plans are available or under development but still siloed and ministry / entity specific - A One Health budget line is clearly defined in the Government expenditure list and is aimed at supporting the development of an integrated disease surveillance and response targeting priority zoonotic diseases. - There is a national One Health action plan that coordinates all interventions across actors.	- The One Health governance documents are regularly reviewed and evaluated to improve interventions efficiency and adjust government budget allocation to zoonotic diseases spillover, surveillance and preparedness management. - One Health related considerations are included into economic forecasts, business strategies and risk management frameworks at all levels.	- National One-Health policies and governance framework are aligned with regional and international guidance and standards - A mechanism is in place to document, monitor, and evaluate progress. - Lessons learned are used to measure adequation with financial resources invested.

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One Health	I. Human and Veterinary Healthcare	Human and animal health Surveillance (Risk assessment and management processes)	Emergency Operation Center *Objectives:* *- Apply the concepts of emergency management, including the use of Emergency Operation Centers (EOCs) to Incident Management Systems (IMS) to help national and subnational public health systems protect populations impacted by a public health threat (1).*	- There is a routine health information system in place that collect disease surveillance data but there isn't an Emergency Management Program (EMP) in place to prepare and respond to a disease outbreak - There isn't an Emergency Operation Center or the center is not fully operational - The availability of field epidemiology investigation teams is limited or inexistent.	- There is EMP in place and an ongoing effort to operationalize a EOC in charge of both preparedness (exercises and training of field epidemiologists) and response activities - The EOC facilitates efficient, coordinated public health activities for the duration of a response in the health sector.	- The EMP uses a tiered level of activations that generally has 3 Levels: Level 3 (lowest activation level), Level 2 (intermediate level) and Level 1 (highest activation level). - The EOC exist and is operational - The EOC is equipped to investigate the One Health Events across ministries.	- The EMP includes common elements of a response that may include epidemiologic investigations, laboratory services, medical care, medical counter-measure (such as vaccines, antiviral, and antimicrobial drugs) distribution, public messaging and risk communications, and partner communication—all organized in a series of task forces or similar structures within a OH inclusive IMS. - The EMP includes a standardized national response doctrine, including common terminologies Focus on communication, information management, and resource management.	National Emergency Management Program takes into account the following components and principles: - Defined modular management structures that are scalable and flexible - Importance of operating from one set of objectives and priorities - Understanding of joint limitations in a multipartner environment - Protection of agency's legal authorities to conduct response operations - Optimization of unity of effort among partners under a single plan.

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One Health	I. Human and Veterinary Healthcare	Human and animal health Surveillance (Risk assessment and management processes)	Priority zoonotic diseases: *Objectives:* *- One Health Zoonotic Disease Prioritization (OHZDP) process uses a multisectoral, One Health approach to prioritize zoonotic diseases of greatest concern that should be jointly addressed by human, animal, and environmental health sectors in a country, region, or other area. A standardized OHZDP tool is used to assist with this process.* *- The zoonotic priority diseases list is well identified, regularly updated, shared and widely used for disease surveillance in all of the ministries involved in the OH approach in addition to other diseases associated with potential epidemic risk.*	Zoonotic diseases with epidemic potential are well known in the country but a national list of priority zoonotic diseases issued from an inclusive and decentralized prioritization process doesn't exist.	- The One Health Zoonotic Disease Prioritization (OHZDP) process is completed using a multisectoral, One Health approach to prioritize zoonotic diseases of greatest concern that should be jointly addressed by human, animal, and environmental health sectors in a country, region, or other area. A standardized OHZDP tool is used to assist with this process. - The zoonotic priority diseases list is well identified, shared and widely used for disease surveillance in all of the ministries involved in the OH approach in addition to other diseases associated with potential epidemic risk.	- Harmonized data collection tools on the country's zoonotic priority diseases are equally used and implemented at all levels in all ministries involved in the OH approach for data reporting. - The OH priority zoonotic diseases list exists and is implemented in the country's OH information system to track spillovers at the decentralized and community levels.	- The OH priority zoonotic diseases list is used to track data across all databases and used for data triangulation for increased surveillance.	- There is a mechanism in place to assess the list of priority zoonotic diseases on a regular (at least yearly) basis and the result of this assessment is used to update national policies and strategies. - The OH priority zoonotic diseases list is aligned with regional and global health threats prioritization.

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One Health	I. Human and Veterinary Healthcare	Human and animal health Surveillance (Risk assessment and management processes)	Integrated Investigation policy: *Objectives:* *- Decentralized level OH coordination policy allow collaboration of staff from different ministries to assess and report One Health threats more efficiently.*	- No coordination policies are in place at decentralized level to guide joint investigation by the different OH sectors, of reported zoonotic diseases rumors and abnormal events - Investigation of health related rumors and notified abnormal health related events, are happening on a case by case basis in silo within the same ministry or OH sector.	- Coordination policies are defined and available at central level to guide joint investigations of zoonotic cases or health related events but its implementation at the decentralized level is not effective. - Guidances on investigation procedures of health related rumors and notified abnormal health related events are still not fully implemented or applied on a case by case basis by the concerned ministries et the point of service and community level.	- Coordination policies are in place to guide joint investigation of zoonotic diseases cases and health related events. It's implementation at the decentralized level by all OH sectors is effective. - Guidances on investigation procedures of health related rumors and notified abnormal health related events are applied and investigation teams formed by staff form two or more ministries are created to conduct investigations of abnormal zoonotic events. - The implemented guidance and procedures make it possible for rumors reported by community agents from each OH sectors to be shared with other OH ministries at the decentralized level to enable coordinated joint investigations.	- The Coordination policies and guidance documents define a clear diagram of the cross ministries joint investigations process and is available, shared and implemented at all levels - The coordination policies and guidance document contain and take into account the appropriate skills and staff profile available from each ministries involved in the OH approach and ensure they are mobilized to investigate zoonotic threats independently of the notifying ministry.	- Feedback and lessons learned from joint OH investigations are used to improve national coordination policies and guidance document on a regular basis or during routine planning process. - The joint investigation policy is inline with international standards. - Resources of each of the ministries involved in the OH approach can be leverage to investigate, transport, analyse and respond to OH related health threats.

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One Health	II. Human Capacity	Human resource	Workforce development and management *Objectives:* *- Invest in and strengthen the health workforce in the light of experiences during the pandemic, with a focus on ways of attracting, retaining and supporting health and care workers throughout their careers, coupled with reviews of how the roles of health workers can evolve, given the rapidly changing nature of medicine and technology.* *- One Health capacity building, including pre and in-service training programmes for the health workforce and expansion of transdisciplinary competences are available through a public-private partnership.*	- General Health workforce inventory is available but nothing specific to the One Health human capacity available in the country - No OH career plan or training curriculum is available to produce a workforce capable of conducting OH related activities.	- A clear OH career and curriculum is available or under development to train, motivate and promote development of OH human resource - A few training private training institutions are providing pre and in-service trainings in One Health - A clear inventory of OH workforce is available defining cadres available.	- A clear OH career and curriculum is available and fully implemented to train, motivate and promote development of OH human resource - A public-private partnership makes it possible for institutions to provide pre and in-service trainings - A clear inventory of OH workforce is available defining cadres available and positions needs at different levels of the OH system.	- A One Health human resource development plan is available and implemented outlining the OH workforce needs and strategy to address those needs.	- A Global plan to promote capacity building programmes primarily focus on developing cooperation between human and veterinary health sectors for monitoring, detection and control of zoonotic outbreaks and training the corresponding workforce exists. - Lessons learned are used to improve the training curriculum of the OH workforce.

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One Health	II. Human Capacity	Human resource	User's capacity and access *Objectives:* *- The final users of the OH system in place are equipped to make the most of it and take evidence based decisions that leads to population health improvement.*	- The concept and implementation of OH is still at an early stage and promoted by international organization and implementing partners but national ownership yet to be built - The users of the OH system are not clearly defined yet - The access to the One Health information is limited and siloed. Only users from specific sectors have access to their own information.	- The main users of the OH are still the non governmental organizations but the country is gaining ownership of the process and start integrating OH use in the routine health information reports - One health system users base is increasing to include all sectors and laboratories - There is an increasing inclusion of OH into the country's routine data managers and data analysis tasks.	- OH is incorporated in normal routine and surveillance activities and included in the user's tasks - Decision makers have access to the OH information on a regular basis and use it for evidence based decision making - OH users are trained on a regular basis on the OH data collection, analysis and use.	- The use of OH system and information is institutionalized and part of normal health management operations across sectors - Inter-sectoral task forces, investigation teams, supervision teams and data review teams are collaborating on a regular basis to improve the OH system and products.	- Gender aspect are included into user access to OH system and products - Users at the high level of the government are routinely using OH data for decision making, pandemic preparedness and response. - Lessons learned from OH data use are included in Monitoring and evaluation activities as well policy revisions.

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One Health	III. Healthcare Industry	Health care customers	Patients and caregivers *Objectives:* *- Bring digital health to the caregivers and patient level which can be human, animal and environmental* *- digital consumers caregivers, human, animal or environmental who use a wide range of smart-devices, connected medical equipment, or connected wellness equipment to monitor health in real-time.* *- Use of digital health by caregivers and patients which encompasses other digital technologies for health, such as the Internet of Things, artificial intelligence, big data, and robotics.*	- Adoption of Internet of things (IoT) and wearable technologies is very low among caregiver and patients (human or animal) mostly due lack of access to the technology or network availability. - Caregivers are using more traditional approach and not using digital health technology on a daily basis - The regulatory framework required to properly control monitor the use of the technology and the data produced doesn't exists yet.	- Some NGOs or International organizations are promoting or supporting the use by caregivers of Internet of things and wearable technologies to collect and monitor patient's (human, animal and environment) health data in pilot or experimental projects settings but the use of this technology is not yet widely spread at the population level. - Pilot projects involving digital health technologies such as Artificial Intelligence, machine learning, big data etc. are ongoing but not yet widely used - The regulatory framework required to properly control monitor the use of the IoT and wearable technologies and the data produced is not yet full developed or implemented.	- The regulatory framework required to properly control monitor the use of the IoT and wearable technologies is in place and fully implemented at caregivers level. - Patients data and privacy are fully protected by the appropriate legislation. - The use of digital health technolo-gies is promoted by the govern-ment to monitor human, animal and environmental health.	- A Government regulation provides a framework to manage the use of patient's data collection using Internet of things and wearable technologies. - Clear regulations are in place to define when government and private institutions can use privacy invasive internet of things technologies to collect One Health data to prevent spillovers - A digital health policy exist that promote and facilitate the adoption and use of digital health technologies in all health strategic planning process.	- A unified policy on the use of Internet of things and wearable technologies across One Health sectors is in place and implemented - Lessons learned from the use of Internet of things and wearable technologies are used to inform future legislations, plannings and research.

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One Health	III. Healthcare Industry	Healthcare services	Providers: *Objectives* *- interoperability of digital health data systems and care giving institutions.*	- Providers within the human health sectors are siloed and patients data systems are not talking to each other. - Public health hospitals and clinics don't have a unique identifier to track patients across institutions - hopital and veterinarian health information systems are mostly paper based.	- Public and private hospitals and veterinary clinics are starting to implement digital health information systems able to track patients within the health institution but not yet linked to each other - Public and private laboratories are also going digital but are still siloed and not yet interoperable with other institutions and health providers.	- Public and private hospitals and veterinarian clinics are fully digitalized and implement a unique identification system that allows tracking of any patient human or animal across institutions - The different health institutions are interoperable allowing patient data to be shared across institutions and aggregate data reporting to occurs easily	- International standards like HL7 are adopted and implemented nationally - Clear regulatory and policy documents defines the adoption of standards and norms enabling the interoperability of systems across human and animal health institutions.	- A set of national registry services are available to all human, animal and environmental sectors to allow seamless interoperability of their institution systems and ease data sharing (Metadata registry, location registries, patients index, etc.) operations.
			Insurers *Objectives:* *- Digitalization of health insurance in public sector* *- Universal health insurance to all human, animal and environmental sectors* *- Access to private health insurance alternative.*	- Private health insurance is available at a variable level - The public health care insurance is not available to all. It is only available to some groups of workers - The availability of health insurance offer for the veterinarian world is not sufficient.	- There is an effort to develop and implement a universal health care coverage for all human - There is a limited offer of public and private health insurance for pets and livestocks - There isn't any data exchange between human and veterinary health insurance systems with the OH information system.	- Availability of a universal health care coverage enabling free or low cost access to health care for the human population - Animal insurance information system data is interoperable and shared with human insurance data enabling OH data triangulation.	- Special provision are included by health insurers to grant affordable care to patients in the event of zoonotic diseases pandemic.	- Strategic planning processes and policies are in place to ensure integration and collaboration between insurers of public and private sectors and human, animal and environmental health - Appropriate policies are in place to guarantee access to

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One Health	III. Healthcare Industry	Healthcare infrastructure	Medical equipment *Objectives:* *- Availability of medical equipment for diagnostic and care and treatment of zoonotic diseases* *- Availability of digital internet enabled medical equipments.*	- The existing medical health equipment are not digital or connectable to Internet to allow electronic medical data collection and processing both in human and animal sectors.	- The availability of digital health medical equipment exist only in a few private health facilities in public health establishments at the central level.	- Most of public national, and decentralized hospitals are equipped with digital diagnostic and care equipments to manage zoonotic diseases - Highly digitally equipped private facilities are available to provide advance diagnostic capabilities when needed - National laboratories are equipped with digital enabled equipment capable of identify microbial resistance and zoonotic disease.	- The digital medical equipment ecosystem is interoperable and promotes electronic data exchange between animal, human and environmental systems.	- A national directive promotes the digital collection and transmission of OH data over paper based data collection and transmission.

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One Health	III. Healthcare Industry	Healthcare infrastructure	Pharmaceutical product supply chain and sample transport *Objectives:* *- Integrated supply chain management system taking into account human, animal and environmental supply needs* *- Interoperability of systems and sectors supply chain* *- Availability of a sample transportation management system.*	- The supply chain is managed mostly with a paper based system at least between the national data warehouses and the decentralized point of services - The transport of supplies and commodities are essentially from the central level to the decentralized level.	- There is an ongoing effort to implement a logistic management information system (LMIS) at the human and animal health levels but the systems are still siloed and not talking to each other - There is an ongoing effort to implement a sample management information system (SMIS) and transportation at the human and animal health laboratory levels but the systems are still siloed and not talking to each other - The need for a digitalized and comprehensive sample transportation system is acknowledged.	- A sample management software or Laboratory Information management System (LIMS) is in place and used at all levels of the human and animal health sectors to ensure the data security and accuracy of all the samples right from when they are sent and received in the lab until they are processed, tested and shipped out. - An interoperability of human and animal LIMS and SMIS exist and allow data sharing across sectors.	- Clear regulatory and policy documents defines the adoption of standards and norms enabling the interoperability of SMIS and LMIS systems across One Health sectors.	- Monitoring and Evaluation and learning of the supply chain is in place and used to improve future development and re-inforce capacities.

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One Health	III. Healthcare Industry	Healthcare governance	Regulatory agencies and standardization organizations *Objectives: The objective of Industry 4.0 is to use findable, accessible, interoperable, reusable, ethical, and revisable (FAIRER) data.*	- There is no agency in charge of regulating the collection, transmission, processing and use of One Health data.	- There is an effort to implement a governance body in charge of regulating the collection, transmission, processing and use of One Health data across sectors.	- There is an agency / governance body in charge of regulating the collection, transmission, processing and use of One Health data. - A regulatory framework is in place and implemented at all levels.	- Adoption of Fast Healthcare Interoperability Resources standard are promoted - The focus is on the use of application programming interfaces within and across health/care sectors to improve a wide range of areas (ie, interconnected-ness to contractual agreements).	The implementation of regulation and policies are monitored to inform future development of the One Health ecosystem.

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One Health	IV. Citizen's engagement	Healthcare infrastructure	Citizen engagement in personal, public and environmental health: *Objectives:* *- Learning opportunities provided to citizens, so that they can protect and take care of themselves and the environment* *- Opportunities exist in which citizens use their electronic health data to manage personal health and share personal information require citizens who trust in health care delivery.* *- The use of implemented opportunities depends on patient engagement, the direct benefits for users, and health care management organizations* *- Responsible use of Smart cities and neighborhoods (ie, cities and neighborhoods that extensively use smartphones that can geolocate individuals and trace/track behaviors).*	- There are not any active learning opportunities offered to the populations to teach counter measures to protect themselves against zoonotic diseases spillover - The Internet penetration is limited and availability of smart mobile devices is still very low.	- Internet and smart devices availability has increased to reach more than 60% of the population - A strategy to promote self care at the individual and empower citizen to take control of their own health and their environment is in under development or at an early stage.	- There is a strategy in place to engage the populations to be part of the response to zoonotic diseases threats and environmental monitoring - Citizens are trusting the health care organization and trust that the promoted measures are for its own direct benefits and thus take an active part of their implementation.	- Citizen's are actively engaged in peer to peer behavioral change activities as a result of the health authorities communication strategy - Citizens actively reports abnormal events to health authorities using their own computers or mobile devices - A data protection regulation similar to the European General Data Protection (GDP) Regulation has been implemented to reduce the amount of excess data in the overall data sphere and protect citizens privacy with regards to health care data.	- Development and Responsible use of Smart cities and neighborhoods (ie, cities and neighborhoods that extensively use smartphones, cameras and others digital devices that can geolocate and monitor individuals, animals and the environment and trace/track behaviors) - Citizens are voluntarily participating in government controlled mobile real-time tracking programs aimed at collect, transmit and analysing data to better understand and mitigate spillovers - Citizens use their electronic health data to manage personal health and share personal information with their health institutions.

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One Health	IV. Citizen's engagement	Infodemic management	Community involvement in early warning systems *Objectives:* *- A successful diseases surveillance program has to be rooted at the community level by the involvement and interstment of community agents* *- Involving communities in building and implementing strategies for mitigating misinformation is key to the success of any response plan.*	- Each One health sector has it own more or less functioning disease surveillance system relying on community level agent that are often volunteers - Communities are not involved or targeted by any misinformation mitigation strategy.	- There an effort from the government and international partners to institutionalize the use of community workers to support disease surveillance at the lower level - There is not regular or formal commitment to motivate or provide financial compensations to community agents in most of the One Health sectors - There is some case by case communication campaigns targeting misinformation mitigation at community level.	- All sectors involved in One Health disease surveillance have a defined list of community health agents contracted to support event based surveillance at community level - Community agents from all One Health sectors are collaborating and reporting all abnormal event independently of the sector concerned - There is a sustained effort to provide financial compensation and training to the community health agents - The is an effective misinformation mitigation strategy implemented that involves and target communities.	- There is a One Health community health agents coordination body in place overseeing community based workforce management across sectors - Communities are actively participating in fight against health in general and zoonotic diseases related misinfor-mation campaigns.	- There is a sustainable mechanism in place to consistently support, maintain and grow the One Health community based workforce - There is communication task force in place to address health and zoonotic diseases related misinformation mitigation strategies.

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One Health	IV. Citizen's engagement	Infodemic management	Social network / confidence *Objectives:* *- ODH teaches people how to differentiate between real and fake news, which are disseminated over the mass media and the internet.* *- Supporting digital health literacy by actively encouraging everyone (ie, from children to elderly people) to engage with personal health, public health, and environmental monitoring systems can increase citizens' awareness.*	- Citizens are not aware of the risks associated with the use of Internet and social network in general. - Citizens are not educated to make the difference between false and truthful health information - There is not a global communication strategy to educate the citizen's using mass media on health issues associated with zoonotic diseases.	- There is a global effort to communicate effectively using the media and Internet on health risks associated with zoonotic diseases but no specific One health communication strategy targeting the general population - There is a long term plan to support digital health literacy by actively encouraging everyone (ie, from children to elderly people) to engage with personal health, public health, and environmental monitoring systems can increase citizens' awareness.	- There is a global One Health communication strategy and plan in place to educated effectively the citizen's on risk and countermeasures to mitigate the impact of zoonotic diseases - There is an active public campaign on social medias like facebook, instagram, twitter etc. aimed at fighting misinformation and promoting behavioral change - Citizens have a trusted source of information regarding One Health related issues.	- Citizens engage on social media to fight misinformation and promoted trusted source of One Health information - Infodemic management curriculum are developed and taught in training institutions.	- An infodemic management monitoring and evaluation and learning plan exist and is implemented - Lessons learned are used to improve the infodemic management policies.

One-Health (OH) Information Maturity Stages

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One Health	V. Environmental health	Climate change and land use	Biodiversity: *Objectives:* *- Ensuring biodiversity is a crucial to maintaining One Health as it acts as an insurance policy against threats to human survival.* *- Enforce appropriate policies aimed at preserving forest and manage cropland expansion and improve biodiversity and agriculture performance in general.*	- There is no policies in place regulate forest wood exploitation - No policies in place to regulate expansion of cropland and deforestation - Innovative research to protect natural animal habitat and promote biodiversity as a mean to respond population food needs is not a priority.	- There are policies in place regulate forest wood exploitation - A government regulation limits deforestation and agricultural extension and save the balance of the ecosystem - Innovative research to protect natural animal habitat and promote biodiversity as a mean to respond population food needs is considered a high priority for the country but still at an early stage.	- There is ongoing research to monitor climate change and mitigate its impact on the populations, agriculture and the environment - There are regulations and policies in place that effectively regulate human and environment interaction, animal habitat protection and biodiversity - There are governance bodies in place charged of the management of the control of human and wildlife animal populations interaction / protection - Research programs are in place to survey, monitor, protect and promote entomology and biodiversity in general - The animal habitats are protected, monitored using digital technology for climate change effects or zoonotic diseases threats.	- A CO2 / carbon emission regulation policy is in place and enforced - Environmental monitoring metrics (Air and water quality, meteorology, cropland une, forest size, etc.) are openly/trans-parently published and shared with the population and also used to inform national biodiversity and environmental protection policies - The biodiversity and environmental related policies implementations are enforced and monitored at the highest level of the government.	- Ongoing research and monitoring of the biodiversity and climate change policy implemen-tation is routinely revised and implemented to improve outcomes - The Biodiversity question is monitored on a regular basis at the highest level of the state.

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OH Key Enabling Areas	OH Core Domains	OH Components	OH Subcomponents	Nascent (1)	Emerging (2)	Established (3)	Institutionalized (4)	Optimized (5)
One Health	V. Environmental health	Human and animal Habitats	Wildlife habitat *Objectives:* *- Wildlife monitoring and population control is implemented across the country* *- Hunting and big game regulation is in place and enforced* *- Nature preservation and parks maintenance is a priority for the country.*	- There isn't a strategy in place to monitor wildlife populations and ensure proper control - Poaching is not regulated and is not sufficiently enforced in protected parks and wildlife reserves - There is not sufficient funding available to support, maintain and improve wildlife habitats.	- Wildlife population and habitat management and governance bodies exist but are not equipped to provide effective protection of all parks and reserves and enforce policies and regulations - There is defined list of wildlife reserves and parks but conflicts with neighboring population put them at risk - There is an ongoing effort to control poaching but so far with limited success.	- Endangered species are identified and monitored. Measures are in place to protect their population and habitat - Parks and wildlife reserves boundaries are well protected and enforced - Sustainable economic approaches are promoted to ensure cohabitations of the population and the protected wildlife - Health of animals living in proximity with human is actively monitored to prevent spillover.	- Wildlife research programs are in place to monitor the population using smart technologies - A multisectorial approach is used to address the issues raised by animal-human interactions - Populations are educated on health risks linked with close interaction with wildlife and bushmeat consumption.	- Innovative approaches are used to reduce human-animal interactions while preserving the wellbeing of animals and humans - Population voluntarily participate in real time reporting and monitoring of wildlife intrusion on human habitats.

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OH Key Enabling Areas	OH Core Domains	OH Components	OH Subcomponents	Nascent (1)	Emerging (2)	Established (3)	Institutionalized (4)	Optimized (5)
One Health	V. Environmental health	Human and animal Habitats	Smart cities *Objectives:* *- A smart city is a framework, predominantly composed of Information and Communication Technologies (ICT), to develop, deploy, and promote sustainable development practices to address growing urbanization challenges.* *- promote cities that provide a core infrastructure, and a clean and sustainable environment and give a decent quality of life to their citizens through the application of 'smart solutions'.* *- One potential modality for addressing the determinants of urban health is through Smart Cities, which take a multi-sector, multi-stakeholder approach to urban planning.* *- Pets and Livestock health monitoring are used as a proxy for owner's health and monitor impact on the households.*	- Environmental concerns are not taken into account while building cities and human habitats in general - No global policy exists to engage environmental and spatial planners / scientists who can enable the pursuit of sustainable development while also technically addressing complex urban challenges.	- Stakeholders and local governments are collaborating to implement smart cities concepts - There is an effort to develop a global policy and regulatory framework to promote the development of smart cities at all levels.	- A multisectorial and multi-stakeholder governance body is in place to coordinate smart cities interventions - Smart technologies are used in innovative projects to improve the environment, the health and quality of living of the citizens. - Internet of Things (IoT) are used to promote sustainable and clean environment (Air and water quality, biodiversity, etc.) and behaviors that impact health and well being - IoT and wearable devices are used to monitor health of pets and domesticated animal as a proxy and early warning monitoring of citizen's health - Smart waste management systems are in place and functional.	- The smart city approach is institutionalized and included in the government strategic planning - Smart cities innovations are regularly tried out and scaled up when successful - Cloud-based IoT applications receive, analyze, and manage data in real-time to help municipalities, enterprises, and citizens make better decisions that improve quality of life in cities. - Citizens engage with smart city ecosystems in various ways using smartphones and mobile devices and connected cars and homes. Pairing devices and data with a city's physical infrastructure and services allowing to cut costs and improve sustainability. - A green city policy is in place and promoted in most of the cities.	- Population growth management is under control using smart technologies providing safer and healthy living place - Smart cities innovations are regularly evaluated, lessons learned and use to improve subsequent implementation iterations. - Communities improve energy distribution, streamline trash collection, decrease traffic congestion, and improve air quality with help from the IoT. - Innovative solutions to grow food in smart cities and reduce croplands are regularly tried out, tested and scaled up when successful.

One-Health (OH) Information Maturity Stages

OH Key Enabling Areas	OH Core Domains	OH Components	OH Subcomponents	Nascent (1)	Emerging (2)	Established (3)	Institutionalized (4)	Optimized (5)
One Health	V. Environmental health	Environmental sampling	Water, Sanitation and hygiene *Objectives:* *- Population's access to clean water is a key health determinant* *- Good sanitation practice promotion can help reduce spread of germs* *- Monitoring Human activities impacts on the environment (mining effect on rivers and fish populations) is key* *- Sustainable access to water, sanitation and hygiene in health centres and schools is key* *- Increase access to safe water, and reduce the number people who drink untreated and potentially contaminated water is key*	- Not all populations are living in predictable environment with access to clean water - Population of rural areas and some cities are still practicing open defecation - There is unregulated artisanal mining activities increasing the risk of environmental pollution - There are frequent epidemics of waterborne diseases - Water and sanitation best practices are not implemented at the village and community level.	- There is an ongoing effort from stakeholders and the government to improve populations' access to clean water and promote sanitation skills - A survey of all water points and sanitation facilities of the country is planned or ongoing.	- There is a policy and regulatory framework in place to protect the environment and regulate mining activities and their impact on the environment - Citizens are made aware of risks caused by poor hygiene and sanitation practices - Basic infrastructures are available to most community level and villages to provide access to clean water - All water points are regularly surveyed to collect their geolocalization, quality of water, water level year round and deserved population - Innovative approaches are used to sanitation facilities and practices in urban and rural areas.	- A national Water, sanitation and hygiene policy is in place and enforced at all levels - Water and sanitation facilities survey data are used to monitor national coverage and inform policy - The country's fresh water resources availability are monitored in real time to inform policy development - Human activities impacting water quality are closely monitored and regulated.	- Access to safe water is available to 90% or more of the population - 90% or more of the population is educated on good sanitation practices to reduce water borne diseases and germs spreading. - Smart technologies are used to monitor water quality everywhere.

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OH Key Enabling Areas	OH Core Domains	OH Components	OH Subcomponents	Nascent (1)	Emerging (2)	Established (3)	Institutionalized (4)	Optimized (5)
One Health	V. Environmental health	Microorganisms (re)emerging AMR	AMR *Objectives:* *- Dedicated prevention and infection control efforts to reduced deaths from antibiotic-resistant infections in hospitals.* *- Use of antimicrobials in food, companion animals, fish, vegetables, and the environmental resistance gene pool, play important roles in development of AMR.* *- The lack of stringent regulations and monitoring and increased use of non-therapeutic antimicrobials in industrial animal farms is an important source of AMR.*	- No or limited policies in place to support infection prevention effort to reduce deaths from antibiotic-resistant infections in health facilities - There isn't a strategy in place to address the risk of cross-transmission of zoonotic bacteria via direct contact due to close proximity with food animals, companion animals, live wildlife markets, environmental contamination, and the intake of contaminated animal origin food items. - No strategy in place to reduce over prescription of antimicrobials which is the major source of selection for antimicrobial resistant bacterial - No control over the use of antimicrobials in food animals which feeds the environmental resistance gene pool ("resistome")	- Policies are available to support infection prevention effort to reduce deaths from antibiotic-resistant infections in health facilities but not fully implemented - There are regulations available to control cross transmission of zoonotic bacteria in live animal and food market - There is an effort in the human and animal medicine area to control and promote responsible use of antimicrobials - There is an effort to introduce legislation to control and monitor the non-therapeutic use of antimicrobials in agriculture, food and animal farms industries - There is not a clear estimation of the impact and cost of AMR.	- There is a clear legislation in place to promote and enforce responsible use of antimicrobials in human medicine - There is a legislation in place to control and monitor the non-therapeutic use of antimicrobials in agriculture, food and animal farms industries - There is multisectoral coordination body in place to monitor and enforce regulations to limit cross-transmis-sion of zoonotic bacteria - There is a clear estimation of the impact and cost of AMR to the society - There is clear regulation and management of human and animal waste disposal to protect aquaculture and aquatic life and ecosystems - An early warning system is implemented based on a local epidemiological database and regular health check-ups of the animals to allow for early detection of disease and thereby prevent the need for use of antimicrobials.	- A cross sectoral multi level approach is used to address AMR challenges at the global level - Promotion of preventive non-antimicrobial strategies which include timely vaccination, appropriate biosecurity measures, proper nutrition and housing to reduce the demand for preventive antimicrobial therapy are in use.	- AMR is taken into consideration in all global health strategic planning at human, animal and environmental level - small-scale backyard farming is promoted as strategy to reduce the need for large scale farming with increased need for antimicrobials.

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OH Key Enabling Areas	OH Core Domains	OH Components	OH Subcomponents	Nascent (1)	Emerging (2)	Established (3)	Institutionalized (4)	Optimized (5)
One Digital Health	I. Infostructure	Data Management	Data ethics and Management *Objectives:* *- Appropriate data management procedures in place and constantly evolving and monitored* *- Data access for One Health use is granted to all actors and global use when needed* *- Appropriate data security and privacy measures are in place and enforced*	- The country has no healthcare or One Health specific data laws, regulatory frameworks, or ethics provisions to guide data security, privacy, and confidentiality. - No national document for data management procedures exists for the national HIS.	- The country has drafted laws, policies, or a regulatory framework for data security and privacy that address issues related to One Health data. - Electronic data management procedures for One Health are clearly developed and documented in a nationally recognized multisectorial document	- The country has an approved health data regulatory framework. - A roadmap is in place to migrate data collection and reporting from a paper system to an electronic system, complete with necessary data security safeguards. - A documented mechanism is in place for maintaining data quality throughout the data supply chain.	- The health data security and privacy laws have been implemented, and there are guidelines on how to operationalize the laws in the One Health Information System (OHIS). - HIS users have been sensitized on the data security and privacy laws. - The government and stakeholders consistently enforce the data security and privacy laws. - National electronic data management processes are published and disseminated for the One Health Information System. - A standard operating procedure and/or data use plan is in place to facilitate data use by the country and its stakeholders. - A data warehouse, integrating data from all One Health Information System (OHIS) subsystems and allowing for data triangulation and quality control, is fully functional and in use. - Strategies to address the negative impact of digital health technologies (security risk, malpractice, job loss, high dependency on algorithms with limited or no feedback loop) are under development or under testing - Strategies for effective transition from paper-based documentation to digital forms are developed and under testing	- The country has a recognized mechanism (e.g., committee or working group) for reviewing data ethics issues in the national OHIS, and for updating policies, procedures, and laws, as needed. This mechanism reflects industry best practices. - Data access and use are constantly monitored, and data management systems are updated accordingly. Electronic data transmission is the default method to move data among information systems. Dashboards displaying information from multiple sources are available to decision makers. - Strategies to address the negative impact of digital health technologies (security risk, malpractice, job loss, high dependency on algorithms with limited or no feedback loop) are developed and fully implemented. - Strategies for effective transition from paper-based documentation to digital forms are fully developed, tested and implemented at all levels of OH sector.

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One Digital Health	I. Infostructure	Data Management	Data Security *Objectives:* *- Electronic data is accessed and exchanged securely* *- National data security guidelines are define, implemented, enforced and monitored regularly*	- No electronic data exchange conducted	- Data exchange is manual, and security standards exists locally or for specific implementations.	- Security standards are used in limited settings for basic/simple electronic data exchange. Data security depends on the infrastructure and application security in place	- Security requirements for data, applications, and network infrastructure to support data access and exchange are defined and used nationally.	- Data access and exchange security is reviewed on a regular schedule to ensure privacy, confidentiality, and compliance with set guidelines. - Access logs are constantly monitored for security and audit purposes.

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OH Key Enabling Areas	OH Core Domains	OH Components	OH Subcomponents	Nascent (1)	Emerging (2)	Established (3)	Institutionalized (4)	Optimized (5)
One Digital Health	I. Infostructure	Data Management	Data quality assurance and use *Objectives:* *- Standardized data quality assurance procedures are implemented at all levels of the One Health pyramid*	- No standardized procedures exist to guide data quality audit. - Procedures used during the course of data collection, processing, analysis, and use exist in limited settings.	- Procedures for data collection, processing, analysis, and use exists locally or for specific implementations. - Data quality reviews and audits are conducted on an ad hoc basis and are driven by specific data needs in each individual OH sector. - A One Health data-quality assurance plan and national coordinating body (can be a subgroup under the One Health leadership group/team) to oversee data quality are being discussed. - Some electronic tools are used to facilitate data quality review and audit process.	- Procedures for One Health related data collection, processing, analysis, and use are defined and implemented nationally (including sex-disaggregated data, where applicable). A regular schedule is defined for conducting data quality reviews and audits, which include a remediation process to address identified issues. There are procedures for documenting metadata. A national coordinating body to oversee data quality is established and meets regularly (at least annually, will vary with context), - Data quality checks and audit procedures and metrics are implemented in the OH electronic data management tools.	- Data reviews and audits (including sex-disaggregated data, where applicable) are integrated in the HIS plan/health plans, conducted on a regular schedule using automated and manual processes to ensure defined levels of quality. Regular meetings of a national data-quality governing body occur, and issues identified are addressed through an established remediation process, which includes documentation of changes made. Data and metrics on data quality assurance (DQA) are shared with stakeholders. Standards for exchanging data between systems to avoid manual reentry where possible are in use nationally.	- There is continuous review and auditing through automated and manual processes, to ensure defined levels of data quality. Metrics reported on data quality issues are used for continuous improvement. The data-quality assurance plan is reviewed periodically by a national coordinating body and appropriate stakeholders, and the plan is revised to meet evolving data quality needs (including sex-disaggregated data, where applicable).

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One Digital Health	I. Infostructure	Data Management	Data set definitions (clinical, lab, commodities and indicators) *Objectives:* *- A common set of metadata to be collected across One Health sectors to ensure proper monitoring of zoonotic threads is define, adopted and implemented at the country leve*	- There is no standardized set of metadata to guide zoonotic diseases data collected across One Health sectors	- Each of the One Health ministry defines its own datasets to collect the data on an ad hoc basis. There is awareness that standardized national One Health data set is needed but it is not defined or in use	- A national One Health minimum data set is define and in use to track priority zoonotic diseases across sectors in the country	- A governance body is in charge of routinely reviewing, updating and ensuring implementation of the standard One Health data set package in accordance with the country's health threads.	- The country's standard One Health data set package is aligned with global standards and data sets

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One Digital Health	I. Infostructure	Standards and guidelines	Interoperability, data and exchange standards *Objectives:* *- Development and implementation of a cross sectorial One Health Enterprise Architecture will guide development of an integrated One Health Information System* *- Implementation of key interoperability building blocks enablers*	- OHIS interoperability guidance documents are absent, and OHIS interoperability is implemented on a case- by-case basis using point-to-point data exchange. - Some standard guidelines exist and are in use, but they are defined locally or for specific implementations. Stakeholders may see little value in the use of guidelines, because of cost and difficulty in adopting them. - No structure, processes, and procedures (e.g., working groups, steering committees, or units) are in place to guide or enforce compliance with data exchange, messaging, and data security standards. No criteria for certification and compliance exist. No regulatory framework for compliance exists. - Applications are hosted by the providers without any control from the government or OH Ministries.	- An OHIS ICT infrastructure assessment has been conducted and the needs for a coherent OHIS ICT infrastructure architecture have been documented. The country has adopted or developed technical standards for health data exchange, messaging, and security. - Some standard guidelines exist and are used for OHIS activities in limited settings. There is awareness of the key role that OHIS standard guidelines play in supporting healthcare operations.	- Interoperability guidance documents developed, tested, and adopted, and include reference terminologies and technical standards for data exchange. - The OHIS has developed or adopted and implemented a regulatory framework for compliance. - Formal processes and procedures for creating, adopting, and managing HIS standard guidelines for OHIS implementations are defined and disseminated. Core standard guidelines exist and are used for HIS activities and implementation nationally. A formal body/group and clearly defined processes are in place for maintaining HIS standard guidelines, and resources are allocated for the activities.	- The interoperability guidance documents are government-owned. They are consistently used and referenced in efforts to guide implementation of OHIS interoperability. - The government enforces the regulatory framework for compliance. The subsystems in the national OHIS are required to meet compliance criteria. - Up-to-date, standard guidelines are available in a central location. - An Interoperability Layer is orchestrating data exchange between existing HIS applications hosted by the integrated ICT infrastructure supporting the national HIS.	- A routine review of standards and requirements compliance is conducted to ensure continuous integration of the various subsystems. - Compliance with standards for data exchange, messaging, and security is regularly reviewed. The regulatory framework is reviewed and updated to reflect best practices for data exchange, messaging, and systems security. - The process of creation, adoption, and management of OHIS standard guidelines is continuously improved. Practice, workflows, and business needs inform creation or adoption of new standard guidelines.

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One Digital Health	I. Infostructure	Business continuity processes and policies	Standard operating procedures

Objectives:
- *IT governance and management procedures*
- *Implementation of best practices* | - No government-approved business continuity plan (BCP) is in place at the national or subnational levels of the HIS. | -The HIS has developed a BCP that outlines the processes needed to ensure continuity of critical business processes. | - The BCP has been audited. Audit results show that at least 50% of the BCP has been implemented. | - The BCP has been audited. Audit results show that at least 75% of the BCP has been implemented. | - The BCP has been audited. Audit results show that all or most (>75%) of the BCP has been implemented. |
| | | Health System Building Blocks | HIS (human) key functions

Objectives:
- *A good health information system brings together all relevant partners to ensure that users of health information have access to reliable, authoritative, useable, understandable, comparative data.*
- *The health information system provides the underpinnings for decision-making and has four key functions: (i) data generation, (ii) compilation, (iii) analysis and synthesis, and (iv) communication and use* | - The country's HIS mainly consists of stand-alone program-specific subsystems working in silos, and addressing only the basic information needs (routine HIS, surveillance system, and human resources).
- Health workers are overburdened by excessive data reporting demands from multiple and poorly coordinated subsystems.
- Data collection is mainly paper based and of poor quality and usually not including private sector data
- Population level data such as census or household surveys are not available or more than 5 years old.
- Facility and community level information are not systematically brought together to define problems and improve public health surveillance. | - There is some subsystems that have an ongoing point to point data exchange process going on reducing at some degrees the duplication of the data collection at facility level
- Some HIS subsystems are becoming hybrid with paper based data reporting from the facility level and digital data reporting from the level above to the national level.
- Data is still mostly from the public sector.
- Population level data such as census or household surveys are now available and aged less that 5 years but not yet included as denominators in the digital health information system applications to automated data analysis.
- Community level data are collected by NGOs and only partially included in the routine or surveillance health information system. | - There was an inclusive indicator review process that generated an integrated and authoritative reporting canvas that brings together all health programs data collection needs
- No parallel data collection tools are in used at the decentralized level
- The national electronic health information collect all facility and community data across the country and shares relevant data with the health programs and the stakeholders
- Private facilities data are included in the national HIS but not yet of good quality (timeliness, completeness and exhaustivity)
- Recent population level data and catchment area data are used as denominators to automate data analysis and feed program specific dashboards promoting data use | - The government requires all HIS subsystems to comply with the country's HIS policy and plan, including use of technical standards.
- The government enforces private sector reporting to ensure overall HIS data quality
- Data is collected digitally at the facility and community level
- The national disease surveillance electronic system is integrated with the national routine information system allowing quicker identification and response of public health threats
- The information generated by the HIS is used for health decision making, planning process and resources allocation | - Most HIS subsystems are integrated data electronically, according to industry standards/best practices.
- There is a stakeholder and health programs inclusive indicator review process that is ongoing on a regular basis to ensure evolving data needs are taken into consideration while keeping the data collection burden manageable at the decentralized levels.
- The national HIS is gender inclusive |

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One Digital Health	I. Infostructure	Health System Building Blocks	HIS (Environment) key functions *Objectives:* - *Cf. Human HIS*	- The country's environmental Health management Information System mainly consists of stand-alone management application - Environmental workers are overburdened by excessive data reporting demands from multiple and poorly coordinated subsystems. - Data collection is mainly paper based and of poor quality and usually not including private sector data	- The country's environmental Health management Information System is hybrid with paper based data reporting from the point of service level and digital data reporting from the level above to the national level. - Data is still mostly from the public sector.	- There was an inclusive indicator review process that generated an integrated and authoritative reporting canvas that brings together all environmental health actors data collection needs - No parallel data collection tools are in used at the decentralized level - Private providers data and community level data are included in the national environmental Health management Information System but not yet of good quality (timeliness, completeness and exhaustivity)	- The government enforces private sector reporting to ensure overall animal Health management Information System data quality - Data is collected digitally at point of services and community level - The information generated by the environmental Health management Information System is used for health decision making, planning process and resources allocation	- There is a stakeholder and environmental health actors inclusive indicator review process that is ongoing on a regular basis to ensure evolving data needs are taken into consideration while keeping the data collection burden manageable at the decentralized levels.

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One Digital Health	I. Infostructure	Knowledgement and sharing (2)	OH Knowledge Management Structure *Objective: Knowledge production has two parts: creation of knowledge through collection, generation, synthesis, and identification; and organization through codification, storage, packaging, and coordination.* *• Knowledge use consists of distribution, sharing, application, and integration.* *• Knowledge refinement consists of evaluation, reflection, adaptation, and sustainability.* *• Social context refers to the underlying structures, values, and preferences of individuals and organizations.*	No knowledge management structure is in place to ensure One Health knowledge collection, generation, synthesis and identification and organization through codification, storage, packaging, and coordination.	There is tentative to create a knowledge management structure is in place to ensure One Health knowledge collection, generation, synthesis and identification and organization through codification, storage, packaging, and coordination.	The knowledge management structure is in place and ensures that One Health knowledge collection, generation, synthesis and identification and organization through codification, storage, packaging, and coordination happens on a regular basis.	The knowledge management structure/body is in place and generates a structured OH knowledge repository accessible to all.	The One health knowledge repository is revised and improved on a regular basis using Monitoring Evaluation and Learning programs.

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One Digital Health	II. Infrastructure	Network infrastructure and Internet connectivity	Internet and mobile Network coverage *Objectives:* *- Internet coverage is available nationwide to support One Health operations* *- Computer hardware and mobile devices are available where needed to support One Health operations*	- Network and Internet connectivity infrastructure exists only at the national level and some subnational level offices. No stable network connection exists at national and subnational levels to support a national One Health Information System (OHIS). - No to very limited computer hardware are available to support One Health operation across the country	- A national plan for network management to ensure high up-time is in place. Adequate dedicated network and Internet connectivity are in place to meet the basic needs of One Health data management and support normal functioning of OHIS in the relevant offices at all levels. - Computer equipment and mobile devices are available partially or only for the most advanced ministries such as the Ministry of health but near to nonexistent for the other One Health sectors	- A national plan for network management to ensure high up-time is in place, with clear procedures to follow in case of network failure, to ensure high up-time. Assessments are conducted at least annually by a designated governing body to identify gaps in ICT infrastructure supporting HIS. - A computer equipment plan for One Health exist and is implemented providing adequate up-to-date computer, tablets and mobile devices as well as Internet services to all appropriate One Health actors in charge of data collection, analysis and management.	- Most national offices of the One Health ministries have a working network connection and about half of subnational offices have a strong and reliable network connection. A dedicated network support team is in place. Gaps in connectivity are documented and addressed in standard process. - A computer and mobile hardware management system is in place ensuring all equipment in current, secure and in good functioning state or replaced appropriately.	- HIS ICT equipment maintenance and user support are integrated in an OHIS strategic plan, which includes financing and technical support for continuous improvement of ICT infrastructure and support. All or almost all of the One Health ministries' national and subnational offices have reliable network connections or mechanisms that support operation in offline mode (and syncing later on). A team with adequate financial, human, and technology resources is dedicated to support connectivity. Industry-based standards are followed.

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One Digital Health	II. Infrastructure	Network infrastructure and Internet connectivity	IT Infrastructure *Objectives:* *- An adequate IT infrastructure will effectively support all OH operations and ensure OH service availability 99% of the time* *- A properly managed and up-to-date IT infrastructure using modern technologies will ensure data security and service availability to users.*	- The OH IT infrastructure is very basic managed by local ministries staff - Individual sectors are managing their IT infrastructures independently with various level of success - Most of the IT infrastructure is hosted on premise or managed on a single computer or local server	- Most OH ministries IT infrastructure are hosted in a cloud but independent from one another - Most of OH systems installation are bare metal installation not using microservices or system orchestration	- OH information systems applications are federated in an unified cloud to make use of the same IT infrastructure and management best practices - Microservices and software orchestration systems are used to ensure 99% service uptime - Load balancing systems are in place to ensure optimal users experience - Automated service monitoring and logs tracking systems are in place to ensure performance and security - Data replication and backup services are in place to prevent data lost	- Redundant and hybrid One Health data backup systems are in place to ensure data recovery in case of disaster	- The country is equipped with Internet router nodes that are properly configured to allows local Internet requests to local resources to be routed locally. - The One-Health IT infrastructure is located in an industry standard grade cloud located in the country allowing local internet traffic between the One Health applications and users.

One-Health (OH) Information Maturity Stages

OH Key Enabling Areas	OH Core Domains	OH Components	OH Subcomponents	Nascent (1)	Emerging (2)	Established (3)	Institutionalized (4)	Optimized (5)
One Digital Health	II. Infrastructure	Hardware / Data Center	Data hosting and storage *Objectives:* *- Data storage and hosting is mutualized in a cloud environment* *- Cloud hosting services meet industry standards* *- Cloud hosting meets sustainability and country's sovereignty needs*	- One Health data is stored independently on paper supports or on an ad hoc basis on local computers not part of a system network	- One-Health data is hosted in an hybrid manner to meet case by case needs and requirements depending on the sector. All the data is stored electronically but distributed on local computer and local or cloud servers.	- All One Health data is stored and hosted in a unified private, public or government controlled cloud hosting environment supported by the government and stakeholders - The cloud hosting resources are in adequation with the One Health data and Information system needs - Cloud hosted data backup is conducted on a daily, weekly and monthly basis - The OH cloud security monitoring is actively conducted by industry grade professionals	- One Health data and Information system hosting is manage by a government agency or body in charge of providing sustainable and continuous service to the OH sector - The OH cloud storage and hosting cost is entirely supported by the government	- An industry standard grade cloud hosting service is made available in the country by a public-private partnership and is used to host all One Health data and systems across sectors.

One-Health (OH) Information Maturity Stages

OH Key Enabling Areas	OH Core Domains	OH Components	OH Subcomponents	Nascent (1)	Emerging (2)	Established (3)	Institutionalized (4)	Optimized (5)
One Digital Health	II. Infrastructure	Hardware / Data Center	Hardware *Objectives:* *- Adequate hardware equipment is available at all levels of the One Health pyramid to support operations* *- Internet of Things and wearable technologies are available and in use to support OH, prevent spillover and monitor the environment*	- The national OHIS has few computers to support it or hardware is dedicated to specific ministries activities not related to One Health. No guidance exists on the minimum specifications for the country's hardware for the health sector. - Internet of Things (IoT) and wearable technologies are not available to the caregivers and general population	- An audit report shows the required hardware at national and subnational levels. Fewer than half of the One Health ministries' central and subnational offices have adequate hardware (e.g., computers, tablets, printers, connecting devices). - Some International organization, or private companies are using Internet of Things (IoT) and wearable technologies to collect and manage OH related data but the technology is not yet widely used or accessible to the general population.	- About half or more of the One Health ministries' national and subnational offices have adequate hardware, including backup services. A plan exists for backup and recovery as well as a plan for replacing old, outdated and broken computing devices - Internet of things and wearable technologies are widely used both at the caregivers and individual patient level and in the healthcare industry to monitor patient's health in real-time.	- Most of the One Health ministries' national and subnational offices have adequate hardware. The hardware is working optimally to support operations. A functional and always-staffed help desk exists at national and subnational levels. - Internet of things and wearable technologies are used to monitor climate changes and environmental variations impacting public health.	- All or almost all of the One Health ministries' central and subnational offices have adequate computing hardware. Hardware is monitored and evaluated on a regular basis to ensure supported functions are operational. - Internet of things and wearable technologies are used to monitor domesticated animals / pet's health and used as a proxy to measure the owner's health and environment impact.

One-Health (OH) Information Maturity Stages

OH Key Enabling Areas	OH Core Domains	OH Components	OH Subcomponents	Nascent (1)	Emerging (2)	Established (3)	Institutionalized (4)	Optimized (5)
One Digital Health	II. Infrastructure	Software Services	Information Systems and software innovation *Objectives:* *- The various One Health sectoral information systems are in place and operational* *- Software service uptime is maximized to reach 99%* *- Innovative service such as Machine Learning and Artificial intelligence are in use to improve OH information systems efficiency* *- Social Network platforms are leveraged to serve OH purpose*	- Not all Ministries involved in the One Health approach have digital health information system - The existing sectoral digital one health information systems are siloed and are not sharing information with each others	- All One Health ministries have a digital information system in place but at various stages of development. The data exchange between systems is done manually by sharing paper based information or digital files	- An integrated One Health Electronic platform exist that integrates zoonotic diseases surveillance data from all sectors	- Innovative services such as Machine Learning, Artificial Intelligence, etc. are used to improve detection, analysis and response of the One Health Information System	The One Health Information system is integrated within the country's global Health Information System Architecture

One-Health (OH) Information Maturity Stages

OH Key Enabling Areas	OH Core Domains	OH Components	OH Subcomponents	Nascent (1)	Emerging (2)	Established (3)	Institutionalized (4)	Optimized (5)
One Digital Health	II. Infrastructure	Power availability	Reliable power / electricity	- Information on electricity/power access, sources and reliability at One Health ministries points of services, and subnational and national level offices is limited and only collected when planning for specific OHIS activities. Procedures for maintaining power infrastructure exist in limited settings.	- Data are collected on electricity/power access, sources, and reliability to support OHIS infrastructure but is not harmonized across One Health ministries points of services, or subnational- and national-level offices. Some procedures for maintaining power infrastructure exist.	- An established governing body oversees standardized procedures for tracking and maintenance of electricity/power access, sources and reliability supporting OHIS infrastructure at point of services and subnational- and national-level offices. Standardized metrics for measuring power outages and the duration of outage are defined.	- Electricity/power access, sources, and reliability profiles for One Health ministries points of services and subnational- and national-level offices are reviewed and updated on a regular schedule. The power infrastructure is monitored on a regular basis by the governing authority to ensure reliability at all levels. Data from electricity profiles is used to develop innovative solutions to improve access and reliability of electricity	- Information collected on the electricity access, sources, and reliability profile is used for planning and continuous improvement of the OHIS implementation and to meet emerging needs of the One Health sector.

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