



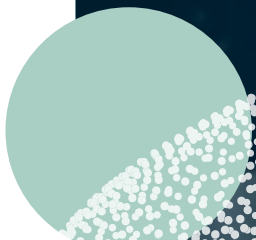
International
Pandemic
Preparedness
Secretariat

100 Days Mission

Implementation Report – 2023

Reducing the impact of future pandemics
by making diagnostics, therapeutic, and vaccines
available within 100 days

An independent report from the
International Pandemic Preparedness Secretariat





100 Days Mission

Implementation Report
24 January 2024

100DM



Mobilising the 100 Days Mission

Foreword from Sir Patrick Vallance

I am writing this foreword in my last month as chair of the 100 Days Mission (100DM) Steering Group. In 2021, a group of G7 Scientific Advisors and experts came together to set out the recommendations that would form the basis of the 100DM. Since then, the world has changed. We are no longer in the throes of a global pandemic; world leaders are dealing with multiple competing crises and the global health landscape appears increasingly complex as organisations grapple with how to optimally prioritise limited funds, and contend with multiple needs and threats. But we know that future epidemics and pandemics are not just likely, they are inevitable.

Set against this background it is important to start this report with a reminder of the original vision of the 100DM. It is a vision for an optimal state of readiness for the production of diagnostics, therapeutics and vaccines (DTVs) that enables the most efficient and equitable response possible to emerging pandemic threats. Of course, there are many other key components to preparing for epidemics and pandemics including surveillance, strengthening of healthcare systems, capacity building, equitable funding and others. The 100DM is deliberately focused specifically on the question of how to get the key tools of diagnostic, therapeutics and vaccines in place fast, knowing that every day counts when managing outbreaks.

It is a vision of a world in which we have **filled the R&D** gaps to create well stocked prototype libraries for DTVs, which give us the essential building blocks to tackle a known pathogen, or enough knowledge to rapidly pivot in a Disease X scenario.

It is a vision of a world in which we have **pre-agreed pandemic response protocols** that set out how the products in those libraries are thoroughly and efficiently tested for safety and efficacy, and manufactured, procured and made accessible where they are needed most.

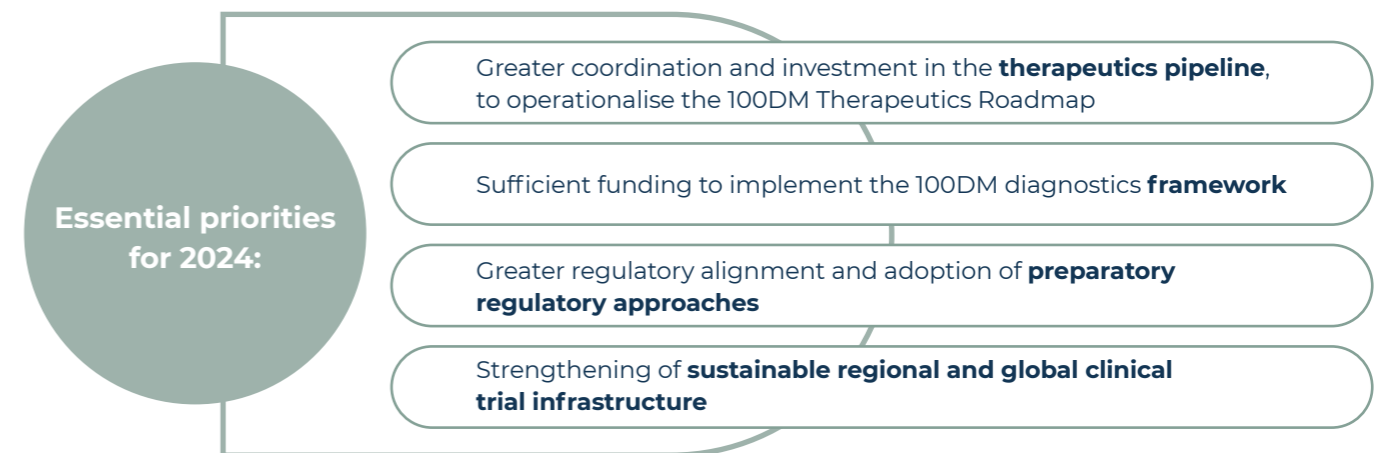
And finally, it is a vision of a world in which we have sought to **make the exceptional routine by embedding best practice in inter-pandemic periods**, learning from experience to strengthen surveillance systems, clinical trial networks, regulatory processes, public health functions and community healthcare; so that we are collectively ready to respond to emerging outbreaks as efficiently as possible, while still handling everyday health needs.

“These 100DM Annual Implementation reports are an opportunity to reflect on how close we are to achieving that vision, the most critical priorities for collective action, and progress made in the last year.”

2023 saw some structural progress in the implementation of the 100DM, with the creation of the 100 Days Mission Science and Technology Expert Group (STEG). The 100DM also received continued endorsement from the G7 and G20, thanks to Japanese and Indian leadership, and the nascent beginnings of a more coordinated approach to pandemic therapeutics, through the development of the 100DM Therapeutics roadmap, co-created with the collaboration of multiple partners. The establishment of the International Pandemic Preparedness Secretariat, hosted by Wellcome, has put the mission more squarely on a global footing. In the course of 2023, informative discussions were facilitated with regional partners through a series of listening exercises, aimed at better understanding regional capacities and challenges in implementing a 100DM preparedness framework. A key takeaway from these discussions is that global solutions have to be translated into regionally appropriate strategies if we are to truly make an impact at a national or community level.

This year, for the first time, we are pleased to launch the **100DM scorecard** within this report, developed together with Policy Cures Research, which gives a more quantifiable sense of our state of readiness. Over time, the intention is that this scorecard will have indicators to show the health of every part of the value chain, from R&D to manufacturing across the major countermeasure technologies. For this year, we have started where we have the most data, focusing on funding and the R&D pipeline. It shows some stark gaps in our preparedness.

Last year, we set out six high-level priorities for 2023, and while we have seen progress in some areas, there is still much more to do. This year, we want to be even more specific about the steps that we as the International Pandemic Preparedness Secretariat and its leadership identify as essential priorities for 2024.



Some of these areas already have a lead organisation and involve partnerships across public and private sectors, others are at an earlier stage. We hope that by the end of 2024 each of the four areas will have a clear overall lead, a credible plan, and the funding necessary to make progress.

Throughout this report we present the work done with implementation partners to set an overarching goal for each element of the 100DM; and the most urgent next steps to be taken towards that goal in 2024. This will need collective action from scientists, policymakers and funders, across all sectors to help us reach these goals. New technologies will continue to help reduce the time between idea and product. But we must not lose sight of why we are ultimately doing this; to minimise the impact of pandemics and epidemics and save lives.

As 2023 draws to a close, I will be passing the chair of the 100DM Steering Group to Dr Mona Nemer. Dr Nemer has been Canada's Chief Scientific Advisor since 2017 and was a key part of the group of G7 Scientific Advisors in 2021 who helped shape the original 100DM recommendations. An internationally renowned scientist and a distinguished academic leader, she has made seminal contributions to several fields, ranging from gene regulation to molecular cardiology, as well as playing a crucial role in Canada's domestic and international response to COVID-19. She will be an outstanding leader for this global mission.

Let me finish by thanking all the contributors to the 100DM and to this report, who share the vision for a change in basic assumptions in preparedness and who are daily taking us closer to that goal. Partnership is the lifeblood of this collective endeavour, and we couldn't do it without each and every one of you.

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Executive Summary

The 100 Days Mission (100DM) remains a crucial ambition in the wake of COVID-19's profound global impact. With 1.6 million lives lost¹ before the first vaccine's availability, and a staggering US\$12.5 trillion economic loss forecasted by 2024², the urgency for faster diagnostic, therapeutic, vaccine (DTV) development is undeniable³. As shown by the data in our 100DM scorecard, despite the lessons of COVID-19 we simply do not have approved, widely accessible, DTVs to respond to a pandemic from any other pathogen.

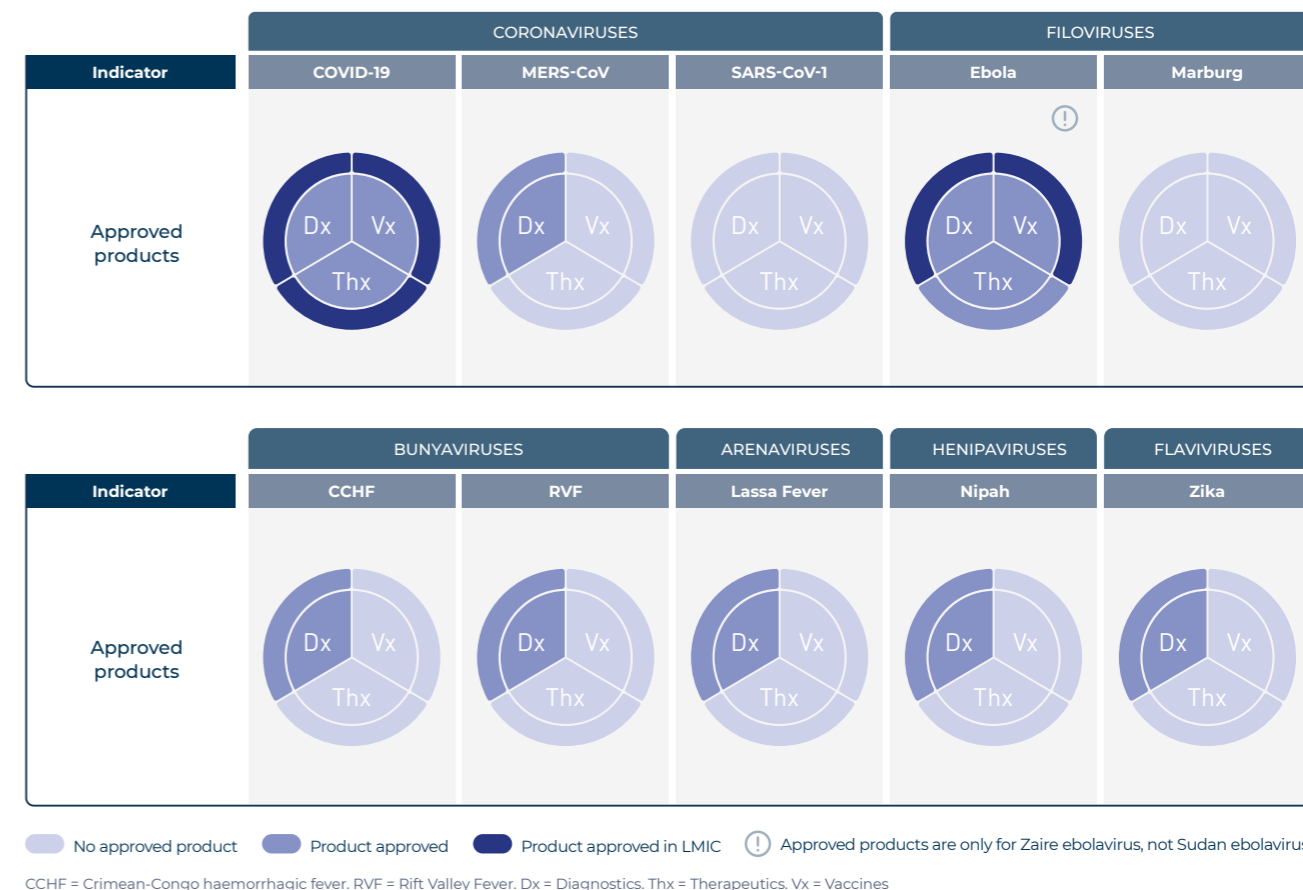
2023 PROGRESS AGAINST 100DM OBJECTIVES

In 2023, the International Pandemic Preparedness Secretariat (IPPS) tracked progress through research, interviews, and partner feedback; focusing on key determinants of progress such as funding, political support, and leadership. Despite a challenging backdrop of competition for funding and so called 'pandemic fatigue' setting in, there have still been areas of progress toward a 100DM ready world in several areas:

- Continued political support** from Japan's G7 presidency and India's G20 presidency, in the alignment of this year's G7 and G20 agendas, facilitated discussions on surge financing, access to medical countermeasures MCMs and a potential future medical countermeasures network to replace the Access to COVID-19 Tools Accelerator (ACT-A), as well as commitments to the aims of the 100DM.
- Vaccines research** has seen promising progress with the US Food and Drug Administration (FDA) approval of a Chikungunya vaccine and Phase 1 trials beginning for Crimean-Congo Haemorrhagic fever, supplemented by multiple new Coalition for Epidemic Preparedness Innovations (CEPI) partnerships around the globe working towards optimising vaccine production covering everything from simplified administration routes to sustainable regional manufacturing strategies.
- Nascent beginnings of a more coordinated approach to pandemic therapeutics**, through the development of the 100DM Therapeutics Roadmap and the collaboration of multiple partners around this effort. Industry groups, international organisations and publicly-funded research groups have come together to map a route to achieving the goal of having at least two 'Phase 2 ready' therapeutic candidates for each of the priority pathogen families.
- Structural progress** in the implementation of the 100DM, with the creation of the 100DM Science and Technology Expert Group (STEG), which has been driving progress through five subgroups, a published opinion piece in The Lancet and catalysing scientific exchange on some of the most challenging aspects of the mission, including via an event on the margins of the UN General Assembly 2023
- The independent nature of the IPPS has also enabled the **mission to be put on a shared global and regional footing**. In the course of 2023, informative discussions were facilitated with regional partners through a series of listening exercises, aimed at better understanding regional capacities and challenges in implementing a 100DM preparedness framework. A key takeaway from these discussions is that any global solutions have to be translated into regionally appropriate strategies if we are to truly make an impact at a national or community level. Simultaneously, regional, national and community strategies work to inform global solutions.

100DM SCORECARD HEADLINES

FIGURE 1 100DM scorecard headlines



For the first time, a 100DM scorecard is being published as part of this annual implementation report, developed together with Policy Cures Research, which gives a more quantifiable sense of our state of readiness. Over time, the intention is that this scorecard will have indicators to show the health of every part of the value chain, from Research and Development (R&D) to delivery, across the major countermeasure technologies. For this year, we have started where we have the most data, focusing on funding and the R&D pipeline. In future years we hope to include additional indicators, tracking capacity along the value chain including access indicators, distribution of trial capacity, regulatory capacity and manufacturing capacity. While the full scorecard can be found in Chapter 1, the indicator shown in Fig. 1 highlights the approved products. There is a long way to go to develop the global insurance policy of well-stocked libraries of DTVs for all pathogen families of pandemic potential.

Key messages:

- Funding is heavily weighted towards COVID-19 and Ebola, and overly reliant on US Government funding, creating vulnerabilities
- Only COVID-19 and Ebola (Zaire) have a full complement of approved DTVs, and these are not available to patients in all countries who need them
- Diagnostics and therapeutics funding is lagging behind vaccines
- Action is needed to agree on non-human models for testing products to accelerate licensure, for example, regulator approved animal models to enable use of the Animal Rule for product approvals, agreed correlates of protection and updated Target Product Profiles (TPPs) to drive suitable product development

¹ CEPI (2022). Delivering Vaccines in 100 Days. [online] cepi.net. https://cepi.net/wp-content/uploads/2022/11/CEPI-100-Days-Report-Digital-Version_29-11-22.pdf
² Business Standard (2022). World Economy to Lose US\$12.5 Trn in Output by 2024 Due to Covid: IMF Chief. [online] business-standard.com. https://www.business-standard.com/article/international/world-economy-to-lose-12-5-trn-in-output-by-2024-due-to-covid-imf-chief-122012100063_1.html
³ CEPI (2022). Delivering Pandemic Vaccines in 100 Days. [online] cepi.net. https://cepi.net/wp-content/uploads/2022/11/CEPI-100-Days-Report-Digital-Version_29-11-22.pdf

PRIORITY 100DM ACTION AREAS FOR 2024

While significant progress has been made, analysis from implementation partner feedback and the 100DM scorecard data highlights key areas needing urgent attention in 2024. These are not meant to be an exhaustive list of actions, but rather focus on the issues which have received least attention to date, and where there are concrete steps forward that could be taken in 2024.

THERAPEUTICS PIPELINE ENHANCEMENT

Except for COVID-19 and Zaire Ebolavirus, the therapeutics pipeline is critically underdeveloped, lacking in both funding and coordination. However, a coalition is growing around the 100DM Therapeutics Roadmap, which sets out an end-to-end plan and investment case of what is needed to reach the updated goal of at least two 'Phase 2 ready' therapeutic candidates for the top 10 priority pathogen families (as identified by WHO). In 2024, early-stage research needs greater investment and coordination from all sectors.

DIAGNOSTICS FRAMEWORK FUNDING

The 100DM Diagnostics Framework, addressing gaps in R&D and regulatory pathways, requires urgent financing. With only four WHO priority pathogens having approved diagnostics and funding waning post-COVID-19, 2024 must see a concerted effort to fund this framework. This framework needs to be supported by a coalition of stakeholders, working with FIND, and others including industry, governments and regulators, and to be integrated into national, regional and global surveillance systems to ensure sustainable markets.

REGULATORY ALIGNMENT AND PREPARATORY REGULATORY APPROACHES

To achieve the 100DM, the world should not wait until a pandemic is declared to start collecting data on the safety and efficacy of prototype pandemic countermeasures. Harmonised regulatory pathways and joint global assessment for emergency use authorisation (EUA) will strengthen response. In 2024, we advocate for advanced agreement with regulators, under the International Coalition of Medicines Regulatory Authorities (ICMRA) leadership, on appropriate alternative methods of data generation, including the use of the animal-rule and acceptable correlates of protection (for vaccines) that allow products to progress through development in the absence of an outbreak. This should be coupled with agreement on shared risk-benefit frameworks for pandemic products and a method of storing this data through platform or pathogen master files, so it can be rapidly drawn on upon when expedited approvals are needed.

SUSTAIN AND STRENGTHEN REGIONAL AND GLOBAL CLINICAL TRIAL INFRASTRUCTURE

The ability to test products rapidly in humans during an outbreak relies on the continued existence of high-quality, regionally dispersed, inclusive global clinical trial networks that are kept active in inter-pandemic periods. These trials need to be appropriately powered, generating the right data to enable approval decisions. In 2024, under WHO leadership, practical discussions on pre-agreeing master trial protocols for emergency use should take place alongside support for regional authorities to maintain sustainable clinical trial capacity with joint ethics reviews, in line with implementation of World Health Assembly resolution 75.8.

THE ROLE OF MULTILATERAL FORA IN DELIVERING THE 100DM PRIORITIES

While the G7 and G20 alone cannot deliver all the capabilities needed to have approved pandemic products ready for mass production in 100 days, they do have a crucial role to play in catalysing coordinated international action. As set out in the priorities above, there are several key implementing organisations who will play a central role in driving progress in 2024. However, the G7 and G20, working with other member states, have the potential to make this progress infinitely more achievable with the right financial and political support.

The G7 and G20 health agendas are not short of challenges to address. Historically, attaining Universal Health Coverage (UHC), tackling antimicrobial resistance (AMR), and improving pandemic preparedness have been seen as competing issues. However, they share common challenges and solutions, which, if sufficiently resourced, will lead to an overall strengthened global health architecture fit to tackle all future health challenges.

It is suggested that there is a particular subset of commitments that the G7 and G20 could make to work towards the 100DM and in the process, strengthen an equitable, sustainable and responsive product development ecosystem capable of responding to all future health threats.

Areas of potential impact for G7 and G20

- **Coordinated and equitable product development funding** to make maximum impact from limited resources. Specifically, by committing to developing virtual global prototype libraries of DTVs for WHO's updated priority pathogen list (once released), and directing R&D funding agencies to coordinate accordingly.
- **Investing in diagnostics** to strengthen surveillance and response systems. Specifically, by providing the US\$80-100 million needed by FIND for their 100DM diagnostics framework, as well as committing to integrate digitally-connected multiplex diagnostics into routine use in national health systems.
- **Taking a preparatory regulatory approach and making clinical trial infrastructure sustainable.** Specifically by tasking regulators with working together under the leadership of ICMRA, towards a proportionate, simplified and flexible preparatory system with a goal of mutual recognition where possible and pre-agreed plans for emergency approvals.

However, as outlined above, the 100DM is a global endeavour that requires the commitment of all countries and regional bodies, not just the G7 or G20, and the expertise of all sectors to have any chance of success. As the IPSS and its governance boards, our commitment to the 100DM is unwavering. The path ahead in 2024 is clear: we must unite in our efforts to fortify global health security, ensuring readiness and resilience against future pandemics.

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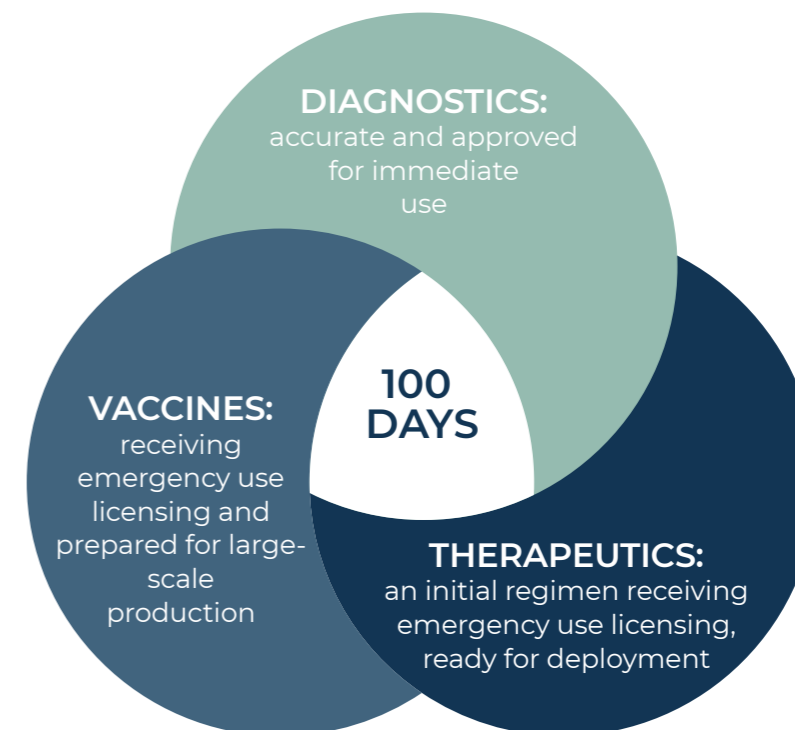
Introduction



Background to the 100 Days Mission

In June 2021, the G7 leaders endorsed the ambitious 100 Days Mission (100DM), aiming to revolutionise pandemic preparedness⁴. This initiative focuses on delivering **three key medical countermeasures (MCMs)** within 100 days of a pandemic threat being declared by the WHO as a Public Health Emergency of International Concern (PHEIC).

⁴ International Pandemic Preparedness Secretariat. 100 DAYS MISSION to Respond to Future Pandemic Threats, June 2021, d7npznm5zwd.cloudfront.net/prod/uploads/2023/01/100_Days_Mission_to_respond_to_future_pandemic_threats_3.pdf



THE ESSENCE OF THE 100DM

The essence of the 100DM is to significantly reduce the time to develop diagnostics, therapeutics, and vaccines (DTVs), maximising the health impact and saving lives. Achieving this goal could prevent the escalation of an outbreak into a full-scale pandemic.



FIGURE 2 100 Days Mission: More than a sprint

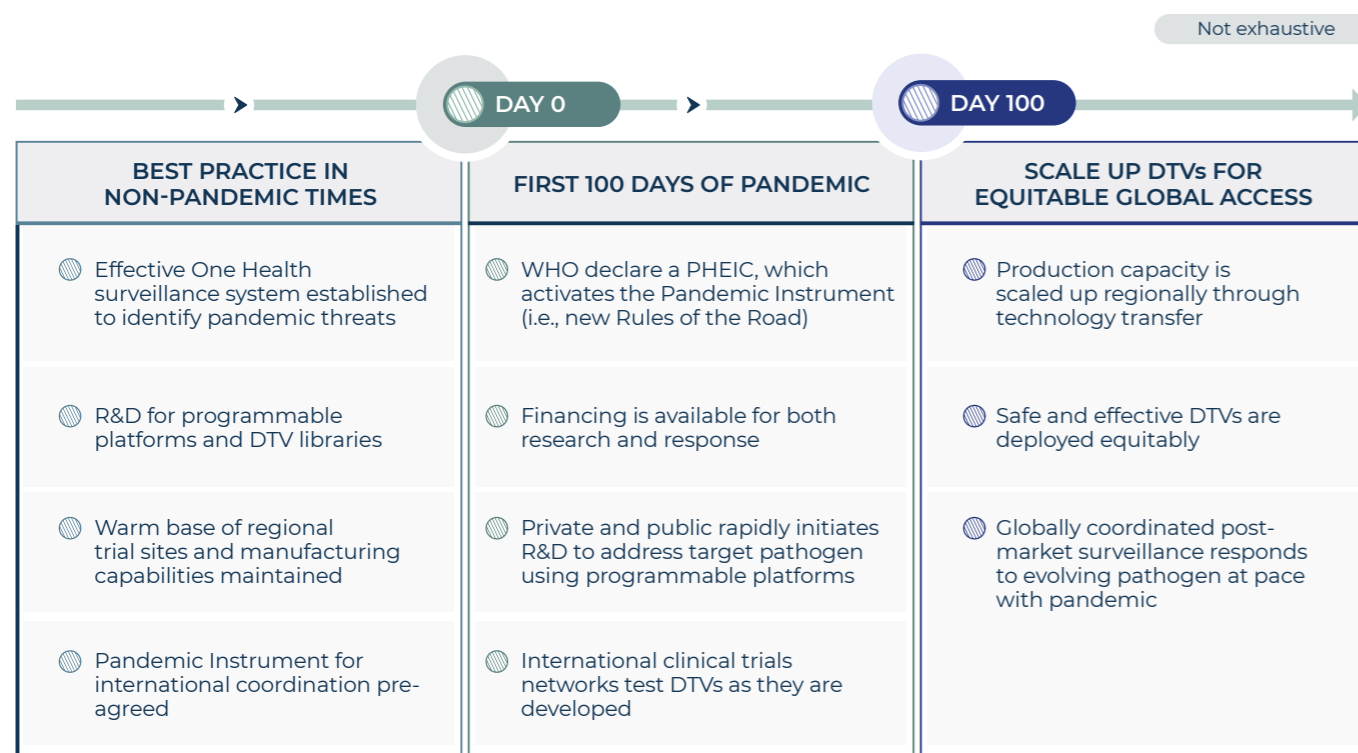


Figure 2. The 100 Days Mission starts before and goes beyond the 100 days. The 100 Days (centre) is intended to last from outbreak declaration via PHEIC to having a first suite of safe and effective DTVs with EUL approval ready to be produced at scale. Efforts required in each different phase will vary between diagnostics, therapeutics, and vaccines, with more significant regulatory and notably, manufacturing efforts required for therapeutics and vaccines to achieve the 100 days target.

However, realising the 100DM requires a fundamental shift in approach. The focus must be on extensive research and innovation before a pandemic emerges. This ‘marathon’ of preparation supports the ‘sprint’ of the 100DM, ensuring quality, safety, and efficacy. It involves streamlining response processes, developing programmable platforms for vaccines and therapeutics, and promoting regular use of accurate diagnostics. For the purposes of this report ‘programmable platform technologies’ references to technologies which can be redirected to multiple different pathogen targets, such as mRNA Vaccine technology.

Access and equity are central principles of the 100DM. The COVID-19 pandemic underscored the principle that global safety is contingent on universal protection. The mission is not a target; it’s a call for a paradigm shift in pandemic preparedness, emphasising accelerated timelines and collaborative partnerships without compromising safety, efficacy, or accessibility.

For the purposes of the 100DM, Day Zero is defined as the WHO’s declaration of a PHEIC. While it is acknowledged that in many ways this is likely to be too late and response activities should start sooner, a PHEIC is currently the clearest global trigger unless a tiered health emergency traffic light system is brought in with the updates to the International Health Regulations. Some regions are also in the process of discussing the merits of having triggers to announce public health emergencies of regional concern. The most important element is that any triggers are connected to clear pre-agreed actions for financing and accelerating product development and distribution.

The 100DM offers a framework for implementers at all levels to take forward and apply, whether at the global, regional or national level. Despite fundamentally being a global mission that unites key actors, it will only be effective when implemented in all countries and in local communities around the world, and particularly in those that have historically been left behind in access to MCMs.

How to use this report: keeping our eyes on the prize

This year’s report maintains a rigorous focus on the overarching end goals of the 100DM and the impact the world can expect to see from the collective actions of partners. This is best depicted in the **100DM Theory of Change**.




Within each section, we have reiterated the overarching goals, critical bottlenecks to achieving these goals and the proposed inputs needed in 2024 to maintain satisfactory progress. The chapters provide high-level analysis, and a summary of 2024 milestones those already planned by implementation partners, and more aspirational goals set by the IPPS. Assessment of progress against the original recommendations is summarised at Annex A based on input from over 30 implementation partners from governments, industry, academia, Civil Society Organisations (CSOs) and international organisations (see Annex C for full list of contributors), in the form of survey responses, interviews and desk research.

Written input was requested from implementation partners through standardised pro-formas covering; progress in 2023, alignment of 100DM with ongoing priorities and approach to implementation, barriers, risks, and enablers to achieving 100DM goals and future progress indicators and what constitutes a successful outcome. The draft report was reviewed by key implementation partners who provided input and was finalised with input from the IPPS Steering Group and Science and Technology Expert Group (STEG).



100DM theory of change

VISION: within 100 days of a recognised international trigger (e.g WHO PHEIC), diagnostics, therapeutics and vaccines are approved* and ready to be produced at scale for global deployment

SPHERE OF CONTROL	SPHERE OF INFLUENCE		SPHERE OF INTEREST
IPPS activities	100DM 2024 outputs	100DM long term outcomes	Impact
 <p>Facilitating and convening multisectoral collaborations</p>	<p>DIAGNOSTICS R&D</p> <ul style="list-style-type: none"> US\$80-100mill invested in 100DM diagnostics framework Pathogen-agnostic platforms and multiplex diagnostics developed <p>THERAPEUTICS R&D</p> <ul style="list-style-type: none"> Therapeutics roadmap launched and operationalised Coordinator(s) support a coalition to take de-risked candidates through clinical development <p>VACCINES R&D</p> <ul style="list-style-type: none"> Global prototype vaccine library defined and launched 	<ul style="list-style-type: none"> Diagnostics R&D is coordinated in a sustainable ecosystem Development of diagnostics libraries provides broad coverage for priority virus families Diagnostics routinely linked to testing and treatment <ul style="list-style-type: none"> Prototype therapeutics libraries developed, supported by pre-agreed procedures in place for their adaption, approval, manufacture, procurement and equitable distribution At least 2 therapeutics products for the top 10 WHO priority pathogen families, ideally with different mechanisms of action <ul style="list-style-type: none"> Continued work on a vaccine library covering WHO priority pathogen families Rapidly programmable platform technologies available Vaccine platforms optimised for large-scale production 	<ul style="list-style-type: none"> DTVs are rapidly developed, and equitably distributed based on greatest impact and need, in the event of a pandemic threat
 <p>Providing technical expertise (STEG, implementation reports)</p>	<p>SURVEILLANCE</p> <ul style="list-style-type: none"> Collaboration enhanced through international networks National capacities for data collection strengthened Digitally connected diagnostics feed into the surveillance system 	<ul style="list-style-type: none"> International network(s) of global/regional/local surveillance systems identifies outbreaks and enables trusted data sharing Reliable and fit-for-purpose mechanisms for rapid exchange of pathogen samples enable equitable R&D efforts for DTVs 	<ul style="list-style-type: none"> Pathogens are identified with genomic sequencing and surveillance data shared to prevent an outbreak from becoming a pandemic
 <p>Influencing global political agendas</p>	<p>CLINICAL TRIALS AND REGULATORY PROCESSES</p> <ul style="list-style-type: none"> Regulators coordinate to adopt preparatory regulatory approaches Countries supported to have mature regulatory authorities Global clinical trial guidance finalised and adopted, utilising regional networks 	<ul style="list-style-type: none"> Clinical trial sites are capacitated in between pandemics Best practices on clinical trial design embedded and adaptive trial designs utilised Master trial protocols pre-agreed for use in emergencies Preparatory approaches adopted by regulators Strengthened and aligned regulatory capacity in all regions 	<ul style="list-style-type: none"> Products authorised for use in humans (e.g. EUL) within 100 days due to pre-emptive data generation and high-quality clinical trials mobilised rapidly utilising existing infrastructure
	<p>SUSTAINABLE MANUFACTURING</p> <ul style="list-style-type: none"> Regional authorities supported to implement sustainable manufacturing capacities Continued strengthening of public-private partnerships within regional manufacturing strategies Preparatory voluntary licensing systems expanded 	<ul style="list-style-type: none"> There is capacity and capability to produce DTVs in each region The ecosystem supports voluntary licensing, technology transfer, robust IP protection, supply-side incentives for investment and demand-side procurement mechanisms Manufacturers use platforms to produce both routine and pandemic products 	<ul style="list-style-type: none"> Each region produces technologies, pivoting its manufacturing sites in the event of a threat
	<p>SUSTAINED PANDEMIC FINANCING AND EQUITABLE PROCUREMENT</p> <ul style="list-style-type: none"> Global recommendations on surge financing set and operationalised Procurement agreements forefront equitable access 	<ul style="list-style-type: none"> Mechanisms enable the automatic release of funding tied to globally-agreed trigger points LMICs can purchase and distribute DTVs through equitable allocation and procurement of supplies 	<ul style="list-style-type: none"> Countries have access to and mobilise funding to reduce pandemic threat escalation

* Approved, available under Emergency Use Licensing (EUL) or pre-authorisation

Introducing the 100DM Science and Technology Expert Group

This year's report has also benefitted from the input and advice of the 100DM Science and Technology Expert Group (STEG) for the first time. Reporting to the Steering Group, the STEG delivers an assurance function for the annual report against the 100DM recommendations and galvanises support from the scientific community on pandemic preparedness through meetings, working groups, and assessments.

The 100DM STEG is co-chaired by Dr Victor Dzau (President of the US National Academy of Medicines) and Shingai Machingaidze (Ag. Chief Science Officer at Africa Centres for Disease Prevention and Control, Africa CDC). Membership was drawn from an open global nominations process and includes members from a wide range of regions and sectors (a full list of members can be found at Annex B).

Five subgroups, composed of STEG members and experts drawn in from international organisations, civil society, industry, regional and national partners, were formed in 2023 to address the different challenges highlighted in last year's report:

2023 STEG subgroups

- ▶ **R&D Coordination** developed the 100DM Scorecard
- ▶ **Therapeutics** developed the 100DM Therapeutics Roadmap
- ▶ **Diagnostics** developed the 100DM Diagnostics Report, launched at the International Conference for Public Health in Africa (CPHIA) and focusing on embedding diagnostic best practice between pandemics
- ▶ **Clinical Trials and Regulatory Processes** advised on the content of the report chapter and led discussions on how to garner support for preparatory regulatory approaches
- ▶ **Sustainable Manufacturing** developed a case study of the components that enabled the rapid manufacturing of the ChAdOx vaccine for the Ugandan Ebola Sudan outbreak

Each subgroup helped to review input received from implementation partners to assess progress and necessary next steps across all areas of this report. The IPPS team would like to express their thanks to all STEG members for their generous input of advice and expertise.



One Year of the International Pandemic Preparedness Secretariat (IPPS)

This report also marks the anniversary of the establishment of the IPPS. The **Secretariat's focus** for this first year has been:

- ▶ Establishing strong governance, in the form of the Steering Group and the STEG
- ▶ Working to understand what further support is needed for all regions to be equipped to deliver pandemic countermeasures within 100 days
- ▶ Building coalitions in areas where the need for greater cohesion was identified, such as in the area of Therapeutics R&D
- ▶ Developing a more quantifiable approach to assessing 100DM readiness through the 100DM scorecard
- ▶ Advocating for continuity of commitment to pandemic preparedness in multilateral fora, including the G20 and G7, World Health Assembly and UN General Assembly. The 100DM has enjoyed the support of the Japanese and Indian presidencies, and it is hoped that this can be built on by Italy and Brazil in 2024

The IPPS has three years left of its mandate, which runs until the end of 2026, and intends to use the coming years to continue to support and elevate implementation partners, to build sustainable coalitions around previously neglected areas and to ultimately put the delivery of the 100DM on a sustainable trajectory. The IPPS will continue to use the twin levers of catalysing scientific exchange on the biggest challenges through the 100DM STEG and advocating for the systemic commitments needed through the G7 and G20.

100 Days Mission Scorecard Findings

The IPPS has been working with Policy Cures Research, the organisation behind the G-FINDER project, to develop a 100DM scorecard which aims to quantify and visualise the world's readiness to develop and approve pandemic countermeasures within 100 days.




For this first version of the scorecard, the focus has been on where most data is available – mainly in product development – including where candidate DTVs are in the R&D pipeline, what funding is available and identifying gaps. For each WHO R&D Blueprint priority pathogen, this year's indicators describe:

INDICATORS

-  **R&D funding landscape:** funding that has been invested in DTV R&D for each disease in the last 4 years, and the top funders
-  **Approved products:** the complement of approved products for DTVs and whether they approved in low-and-middle income countries (LMIC)
-  **Candidates in clinical development:** number of candidates that are in clinical development for all three DTVs
-  **R&D enablers:** The facilitators of R&D that are available or being used for each diseases, for example, the animal rule to facilitate licensure, widely accepted correlates of protection and WHO Target Product Profiles (TPPs)
-  **Disease X:** A breakdown of funding for DTV platform technologies and their top funders

Full descriptions of all indicators can be found in Annex E.

KEY FINDINGS FROM THE SCORECARD

-  MCMs are not available to address most WHO R&D Blueprint priority pathogens. COVID-19 and Ebola Zaire are the only two pathogens with a full complement of products that are authorised either by a Stringent regulatory Authority (SRA), a National Regulatory Authority (NRA) at maturity level 3 or above or pre-qualified by WHO. However, these products are not always accessible to all, nor do they always match the TPPs that can best enable equitable access. Diagnostics are only approved for Crimean-Congo Haemorrhagic Fever (CCHF), Rift Valley Fever (RVF), Lassa and Zika, none of which have been approved in endemic countries. Other priority pathogens have no approved MCMs at all.
-  When it comes to clinical candidates under development, the reactive nature of R&D means that pathogens which have had recent outbreaks and so are perceived as a greater threat benefit from a more mature pipeline of candidates (COVID-19, Ebola and Zika). It is also worth noting that all vaccines and therapeutic candidates (other than COVID-19) are in phase 1. Diseases in the same viral family have benefitted from repurposed candidates and vaccine platform technologies (e.g. viral vector based filovirus vaccines), however, there has not yet been progress in developing platform technologies for therapeutics, and some pathogens have almost no platform technologies being used to develop clinical candidates.
-  Finally, the animal rule has only been used to enable product approval for Ebola. There is a need to consider regulator approved non-human models for testing products outside of an outbreak setting, such as the animal rule, to prepare sufficiently to achieve the 100DM⁵. Whilst the animal rule has been used to enable product approval for Ebola (Zaire), its use is not yet routine; having a harmonised regulatory approach to accepting animal model data would guide developers and de-risk this approach, potentially enabling more rapid emergency use authorisations during outbreaks.

⁵ The 'animal rule' permits approval based on well-controlled animal studies when the results determine that the DTV is reasonably likely to produce clinical benefit in humans

FUTURE INDICATORS

It is recognised that further indicators will be needed in future years to fully capture the breadth of the R&D ecosystem and the pre-requisites needed to enable a 100DM response. Future indicators could leverage data from additional sources, including Policy Cures Research’s “Evidence for Impact” indicator framework and Global Research Collaboration for Infectious Disease Preparedness (GLOPID-R) Pandemic PACT database, with discussions underway to ensure data is shareable and interoperable.

The data here shows a snapshot of product development aspects within the R&D ecosystem. However, even when a product has been approved, it is not a sufficient indicator of the health of the full pandemic R&D ecosystem, and more data is needed on equitable access, manufacturing, and procurement.

In the future, we plan to include indicators drawing on further data sources covering the following topics. Currently, Policy Cures Research has leveraged its “Evidence for Impact” Indicator Framework as an initial menu to choose relevant indicators to meet different needs. However, it should be noted that data is not currently in the public domain for all of this indicators so in parallel we will be advocating for all partners to be collecting additional data and making this publicly available.

For more detailed analysis of the data in this year’s 100DM scorecard, a short explainer document is published alongside this report, exploring the indicators, the implications for the health of the vaccines, therapeutics and diagnostics ecosystems and what future iterations of the scorecard must take into account.

Future indicators for inclusion in the 100DM scorecard

RESEARCH CAPACITY

Such as the number and location of operational clinical trial sites; number of medium to large scale clinical trials in LMICs.

ACCESS ENABLERS

Such as the number of pipeline candidates with LMIC market access plan in place before starting trials.

GROWTH INDICATORS

Such as expansion in regional manufacturing capacity across DTVs and other countermeasures; number of product developers engaging in voluntary licensing agreements and similar mechanisms.

TIME TAKEN

Including time between trial phase completion and initial of next clinical phase; and time between first stringent regulatory approval and product introduction in an LMIC.



		CORONAVIRUSES			FILOVIRUSES		BUNYAVIRUSES		ARENNAVIRUSES	HENIPAVIRUSES	FLAVIVIRUSES	
Indicator		COVID-19	MERS-CoV	SARS-CoV-1	Ebola	Marburg	CCHF	RVF	Lassa Fever	Nipah	Zika	
NOW	R&D funding for diagnostics, therapeutics and vaccines	\$14.5bn 2020-2022 US government, Aggregate industry, German government, Other	\$53m 2019-2022 US government, Samsung Foundation, UK government, Other	\$54m 2019-2022 US government, Brazilian government, Aggregate industry, Other	\$928m 2019-2022 US government, Aggregate industry, European Commission, Other	\$217m 2019-2022 US government, Advanced Technology International, UK government	\$35m 2019-2022 US government, European Commission, UK government, Other	\$44m 2019-2022 European Commission, US government, UK government, Other	\$80m 2019-2022 US government, Wellcome Trust, Aggregate industry, Other	\$53m 2019-2022 US government, Gates Foundation, Aggregate industry, Other	\$238m 2019-2022 US government, UK government, Aggregate industry, Other	
	Approved products	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx	
		High/Low Funding amount colour scales No approved product Product approved Product approved in LMIC Approved products are only for Zaire ebolavirus, not Sudan ebolavirus										
FUTURE READINESS	Candidates tested in humans	Phase III: 64 (Vx), 70 (Thx) Phase II: 52 (Vx), 109 (Thx) Phase I: 57 (Vx), 54 (Thx) Late stage: 88 (Dx)	Phase III: 0 (Vx), 0 (Thx) Phase II: 1 (Vx), 0 (Thx) Phase I: 2 (Vx), 2 (Thx) Late stage: 6 (Dx)	Phase III: 0 (Vx), 0 (Thx) Phase II: 0 (Vx), 0 (Thx) Phase I: 0 (Vx), 0 (Thx) Late stage: 0 (Dx)	Phase III: 0 (Vx), 1 (Thx) Phase II: 1 (Vx), 1 (Thx) Phase I: 7 (Vx), 4 (Thx) Late stage: 17 (Dx)	Phase III: 0 (Vx), 0 (Thx) Phase II: 1 (Vx), 0 (Thx) Phase I: 1 (Vx), 1 (Thx) Late stage: 1 (Dx)	Phase III: 0 (Vx), 0 (Thx) Phase II: 0 (Vx), 0 (Thx) Phase I: 2 (Vx), 0 (Thx) Late stage: 11 (Dx)	Phase III: 0 (Vx), 0 (Thx) Phase II: 1 (Vx), 0 (Thx) Phase I: 1 (Vx), 0 (Thx) Late stage: 4 (Dx)	Phase III: 0 (Vx), 0 (Thx) Phase II: 0 (Vx), 1 (Thx) Phase I: 3 (Vx), 1 (Thx) Late stage: 13 (Dx)	Phase III: 0 (Vx), 0 (Thx) Phase II: 0 (Vx), 0 (Thx) Phase I: 1 (Vx), 1 (Thx) Late stage: 1 (Dx)	Phase III: 0 (Vx), 0 (Thx) Phase II: 3 (Vx), 0 (Thx) Phase I: 9 (Vx), 0 (Thx) Late stage: 0 (Dx)	
	Platform technologies used in clinical candidates	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx	Dx, Vx, Thx
		No platform technology used Less than three platform technologies used Three or more platform technologies used										
R&D ENABLERS	Disease X R&D funding	\$274m 2019-2022 Diagnostic Platforms: 72% (US government, Gates Foundation, Open Philanthropy, Other)				\$415m 2019-2022 Therapeutic Platforms: 78% (US government, Gates Foundation, European Commission, Other)				\$498m 2019-2022 Vaccine Platforms: 43% (Gates Foundation, US government, UK government, Other)		
	Use of animal rule to support licensure	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
Correlates of protection	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	
WHO Target Product Profiles	Vx	✓	✓	✗	✓	✓	✗	✗	✓	✓	✗	
	Thx	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	
	Dx	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	

2

Investing to fill
gaps in R&D

Cross cutting R&D Insights from the 100 Days Mission Scorecard

The 100DM scorecard reveals a critical shortfall in the development of DTVs for pathogens with pandemic potential. Currently, comprehensive DTV solutions exist only for SARS-CoV-2 and Ebola (Zaire). Even for these, accessibility issues persist, with some products falling short of WHO TPPs, particularly in terms of suitability for low-resource settings. For the remaining eight priority pathogens on the WHO's R&D Blueprint priority pathogen list, the gap is more pronounced: there are no approved vaccines or therapeutics and limited diagnostics.

In early 2024, the WHO's updated prioritisation of viral families will refocus R&D efforts. This shift towards understanding entire viral families, rather than individual pathogens, aims to foster the development of broad-spectrum countermeasures crucial for responding to unforeseen threats like a 'Disease X'. This new focus presents a pivotal opportunity to guide R&D across all three tools, leveraging both traditional methods and innovative technologies like artificial intelligence (AI) and machine learning (ML) for advancements in disease tracking and drug discovery.

However, the R&D ecosystem requires further fortification. This involves enhancing coordination across the entire product development spectrum encompassing industry, biotechnology, academia, public sectors, and philanthropic organisations. To catalyse innovation and expedite the delivery of DTVs, it is essential to establish clear commercial incentives, financial risk mitigation, and robust collaborative frameworks.

While specific challenges for DTVs are detailed in subsequent sections, this section underscores several overarching lessons and data gaps identified in this year's 100DM scorecard analysis.

✓ Enhancing R&D Through Coordination and Diverse Funding

The current level of funding for DTVs and platform technologies for priority pathogens is inadequate. The COVID-19 response demonstrated that with ample resources, rapid development of novel DTVs is possible. However, the funding for COVID-19 R&D from 2022-22, which was nearly ten times higher than DTV R&D funding for all other WHO Blueprint priority pathogens from 2019-2022, often lacked coordination and efficiency.

A proactive, rather than reactive, funding approach is essential to prepare for and prevent future outbreaks. Committing to the development of prototype libraries for DTVs could streamline R&D funding, with public and philanthropic funders playing a key role in bridging knowledge gaps. Diversifying funding sources is also crucial, as current reliance on public funding, predominantly from US Government agencies, leaves investment vulnerable to political shifts. Better coordination, and partnership with regions where diseases are endemic, could facilitate risk-sharing among funders for specific products and viral families.

Investing in Platform Technology and AI for Disease X Preparedness

Platform technologies that are adaptable for various pathogens have shown success in vaccine development, such as mRNA technologies. However, tools for diagnostics, such as the GeneXpert MTB/RIF platform, exist but are limited, and equivalent platform technologies for therapeutics are still at a very early stage of discovery. The development of a diverse range of technologies is crucial for rapid adaptation to Disease X or rapidly mutating pathogens. The significant upfront cost and time required for scientific breakthroughs highlight the urgency of starting now. Innovative technologies like AI and ML hold promise for accelerating R&D, from protein sequencing to target identification. These technologies could expedite the collation of vital information on each viral family, forming the foundation for prototype DTV libraries.

Advancing Preparatory Regulatory Approaches and Correlates of Protection

Reducing regulatory approval timelines without compromising safety is a critical prerequisite of the 100DM. Generating extensive data in advance will allow regulators to gain familiarity with major platform technologies, and the risk-benefit profiles of new DTVs. Preparatory regulatory approaches, including pre-agreed correlates of protection for vaccines (and other surrogate outcomes for therapeutics and diagnostics) secure data sharing systems, platform master files, standardised protocols and assays, and shared risk-benefit frameworks, will streamline the approval process during outbreaks.

Aligning SRAs on these approaches will enhance global collaboration in DTV development and deployment. Additionally, the broader adoption of the animal rule (which is currently underutilised) requires the establishment of regulator-qualified animal models for WHO R&D Blueprint pathogens to expedite R&D and facilitate approvals outside of outbreak scenarios.

FIGURE 3 100 Days Mission Timeline for DTV Research and Development

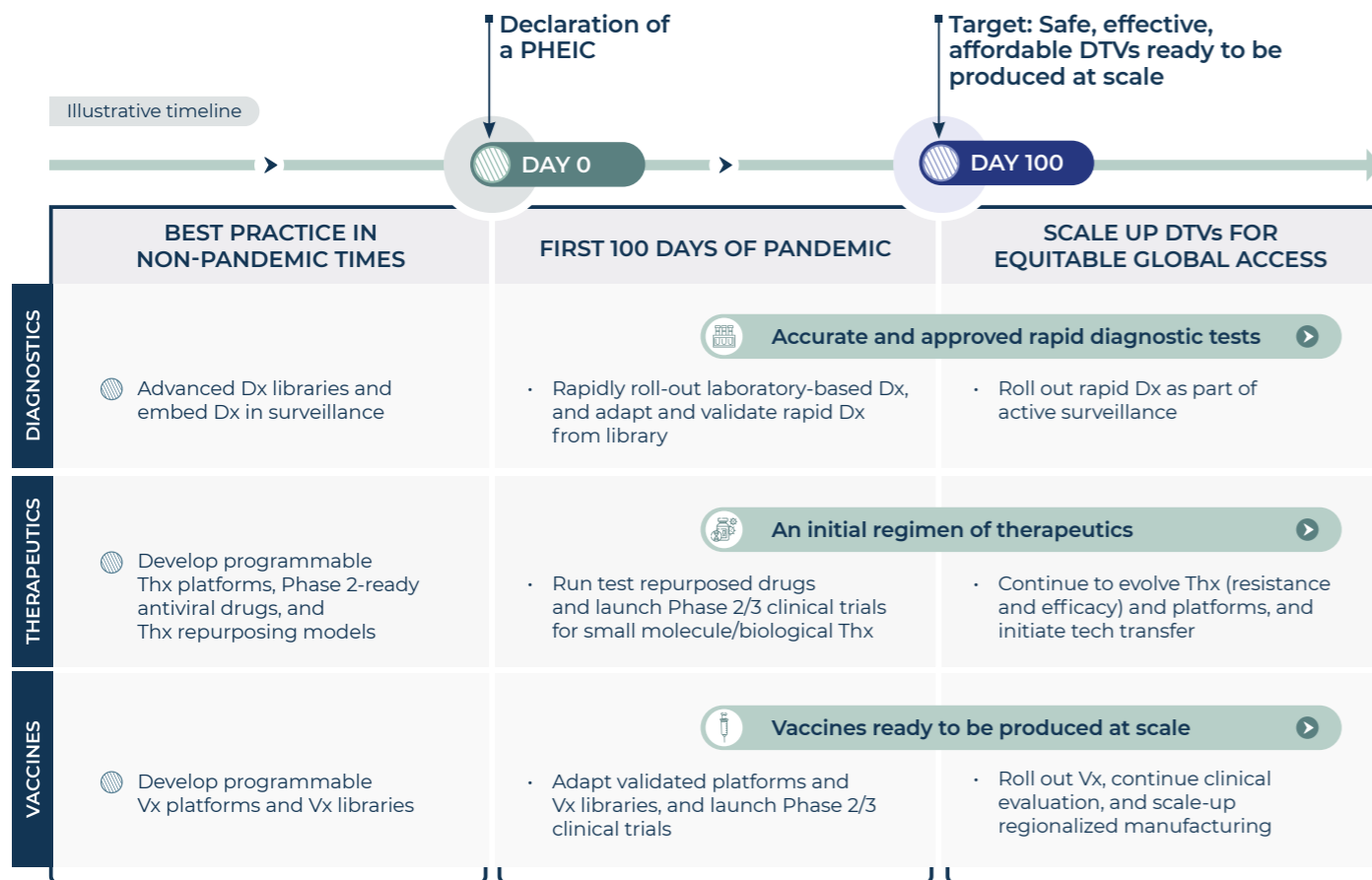


Figure 3. Research and development for pandemic DTVs will involve a significant effort in non-pandemic times, a pivot during the first 100 days of a pandemic and continued scale up and innovation beyond the '100 Days Mission' target. Distinct efforts are required for diagnostics, therapeutics, and vaccines R&D, but cross-DTV collaboration is key, especially to develop a joint understanding of viruses of 'pandemic potential' and the right DTVs to tackle them. (Note: Timeline is focused on DTV R&D, and does not represent a full view of broader health system preparation and response).



Therapeutics R&D

CONTEXT AND AIMS

Given the multiple unknowns about the next pandemic, investment is needed in treatments that can be deployed in various settings. Effective therapeutics are vital to reducing the burden of mortality and morbidity from pandemic diseases. They are essential for treating people who fall ill, particularly while a vaccine is being developed, tested and rolled out, or for diseases for which vaccine development is difficult. Crucially, for some groups a protective vaccine response is unlikely due to underlying co-morbidities; these may also be the people at highest risk of worse outcomes from infectious disease, making the availability of effective treatment even more important. Therapeutics can also be deployed as pre- and post -exposure prophylaxis, especially for health workers and those in vulnerable groups, and reduce the burden on health systems by slowing symptom progression.

It is worth clarifying that there are multiple routes to reaching the goal of 'an initial regimen of therapeutics' within a 100 days of a pandemic being declared. It is highly likely that in the first days and weeks focus will be on repurposing existing drugs, anti-inflammatories etc. This relies on the rapid establishment of well design clinical trials (ideally based on existing infrastructure) and careful selection of existing medicines to trial. This is distinct from the need to also have set up all the work for identification of new and specific antivirals. Given the latter can take years of discovery it is crucial that this work starts now, that we might have a better stocked pipeline of novel therapeutics for priority pathogens. Setting out practical steps for how this might be achieved is the focus of the newly launched 100DM Therapeutics roadmap (see Box 1).

A key learning from the COVID-19 pandemic is the need for funding across all three tools. The Therapeutics Pillar of the Access to COVID-19 Tools (ACT) Accelerator received less than 10% of donor funding, compared to nearly 70% allocated to the vaccines pillar, COVAX. The lack of funding for therapeutics hampered efforts to develop and facilitate access to COVID-19 treatments, at all stages of the value chain. It took almost two years longer for an effective oral antiviral treatment for COVID-19 to become available, compared to multiple approved vaccines. Today, although several affordable versions of oral COVID-19 antivirals have received regulatory approvals, the products are not widely available in LMICs and governments have a low appetite for procuring therapeutics due to reduced perception of COVID-19 burden in the community (from scaled back diagnostics and surveillance programmes).

In the 2022 100DM implementation report, it was highlighted that unlike vaccines and diagnostics – which have international R&D convenors in the form of CEPI and FIND – the therapeutics ecosystem lacked the same coordination and structure, and faced barriers that were distinct from other tools.

The Original 100DM Implementation Report proposed three key outcomes to be reached by 2026:

- A sustainable R&D ecosystem and improved international coordination and funding** for therapeutics R&D for infectious disease pandemic threats
- 25 Phase-2 ready therapeutics developed** against priority virus families
- Readily programmable antiviral platforms** (including monoclonal antibodies, mAbs, and others) evolved towards WHO TPPs for delivery in case of a health emergency, and able to be rapidly repurposed to 'Disease X'

The 2022 report elaborated milestones related to increased funding for therapeutics in 2023; enhanced coordination via a new body or coalition; progress on making mAbs more affordable and easier to administer; and for industry to remain engaged and invest in early-stage R&D to advance candidates.

PROGRESS IN 2023

A major area of progress in 2023 has been the development of the 100DM Therapeutics Roadmap, facilitated by the IPPS and the result of the collective contributions of more than 20 global partners from all sectors, including international organisations, industry, academia and civil society (See Box 1 on 100DM Therapeutics Roadmap). The roadmap aims to provide a framework for actioning updated versions of the 100DM Therapeutics objectives, encompassing key strategic milestones, as well as potential partners to implement the recommendations. It also sets out the major challenges facing the realisation of the 100DM for therapeutics and suggested solutions for all sectors.

Overall, the therapeutics pipeline and ecosystem are not seeing the same level of investment as vaccines at all stages of the value chain, resulting in a concerning dearth of candidates. As exemplified by our 100DM scorecard, the early-stage therapeutics R&D pipeline for pathogens of pandemic potential is very limited. The 100DM original target of 25 Phase-2 ready candidates by 2026 will not be reached; indeed, it seems unlikely that even a quarter of that number of products will be ready for Phase 2 trials by 2026, based on the current trajectory.

Industry has continued to engage in the development of small molecule antivirals, especially via the INTREPID Alliance. In 2023, the INTREPID Board reaffirmed its focus on the creation and stewardship of a centralised listing of antiviral compounds with potential utility against the eight pandemic viral families prioritised by the US National Institutes of Health (NIH)⁶. The group also published a landscape of antiviral global R&D efforts in Q4⁷. However, pull incentives for industry are lacking, with several companies retreating from the infectious diseases space in 2023. Most new drug discovery R&D investments are concentrated in government and philanthropy-funded projects, such as the AViDD centres in the US (funded by NIH), including READDI Inc, which had two clinical candidates for priority pathogen families by late 2023⁸.

Platform technologies received a boost in investment in 2023, with Germany's Federal Agency for Disruptive Innovation (SPRIND) and the Cumming Centre supporting the development of antiviral platforms via awards to the developers of promising technologies^{9,10,11}. The Pandemic Antiviral Discovery (PAD) initiative (funded by BMGF, the Novo Nordisk Foundation and Open Philanthropy), announced grants

totalling more than US\$26 million for 14 research projects aimed at facilitating early-stage development of drugs to treat henipavirus infection and disease¹². In late 2023, a group of early-stage antiviral researchers formed a loose alliance to work together to avoid duplication and ensure a good spread of research activities across viral families.

Unitaid continues to support late-stage R&D efforts for COVID-19 treatments, including the Drugs for Neglected Diseases Initiative (DNDi)-led ANTICOV platform trial to enable research institutions in 13 African countries^{13,14}. Nirmatrelvir/ritonavir from two additional manufacturers licenced by Medicines Patent Pool (MPP) became available for sale in 2023 after approval from the WHO Prequalification Programme (one had already obtained approval in December 2022)¹⁵. Generic sub-licensees were also announced for ensitrelvir, an oral antiviral developed by Shionogi and approved in Japan, that was also sub-licenses to MPP¹⁶. MPP also started to consult with relevant stakeholders to explore mechanisms for building on lessons learnt on the licensing of COVID-19 therapeutics for pandemic preparedness.

The US Biomedical Advanced Research and Development Authority (BARDA) and National Institute of Allergy and Infectious Diseases (NIAID) NextGen programme made investments of almost US\$400m in 2023 in developing next-generation monoclonal antibodies for prophylaxis and treatment, incorporating work to make them less susceptible to reduced efficacy in the face of viral mutation¹⁷. Unitaid, International AIDS Vaccine Initiative (IAVI), MPP and Wellcome collaborated in 2023 to explore novel business models to enable equitable access to mAbs in LMIC countries, recognising that manufacturing capacity and diversification remains a major barrier to both the affordability and availability of mAbs.

6 INTREPID Alliance, 2023. "INTREPID alliance antiviral summit: Averting the next pandemic now March 22, 2023" https://www.intrepidalliance.org/documents/INTREPID-Alliance_Proceedings-and-Exec-Sum.pdf

7 INTREPID Alliance, 2023. "Pharmaceutical companies come together to accelerate the development of innovative antiviral treatments in preparation for future pandemics" <https://www.intrepidalliance.org/news/pharmaceutical-companies-partner-to-accelerate-the-development-of-innovative-antiviral-treatments>

8 READDI, 2023. "READDI contributes to alliance in accelerating antiviral drug development" <https://readdi.org/stories/demo-readdi-receives-18-million-in-state-appropriations/>

9 Cumming Centre Pro Forma

10 "SPRIND Challenge" <https://www.sprind.org/en/challenges/antiviral/>

11 SPRIND Pro Forma

12 PAD, 2022. "Coming soon – a new PAD Request for Proposals" <https://padinitiative.com/coming-soon-a-new-pad-request-for-proposals/>; PAD, 2022. "Henipavirus – Request for proposals 2022" <https://padinitiative.com/henipavirus-request-for-proposals-2022/>

13 Unitaid, 2020. "Unitaid supports ANTICOV, an adaptive platform trial in Africa to treat mild to moderate cases of COVID-19" <https://unitaid.org/news-blog/unitaid-supports-anticov-an-adaptive-platform-trial-in-africa-to-treat-mild-to-moderate-cases-of-covid-19/#en>

14 Unitaid Pro Forma

15 WHO, 2023. "First nirmatrelvir + ritonavir prequalified for Covid-19" [https://extranet.who.int/prequal/news/first-nirmatrelvir-ritonavir-prequalified-covid-19#:~:text=WHO%20Prequalification%20Unit%20\(PQT\)%20added,tablet%20%2D%20Pfizer%20Limited%20%2D%20UNITED%20KINGDOM](https://extranet.who.int/prequal/news/first-nirmatrelvir-ritonavir-prequalified-covid-19#:~:text=WHO%20Prequalification%20Unit%20(PQT)%20added,tablet%20%2D%20Pfizer%20Limited%20%2D%20UNITED%20KINGDOM)

16 MPP, 2023. "Seven manufacturers sign sublicense agreements with MPP to produce generic versions of Shionogi's COVID-19 oral antiviral ensitrelvir to increase access in LMICs" <https://medicinespatentpool.org/news-publications-post/seven-manufacturers-sign-sublicense-agreements-with-the-medicines-patent-pool-to-produce-generic-versions-of-shionogis-covid-19-oral-antiviral-treatment-ensitrelvir-to-increase-access-in-low-and-mid>

17 HHS, 2023. "Project NextGen Selects Initial Vaccine Candidates and Awards Over \$500 Million to Advance Development of Vaccines and Therapeutics" <https://www.hhs.gov/about/news/2023/10/13/project-nextgen-selects-initial-vaccine-candidates-awards-over-500-million-advance-development-vaccines-therapeutics.html>



SUMMARY PLANS FOR 2024

The ultimate objective for the 100DM for therapeutics is to work **towards prototype therapeutics libraries**, supported by pre-agreed procedures in place for their adaption, approval, manufacture, procurement and equitable access in the event of a pandemic.

➤ 2024 will be an important year for the Therapeutics 100DM. Partners will come together in a series of workshops convened by IPPS to discuss and commit to the operationalisation of the 100DM Therapeutics Roadmap. WHO is expected to publish its priority pathogen list in Q1 2024, which will particularly help to focus antiviral discovery efforts; a TPP exercise based on that publication will help develop more concrete use cases for novel therapeutics. Many of the drug development programmes awarded funding in 2023 will publish initial results in 2024, while the WHO-led and G20-endorsed i-MCM-Net process will develop further, and the INTREPID Alliance will publish its first compounds list.

➤ Given the challenges in furthering the early-stage R&D pipeline and the constrained funding landscape, advocating for the importance of investment in pandemic therapeutics will be essential in 2024. The publication of the 100DM Therapeutics Roadmap provides a springboard for such advocacy efforts, engaging funders, member states and industry.

➤ Given the lack of products currently in the pipeline and the need to ensure variety across viral families, the 100DM objective related to the specific number of therapeutics targeted has been adjusted. Instead of aiming for 25 Phase-2 ready products by 2026, the new target aims to

have at least two Phase-2 ready products for the top 10 WHO priority pathogen families, ideally with different mechanisms of action. Work around the roadmap's operationalisation in 2024, including detailed attrition rate analysis, will lead to concrete timelines being attached to this objective in next year's report.

➤ The need for enhanced coordination and coherence is still of utmost importance in the fragmented Therapeutics landscape. The convenings of groups such as the INTREPID Alliance and the 100DM Therapeutics subgroup provide the basis for further collaboration. Early-stage antiviral researchers who are already being funded for their work will form a coalition in 2024 to collaborate, avoid duplication, and ensure discovery efforts are spread across different viral families, with an initial meeting planned for Q1 2024. International organisations, academics and industry should look towards combining efforts in 2024, ideally into a formal therapeutics coalition, with one organisation leading and hosting the work. The scope of this coalition should take in monoclonal antibodies, host-directed therapies and repurposed treatments, as well as small-molecule antivirals, which arguably have the greatest potential utility from an access perspective, along with new promising platform technologies. The coalition should consider the current lack of pull incentives for product development, and the potential breakthrough role of AI in advancing drug discovery, along with critical equitable access enablers such as voluntary licensing and technology transfer.

BOX 1

SUMMARY OF THE 100DM THERAPEUTICS ROADMAP

The 100DM Therapeutics Roadmap has been produced by a 100 Days Mission STEG subgroup, comprised of STEG members, industry partners, early-stage researchers, international organisations, regional organisations and CSOs. A full list of members is available at Annex B.



AIMS

The roadmap aims to provide a **vision for an ideal state of preparedness for pandemic therapeutics**, and a delivery plan for this vision for stakeholders to coalesce around. The headline goal is the development of at least two 'Phase 2 ready' therapeutic candidates for the top 10 WHO priority pathogen families, but also for there to be pre-agreed routes for trials, regulatory approval, manufacture and procurement. The roadmap has four high level objectives:

- To raise awareness of the need for increased investment in the therapeutics pipeline and an end-to-end approach to development, with access embedded by design
- To highlight ongoing scientific drug discovery and development activities being carried out by stakeholders aligned to 100DM therapeutics goals
- To identify gaps in the current therapeutic discovery and development pipeline and setting objectives accordingly
- To provide a framework for action, based on concrete objectives, as well as suggesting potential partners to implement the recommendations

The objectives in the roadmap are based on the **three original overarching goals** for the 100DM for Therapeutics, namely:

**Sustainable R&D funding**

Ensure sustainable R&D funding throughout development lifecycle ideally coordinated via a formal Therapeutics coalition, with the capacity to bring together the existing and newly created stakeholders in pandemic therapeutics.

**'Phase 2 ready' therapeutic candidates**

As part of pre-pandemic preparedness, develop 'Phase 2 ready' therapeutic candidates against the identified pathogen families of greatest pandemic potential (ideally minimum 2 differentiated candidates per family; antiviral small molecules, mAbs or other suitable modalities), based on inclusive TPPs, which address the needs of all patients and markets, and are conducive to rapid, equitable access.

**Programmable platforms or technologies**

Develop scientifically rigorous and validated programmable platforms or technologies capable of speeding the delivery of new, or enhancing existing therapeutics in case of a pandemic, and able to be rapidly re-purposed to 'Disease X'.

In the absence of a single end-to-end coordinator for therapeutics development, it is hoped that this roadmap will offer a step towards a more formalised Therapeutics coalition, and in time, the emergence of an appropriate coordinator.

Throughout 2024, the IPPS and subgroup partners will convene a series of workshops to identify concrete next steps for the implementation of the roadmap. These workshops will cover early-stage R&D coordination; clinical trials and regulatory pathways; and access and market shaping. The IPPS would like to give special thanks to Unitaid, MPP, DNDi, the INTREPID Alliance and READDI Inc for their contributions as part of the core working group and looks forward to working with a growing number of partners to see the roadmap implemented.



Diagnostics R&D

CONTEXT AND AIMS

Accurate and swift diagnostics are crucial for the early detection and containment of infectious diseases. COVID-19 underscored the critical role of diagnostics in managing pandemic threats as well as in supporting various challenges health systems face, from pandemics to antimicrobial resistance.

FIND, the Diagnostics Alliance, serves as a global convener in diagnostics R&D and have developed a comprehensive framework to define what is needed to achieve the 100DM's diagnostic goals. FIND estimates that an initial investment of US\$80-100 million over five years, if leveraged effectively, could substantially advance the development of a prototype library for pandemic diagnostics. However, a significant challenge remains: post-COVID-19, funding for diagnostics R&D has markedly declined, undermining the capacity of agencies, research institutions, and the private sector to develop essential diagnostics. This funding shortfall poses a serious risk to health systems in the face of potential epidemic or pandemic pathogens. Bridging this funding gap is imperative to maintain this vital pillar of pandemic prevention and response. Despite commendable coordination and technical efforts from FIND and others including but not limited to PATH and Clinton Health Access Initiative (CHAI), the objectives of the 100DM for diagnostics, are not on track.

End goals of the 100DM for diagnostics:

Strengthened International Coordination

There is a need for enhanced global collaboration among governments, industry, and international organisations to create a sustainable diagnostics R&D ecosystem

Development of Diagnostic Libraries

The goal of creating comprehensive diagnostic libraries offering broad coverage for priority pathogen families remains unfulfilled-re-purposed to 'Disease X'

Addressing these challenges requires renewed focus and investment to ensure that diagnostics R&D can help address future health emergencies effectively.

BOX 2

MAKING THE EXCEPTIONAL ROUTINE: DIAGNOSTIC PRACTICES FOR ENHANCED PANDEMIC PREPAREDNESS OVERVIEW

In the recent report, 'Making the Exceptional Routine: Embedding Diagnostic Best Practice to Improve Pandemic Preparedness'¹⁸, the IPPS and FIND highlight three key strategies for integrating advanced diagnostic practices into healthcare systems, crucial for both routine healthcare and during major infectious disease outbreaks:



KEY STRATEGIES



Multiplex Diagnostics for Enhanced Efficiency

These innovative diagnostics can detect multiple biomarkers in a single test, revolutionising disease surveillance. Their ability to facilitate early detection, guide patient care, and offer cost-effectiveness, particularly in resource-limited settings, is transformative. Multiplex diagnostics are instrumental in simultaneously tracking various pathogens, thereby significantly improving outbreak surveillance.



Digitally Connected Diagnostics

The integration of digital technology in diagnostics is a game-changer. It enhances the accuracy and efficiency of test data, shortens the time to treatment, bolsters disease surveillance, and provides real-time insights into diagnostics and disease patterns.



Programmable platforms or technologies

Establishing a direct link between diagnostics and subsequent care and treatment is crucial. Evidence shows that this integration boosts testing uptake and facilitates early intervention. Successful initiatives like the 'test-and-treat' pilots by the ACT-A and the US government exemplify its effectiveness and potential. Overcoming the existing challenges in this area requires collaborative efforts from research funders, policymakers, and regulatory bodies.

The report offers targeted recommendations for national and global policymakers, regulators, and researchers to embed diagnostic practices more effectively into healthcare and surveillance systems. This approach serves a dual purpose: to strengthen routine healthcare delivery but also significantly enhances capabilities for outbreak detection and response.

¹⁸ IPPS, 2023 https://d7npznm5zwwd.cloudfront.net/prod/uploads/2023/11/IPPS_Diagnostics-Report_2023.pdf

PROGRESS IN 2023

Despite funding challenges, significant strides were made in diagnostics R&D in 2023, contributing to the goals of the 100DM. The 76th World Health Assembly in May 2023 marked a pivotal moment with the adoption of the Diagnostics Resolution¹⁹. This resolution addresses key issues of access, affordability, and quality of diagnostic tests, placing diagnostics at the forefront of member states' agendas. Efforts are underway to form an international diagnostics alliance, contingent on securing adequate funding.

FIND and its Pandemic Threats Team has been instrumental in advancing the diagnostic objectives of the 100DM, focusing on developing diagnostics for pathogens like Lassa fever and Ebola virus²⁰. Efforts are also being made to broaden the scope to include Nipah virus and Disease X diagnostics. FIND and other organisations including PATH have continued to support initiatives for distributed diagnostics manufacturing in several countries, aiming to enhance global access and preparedness with new partnership agreements signed with PAHO and South Korea in 2023²¹.

BARDA Dive in the US made progress on introducing diagnostics for sepsis and infection severity, which is critical step to better identify patients who are likely to be severely ill from an infection rather than simply infected. This was a huge gap in the covid response in the US and around the world. BARDA funded the California-based company Cytovale for their 10 minute emergency department sepsis test²² and funded Ad Astra Diagnostics for their 2 min point-of-care haematology analyser that has a similar capability²³. BARDA is also working with the European Commission's Health Emergency Preparedness and Response Authority (HERA) on advancing metagenomic sequencing as a point-of-care clinical diagnostic agnostic to any particular pathogen which could transform surveillance.

Furthermore, global partnerships and initiatives have been begun. For example, in India, the National Diagnostics Catapult (C-CAMP InDx 2.0) was launched, aiming to enhance pandemic preparedness and scale up diagnostics for infectious diseases²⁴. Senegal's diaTROPIX platform, a collaboration between the Institut Pasteur of Dakar and Global Access Diagnostics (GADx), continues to make progress in infectious disease diagnostics²⁵. The UK Health Security Agency (UKHSA) is developing a diagnostics accelerator to support novel test development for emerging pathogens²⁶.

¹⁹ WHO, 2023. "Seventy-sixth World Health Assembly" <https://www.who.int/about/accountability/governance/world-health-assembly/seventy-sixth-world-health-assembly>; FIND Pro forma

²⁰ FIND, 2023. "Pandemic Threats" <https://www.finddx.org/what-we-do/programmes/pandemic-threats/>

²¹ FIND, 2023. "Media and Press" www.finddx.org/media-and-press/; PATH, 2023. "PAHO and PATH sign agreement to advance health equity in the Americas" <https://www.path.org/media-center/paho-and-path-sign-agreement-to-advance-health-equity-in-the-americas/>

²² FDA, 2023. <https://www.businesswire.com/news/home/20230118005120/en/FDA-Clears-Cytovale%E2%80%99s-C2%AE-IntelliSep%C2%AE-Sepsis-Test-First-in-a-New-Class-of-Emergency-Department-Focused-Diagnostic-Tools>

²³ FDA, 2023. <https://www.prnewswire.com/news-releases/ad-astra-diagnostics-receives-510k-clearance-of-qscout-hematology-analyzer-the-first-to-report-measures-of-infection-and-severity-at-point-of-care-302008227.html>

²⁴ CCAMP, 2023. "CCAMP - InDx 2.0 - National Diagnostics Catapult" CCAMP <https://www.ccamp.res.in/indx-indigenous-diagnostics-national-diagnostics-catapult>

²⁵ Global Access Diagnostics, 2023. "Regional Manufacturing" <https://www.globalaccessdx.com/regional-manufacturing-network/>; Pasteur Network Pro forma

²⁶ GOV.UK, 2023. "Making progress on the global mission to develop pandemic-fighting tools within 100 days" <https://ukhsa.blog.gov.uk/2023/01/31/making-progress-on-the-global-mission-to-develop-pandemic-fighting-tools-within-100-days/>; UK Government pro forma



Vaccines R&D

CONTEXT AND AIMS

Of all three tools, vaccines for pandemic pathogens are unique in having CEPI as a single, internationally recognised convenor with comparatively strong funding support, who have embedded the 100DM for vaccines in their 2.0 Strategy. Their advocacy and leadership, along with political support for the value of vaccines and CEPI's mission, has put vaccines R&D on a strong trajectory. That being said, 2024 will be a transition year, with multiple initiatives seeking to codify the learnings from COVID-19 into new ways of working, such as through the Pandemic Accord negotiations and discussions on the i-MCM-Net, as well as the need to re-establish routine vaccination programmes globally post-COVID.

Despite the contextual and political shifts, the overarching end goals of the 100DM for vaccines remain the same as when set out in the original 100DM report.

End goals
of the 100DM for
vaccines:

A **global prototype vaccine library** developed for 10 high-priority viral families

Readily programmable **vaccine platform technology** available, which can be rapidly re-purposed to an emerging 'Disease X' threat

Vaccine platforms optimised for **large-scale production and simplified routes** of administration and storage (i.e., to comply with the WHO TPPs)

NB: this section is focused specifically on vaccine R&D – vaccine manufacturing capacity is covered in Chapter 3.

SUMMARY PLANS FOR 2024

The two overarching end goals of the 100DM for diagnostics are a **coordinated and sustainable diagnostics R&D ecosystem** and the development of diagnostics libraries to provide broad coverage for priority virus families.

Looking ahead to 2024, the focus will be on achieving these primary goals:

- ▶ **Strengthening the diagnostics R&D ecosystem** by securing adequate funding to initiate work on prototype diagnostic libraries. Efforts should be made to leverage additional financial support from G7 and G20 members for FIND's 100DM diagnostics framework, as well as building a broader multisectoral diagnostics coalition to support implementation.
- ▶ **Advancing scientific and regulatory progress** through collaborations between industry, government, and international organisations is essential to support the 100DM diagnostics framework. Priority should be given to research into pathogen-agnostic platforms capable of detecting Disease X.
- ▶ **Embedding best practices during inter-pandemic times** with policymakers and health ministries prioritising the procurement and integration of multiplex diagnostics with data connectivity and link diagnostic testing to treatment pathways.

PROGRESS IN 2023

Overall, good progress was made in 2023 against the original recommendations and towards the overarching end goals of the 100DM. A notable update being in November 2023, the US FDA approved the first vaccine for Chikungunya Virus²⁷ developed by Valneva.

A key goal set out in the first implementation report is the development of a prototype vaccine library for the top 10 priority viral families by 2026. This year CEPI has started a conversation with global partners on what supporting infrastructure is needed to realise the vision of a global prototype vaccine library. While there is much to be done on understanding the necessary data requirements, IT infrastructure and access requirements, it is critical that these conversations take place.

To facilitate a clear focus for future R&D efforts, the WHO Prioritisation Advisory Committee is developing its updated selection of priority pathogens of pandemic potential. This progress is coupled with complementary work led by CEPI and the University of California Davis, who are developing their ranking of the potential of 'Disease X' emergence from key viral families²⁸.

In 2023, CEPI has worked towards developing clinical proof of concept (PoC) for four virus families and pre-clinical PoC for an additional six virus families for the vaccine library. CEPI also signed a partnership agreement with Houston Methodist Consortium & Institute for Drug Discovery at Leipzig University to advance its pilot to create prototype vaccines for paramyxoviridae and arenaviridae²⁹. Additionally, CEPI have funded several partnerships to develop Disease X vaccine library platforms, such as with University of Oxford using a Junin vaccine³⁰ as an exemplar for use of their viral vector vaccine platform for arenaviruses, as well as mRNA based platform technologies for exemplar candidates such as Lassa, Japanese Encephalitis Virus and Mpox³¹ with SK Bioscience, and BioNTech respectively³². CEPI expanded its animal model network to consider risk factors associated with spillover risk of domestic animal viruses³³, gathering expert knowledge in interviews and a workshop³⁴.

International collaboration and coordination will be critical to develop prototype vaccine libraries in the coming years. In support of this, CEPI has expanded its Centralized Laboratory Network to five new members from Africa and India, bringing the network to over 15 partner facilities in 13 countries³⁵. The Strategic Center of Biomedical Advanced Vaccine Research and Development for Preparedness and Response (SCARDA), Japan Agency for Medical Research and Development (AMED) and CEPI have also signed a Memorandum of Cooperation to strengthen collaboration between the organisations³⁶. In June 2023, the Department of Pharmaceuticals, Government of India, PATH, and CEPI,

held a co-branded event 'Global Vaccine Research Collaborative'³⁷ aimed at building consensus among stakeholders engaged in vaccine research, regulation, development, and manufacturing. Eight countries and 65 organisations participated, including vaccine research institutes, academia, international organisations, and manufacturers. This conversation has informed subsequent discussions on the formation of a prototype global vaccine library.

Significant progress has also been made with investment towards modernising vaccine technology. In 2023, BARDA and NIAID's NextGen programme funded just over US\$1 billion to advance vaccine R&D through providing broader more durable protection and better transmission blocking capabilities³⁸.

27 FDA, 2023. "FDA Approves First Vaccine to Prevent Disease Caused by Chikungunya Virus" <https://www.fda.gov/news-events/press-announcements/fda-approves-first-vaccine-prevent-disease-caused-chikungunya-virus>

28 CEPI, 2023. "From Spillover to Disease X: new AI collaboration aims to rank viral families with greatest pandemic threat" https://cepi.net/news_cepi/from-spillover-to-disease-x-new-ai-collaboration-aims-to-rank-viral-families-with-greatest-pandemic-threat/

29 Eden McCleskey, Houston Methodist, 2023. "CEPI and Houston Methodist Announce Partnership to Leverage AI to Combat Next Global Pandemic" <https://www.houstonmethodist.org/leading-medicine-blog/articles/2023/sep/cepi-and-houston-methodist-announce-partnership-to-leverage-ai-to-combat-next-global-pandemic/>

30 CEPI, 2023. "CEPI and University of Oxford advance vaccine work against potentially deadly Arenaviruses" https://cepi.net/news_cepi/cepi-and-university-of-oxford-advance-vaccine-work-against-potentially-deadly-arenaviruses/

31 SK bioscience, PR Newswire, 2023. "SK bioscience and CEPI Sign Agreement to Develop mRNA Vaccines" <https://www.prnewswire.com/news-releases/sk-bioscience-and-cepi-sign-agreement-to-develop-mrna-vaccines-301658246.html>

32 CEPI, 2023. "BioNTech and CEPI Announce Partnership to Advance mRNA Mpox Vaccine Development and Support CEPI's 100 Days Mission" https://cepi.net/news_cepi/biontech-and-cepi-announce-partnership-to-advance-mrna-mpox-vaccine-development-and-support-cepis-100-days-mission/

33 CEPI Pro forma; Enabling Sciences, 2023. "Preclinical Model Network" <https://epi.tghn.org/covax-overview/enabling-sciences/preclinical-model-network/>

34 CEPI Pro forma

35 CEPI, 2023. "Laboratory network to test vaccines against epidemic and pandemic diseases expands presence in Global South" https://cepi.net/news_cepi/laboratory-network-to-test-vaccines-against-epidemic-and-pandemic-diseases-expands-presence-in-global-south/

36 AMED, 2023. "SCARDA and CEPI collaborate to strengthen global pandemic preparedness and response" https://www.amed.gov.jp/en/news/release_20230626.html

37 PATH, 2023. "Global Vaccine Research Collaborative: Building consensus for future health emergencies prevention, preparedness, and response" <https://www.path.org/resources/global-vaccine-research-collaborative-building-consensus-for-future-health-emergencies-prevention-preparedness-and-response/>

38 Medical Countermeasures, 2023. "Project NextGen: next generation medical countermeasures" <https://medicalcountermeasures.gov/hextgen/>; HHS, 2023. "Project NextGen Awards Over \$1.4 Billion to Develop the Future of COVID-19 Vaccines and Therapeutics" <https://www.hhs.gov/about/news/2023/08/22/funding-1-billion-vaccine-clinical-trials-326-million-new-mono-clonal-antibody-100-million-explore-novel-vaccine-therapeutic-technologies.html>; HHS, 2023. "Project NextGen Selects Initial Vaccine Candidates and Awards Over \$500 Million to Advance Development of Vaccines and Therapeutics" <https://www.hhs.gov/about/news/2023/10/13/project-nextgen-selects-initial-vaccine-candidates-awards-over-500-million-advance-development-vaccines-therapeutics.html>

Additionally, the Bill and Melinda Gates Foundation (BMGF) invested US\$40 million towards mRNA vaccine innovation and production in LMICs to enable low-cost and high-quality vaccines to be produced at large scale³⁹. NIH are also continuing their support in universal influenza vaccines, with US\$260 million for influenza vaccine research this year⁴⁰. In July 2023, the European Commission and the European Investment Bank announced the creation of HERA Invest, a flagship initiative of the HERA⁴¹ which will provide €100 million to the InvestEU programme to support R&D⁴².

SCARDA launched a strategic funding programme supporting vaccine development throughout inter-pandemic and pandemic periods⁴³ and established R&D centres (comprising a flagship centre, synergetic centre, and support institutions) which aim to strengthen and promote vaccine-related research⁴⁴. In April 2023, the Engineering and Physical Sciences Research Council (EPSRC), part of UK Research and Innovation (UKRI), announced £34.5 million investment to fund four hubs dedicated to the development of vaccines with epidemic potential in LMICs up to 2030, led by the University of Oxford and University College London⁴⁵. UKHSA has also unveiled its world-leading Vaccine Development and Evaluation Centre (VDEC)⁴⁶, and this year CEPI extended their collaboration with VDEC to include application of assays for Mpox vaccine assessment and to conduct further coronavirus research⁴⁷. The UK's Department for Health and Social Care's (DHSC) UK Vaccine Network announced a second phase in 2023 with a commitment of up to £103.5million in Official Development Assistance (ODA) funding over five years⁴⁸. This funding includes £33 million for collaborative manufacturing innovation research hubs managed by EPSRC and working with LMIC organisations, to address challenges relating to vaccine delivery or manufacturing⁴⁹. Finally, the UK Government also announced a 10-year strategic partnership with Moderna to invest in mRNA research and development⁵⁰.

In 2023, CEPI supported technology innovations to apply to potential next-generation vaccine platforms through partnership agreements with innovators, including Tiba Biotech⁵¹, Celestial Therapeutics⁵², and Gennova⁵³, Vaxxas,

20Med, Jurata Thin Film and Vaxipen⁵⁴. Sanofi has also supported innovations in vaccine technology with R&D programmes for pan-coronavirus, and paramyxovirus progressed to pre-clinical stages of development⁵⁵. Furthermore, Sanofi are collaborating with the US Walter Reed Army Institute of Research, the Vaccine Research Center from NIH, and Sheba Medical to design and clinically validate a vaccine able to induce broad protective responses against all known (and future) variants of SARS-CoV and to provide a strong basis for future pandemic response to Sarbecovirus outbreaks⁵⁶.

39 Sanika Santhosh, Health Policy Watch, 2023. "Gates Gives \$40m Boost to Africa's mRNA Vaccine Development" <https://healthpolicy-watch.news/gates-gives-40m-boost-to-africas-mrna-vaccine-development/>

40 NIH, 2023. "Overview of Budget" <https://officeofbudget.od.nih.gov/pdfs/FY23/br/Overview%20of%20FY%202023%20Executive%20Summary.pdf>; NIH, 2023. "US public investment in development of mRNA covid-19 vaccines: retrospective cohort study" <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9975718/>

41 European Commission, 2023. "EIB Lunch dialogue – Launch of HERA Invest" EIB Lunch dialogue – Launch of HERA Invest (europa.eu)

42 Giedre Peseckyte, Euractiv, 2023. "Commission announces additional funding to boost preparedness for health threats" <https://www.euractiv.com/section/health-consumers/news/commission-announces-additional-funding-to-boost-preparedness-for-health-threats/>

43 AMED, 2023. "Strategic Center of Biomedical Advanced Vaccine Research and Development for Preparedness and Response: SCARDA" <https://www.amed.gov.jp/en/program/list/21/index.html>

44 AMED, 2023. "Japan Initiative for World-leading Vaccine Research and Development Centers" <https://www.amed.gov.jp/en/program/list/21/02/002.html>

45 UKRI, 2023. "Vaccine and food manufacturing hubs will save lives and cut carbon" <https://www.ukri.org/news/vaccine-and-food-manufacturing-hubs-will-save-lives-and-cut-carbon/>

46 GOV.UK, 2023. "UKHSA's Vaccine Development and Evaluation Centre (VDEC)" <https://www.gov.uk/guidance/ukhsas-vaccine-development-and-evaluation-centre-vdec>

47 CEPI, 2023. "BioNTech and CEPI Announce Partnership to Advance mRNA Mpox Vaccine Development and Support CEPI's 100 Days Mission" https://cepi.net/news_cepi/biontech-and-cepi-announce-partnership-to-advance-mrna-mpox-vaccine-development-and-support-cepis-100-days-mission/; UK Government Pro forma

48 GOV.UK, 2023. "UK announces 'transformational' support to boost global health at the UK General Assembly" <https://www.gov.uk/government/news/uk-announces-transformational-support-to-boost-global-health-at-unga>

49 UKRI, 2020. "UKRI invests £33m in Made Smarter innovation hubs" <https://www.ukri.org/news/ukri-invests-33m-in-made-smarter-innovation-hubs/>

50 GOV.UK, 2022. "UK cements 10-year partnership with Moderna in major boost for vaccines and research" <https://www.gov.uk/government/news/uk-cements-10-year-partnership-with-moderna-in-major-boost-for-vaccines-and-research>

51 CEPI, 2023. "CEPI partners with Tiba Biotech to evaluate next-generation RNA vaccine platform technology to respond to 'Disease X'" https://cepi.net/news_cepi/cepi-partners-with-tiba-biotech-to-evaluate-next-generation-rna-vaccine-platform-technology-to-respond-to-disease-x/

52 CEPI, 2023. "CEPI partners with Celestial Therapeutics Inc to develop self-adjuvanting mRNA vaccine platform" https://cepi.net/news_cepi/cepi-partners-with-celestial-therapeutics-inc-to-develop-self-adjuvanting-mrna-vaccine-platform/

53 CEPI, 2023. "CEPI to support development of self-amplifying mRNA vaccine technology for use against Disease X" https://cepi.net/news_cepi/cepi-to-support-development-of-self-amplifying-mrna-vaccine-technology-for-use-against-disease-x/

54 CEPI, 2023. "Coming in from the cold: needle-free patch technology for mRNA vaccines aims to end need for frozen storage and improve access" https://cepi.net/news_cepi/coming-in-from-the-cold-needle-free-patch-technology-for-mrna-vaccines-aims-to-end-need-for-frozen-storage-and-improve-access/; CEPI, 2023. "Stabilised mRNA vaccine technology aims to end need for frozen storage and improve access" https://cepi.net/news_cepi/stabilised-mrna-vaccine-technology-aims-to-end-need-for-frozen-storage-and-improve-access/

55 Sanofi Pro forma

56 Sanofi Pro forma; Eric Sagonowsky, Fierce Pharma, 2016. "Sanofi grabs \$43M in U.S. government funds to advance Zika vaccine into Phase II" <https://www.fiercepharma.com/vaccines/sanofi-grabs-43m-u-s-government-funds-for-zika-vaccine-r-d>; Sheba Global, 2023. "Sheba Medical Center Partners With NIH, Sanofi, And Walter Reed Army Institute To Develop Pan-Coronavirus Vaccine" <https://sheba-global.com/sheba-medical-center-partners-with-nih-sanofi-and-walter-reed-army-institute-to-develop-pan-coronavirus-vaccine/>

BOX 3

CRITICAL COMPONENTS OF A PROTOTYPE VACCINE LIBRARY

To note, this is an IPPS perspective only, owners would need to be agreed for each component, and a strong coalition built to maintain political and financial buy-in. Such a library could lay foundations for future Therapeutic and Diagnostic Libraries.



COMPONENTS



Scientific Library contents

Knowledge, working material and analytical methods for each viral family:

- Natural history of the viral family and human responses
- Genetic sequences of pandemic priority viral families
- Prototype products per viral family- at least Phase 2 ready pre- outbreak
- Collation of safety, and toxicity data for prototype products
- Applicability of animal rule and any correlates of protection data



Repository of pre-agreed pandemic protocols

- Ideal Phase 3 clinical trial protocols for pandemic use
- Pre-agreed regulatory pathways
- Possible mapping of regionally available manufacturing capacity per platform
- Guidance on preparing high quality voluntary licences



SUPPORTED BY

A

Robust Virtual Operating System

- Knowledge management, secure overarching infrastructure that enables differentiated access permissions and dashboard monitor priorities, gaps, and needs

B

Clear Terms of Reference for Library Contributors and Users

- Including clarity on access clauses, Intellectual Property (IP) management and any changes to use protocols in a PHEIC scenario

SUMMARY PLANS FOR 2024

The **three overarching end goals of the 100DM** for vaccines are a strengthened international system that enables a sustainable and coordinated vaccine R&D ecosystem; prototype libraries to be developed for the ten highest priority pathogen families; and vaccine platform technologies that can be rapidly repurposed and deployed globally at scale to an emerging Disease X threat.

- To achieve the development of a prototype vaccine library for the top 10 viral families, research and development needs to continue at pace, alongside development of the governance and digital infrastructure to support a library approach. Therefore, in 2024, a global prototype vaccine library should be defined in alignment with the 100DM goals, with a coalition of supporting partners formalised to include WHO, CEPI, national R&D funders, companies and regulators.
- On the R&D front, CEPI – working with funding and delivery partners – will complete preclinical tests for the development of initial prototype exemplar vaccines for Lassa virus, Junin virus, Nipah virus, Mpox, Japanese Encephalitis and enter further candidates into the pre-clinical phase.
- The development of platform technologies that are robust, stable and easily to deliver globally will be critical to respond rapidly to future unknown threats; the next step in 2024 towards achieving this goal will require funded innovations that have met proof of concept criteria to be applied to vaccine product development programs.
- Gathering a clear understanding of LMIC capacity for vaccine R&D (and manufacturing)

is essential for informed funding, prioritisation, and partnership decisions to be made across industry, academia, and the public and private sector. Multiple partners are developing mapping exercises, such as WHO's i-MCM-Net, GloPID-R's Pandemic PACT mapping exercises and WHO's mRNA Hub. However, there is a risk that multiple bilateral or even multilateral initiatives in one country can breed confusion without clear communication and alignment with priorities set by national governments. Maintaining and accelerating progress will require coordinated action by industry, governments, regulators, and multilateral organisations, with the right incentives to support the pipeline of vaccines that will be needed to respond to future pandemics. If science is to respond even faster than it did against COVID, we must make innovation central to pandemic preparedness plans, with investment in surveillance, rapid access to pathogen data for scientists, and robust intellectual property protection and enforcement underpinning the voluntary collaborations necessary for rapid scale up of production and supply. The IPPS will seek to support and highlight all efforts to align behind national and regional strategies, such as those set by Africa CDC.

Case study: Regional listening exercises

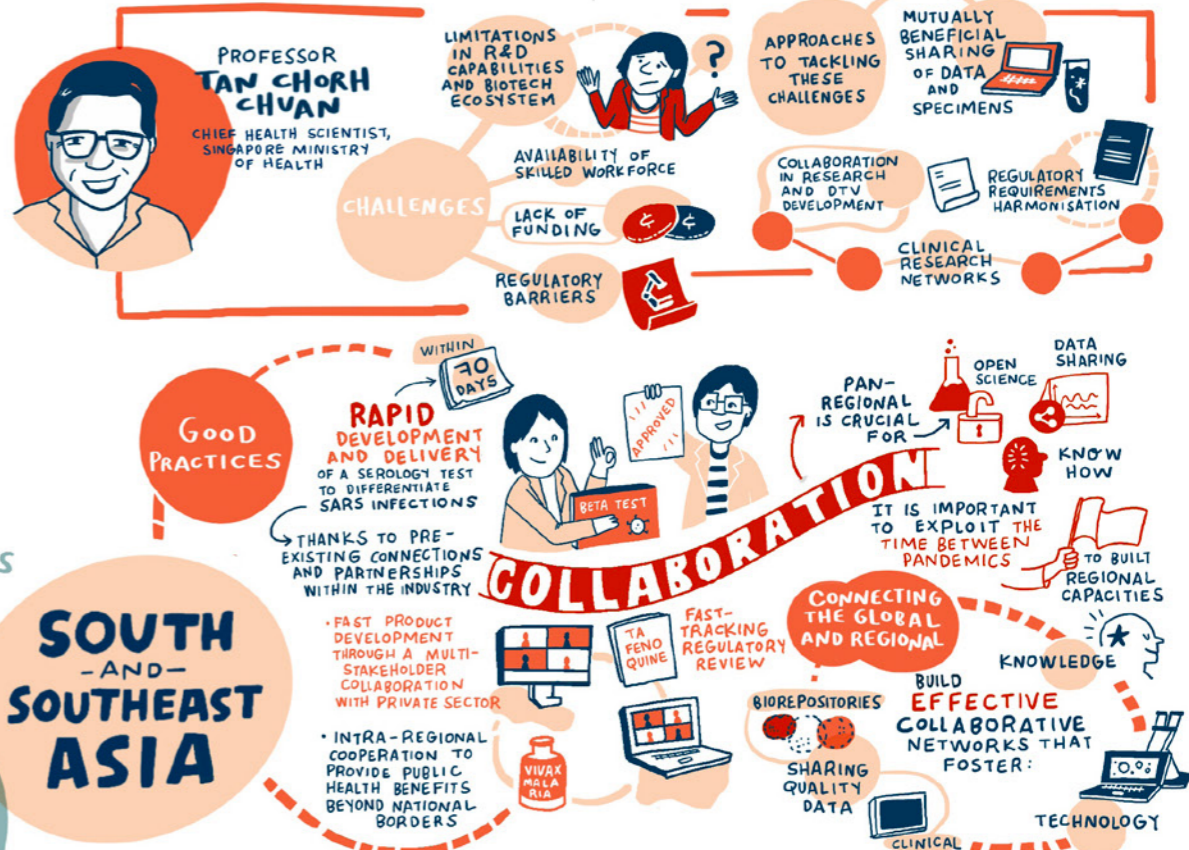
The IPPS held a series of four regional ‘listening exercises’ over the summer to better understand different regional contexts and approaches to delivering the 100DM. Working with regional partners, the events provided valuable insights into the strengths and challenges within different regions, featuring in-depth discussions with a diverse set of experts, focusing on **South and Southeast Asia, West Africa, East Africa** and **Latin America** and the **Caribbean** respectively.

Participants highlighted examples of previous success in fighting pandemics and epidemics in their region, the current challenges and barriers to effectively implementing the 100DM, strategies to ensure equity at each stage of countermeasure development and delivery, and how local and national systems can best interact with regional and global systems.

COMMON THEMES ACROSS ALL FOUR REGIONS

- The **criticality of regional governance institutions** to connect the national to the global, and to increase solidarity and distribution of support in economically diverse regions.
- The need for **regulatory capacity-building** and the value of regional regulatory harmonisation to boost local product development.
- A strong desire from national representatives to work collaboratively with other partners in their region and **make a virtue of their differing strengths**, to develop a regional end-to-end product development system.
- A desire for **more infrastructure and frameworks to support the technical cooperation that had worked well during COVID-19**, but could now be formalised through digital platforms or shared projects, such as the development of regional product libraries.
- Support for the **strengthening of regional manufacturing** is growing in all four regions, albeit at different rates; this contrasts with early-stage R&D investments, where funding and infrastructure are more uneven.
- The need for effective, equitable and sustainable **financing systems**.
- The centrality of **strengthening community health systems** for surveillance, response, effective clinical trials and building trust in MCMs.
- The importance of **strong regional representation in global decision-making processes** on MCMs, especially International Negotiating Body (INB), G7 and G20 discussions.

The full summaries from each region, translated into French, Spanish and Portuguese where relevant, downloaded from the IPPS website.



BOX 4

WEST AFRICAN REGULATORY HARMONISATION AND POOLED PROCUREMENT



BACKGROUND

The Economic Community of West African States (ECOWAS) and West African Health Organization (WAHO), in collaboration with United Nations Industrial Development Organization (UNIDO), established the West Africa Medicines Regulatory Harmonization initiative (WA-MRH) in 2017.



KEY ACHIEVEMENT IN RELATION TO 100DM

To improve access to medicines and vaccines in the region, WA-MRH embraced digital solutions (e.g. an electronic submission system) to accelerate the product application and joint assessment procedure (JAP). Once a product is approved on the regional platform, it is automatically recommended for market authorization issuance for use in the 15 member states. To date the initiative has approved 11 products from 25 applications.



FUTURE OPPORTUNITIES

ECOWAS is now seeking to establish similar alignment in regional pooled procurement to facilitate access to approved products. Their proposal has received strong support from governments and partners, and will include:

- a mechanism to facilitate the pooled procurement and supply chain of medicines;
- a Revolving Fund, providing a repayable funding mechanism enabling products to be purchased through the ECOWAS pooled procurement mechanism rapidly; and
- a quality-assurance policy framework that will support procurers in any setting.

BOX 5

SOUTH AND SOUTH EAST ASIA: RAPID DEVELOPMENT AND DELIVERY OF A SEROLOGY TESTS



BACKGROUND

In January 2020, accurate serology was required to differentiate between SARS-CoV-1 and SARS-CoV-2 infections.



KEY ACHIEVEMENT IN RELATION TO 100DM

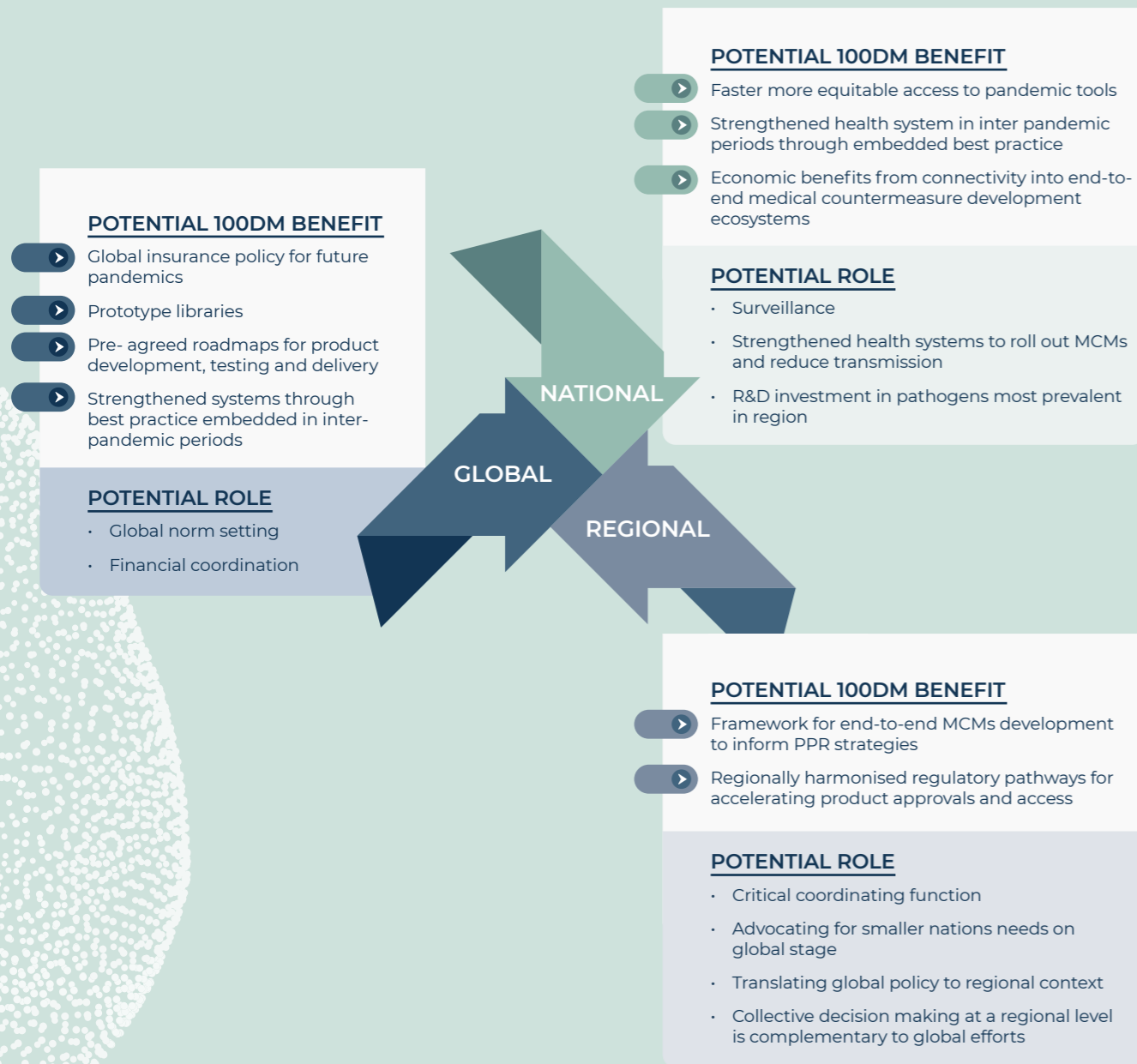
A beta test was rapidly developed, a patent was applied for, and regulatory approval was received - all enabling delivery within 70 days. Pre-existing industry connections made such speed possible, as they had resources to develop it and trusted it was the right thing to do, despite economic profit not being guaranteed. Discussions with regulatory bodies and other partners began before the product was finalized, so there was sufficient data and familiarity with the product to enable rapid approval.



FUTURE OPPORTUNITIES

Fundamentally, developing cross-sectoral networks during inter-pandemic periods was essential, so that they could be drawn on when accelerated approaches are needed. Although this product was developed, approved and delivered in 70 days for one country, it took three years to get approval for use in other countries in the region showing the importance of regional regulatory harmonisation.

The success of the 100DM has potential benefits for national, regional and global players, and relies on all working in concert



Think globally, organise regionally, and act nationally.

 -Ambassador John Nkengasong



3
Embedding best practice between pandemics



Surveillance

CONTEXT AND AIMS

Surveillance is an important prerequisite for the development of pandemic DTVs. Whilst surveillance is not the main focus of the 100DM, accurate and consistent pathogen identification allows for the swift development and deployment of MCMs. National ownership of surveillance systems, coupled with international sharing of data and pathogen samples through trusted mechanisms, is essential. The integration of innovative technologies, artificial intelligence, and novel data sources is crucial in identifying hotspots and establishing early warning systems. These should complement, not replace, established systems that focus on essential data collection and routine diagnostic use. Bridging the gap between surveillance systems and the diagnostics development ecosystem, and establishing trusted international data and pathogen sharing mechanisms, are critical challenges to address.

The aim is to develop a global surveillance system capable of enabling a 100-day response to emerging threats.

1 International network(s) of local surveillance systems

These systems should be capable of rapidly identifying and characterising local outbreaks to facilitate quick responses.

2 Global ecosystem of interoperable data analytics platforms

This would enable the sharing of data to identify emerging patterns and trends, crucial for early detection and response.

3 Rapid exchange mechanisms for pathogen samples

Such mechanisms are vital for global R&D efforts in developing DTVs and includes acknowledging and supporting sample providers to ensure mutual benefits.

4 Routine use of diagnostics

To create sustainable markets, underpin global affordability, and promote innovation in the field of diagnostics.

As set out in the original 100DM report this **system** would be built on:

PROGRESS IN 2023

In 2023, efforts have been made to ensure surveillance can be established in countries in a more globally connected way, with WHO leading on coordination. At the 76th WHA in May 2023, WHO launched its collaborative surveillance concept, defined as “the systematic strengthening of capacity and collaboration among diverse stakeholders, both within and beyond the health sector, with the ultimate goal of enhancing public health intelligence and improving evidence for decision-making.”⁵⁷ Efforts are now being made to disseminate and align surveillance efforts using this approach at the regional level, working across the World Health Emergencies programme at WHO.

To facilitate the implementation of collaborative surveillance, the WHO Hub for Pandemic and Epidemic Intelligence (WHO Pandemic Hub) exists to connect, innovate and strengthen capacities for surveillance. It has established institutional partnerships with the Robert Koch Institut (RKI), Fiocruz, among others, and has undertaken the following activities in 2023⁵⁸.

- **Building networks** In 2023, the Hub launched the International Pathogen Surveillance Network (IPSN), a global network of pathogen genomic actors to accelerate progress on the deployment of pathogen genomics sequencing (PGS) and improve public health decision-making. The IPSN consists of Communities of Practice to solve common challenges, a Country Scale Up Accelerator to align efforts and enable South-South exchange, grant funding, a Global Partners Forum for genomic surveillance and high-level advocacy to keep PGS on the agenda. It has now reached 50 partners and is set to award funds through a Catalytic Small Grants Fund in 2024.
- **Establishing communities** The Hub continued deployment of the Epidemic Intelligence from Open Sources (EIOS) initiative for early detection of public health threats. This year, EIOS has increased its user communities to 113 globally, encompassing member states, UN agencies, and other organisations⁵⁹. Furthermore, 67 EIOS training workshops were conducted across all WHO regions in 2023, across 45 member states and organisations, resulting in over 1,100 new users trained to enhance capabilities globally.
- **Facilitating regional collaborations** July 2023 saw the launch of the Health Security Partnership to Strengthen Surveillance in Africa, a partnership between Africa CDC, RKI, and WHO, supported by the Canadian government. It aims to strengthen capabilities in biosecurity, integrated disease surveillance, event-based surveillance, genomic surveillance, and epidemic intelligence in six pilot countries (Tunisia, Malia, Gambia, Morocco, Namibia and South Africa).

Furthermore, the WHO BioHub has furthered its pilot phase with a total of 23 Standard Material Transfer Agreements signed with countries; eight countries have shared Biological Materials with Epidemic or Pandemic Potential (BMEPP) and 15 requested BMEPP through the system. This is enabling faster and more equitable access to biological materials, as well as greater knowledge and data sharing. Standardised documentation has also improved operational transparency, security and efficiency, increasing trust in the multilateral system⁶⁰.

At the national level, the Pandemic Fund is financing surveillance projects with the first round of funding allocations awarded in July 2023, while Resolve to Save Lives’ 7-1-7 framework is now being used to assess capabilities in 15 countries⁶¹. Epiverse, a data.org programme, has built local open-source software tools for the epidemiological community through projects with the London School of Hygiene and Tropical Medicine, the Medical Research Council (MRC) Unit in the Gambia, Universidad de Los Andes, and Pontificia Universidad Javeriana (both in Colombia). These digital public goods are essential for surveillance and have been downloaded over 10,000 times since release⁶².

However, despite international organisations working together and discussions about Access and Benefit Sharing featuring as a key part of the INB negotiations, there has been a lack of government backing to ensure progress and prioritisation of data sharing. For example, the Global Pandemic Data Alliance (GPDA) established in 2021 under the UK’s G7 presidency has seen a drop off in engagement from government and non-government partners as political attention has moved on from the pandemic to other pressing priorities. Members of the alliance still see the value in having a forum for coordination and so are now working towards uniting efforts between the WHO Pandemic Hub, UKHSA and data.org⁶³.

⁵⁷ WHO (2023), Defining Collaborative Surveillance. <https://www.who.int/publications/i/item/9789240074064>

⁵⁸ WHO Hub for Pandemic and Epidemic Intelligence interview
⁵⁹ EIOS July 2023 newsletter https://cdn.who.int/media/docs/default-source/eios/eios-newsletter_july-2023.pdf?sfvrsn=96aa4da1_1&download=true

⁶⁰ WHO BioHub pro forma
⁶¹ <https://www.worldbank.org/en/news/press-release/2023/07/20/pandemic-fund-allocates-first-grants-to-help-countries-be-better-prepared-for-future-pandemics>; <https://resolvetosavelives.org/timeline/sharing-learning-to-achieve-the-7-1-7-target/>

⁶² Data.org Pro Forma
⁶³ Data.org interview

SUMMARY PLANS FOR 2024

To **enhance surveillance that supports the 100DM**, implementing partners will continue to work to implement collaborative surveillance, particularly to achieve data and pathogen sharing goals that would enable DTV R&D.

- ▶ The WHO Pandemic Hub will further establish networks and active collaborations through partnerships with National Public Health Agencies around the world. It also plans to pool efforts in the area of wastewater surveillance and is continuing work on a pandemic decision simulator after having developed a blueprint in 2023 – a data-driven decision support platform for the impact of various interventions before and during health emergencies.
- ▶ In-country capacities will also be strengthened through the IPSN's Catalytic Small Grants Fund for pathogen genomic sequencing, which is set to be implemented in 2024, along with the Pandemic Fund's second round of surveillance funding, and locally-led software tool development through programmes like Epiverse.
- ▶ In addition, governments should work to tie diagnostic development to surveillance systems to better detect diseases in clinical and non-clinical settings. This includes creating market incentives by normalising the use of multiplex diagnostics in primary care. Globally, the WHO-led International Health Regulations (IHR) review should identify surveillance-based pre-PHEIC triggers, and the INB will set out a framework for Access and Benefit Sharing.



BOX 6 DATA & SAMPLE SHARING

- Sharing pathogen samples and genomic sequence data at speed is critical for the rapid development and deployment of DTVs, as well as enabling cross-border surveillance.
- Political, economic and scientific challenges exist around the sharing of materials and data, with tensions arising between public, non-governmental and private sector organisations over wanting access to data and samples, while ensuring the fair and equitable benefit sharing in line with the Nagoya Protocol. LMICs want to ensure their right to control their own data and pathogen samples is protected, and that they get benefits in return for sharing it. On the other hand, industry partners have called for the “immediate and unhindered” sharing of data in the Berlin Declaration, in return for committing pharmaceutical companies to early access during pandemics. Companies have said they are willing to reserve an allocation of real-time production of vaccines, treatments and diagnostics for priority populations in lower-income countries and take measures to make them available and affordable.
- Pathogen sharing is important for the 100DM as the ability to rapidly develop and deploy novel DTVs is dependent on a timely and systematic approach to data, information and biological sample sharing between industry, academia, international organisations, civil society and governments.



PRE-REQUISITES

Pre-requisites to enable sufficiently agile pathogen sharing for the 100DM:



A pre-agreed framework for the rapid sharing of samples

When a PHEIC is declared, the pre-negotiated pandemic rules of the road can take effect to facilitate sharing of samples and materials, including having the mechanisms in place for biological sample collection and sharing.



Data access agreements

That set the terms of use for data sharing that ensure data is available, accessible and ready for future health emergencies (e.g., building off work by the GISAID), agreed in advance.



Data sharing platforms and systems based on a system of trust

Whereby communities that share data benefit from the outputs (particularly in accessing medical countermeasures that have been subsequently developed using shared data). It should follow the WHO guiding principles on genomic data sharing, aiming for pathogens to be sequenced and shared globally through integrated data and sample sharing mechanisms, in advance of a PHEIC being declared.



Improvements to Clinical Trials Capability and Regulatory Processes

CONTEXT AND AIMS

During the COVID-19 response, clinical trials and regulatory processes underwent a transformation. Innovations in platform trials such as the UK's RECOVERY and the WHO's Solidarity trials, whilst not perfect, presented a model for large-scale clinical trials, showcasing their relevance beyond the pandemic context. Regulators demonstrated agility in identifying accelerated pathways and engaging with innovators for swift guidance and data review. Emergency use authorisation was standardised across the regulators and became an instrument for fast-tracking approvals without compromising safety and quality of vaccines.

Despite these successes, challenges persist in advancing clinical trials and streamlining regulatory processes during inter-pandemic periods to ensure readiness for future pandemics. Addressing these challenges requires a commitment to the establishment of a sustainably funded, regionally dispersed inclusive, network of clinical trial sites that can pivot for emergency response. Such a network needs to be complemented by systems for joint ethics reviews, pre-agreed trial protocols within prototype libraries for DTVs, and reinforced regulatory capacity globally with regional regulatory harmonisation to ease the burden on innovators.

Moreover, further and continuous capacity building will be necessary in several areas for strong, high-impact clinical trials, globally. Improvements needed include greater capacity for joint ethics reviews, more Phase I trials to take place closer to end-user communities (i.e. to bolster R&D ecosystems in LMICs), and greater genetic diversity to make trial results more representative. Growth in these areas will allow for more significant and sufficiently funded trials that yield results with relevance for informing public health policy.

As outlined in the original 100DM report, a clinical trial and regulatory system that enables a **100-day response** would be built on these components:

- 1 Sufficient clinical trial capacity and capability, especially in areas where outbreaks are most prevalent
 - 2 Coordinated clinical pipelines for this global network of trials
 - 3 Best practices on trial design embedded across global efforts
 - 4 Flexible regulatory procedures, including pre-agreed emergency regulatory procedures during a PHEIC
- Added this year:**
- 5 Strengthened regulatory capacity in all regions to expedite national approvals
 - 6 Adoption of preparatory regulatory approaches such as pathogen master files, cloud-based data platforms, platform approach and shared risk-benefit frameworks

PROGRESS IN 2023

In 2023 there were several political declarations on strengthening regulatory processes to support pandemic preparedness and response (PPR). The G7 and G20 health ministers reiterated the importance of fostering innovation and catalysing R&D through global cooperation, emphasising adherence to international frameworks to enhance global harmonisation such as guidance from the International Coalition of Medicines Regulatory Authorities (ICMRA) and the International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use (ICH). However, these multilateral declarations have not universally translated into greater regulatory alignment or adoption of more preparatory regulatory approaches that would speed up pandemic response.

There is increasing appetite to bring regulators together to align approaches. The European Medicines Agency (EMA), for example, hosted a workshop on the lessons learned from Mpox and COVID-19 identifying that more transparent processes are needed to assess products in emergencies as well as funding to sustain clinical trial networks during inter-pandemic periods that can pivot when required⁶⁴. In Africa, the African Vaccine Regulatory Forum (AVAREF) continues to deploy its Joint Review Process to enable regulatory alignment across members in Africa⁶⁵, and NISH, the National Immunization Technical Advisory Groups (NITAGs) Support Hub, continues to actively support the work of NITAGs in Africa (supported by Wellcome)⁶⁶.

In clinical trials, WHO conducted a consultation on its guidance for best practices for clinical trials (which incorporates principles from the Good Clinical Trials Collaborative, GCTC), and in November 2023 convened a new Global Clinical Trials Forum to discuss how to ensure robust clinical trials are operationalised sustainably⁶⁷. With guidance developed, organisations are now moving to support their regional implementation. The GCTC formed the Good Trials Prism, a strategic collaboration funded by Wellcome bringing together four clinical trial networks in LMICs: Advancing Clinical Evidence in infectious Diseases (ADVANCE-ID),

Africa Health Research Institute (AHRI), Oxford University Clinical Research Unit (OUCRU), and The Global Health Network (TGHN)⁶⁸. In Africa, the Science for Africa Foundation launched the Clinical Trials Community this year to increase the visibility of where clinical trial sites are on the continent, who is conducting them and what DTVs are being assessed, as well as making individual country regulatory procedures more transparent and accessible⁶⁹. PANTHER (Pandemic preparedness platform for Health and Emerging infectious Response, hosted by DNDi) is an innovative platform designed as a flexible clinical research response framework to assess DTVs rapidly in Africa.

R&D funders are also increasingly aligned to better coordinate and capacitate clinical trial networks through the GloPID-R. GloPID-R have brought 37 member organisations into a Clinical Trial Networks & Funders Working Group to define standards and actions that can prepare clinical trial infrastructure regionally during outbreaks, publishing a Living Roadmap on Clinical Trial Coordination to guide funders⁷⁰. They also launched a 'Regional Hub Strategy' with Hubs so far in Asia-Pacific region and South Africa Hub⁷¹.

In Africa, the Science for Africa Foundation and partners launched the Clinical Trials Community Africa Network this year to map clinical trial sites and lab networks in the continent⁷². This initiative will build up on the gains from the Clinical Trials Community initiative that profiles clinical trial sites and their clinical trials capacity, clinical trialist conducting the trials, DTVs being assessed, as well as making individual country regulatory and ethics information more transparent and accessible⁴⁰.

64 EMA, 2023. "Report of the EMA ETF Workshop on Lessons Learned on Clinical Trials In ..." www.ema.europa.eu/en/documents/report/report-ema/etf-workshop-lessons-learned-clinical-trials-public-health-emergencies_en.pdf

65 Wellcome Interview
66 NISH, 2023. "NISH Support Hub" <https://health.uct.ac.za/nish/>; Wellcome pro forma
67 WHO, 2023. "Public Consultation on Who Guidance for Best Practices for Clinical Trials." www.who.int/news-room/articles-detail/public-consultation-on-who-guidance-for-best-practices-for-clinical-trials

68 Medhurst, N. "Enabling 'Good' Clinical Research in Lmic with the Good Clinical Trials Collaborative." *Clinical Leader*, 2023, www.clinicalleader.com/doc/enabling-good-clinical-research-in-lmic-with-the-good-clinical-trials-collaborative-0001

69 "About Us." CTC Platform, 2023, www.ctc.africa/about
70 GloPID-R, 2023. "Launch of a New Tool for Funders: Living Roadmap Will Support Stronger Coordination of Clinical Trial Responses to Epidemics and Pandemics." www.glopid-r.org/launch-of-a-new-tool-for-funders-living-roadmap-will-support-stronger-coordination-of-clinical-trial-responses-to-epidemics-and-pandemics/

71 GloPID-R, 2023. "Progress in the implementation of GloPID-R's regional hub strategy" <https://www.glopid-r.org/articles-newsletter/progress-in-the-implementation-of-glopid-rs-regional-hub-strategy/#:~:text=With%20the%20rol%20of%20of,improve%20regional%20responsibilities%20and%20ownership>

72 CORDIS EU research results, 2023. "Clinical Trials Community Africa Network" <https://cordis.europa.eu/project/id/101103299>



SUMMARY PLANS FOR 2024

For clinical trials, in 2024 100DM implementation partners should come together under the leadership of WHO's programme to implement WHA resolution 75.8 to support the **twin objectives**:

➤ **Strengthening regionally dispersed clinical trial networks for use in inter-pandemic periods**

➤ **Pre-agreeing trial protocols for emergency response against known priority pathogens**

➤ In 2024, a number of activities are already planned to work towards these overarching goals. The WHO clinical trials guidance will be finalised and adopted, supported by partners such as GCTC, who will co-develop resources with TransCelerate, TGHN and Clinical Trials Transformation Initiative (CTTI) to help regions implement guidelines. The Africa CDC has recently agreed to launch a new clinical trials coordination mechanism⁷³ which will foster collaboration across all parties in the clinical trials ecosystem. Its function will include evaluation of the pipeline of clinical trials in line with African public health and research priorities. In 2024, Africa CDC and African Union Development Agency (AUDA-NEPAD) will continue to engage with the African clinical research ecosystem and African member states to shape and refine this coordination role, including through the evolution of a ten-year execution roadmap. GloPID-R's Clinical Trials Working Group will help enable best practices, and develop a monitoring, evaluation and learning framework for its Living Roadmap on Clinical Trial Coordination. It will also publish an update of its scoping review (PEARLES) on the

barriers affecting the implementation of clinical research of viruses with pandemic potential. As part of this, there should be regionally coordinated discussions on sustainable clinical trial networks that can remain in use in inter-pandemic periods.

➤ On the regulatory side, ICMRA will support further practical steps to bring regulators together and discuss practical steps on moving to a more preparatory regulatory approach, for example, through cloud-based data platforms, platform master files, shared risk/benefit frameworks, and exploring correlates of protection. The G7 and G20 should support more formalised 'twinning' initiatives to build capacity in LMIC regulators, helping more countries to reach maturity level 3 (ML3), while FIND will work with regulators to better define criteria and standards for effectiveness, quality and use cases for diagnostics, as part of 100DM diagnostics framework. Discussions between partners, governments and research institutions will need to take place around the practicality, development and implementation of pre-agreed, master protocols for clinical trials; working closely with the World Health Organization, with a view to having these protocols approved across jurisdictions

⁷³ "Meeting Report: Optimizing Efficiency and Impact in the African Clinical Trials Ecosystem." Africa CDC, 2023, africacdc.org/download/meeting-report-optimizing-efficiency-and-impact-in-the-african-clinical-trials-ecosystem/

BOX 7

PROGRESS TOWARDS THE AFRICAN MEDICINES AGENCY (AMA)

Strengthening Africa's regulatory framework for medicines is crucial to achieving the goal of 60% local vaccine production by 2040. Currently, over 90% of national medicines regulatory agencies in Africa lack capacity. Despite progress, only 7% have moderately developed capacity. As of October 2023, only five out of 54 states' national regulatory authorities (NRAs) have an assessed ML3 or above according to the WHO global benchmarking tool. Initiatives like the African Medicines Regulatory Harmonisation (AMRH) which is a precursor for the African Medicines Agency (AMA) aim to harmonise regulations across the continent. However, the implementation and widespread ratification of the Treaty for the establishment of the AMA is needed for substantial change. Currently, 27 out of 55 countries have ratified the treaty.

22 MEMBER STATES ratified and deposited

- | | |
|--------------|--------------|
| Algeria | Mali |
| Benin | Mauritius |
| Burkina Faso | Morocco |
| Cameroon | Namibia |
| Chad | Niger |
| Egypt | Rwanda |
| Gabon | Seychelles |
| Ghana | Sierra Leone |
| Guinea | Tunisia |
| Kenya | Uganda |
| Lesotho | Zimbabwe |

37 COUNTRIES have supported the AMA Treaty

22 COUNTRIES have ratified and deposited the Treaty

4 MEMBER STATES ratified but NOT deposited

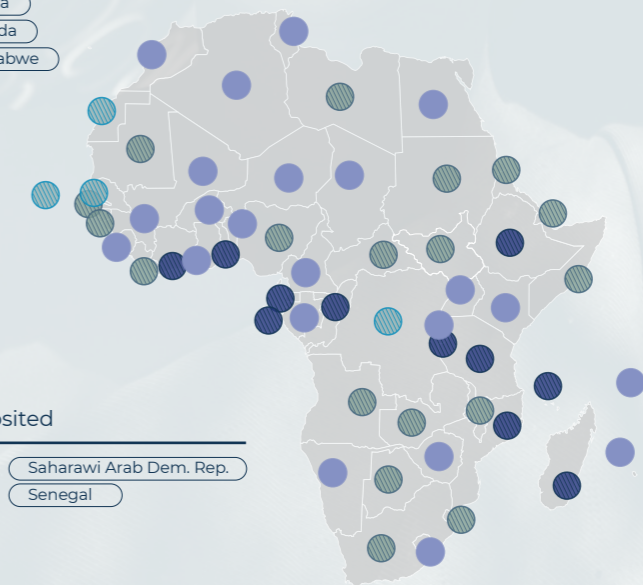
- | | |
|------------------------|-------------------------|
| Cape Verde | Saharawi Arab Dem. Rep. |
| Dem. Rep. of the Congo | Senegal |

18 MEMBER STATES NOT yet signed

- | | |
|----------------------|--------------|
| Angola | Libya |
| Botswana | Malawi |
| Central African Rep. | Mauritania |
| Djibouti | Nigeria |
| Eritrea | South Sudan |
| Eswatini | Somalia |
| Gambia | South Africa |
| Guinea-Bissau | Sudan |
| Liberia | Zambia |

11 MEMBER STATES signed but NOT ratified

- | | |
|-------------------|---------------------|
| Burundi | Mozambique |
| Comoros | Republic of Congo |
| Cote d'Ivoire | Sao Tome & Principe |
| Equatorial Guinea | Tanzania |
| Ethiopia | Togo |
| Madagascar | |



BOX 8

PREPARATORY REGULATORY APPROACHES

Preparatory regulatory approaches are needed to ensure that as much work as possible is done before an outbreak that is a pandemic threat occurs. In practice, this means:



Cloud-based approaches

To enable real-time exchange of information between developers and regulators, as the data becomes available during the drug development lifecycle. Such approaches would play a critical role in preparedness, enabling real-time and rolling regulatory review by multiple agencies; increased transparency with regulators able to see others' questions and company responses; and reduced workload.



Risk-benefit methodologies

That enable informed decisions to be made on whether DTVs have a favorable risk-benefit profile (i.e. the benefits of the technology outweigh any potential risks of its use). This includes having a package of tools (e.g. standardised templates for gathering information) to plan, conduct and evaluate DTVs and enable increased transparency around the development, licensure and deployment of DTVs. This is particularly important for using correlates of protection, where agreement is needed over the biomarkers and associated evidence that are likely to predict clinical benefit.



Platform master files

That capture all the information and data available on innovative platform technologies in a standardised way, to ensure information is only submitted once to regulators and can then be re-used and re-reviewed by agencies when common components and manufacturing process steps have been used.



Sustainable Manufacturing of DTVs

CONTEXT AND AIMS

The inequitable access to MCMs seen during COVID-19 highlighted the importance of strategic manufacturing ecosystems to overcome potential trade barriers. There is a need for better coordination within regions (and globally, supported by mechanisms for equitable access and distribution) to ensure there are routine manufacturing sites that produce DTVs during inter-pandemic times and which can pivot to produce DTVs in the event of a pandemic or epidemic threat. A regional approach would help solve challenges like economies of scale, scale-up, expertise, procurement and availability of reagents and consumables, as well as high capital expense and operating expense.

Developing DTVs regionally can help maintain global health security. However, as we learned with the Global Action Plan for Influenza²⁹, establishing and sustaining such a diversified manufacturing footprint is a complex, costly and lengthy procedure. Governments and industry can share risk to build, develop and maintain DTV manufacturing capacity, recognising its economic and health security potential. Any new manufacturing facilities should prioritise attaining and maintaining relevant Good Manufacturing Practice (GMP) standards and ensure the viability of facilities by modelling the size and scope of demand where possible, in the case of routine products. Operational sustainability (i.e. capacity that can be pivoted and/or scaled up for pandemic production) can be promoted using platforms that produce multiple products. Flexibility of production is paramount, especially with advancements in biomanufacturing technology and platforms designed to reduce scale and electricity usage.

The overarching aims of a manufacturing strategy that can **ensure success** in a 100DM response are:

1

Sufficient capacity and capability (including workforce) to produce an initial regional DTV supply of approved products and associated adequate supply of raw materials. Balancing speed and geographical diversity to prioritise access. This capacity should contribute to sustainable production of routinely used products in inter-pandemic periods, adhering to international standards and delivering to predictable local or regional demand

2

A sustainable **collaborative ecosystem** that supports regional capacity development, including technology transfer, financing models, and market shaping

3

Manufacturing technology developed that enables **flexibility of production** for both routine and pandemic products

4

Greater adoption of high-quality **voluntary licensing frameworks** to enable timely and equitable access to products wherever they are most needed

BOX 9

THE VALUE OF VOLUNTARY LICENSING OF PHARMACEUTICALS AND BIOPHARMACEUTICALS

Voluntary licensing enables innovators to support the manufacturing of effective new treatments for supply in licenced countries, such as LMICs, that might otherwise face delays in accessing needed, new, pandemic products. Voluntary licensing fosters collaboration by allowing partners to contribute to global health initiatives on a voluntary basis on mutually agreed terms. For populations, it facilitates improved access to essential medicines, addressing critical healthcare needs and contributing to public health outcomes.

Licensing has contributed to facilitating access to essential medicines in various disease areas, including HIV, hepatitis C and was widely used in COVID-19 to facilitate access to new, small molecule antivirals in over 100 LMICs. Across all disease areas, the MPP⁷⁴ has secured licence agreements with 20 patent holders, established partnerships with 58 manufacturing companies across 16 countries, including a network of generic manufacturers built during the COVID-19 pandemic. Its manufacturing partners have delivered 35 billion doses of generic versions of patent-protected medicines in over 140 LMICs, with significant health and economic impact⁷⁵. The voluntary nature of these partnerships makes this approach attractive to industry, including generics manufacturers, and policymakers. G20 health ministers have recognised the need to leverage existing networks of generic manufacturers built during the COVID-19 pandemic for equitable access to future pandemic countermeasures.

Indeed, the G7 health minister's communique agreed in Nagasaki in May 2023 noted that:

The G7 would welcome the MPP to work with relevant stakeholders on strengthening the voluntary licencing processes for vaccines and other medical products as an important tool to improve equitable access.

⁷⁴ MPP is a public health organization established by Unitaid in 2010 to accelerate access to innovative medicines and other health technologies in Low- and Middle-Income Countries (LMICs) and facilitate further innovation through voluntary licensing of intellectual property and technology transfer. It operates based on collaborative engagements with patent holders, generic manufacturers and other stakeholders, transparency and market non-exclusivity

⁷⁵ Morrin, S. "The Economic and Public Health Impact of Intellectual Property Licensing of Medicines for Low-Income and Middle-Income Countries: A Modelling Study." *The Lancet Public Health*, 25 Oct. 2021, [www.thelancet.com/journals/lanpub/article/PIIS2468-2667\(21\)00202-4/fulltext](http://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(21)00202-4/fulltext).

PROGRESS IN 2023

Much of the progress in manufacturing capacity in 2023 has focused on Africa, with new strategies and agreements in place as of this year. Gavi developed a comprehensive, four-pillar regional manufacturing strategy to support sustainable vaccine manufacturing through an African Vaccine Market Accelerator (AVMA), aimed at leveraging its market shaping and innovative financing capabilities to support⁷⁶. They also partnered with the Africa CDC to ensure regional ownership and coordination of manufacturing, signing an MoU with the African Union Commission in May 2023 to enhance access to vaccines across member states (focused on immunisation, technical assistance and health systems strengthening)⁷⁷. In addition, the Africa CDC and Gavi hosted the First Manufacturers Marketplace for Vaccine Manufacturing African Union member states in October 2023, where discussions around sustainability of vaccine manufacturing projects in Africa and preferential procurement of African-manufactured vaccines were held.

In December 2023, Gavi's Board approved the establishment of AVMA, that will make up to US\$ 1 billion available to support sustainable vaccine manufacturing in Africa. CEPI have also signed agreements with three organisations including Aspen and the Institut Pasteur Dakar (IPD) in Senegal, Africa's first GMP vaccine manufacturing facility, BioFrama PT in Indonesia with additional facilities to be announced in other Global South regions⁷⁸. Alongside this progress, there are significant developments in other regions, with the Pasteur Network's leading regional manufacturing efforts via Fiocruz and IPD with several other partners.

Manufacturers have been supported through regulatory approvals by 100DM implementation partners. PATH's Center for Vaccine Innovation and Access has supported manufacturers working toward national licensure and World Health Organization prequalification (PQ), including advancing multiple vaccines to the global marketplace through either PQ or Emergency Use Listing with two vaccine suppliers receiving PQ status in 2023⁷⁹. Pfizer submitted its regulatory filing for COMIRNATY[®]

to the South African Health Products Regulatory Authority (SAHPRA) in late 2022 and received full approval as a supply node in 2023.

There have also been technological innovations in manufacturing this year. CEPI supported innovations for equitable access, including thermostable products and sped-up production, with approximately US\$8 million awarded for proof-of-concept studies applicable to mRNA or protein vaccine platforms⁸⁰. They have also established reagent standards for SARS in partnership with UK National Institute for Biological Standards and Control⁸¹.

Furthermore, Unitaid is supporting the late-stage development and catalytic introduction of multiplex molecular diagnostics and next-generation sequencing. They are collaborating with governments, organisations, and regional manufacturers to improve the profitability and competitiveness of diagnostic products and achieve WHO prequalification⁸².

Technology transfer initiatives have advanced to enable the transfer of knowledge and production processes. The mRNA Technology Transfer program, co-led by the WHO and MPP was established to develop sustainable mRNA manufacturing capabilities in LMICs and includes manufacturing partners across 15 LMICs⁸³.

⁷⁶ GAVI, 2023. "The African Vaccine Manufacturing Accelerator: what is it and why is it important?" <https://www.gavi.org/vaccineswork/african-vaccine-manufacturing-accelerator-what-and-why-important>

⁷⁷ GAVI, 2023. "Signing of a new agreement to drive vaccine impact in Africa" <https://www.gavi.org/news/media-room/signing-new-agreement-drive-vaccine-impact-africa>

⁷⁸ CEPI, 2022. "Aspen, CEPI and the Bill & Melinda Gates Foundation expand commitments to improve access to vaccines in Africa" https://cepi.net/news_cepi/aspen-cepi-and-the-bill-melinda-gates-foundation-expand-commitments-to-improve-access-to-vaccines-in-africa/; CEPI, 2023. "CEPI and Institut Pasteur de Dakar announce 10-year partnership to boost manufacturing of affordable vaccines for the Global South" https://cepi.net/news_cepi/cepi-and-institut-pasteur-de-dakar-announce-10-year-partnership-to-boost-manufacturing-of-affordable-vaccines-for-the-global-south/; CEPI, 2023. "CEPI and Bio Farma partnership boosts rapid response vaccine manufacturing for the Global South" https://cepi.net/news_cepi/cepi-and-bio-farma-partnership-boosts-rapid-response-vaccine-manufacturing-for-the-global-south/

⁷⁹ PATH, 2023. "Center for Vaccine Innovation and Access" <https://www.path.org/programs/center-for-vaccine-innovation-and-access/>

⁸⁰ CEPI, 2023. "Innovations to Prepare for Future Epidemics and Pandemics Call for Proposals" https://cepi.net/wp-content/uploads/2023/10/Innovations-to-Prepare-for-Future-Epidemics-and-Pandemics_FAL_CFP-Oct2023.pdf; CEPI, 2022. "CEPI 2022 Annual Progress Report" <https://cepi.net/wp-content/uploads/2023/06/CEPI-Annual-Progress-Report-2022.pdf>; CEPI pro forma

⁸¹ NIBSC, 2023. "Reagent update" https://nibsc.org/science_and_research/virology/influenza_resource/_full_reagent_update.aspx; CEPI, 2023. "CEPI Joint Coordination Group (JCG) meeting summary" <https://cepi.net/wp-content/uploads/2023/10/CEPI-JCG-meeting-summary-August-2023.pdf>; CEPI pro forma

⁸² Unitaid, 2023. "Global Fund, PEPFAR and Unitaid Collaboration Paves Way to Accelerate Approval of African-Manufactured HIV Rapid Tests" <https://unitaid.org/news-blog/global-fund-pepfar-and-unitaid-collaboration-paves-way-to-accelerate-approval-of-african-manufactured-hiv-rapid-tests/#en>; Unitaid, 2023. "Support for WHO prequalification of diagnostics and medicines" <https://unitaid.org/project/support-prequalification-diagnostics-medicines/#en>

⁸³ MPP, 2023. "mRNA technology transfer programme" ; The Lancet, 2023. "First WHO/MPP mRNA Technology Transfer Programme Meeting" [https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247\(23\)00184-2/fulltext](https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(23)00184-2/fulltext); WHO, 2023. "WHO/MPP mRNA Technology Transfer Programme" <https://www.who.int/news-room/events/detail/2023/04/17/default-calendar/who-mpp-mrna-technology-transfer-programme-17-21-april-2023>

The program initially focused on COVID-19 vaccines, but it also aims to empower LMICs to develop mRNA vaccines against various diseases relevant to the regions and for long-term pandemic readiness⁸⁴. South African biologics firm Afrigen, which serves as the hub for the programme's technology development and transfer, has successfully completed the development of its vaccine candidate (AfriVac 2121) which demonstrated comparable immunogenicity, safety and efficacy to the control in pre-clinical animal models⁸⁵. The program is also undertaking mRNA platform technology development. Technology transfer agreements have been signed with 13 out of 15 program partners across LMICs, technology packages have been delivered and Afrigen has conducted introductory training on laboratory scale mRNA production for the partners. Manufacturing sites gap assessments were initiated in 2023 and would be concluded in 2024. Furthermore, in October 2023 the BMGF announced new investments to advance access to mRNA research and vaccine manufacturing technology that will support LMICs' capacity to develop high-quality, lifesaving vaccines at scale⁸⁶.

New public-private partnerships have been established in high-income countries. In May 2023, the UK government announced an investment of £650 million in the 'Life Sciences for Growth package' to include funding for manufacturing, skills and infrastructure⁸⁷. Moderna is collaborating with the UK government to establish an innovation and technology centre capable of producing up to 250 million doses of mRNA vaccines annually by 2025. Moreover, the Canada-UK Biomanufacturing of Biologics and Advanced Therapies Fund was launched to invest up to £3.5 million in developing and implementing innovative technologies for biomanufacturing⁸⁸.

Finally, strides have been made in advancing the regionalisation of manufacturing through the eight pillar framework being developed by the World Economic Forum's Regionalised Vaccine Manufacturing Collaborative (RVMC)⁸⁹. A joint study conducted by the Africa CDC, CHAI and PATH between December 2022 – March 2023 engaged 19 African manufacturers. The study found that a high level of collaboration is needed across the centres that exist in all African regions to ensure that supply produced is aligned with projected 2030 continental vaccine needs to avoid surplus supply⁹⁰.

84 WHO, 2023. "WHO/MPP mRNA Technology Transfer Programme" <https://www.who.int/news-room/events/detail/2023/04/17/default-calendar/who-mpp-mrna-technology-transfer-programme-17-21-april-2023>

85 Fraiser Kansteiner, Fierce Pharma, 2023. "Amid separate BioNTech and Moderna moves, WHO debuts mRNA tech hub in Africa" <https://www.fiercepharma.com/manufacturing/amid-separate-biontech-and-moderna-moves-who-launches-mrna-technology-hub-africa>

86 BMGF, 2023. "Gates Foundation to Accelerate mRNA Vaccine Innovation and Manufacturing in Africa and Globally" <https://www.gatesfoundation.org/ideas/media-center/press-releases/2023/10/mrna-vaccine-manufacturing-africa>

87 GOV.UK, 2023. "Chancellor reveals life sciences growth package to fire up economy" <https://www.gov.uk/government/news/chancellor-reveals-life-sciences-growth-package-to-fire-up-economy>; UK Parliament, 2023. "Life Sciences Growth Package Statement made on 5 June 2023" <https://questions-statements.parliament.uk/written-statements/detail/2023-06-05/hcws819>

88 UKRI, 2023. "Canada-UK: biomanufacturing of biologics and advanced therapies" <https://www.ukri.org/opportunity/canada-uk-biomanufacturing-of-biologics-and-advanced-therapies/>

89 WEF, "Is There an Effective Regional Solution to Vaccine Inequity?" World Economic Forum, Jan. 2023, www.weforum.org/agenda/2023/01/regional-solution-to-vaccine-inequity-davos23/

90 Mogoje, Harvey. "Current and Planned Vaccine Manufacturing in Africa." Clinton Health Access Initiative, CHAI, 21 Sept. 2023, www.clintonhealthaccess.org/report/current-and-planned-vaccine-manufacturing-in-africa/



SUMMARY PLANS FOR 2024

To ensure that sufficient global manufacturing capacity is built **sustainably with the flexibility of technology** to meet the needs of the day, several key actions are needed in 2024.

- As learnings from the COVID-19 pandemic are embedded globally, greater adoption of access-oriented voluntary licensing frameworks is needed to enable timely and equitable access to products wherever they are most needed. During COVID-19, several companies used voluntary licences to enable COVID-19 products to be manufactured around the world but experience and learnings from the various approaches will need to be considered for pandemic preparedness for the future. Outside of an emergency response, more detailed discussions are needed between technology IP and licences holders, manufacturers and recipient organisations on the most important components of usable voluntary licences.
- It is welcomed that the Brazil G20 presidency plans to prioritise local manufacturing in 2024. Early licensing (while the innovator product is still under development), prior identification of qualified manufacturers, sharing of technical know-how, streamlined mechanisms for sharing of reference product, mechanisms to de-risk manufacturers (where appropriate) and accelerated regulatory pathways for quality assurance and in-country regulatory approval are some of the critical enablers for licensing to deliver rapid access to new therapeutics during a pandemic. The G20 has proposed developing a network of generic manufacturers for future pandemic response that could build on the network developed by MPP in the context of COVID-19.
- The wRVMC – launched at Davos in 2022 – is taking strides by sharing multi-year implementation roadmaps that not only facilitate manufacturing efforts, but also emphasise sustainability measures. In 2024, the RVMC are moving towards a new model in an operational phase. The RVMC will continue to support engagement with South East Asia, Latin America, and Middle East regions in 2024, working to promote sustainable practices in manufacturing globally.
- Gavi has sought industry input into the AVMA design through collaboration with the Developing Countries Vaccine Manufacturers Network (DCVMN). CEPI is strategically establishing partnerships to prioritize rapid-response technology platforms funding, with a specific focus on sustainable manufacturing capacity building in Latin America and South East Asia. Pfizer is contributing to sustainable manufacturing by continuing its regional 'Higher Height' training programmes, in partnership with Ministries of Health, emphasizing responsible and ethical production practices. Collectively, these initiatives underscore the international community's commitment to fostering sustainable manufacturing processes that empower countries and regions.
- Central to the success of building biomanufacturing capacity in previously low manufacturing regions is the transfer of appropriate technologies and the upskilling of labour that is technology agnostic and thus, transferable. An upskilled workforce allows for adaptation and customization of technologies to suit local needs, fostering a culture of continuous improvement. The resulting competitiveness attracts investments, expanding markets and sustaining economic growth. This reduction in dependence on imported pharmaceuticals and biopharmaceuticals is a significant benefit to regions that sustainably invest in this aim, making economies more resilient to epidemic and pandemic threats, as well as endemic disease.
- Diversified manufacturing networks focussed solely on fill, finish and formulation processes without further capacity are necessary but remain reliant on imported drug substance for upstream and downstream processes. Strategically expanding global capacity for other stages of the bioproduction processes in the long-term benefits global health security efforts though it is recognised that this will take time.

Case study: Sustainable manufacturing in the Sudan Ebola virus outbreak

Within the first 100 days of an outbreak, it is essential to have rapid production of doses for clinical trials. In September 2022, an outbreak of Sudan Ebolavirus (SUDV) was declared in Uganda. WHO, international organisations and governments worked collaboratively with vaccine developers and researchers to expedite manufacturing of investigational vaccine doses for a clinical trial led by Uganda's Makerere University and co-sponsored by the Ugandan Ministry of Health and WHO, resulting in the first doses arriving on the ground in a record time of 79 days. The quick, coordinated response demonstrates that the 100DM is achievable in the event of another emerging infectious disease outbreak. While the effective deployment of public health measures to curb the epidemic meant that it was too late for vaccines to support the outbreak response and the planned trial did not need to go ahead, both availability of investigational doses and clinical trial infrastructure could be expedited in the future, building on these lessons learnt.

Three vaccine candidates were included in the Tokomeza ring vaccination trial namely (i) ChAd3 (Chimpanzee adenovirus 3)-vectored candidate vaccine, (ii) ChAdOx1 (Chimpanzee adenovirus Oxford, strain 1)-vectored candidate vaccine and (iii) VSV-vectored candidate vaccine, all of which are configured as single-dose vaccines⁹¹. Two of the candidate vaccines developed used the ChAdOx and ChAd3 vector platform, a technology that uses chimpanzee adenovirus modified to reduce its pathogenicity. When injected, it triggers antigens to be produced, stimulating a strong immune response. The VSV-vectored candidate vaccine used a vesicular stomatitis viral vector (single-stranded, negative-sense RNA genome of VSV encoding five structural proteins).

This case study primarily focusses on the lessons learnt from the experiences of those working on the ChAdOx1 vaccine and the partnership with the Serum Institute of India. Many of the lessons learnt are likely to be cross cutting with the other candidate vaccines, though further research is ongoing by the STEG to expand on this case study.

⁹¹ WHO, 2023. "Sudan Ebolavirus Candidate Vaccines What additional research should be conducted to advance the evaluation of these candidate vaccines?" <https://www.who.int/publications/m/item/sudan-ebolavirus-candidate-vaccines-what-additional-research-should-be-conducted-to-advance-the-evaluation-of-these-candidate-vaccines>



Several key factors contributed to the rapid development of investigational doses:



1. Vaccine candidate development & manufacturing

Preparedness efforts gave the world a head start on the manufacturing of vaccines for SUDV, particularly as filoviruses are a well-known viral family. Platform technologies were established for SUDV and kept "warm" by being used for other clinical candidates in the inter-outbreak periods, such as Ebola Zaire, Marburg and other filoviruses⁹².

Given the Serum Institute of India's (SII) experience in the ChAdOx adenoviral vector platform, they could quickly adapt to produce SUDV vaccine developed by the University of Oxford based on this technology in a timely manner. They leveraged established manufacturing, testing and release methods and other vaccine candidates from Sabin Institute and IAVI, who had intermediates ('bulk drug substance') already available to be formulated and filled by contract manufacturing organisations. Manufacturers quickly assessed bottlenecks in the supply chain to ensure there was a supply of the necessary raw materials, and reached out to organisations such as CEPI if they were not. Some pre-assessment in cold storage infrastructure was also valuable in so that the doses could be shipped and held at the trial sites.



2. Partnerships and communication

There was constant communication between the manufacturers and regulatory authorities in Uganda, India and the UK, as well as the Ugandan Ministry of Health at a senior level, supported by WHO, UNICEF, Gavi and CEPI to ensure challenges could be overcome. Such challenges included concerns over at-risk shipping of biological materials to manufacturers; the unclear export and import procedures of virus-containing clinical doses; the acceptance of rapid sterility testing methods for batch release, so that doses could be shipped before all data was available. These partnerships were not new, which meant that technology and material transfer agreements were in place, and there was shared knowledge. This enabled the baton to be passed more smoothly from the developers involved in the SUDV response to manufacturers, where scaling of vaccine production could take place.

Finally, developing and maintaining a skilled workforce is critical for biomanufacturing. The manufacturers and their outsourced testing laboratories already had a technical workforce with experience of the base production platform. For SII, this was via delivering around 2 billion doses of COVID-19 adenoviral vector vaccine. This trained manpower helped accelerate tech transfer, manufacturing, regulatory filings, quality assurance, quality control testing and batch release.

⁹² Rajee Suri, SABIN Vaccine Institute, 2023. "Sabin Vaccine Institute Delivers Ebola Sudan Vaccine to Fight Outbreak in Uganda" <https://www.sabin.org/resources/sabin-vaccine-institute-delivers-ebola-sudan-vaccine-to-fight-outbreak-in-uganda/>



3. Funding, clinical trials and regulation during uncertainty

The uncertainty at the start of an infectious disease outbreak can become a hurdle for funding, regulation and establishing clinical trials. In the Sudan Ebolavirus example, there was a lack of certainty around how many doses would be needed, so doses were manufactured at-risk, based on early estimates that 100,000 doses would be needed for a WHO ring vaccination protocol – supported by the quick release of funding from the UKHSA, BARDA and manufacturing partners.

The involvement of regulators and health authorities was crucial throughout the process; it was also important that processes were started simultaneously to save time. Manufacturers adhered to the Good Manufacturing Practices (GMP) guidelines set by regulatory authorities, while in parallel gaining permission to import the Starting Materials required to manufacture the vaccine, release and export from India. Furthermore, the Investigational Medicinal Product Dossier (IMPD, a central document containing data on the quality, production and control of a product being researched) was written alongside development, which allowed the manufacturers to deliver the IMPD on the same day as clinical doses left the manufacturing site. Furthermore, WHO rapidly established pre-agreed components to enable clinical trials to start rapidly. This included a prioritised set of candidate vaccines, immediately accessible funding agreements, trial insurance which provided appropriate liability and compensation framework, and adapted trial protocols⁹³.

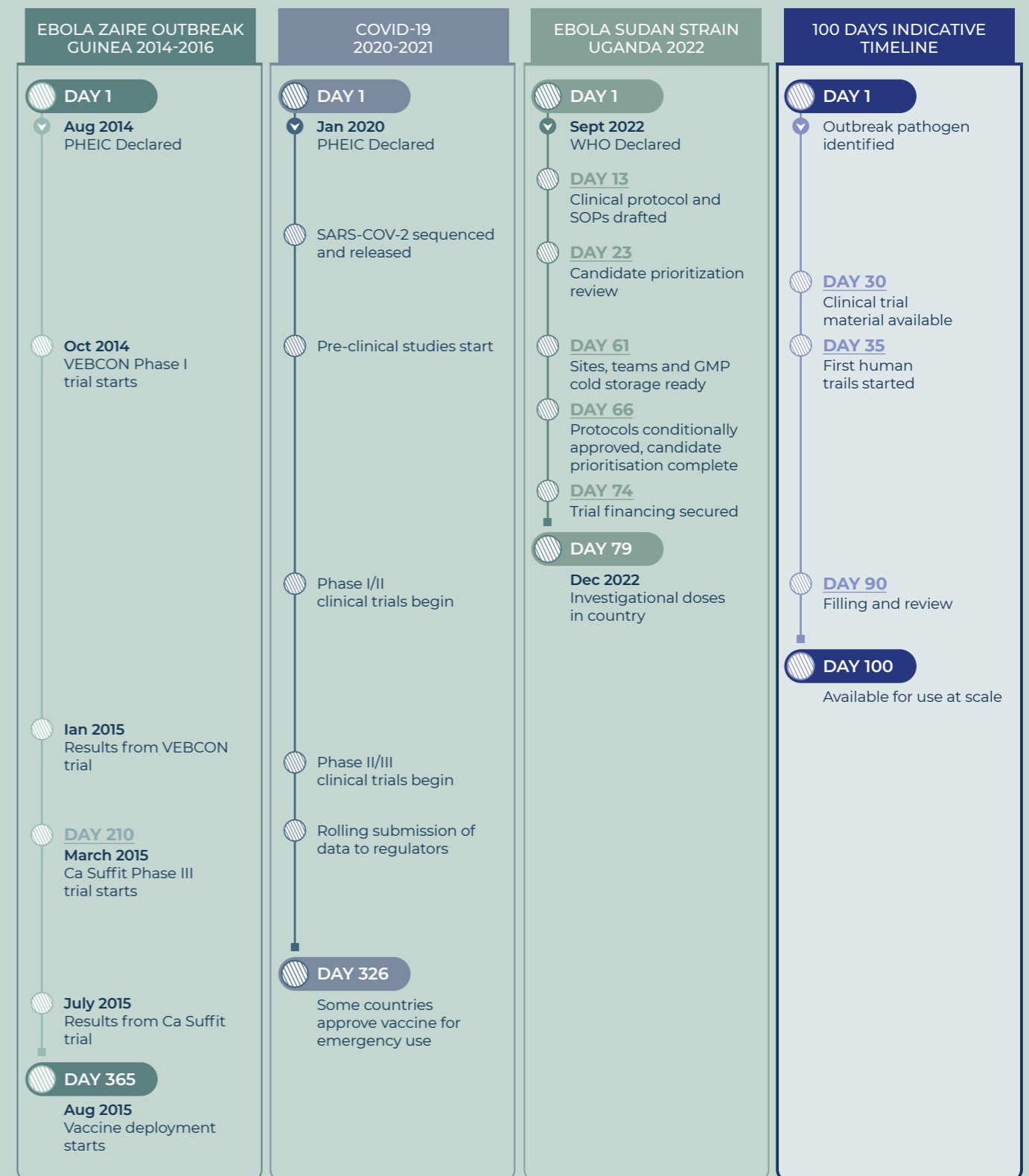
What improvements are now needed?

The response to the SUDV outbreak was rapid, but arguably not rapid enough, even with a significant head start given by the availability of Phase 1-tested candidate materials. This case study demonstrates the need for a whole-ecosystem approach, and many of these improvements need to be made before another major outbreak. The essential improvements that are now needed are:

- Strategic investments in platform technologies with a focus on priority pathogen families and better coordination of R&D between outbreaks
- Harmonised, accelerated regulation and pre-agreed clinical trial designs
- Access to investigational doses based on agreements established between outbreaks
- Regional manufacturing funding and capabilities
- Improvements to manufacturing processes, products and documentation
- Incentivised development of prioritised candidate vaccines through licensure for stockpiling/procurement
- Timely support for deployment of experimental doses at country level and in-country vaccination as part of clinical trials

⁹³ WHO R&D Blueprint meeting 12th January 2023: Sudan Ebolavirus Candidate Vaccines: What additional research should be conducted to advance the evaluation of these candidate vaccines? <https://www.who.int/publications/m/item/sudan-ebolavirus-candidate-vaccines-what-additional-research-should-be-conducted-to-advance-the-evaluation-of-these-candidate-vaccines>

FIGURE 4 Timelines for vaccine development (data from CEPI)



NB it should be noted that the starting point for day 1 in each of the first scenarios differed greatly, and there is of course great uncertainty about the level of preparedness that will be attained before any future attempts at a '100day response'.

4

Pre-agreed pandemic protocols

Pandemic financing, equitable procurement and rigorous global health governance are essential components of pandemic preparedness and response. Whilst their impact on the 100DM cannot be underestimated, it is beyond the scope of the IPPS to influence discussions and negotiations underway as these are driven by member states. As such, we did not collect extra evidence on these areas from implementation partners but have highlighted the core areas relevant to the 100DM below.

Moreover, pre-agreed arrangements should be in place to fund both R&D and DTV procurement. This section details efforts to strengthen financing and procurement mechanisms to enable pandemic readiness and emergency response but does not cover general funding provision for R&D, which is expanded on in the relevant DTV sections in Chapter 1.



Sustainable Pandemic Financing and Procurement for Equitable Access

CONTEXT AND AIMS

There is a strong economic and health imperative for investing in pandemic preparedness to ensure mechanisms are in place to unlock surge financing as well as investing in systems to build capabilities in inter-pandemic times. Surge financing refers to “rapidly deployable technical and financial support that allows regional and national bodies to respond to global health threats at a local level” Adequate surge financing mechanisms would allow LMICs and upper-middle-income countries (UMICs) to purchase sufficient volumes of DTVs quickly and at risk when a threat materialises, and it should be complemented by preparatory funding, such as that provided through the Pandemic Fund, that help build capacities to identify outbreaks and mobilise resources quickly.

There are **two core actions required** to achieve this goal as set out in the original 100DM report:

Establish mechanisms that enable immediate access to pandemic response funding to promote equitable access to DTVs. (The automatic release of funding should be tied to globally agreed trigger points, whether that be a PHEIC or clear pre-PHEIC milestones)

Support LMICs in purchasing and distributing DTVs through equitable allocation and procurement of supplies, including eliminating trade barriers where applicable

PROGRESS IN 2023

In 2023, global dialogues have been underway to make progress towards equitable financing, access and distribution of DTVs. As part of the G20 Joint Finance and Health Task Force (JFHTF) workplan, WHO and the World Bank have been mapping existing pandemic response financing mechanisms and gaps to inform the development of future financing approaches⁹⁵. They identified that less than 40% of G20 countries have dedicated pre-existing contingency financing mechanisms for health crisis response (i.e. during COVID from Multilateral Development Banks), but this did not necessarily mean the funds could be deployed as rapidly as was needed.

Whilst the G20 JFHTF will be reviewing its priorities in 2024, these need to be implemented by member states, and in practice should be tied to globally agreed triggers that enable the release of funding. Currently, when a PHEIC is triggered by WHO, states have a legal duty to respond to the threat, however this timing is too late for many preparatory R&D processes. For example, in COVID-19, major clinical trials for therapeutics had begun well in advance of a PHEIC, but mainly in High Income Countries (HICs) that had funding and resources to mobilise R&D quickly. Other organisations (such as CEPI and Gavi) are considering alternative earlier triggers that could be used as Day 0 for the 100DM for DTVs, and in absence of pre-PHEIC triggers regions are also using their own mechanisms for unlocking resources based on surveillance data.

At the G7 Hiroshima Summit in May 2023, the G7 announced the “the G7 Hiroshima Vision for Equitable Access to Medical Countermeasures (MCMs)” and reconfirmed the importance of ensuring equitable access to MCMs, including therapeutics and vaccines throughout the world⁹⁶. In addition, as one of its concrete initiatives, “the MCM Delivery Partnership for Equitable Access (MCDP)” was launched. The kick-off meeting of the MCDP working group was held in July with the G7, India as the G20 presidency and other related countries, and international organisations such as WHO and UNICEF⁹⁷. Additionally, G7 Development Finance Institutions have committed to contributing to the financing gap and released a new G7 Development Finance Institutions Collaboration Framework for Health Emergencies, which featured several instruments pioneered by Gavi as possible models for the future.

In response and complement to these discussions, Gavi has developed the Day Zero Pandemic Financing Facility for Vaccines (DZF), a suite of financing tools that will enable the Alliance to deliver a rapid and more equitable end-to-end vaccine response in the next pandemic^{98,99}.

It consists of two elements that complement each other: (1) the creation of a new First Response Fund that will enable funds to be deployed faster than any other mechanism in

Gavi’s PPR toolkit, and (2) the expansion of the use and effectiveness of Gavi’s existing surge financing mechanisms so that they can be used beyond COVID-19. This includes an adapted European Investment Bank Frontloading Facility, the US International Development Finance Corporation Rapid Financing Facility, and the International Finance Facility for immunisation (IFFIm) Contingent Financing Mechanism. In 2024 Gavi will continue to seek the DZF for Vaccines’ alignment with discussions and outputs from G20 and G7 discussions on pandemic financing.

Alongside surge financing mechanisms, the Pandemic Fund was established to strengthen prevention, preparedness and response. In July 2023, the Fund awarded its first round of grants in after a call for proposals which received 179 applications from 133 countries (demonstrating exceptionally high demand from LMICs to invest in pandemic prevention)¹⁰⁰. The World Bank awarded grants totalling US\$338 million to 17 projects benefiting 37 countries, focused on disease surveillance, laboratory systems and strengthening workforce capacity within countries¹⁰¹. These projects are expected to mobilise over US\$2 billion in additional resources. However, whilst progress has been made, sustainably financing the Fund remains a challenge as it has only received US\$2 billion in pledges, far below the US\$10.5 billion annual estimated need.

⁹⁵ Pratyasha Ghosh, P4H News, 2023. “G20 Joint Finance and Health Ministerial Taskforce advances global health financing strategies” <https://p4h.world/en/news/g20-finance-health-task-force-advances-global-health-financing-strategies/>; Madeleine Kalisch, Global Health Hub, 2023. “G20 Gandhinagar Health Ministers’ Meeting: Overview of commitments” <https://www.globalhealthhub.de/en/news/detail/g20-health-minister-meetings>

⁹⁶ G7 Hiroshima Summit, 2023. “G7 Hiroshima Vision for Equitable Access to Medical Countermeasures” <https://www.mofa.go.jp/files/100506811.pdf>; Ministry of Foreign Affairs of Japan, 2023. “G7 Hiroshima Summit Session 6 Working Together to Address Multiple Crises” https://www.mofa.go.jp/ecm/ec/page/e_000692.html

⁹⁷ Japan pro forma

⁹⁸ Gavi, 2023. “More than US\$ 1.8 billion in support for African vaccine manufacturing, catching up missed children and pandemic preparedness approved as Gavi Board steps up efforts to tackle backsliding and fight health emergencies” <https://www.gavi.org/news/media-room/initiatives-african-vaccine-manufacturing-approved-gavi-board>

⁹⁹ Gavi pro forma; IFFIm, 2023. “IFFIm Board meets in Geneva with focus on pandemic preparedness” <https://iffim.org/news/iffim-board-meets-geneva-focus-pandemic-preparedness>

¹⁰⁰ The World Bank, 2023. “Pandemic Fund Allocates First Grants to Help Countries Be Better Prepared for Future Pandemics” [HYPERLINK https://www.worldbank.org/en/news/press-release/2023/07/20/pandemic-fund-allocates-first-grants-to-help-countries-be-better-prepared-for-future-pandemics](https://www.worldbank.org/en/news/press-release/2023/07/20/pandemic-fund-allocates-first-grants-to-help-countries-be-better-prepared-for-future-pandemics)

¹⁰¹ Pandemic Fund & PAN pro forma <https://thedocs.worldbank.org/en/doc/ea1acfe37285a29942e9bb513a4fb43-0200022022/related/Pandemic-Fund-Cover-Note.pdf> <https://www.worldbank.org/en/news/press-release/2023/07/20/pandemic-fund-allocates-first-grants-to-help-countries-be-better-prepared-for-future-pandemics>

SUMMARY PLANS FOR 2024

Going forward, globally agreed **pre-PHEIC triggers would be critical** to automatically enable the release of financing to support countries to respond to outbreaks.

- The G20 JFHTF will provide recommendations on surge financing for governments, which Gavi will also seek to align the DZF with.
- The Pandemic Fund should also attract increased contributions for preparedness, should ensure regional bodies are involved in setting priorities and funding decisions. Should the fund be sufficiently recapitalised it should be reconsidered whether grants may also be awarded to strengthen pandemic R&D. Experienced procurement agencies should also consider having advanced purchase frameworks with no-fault compensation systems, indemnification and liability in place to allow the development and fast deployment of pandemic countermeasures.
- Overall, the global system should work towards ensuring greater coordination between funders and those countries and entities receiving funding, to facilitate greater coherence, particularly in the therapeutics space. Procurement agreements that centre equitable access to DTVs are needed between manufacturers and procurers such as Gavi, UNICEF and The Global Fund, and need to be implemented before an outbreak occurs.





Rigorous global health governance

CONTEXT AND AIMS

Governance and international coordination are key aspects of an effective pandemic response, particularly when it comes to declaring a PHEIC, directing R&D, running clinical trials, and ensuring common approaches to access and equity. Strengthened coordination is essential to improve dialogue, global cooperation, and oversight of pandemic readiness and thus accelerate progress against the 100DM and in support of developing safe and effective DTVs.

1

Interim-Medical Countermeasures Network (i-MCM-Net):

Throughout 2023, WHO, convened its member states and stakeholders to develop the concept for an i-MCM-Net. The objective of i-MCM-Net is to strengthen the global MCM ecosystem's resilience, preparedness and responsiveness to pandemic threats by creating a measure of convergence and enhance communication, collaboration and coordination between existing key MCM networks, actors and constituencies at global and regional levels. The 100DM STEG outlined what a genuine multisectoral partnership should ensure in a Lancet opinion piece in September 2023:

- New DTVs are inherently accessible in a timely manner
- R&D is coordinated internationally, particularly when there is limited funding
- A global clinical trials network is developed and maintained
- Preparatory regulatory approaches based on aligned requirements¹⁰²

The stakeholders convened in the i-MCM-Net are collaboratively drafting a report on the MCM ecosystem for publication in 2024. The report will provide a landscape of current activities stakeholders operating in the MCM ecosystem, and critical gaps that need attention with a specific focus on Pandemic Influenza, Novel Coronavirus, and Disease X preparedness. It will cover: R&D, manufacturing, supply & demand, allocation, and last mile delivery.

This year, the main global health governance developments related to the 100DM were:

2

Global Preparedness Monitoring Board (GPMB) Monitoring framework:

GPMB, the independent body responsible for assessing the state of the world's preparedness for pandemics, completed analysis for its Monitoring Framework for Preparedness in 2023, highlighting that there are significant weaknesses in several areas of preparedness. No area that was assessed was deemed as doing well. Moving forward, the GPMB outlined four key priorities, much of which is complementary to the 100DM:

- Strengthen independent and multisectoral monitoring and accountability
- Reform the global financing system for pandemic preparedness, prevention and response
- Achieve more equitable and robust R&D and supply chains
- Enhance multisectoral, multistakeholder engagement

3

INB discussions: In December 2021, the World Health Assembly established an INB to draft and negotiate a convention, agreement or other international instrument under the Constitution of the World Health Organization to strengthen pandemic prevention, preparedness and response. INB negotiations and consultations have been progressing throughout 2023, with the process expected to conclude in 2024. It is hoped that whatever is agreed in the final Pandemic Accord will have a positive impact on the world's ability to deliver the 100DM. Targeted amendments to IHR in October 2023 also hold promise for financing public health emergencies and implementation in several relevant areas¹⁰³.

¹⁰² Dzau et al (2022). The 100DM: how a new medical-countermeasures network can deliver equity and innovation. The Lancet. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(23\)01775-0/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(23)01775-0/fulltext)

¹⁰³ WHO. "Governments Make Progress towards Agreeing Amendments to the International Health Regulations (2005)." World Health Organization, World Health Organization, Oct. 2023, [www.who.int/news/item/07-10-2023-governments-make-progress-towards-agreeing-amendments-to-the-international-health-regulations-\(2005\)](http://www.who.int/news/item/07-10-2023-governments-make-progress-towards-agreeing-amendments-to-the-international-health-regulations-(2005))

5

The year ahead

The year ahead

THE URGENCY OF NOW

Four years post-COVID-19, the world has grappled with economic, conflict and climate crises, inadvertently shifting focus away from pandemic preparedness. Yet, the cost of unpreparedness for the next pandemic could magnify these challenges and spawn new ones. The need for sustained political and financial commitment to pandemic preparedness is more critical than ever.

The 100DM offers a robust, globally endorsed framework for pandemic response. It transcends the usual cycle of panic and neglect in infectious disease R&D. In 2024, we stand at a pivotal moment to transform this plan into action. This mission calls for a united front from international partners, industry, academia, and leaders at all levels.

OPPORTUNITIES IN 2024

The upcoming year is pivotal to put pandemic preparedness on a sustainable footing. There are major milestones such as the conclusion of the Pandemic Accord negotiations at the World Health Assembly in May, advancement of the i-MCM-net concept and release of updated International Health Regulations. These efforts will enhance our ability to respond swiftly and effectively to future pandemics.

As the pandemic fades into the rearview mirror for some political leaders, the health community must find smarter ways to call for multi-benefit investments that will enable UHC, tackle AMR, and lay the groundwork for a 100DM response to any future major outbreaks. The agendas of the Italian and Brazilian presidencies show great potential acknowledge the common challenges and potential common solutions to these threats. By aligning resources and strategies, we can fortify a global health architecture capable of confronting all future health challenges.

THE ROLE OF THE INTERNATIONAL PANDEMIC PREPAREDNESS SECRETARIAT

The IPPS and its leadership will continue its multisectoral approach, collaborating with global partners to keep pandemic preparedness at the forefront of the political agenda. By facilitating scientific exchange and monitoring progress, the Secretariat aims to drive policy and ensure the realisation of the 100DM.

As we look ahead, the call to action is clear and urgent. It is incumbent upon all stakeholders to engage, invest, and collaborate. Together, we can turn the 100DM from aspiration to reality, ensuring a world better prepared for the challenges of tomorrow.

Annex A:

Summary of Recommendations

- NOTE B:
- Progress summarised is not exhaustive but seeks to highlight updates of international relevance
 - Recommendations have been grouped by theme rather than original numerical order
 - Information in the table below has been collated from pro formas and interviews with the named implementation partners.

TOPIC	RECOMMENDATION	2023 SUMMARY PROGRESS UPDATE	PROPOSED 2024 ACTIONS AND OVERARCHING GOALS
<p>Strengthening Global Surveillance</p>	<p>07. Governments should normalise the use of accurate diagnostics for coronavirus and influenza in point-of-care and nonclinical settings</p>	<ul style="list-style-type: none"> • Governments, such as UK and Japan, have made progress towards normalising the use of accurate diagnostics in point-of-care and nonclinical settings. The UK launched the next phase of the Winter COVID-19 Infection Study, providing data on the effects of epidemiological changes in COVID-19, and Japan made antigen qualitative test kits for simultaneous testing of COVID-19 and influenza available as over the counter products that can be purchased online¹⁰⁴ • In May 2023, WHO launched its collaborative surveillance concept¹⁰⁵ • The WHO Pandemic Hub launched the International Pathogen Surveillance Network (IPSN), bringing together pathogen genomics actors to accelerate progress and improve public health decision-making¹⁰⁶ • WHO has accelerated deployment of the Epidemic Intelligence from Open Sources (EIOS) system for early detection, which now includes 72 members and 113 user communities globally¹⁰⁷ • In 2023, the EIOS community conducted 67 EIOS training workshops across 45 member states and organisations, and trained over 1,122 new users, enhancing the capacity to use EIOS tools effectively around the globe. The Global EIOS Trainers Team (GETT) was also established, which, by October 2023, had more than 54 expert trainers¹⁰⁸ • PATH launched the PATH Diagnostic Image Repository in April 2023, a library of reliable, complete, and ethically sourced diagnostic datasets available for digital health technology developers and manufacturers who are committed to advancing health equity¹⁰⁹ • WHO BioHub has furthered its pilot phase with a total of 23 Standard Material Transfer Agreements signed with countries¹¹⁰ • The Pandemic Fund is financing surveillance projects with the first round of funding allocations awarded in July 2023¹¹¹ • The Health Security Partnership to Strengthen Surveillance in Africa launched in July 2023¹¹² 	<ul style="list-style-type: none"> • Implementing partners of the 100DM will continue to work towards a vision for collaborative surveillance • The WHO Pandemic Hub will further establish networks and active collaborations through partnerships with National Public Health Institutes, governments, academia, foundations, CSOs, non-state actors and international organisations around the world • In-country capacities will be strengthened through the IPSN's Catalytic Small Grants Fund for pathogen genomic sequencing, which is set to be launched in 2024, along with the Pandemic Fund's second round of surveillance funding, and locally led software tool development through organisations like Epiverse • Governments should work to tie diagnostic development to surveillance systems to better detect diseases in clinical and non-clinical settings. This includes creating market incentives by normalising the use of multiplex diagnostics in primary care. • Globally, the WHO-led IHR review should identify surveillance-based pre-PHEIC triggers, and the INB will set out a framework for Access and Benefit Sharing <p>Overarching end goals</p> <ul style="list-style-type: none"> • An international network of local surveillance systems, able to identify and characterise local outbreaks for rapid responses • A global ecosystem of interoperable data analytics platforms to enable data sharing that can identify emerging patterns and trends • Mechanisms for rapid exchange of pathogen samples to enable global R&D efforts for diagnostics, therapeutics, and vaccines (including reciprocity with sample providers) • Routine use of diagnostics, especially in high-income settings where it has a key role in underpinning global affordability and promoting innovation • Trusted data sharing mechanisms and platforms
	<p>08. WHO should support an enhanced role for diagnostics in the surveillance of pandemic threats</p>		
	<p>21. Explore the scope for a system that enables biological samples to be collected and shared immediately and unhindered in a pandemic</p>		
	<p>22. Support the recommendations of the Science Academies of the G7 and endorse the development of a roadmap towards a more systematic approach to data capture, standards, sharing and analysis for health emergencies</p>		

104 GOV.UK, 2023."Winter Coronavirus (COVID-19) Infection Study: Estimates of Epidemiological Characteristics": <https://www.gov.uk/government/statistics/announcements/winter-coronavirus-covid-19-infection-study-estimates-of-epidemiological-characteristics-7-december-2023>; Government of Japan pro forma

105 WHO, 2023. "Defining Collaborative Surveillance" <https://www.who.int/publications/i/item/9789240074064>

106 WHO, 2023. "WHO launches global network to detect and prevent infectious disease threats" WHO launches global network to detect and prevent infectious disease threats

107 WHO, 2023. "EIOS Newsletter July 2023" https://cdn.who.int/media/docs/default-source/eios/eios-newsletter_july-2023.pdf?sfvrsn=96aa4da1_1&download=true

108 WHO Berlin Hub interview

109 PATH, 2023."PATH Diagnostic Image Repository" <https://www.path.org/programs/diagnostics/diagnostic-data-repository/#:~:text=The%20PATH%20Diagnostic%20Image%20Repository,while%20maintaining%20privacy%20and%20standards>

110 WHO BioHub pro forma

111 The World Bank, 2023."Pandemic Fund Allocates First Grants to Help Countries Be Better Prepared for Future Pandemics" <https://www.worldbank.org/en/news/press-release/2023/07/20/pandemic-fund-allocates-first-grants-to-help-countries-be-better-prepared-for-future-pandemics>

112 WHO, 2023. "Africa CDC, WHO and RKI Launch a Health Security Partnership to Strengthen Disease Surveillance in Africa" <https://www.who.int/news/item/18-07-2023-africa-cdc--who-and-rki-launch-a-health-security-partnership--to-strengthen-disease-surveillance-in-africa#:~:text=The%20Africa%20Centres%20for%20Disease,and%20Epidemic%20Intelligence%20in%20Africa>

TOPIC	RECOMMENDATION	2023 SUMMARY PROGRESS UPDATE	PROPOSED 2024 ACTIONS AND OVERARCHING GOALS
<p>Strengthening Global Surveillance</p>		<ul style="list-style-type: none"> United Nations General Assembly High-level Meeting on Pandemic Prevention, Preparedness and Response (UNHLM PPR) political declaration committed to encourage fair, equitable and timely sharing of benefits of pathogens with pandemic potential, including genomic sequences through a multilateral system¹¹³ BMGF has been strengthening disease surveillance in Africa by focusing on a small set of high-impact levers which provide value across both high-burden diseases and epidemic threats. These levers include foundational health metrics on population and mortality; multi-pathogen surveillance platforms; and investments in data integration, modelling and use that make them actionable for public health decisions¹¹⁴ Resolve to Save Lives progressed their 7-1-7 framework for monitoring outbreak response and have been providing technical assistance, to help countries to implement surveillance systems for health emergencies through their 717 Alliance¹¹⁵ Epiverse, a data.org programme, has built local open-source software tools for the epidemiological community through projects with the London School of Hygiene and Tropical Medicine, the MRC Unit in the Gambia, Universidad de los Andes, and Pontificia Universidad Javeriana (both in Colombia)¹¹⁶ Data.org is working with WHO and UKHSA to consolidate and collaborate on data sharing for surveillance¹¹⁷ 	
<p>Diagnostics R&D</p>	<p>02. Build prototype [vaccines and] diagnostic libraries applicable to representative pathogens of pandemic potential</p> <p>06. Strengthen the role of the international system in R&D capability and coordination for [therapeutics and] diagnostics</p> <p>Note that progress against this recommendation has been broadened to diagnostics R&D coordination more broadly, beyond a potential CEPI role</p>	<ul style="list-style-type: none"> BARDA has supported multiplex diagnostic test for COVID-19, and Flu and RSV received FDA clearance¹¹⁸ BARDA has supported the development of the BD Respiratory Viral Panel, which is a single consumable and ready-to-use assay that runs on the automated, sample-to-result BD MAX system used by hospitals and labs nationwide¹¹⁹. FIND has entered discussion with the European Commission Health Emergency Preparedness and Response Authority (HERA) regarding diagnostics for pandemic preparedness and submitted a proposal for significant EU funding to advance the 100DM diagnostics agenda¹²⁰ WHO member states endorsed a resolution on diagnostics to address the challenges related to access, affordability, and quality of diagnostic tests, which was passed at the 76th World Health Assembly in May 2023¹²¹ FIND, CHAI, and Africa CDC, among others, have taken initial steps to promote a vision for an international diagnostics alliance¹²² FIND and other organisations including PATH have continued to support initiatives for distributed diagnostics manufacturing in several countries, aiming to enhance global access and preparedness with new partnership agreements signed with PAHO and South Korea in 2023¹²³ 	<ul style="list-style-type: none"> Funders and fundraising bodies should prioritise funding and investment in Diagnostics R&D to achieve appropriate diagnostics infrastructure Funders, in coordination with FIND, should explore mechanisms to ensure adequate funding to initiate work on prototype diagnostic libraries, including garnering investment against FIND's US\$80-100 million proposed plan FIND to hold quarterly meetings to progress partnerships between governments, industry and international organisations towards the 100DM Dx framework Research to continue into effective pathogen-agnostic platforms with the potential to detect Disease X, in line with WHO TPPs Policymakers, research funders and health ministries should prioritise multiplex diagnostics and data connectivity for existing and novel diagnostic tools Health ministries and healthcare governing bodies should prioritise linking diagnostic testing to treatment

113 UN, 2023. "UNHLM Political Declaration (2023)" <https://www.un.org/pga/77/wp-content/uploads/sites/105/2023/06/Zero-draft-PPPR-Political-Declaration-5-June.pdf>

114 BMGF pro forma

115 Resolve to Save Lives, 2023. "Sharing learnings to achieve the 7-1-7 target" <https://resolvetosavelives.org/timeline/sharing-learnings-to-achieve-the-7-1-7-target/>

116 Data.org pro forma; Data.org, 2023. "The Global Epidemic Response of the Future" <https://data.org/initiatives/epiverse/>

117 Data.org interview

118 Medical Countermeasures, 2023. "FDA provides Emergency Use Authorization of Becton, Dickinson and Company's BD Respiratory Viral Panel for BD MAX System developed in collaboration with BARDA" <https://medicalcountermeasures.gov/newsroom/2023/bd/>

119 Medical Countermeasures, 2023. "BARDA-Supported Multiplex Diagnostic Test for COVID-19, Flu, and RSV Receives FDA-Clearance" <https://www.medicalcountermeasures.gov/newsroom/2023/bdpanel/>

120 FIND pro forma

121 WHO, 2023. "Seventy-sixth World Health Assembly" <https://www.who.int/about/accountability/governance/world-health-assembly/seventy-sixth-world-health-assembly>

122 FIND, 2023. "FIND welcomes adoption of historic World Health Assembly Resolution on diagnostics as the organization enters its 20th anniversary year" <https://www.finddx.org/publications-and-statements/press-release/find-welcomes-adoption-of-historic-world-health-assembly-resolution-on-diagnostics-as-the-organization-enters-its-20th-anniversary-year/>

123 FIND, 2023. "Media and Press" www.finddx.org/media-and-press/; PATH, 2023. "PAHO and PATH sign agreement to advance health equity in the Americas" <https://www.path.org/media-center/paho-and-path-sign-agreement-to-advance-health-equity-in-the-americas/>

TOPIC	RECOMMENDATION	2023 SUMMARY PROGRESS UPDATE	PROPOSED 2024 ACTIONS AND OVERARCHING GOALS
Diagnostics R&D		<ul style="list-style-type: none"> • FIND has initiated discussions in China aimed at supporting technology transfer from China to low resource countries and their present and future manufacturers¹²⁴. • FIND and its Pandemic Threats Team have been advancing 100DM diagnostics objectives in 2023, focusing on developing diagnostics for pathogens like Lassa fever and Ebola virus¹²⁵ • The National Diagnostics Catapult (C-CAMP InDx 2.0) was launched, aiming to enhance pandemic preparedness and scale up diagnostics for infectious diseases¹²⁶. • Senegal's diaTROPIX platform, a collaboration between the Institut Pasteur of Dakar and GADx, continues to make progress in infectious disease diagnostics¹²⁷ • Africa CDC in partnership with key partners have launched the Africa Collaborative Initiative to Advance Diagnostics (AFCAD)¹²⁸. • UKHSA are developing a diagnostic accelerator capability with the aim of supporting academic, NGO, and commercial partners to rapidly develop and evaluate new diagnostics along with innovative diagnostic methods for pandemic preparedness, emerging outbreaks and endemic infections, including AMR infections¹²⁹ • BARDA's Division of Research, Innovation, and Ventures (DRIVE) demonstrated clinical mNGS capability for respiratory RNA viruses through its NGS-based agnostic diagnostics program¹³⁰ 	<p>Overarching end goals</p> <ul style="list-style-type: none"> • Strengthened international coordination between governments, industry and international organisations on a sustainable diagnostics R&D ecosystem • Diagnostics library developed providing broad coverage for priority virus families
Therapeutics R&D	<p>03. Develop prototype antiviral therapeutics, including antibody therapies, for pathogens of pandemic potential</p> <p>Note that progress against this recommendation has been broadened from respiratory to all pandemic pathogens (e.g., skin-to-skin, blood-borne)</p> <p>05. Invest in simplified cheaper routes for producing monoclonal antibodies and other new therapeutic modalities</p>	<ul style="list-style-type: none"> • READDI launched broad spectrum antiviral discovery efforts for multiple priority virus families, with ~50 active projects (up from ~30 in 2022) spanning the discovery and development continuum¹³¹ • The Cumming Centre launched the first of two rounds of grant funding under its Foundation Grants (~US\$18million)¹³² • The Pandemic Antiviral Discovery (PAD) initiative announced grants totalling more than US\$26 million for 14 research projects aimed at facilitating early-stage development of drugs to treat henipavirus infection and disease released a Request for Proposals (RfP) focused on Antivirals for Pandemic Influenza in late-2022¹³³ • RD therapeutics demonstrate oral thin-film platforms in animal models with an expressed interest to test this drug delivery technology for vaccines and therapeutics for viruses of pandemic potential¹³⁴ 	<ul style="list-style-type: none"> • Advocating for the importance of investment in pandemic therapeutics will be essential in 2024. The publication of the 100DM Therapeutics Roadmap provides a springboard for such advocacy efforts, engaging funders, member states and industry • IPPS will convene partners in a series of workshops to discuss and commit to the operationalisation of the 100DM Therapeutics Roadmap • WHO is expected to publish its priority pathogen list in Q1 2024, which will particularly help to focus antiviral discovery efforts; a TPP exercise based on that publication will help develop more concrete use cases for novel therapeutics • Many of the drug development programmes awarded funding in 2023 will publish initial results in 2024, while the WHO-led and G20-endorsed i-MCM-Net process will develop further, and the INTREPID Alliance will publish its first compounds list

124 FIND pro forma
 125 FIND, 2023. "Pandemic Threats" <https://www.finddx.org/what-we-do/programmes/pandemic-threats/>
 126 CCAMP, 2023. "CCAMP - InDx 2.0 - National Diagnostics Catapult" CCAMP <https://www.ccamp.res.in/indx-indigenous-diagnostics-national-diagnostics-catapult>
 127 Global Access Diagnostics, 2023. "Regional Manufacturing" <https://www.globalaccessdx.com/regional-manufacturing-network/>; Pasteur Network Pro forma
 128 Africa CDC, 2023. "Africa CDC and AUDA-NEPAD Established Diagnostic Advisory Committee (DAC) to Harmonize regulatory processes for Invitro Diagnostics (IVDs) and to accelerate access to diagnostics for the health security of the continent" <https://africacdc.org/news-item/africa-cdc-and-auda-nepad-established-diagnostic-advisory-committee-dac-to-harmonize-regulatory-processes-for-inviro-diagnostics-ivds-and-to-accelerate-access-to-diagnostics-for-the-health-security/>
 129 GOV.UK, 2023. "Making progress on the global mission to develop pandemic-fighting tools within 100 days" <https://ukhsa.blog.gov.uk/2023/01/31/making-progress-on-the-global-mission-to-develop-pandemic-fighting-tools-within-100-days/>; UK Government pro forma
 130 Center for Biotechnology, 2023. "Who we are BARDA DRIVE Accelerator" <https://centerforbiotechnology.org/who-we-are/barda-drive-accelerator/#:~:text=About%20BARDA%20DRIVE&text=DRIVE%27s%20mission%20is%20to%20accelerate,Americans%20from%20health%20security%20threats>; DRIVE, 2023. "Get to Know DRIVE" <https://drive.hhs.gov/about.html>

131 READDI, 2023. "Antiviral drug solutions" <https://readdi.org/our-approach/broad-spectrum-small-molecule-solutions/>; READDI, 2023. "READDI contributes to alliance in accelerating antiviral drug development" <https://readdi.org/stories/demo-readdi-receives-18-million-in-state-appropriations/>; READDI pro forma
 132 Cumming Centre pro forma
 133 PAD, 2022. "Coming soon – a new PAD Request for Proposals" <https://padinitiative.com/coming-soon-a-new-pad-request-for-proposals/>; PAD, 2022. "Henipavirus – Request for proposals 2022" <https://padinitiative.com/henipavirus-request-for-proposals-2022/>
 134 RD Therapeutics pro forma

TOPIC	RECOMMENDATION	2023 SUMMARY PROGRESS UPDATE	PROPOSED 2024 ACTIONS AND OVERARCHING GOALS
<p>Therapeutics R&D</p>	<p>06. Strengthen the role of the international system in R&D capability and coordination for therapeutics [and diagnostics]</p> <p>Note that progress against this recommendation has been broadened to therapeutics R&D coordination more broadly, beyond a potential CEPI role</p>	<ul style="list-style-type: none"> In March 2023, IAVI, Unitaid, the MPP and Wellcome convened a consultation to explore novel business models to enable equitable access to mAbs in LMICs. The two-day meeting concluded that an action plan was needed to advance key recommendations to ensure a pathway to access could be developed, and a coordinating mechanism which could help galvanise stakeholder interest and investment activities Monoclonal antibodies for Ebola were added to WHO's Essential Medicines List¹³⁵ CEPI launched a funding call for clinical development of mAbs for Nipah virus and to maintain a clinical trial-ready reserve of mAb doses¹³⁶ SPRIND is investing through its funding mechanism, the SPRIND Challenge, in novel therapeutics. In 2021 SPRIND funded nine teams with up to €700,000. In 2023, the best six teams were invited to participate in the second round, supported with up to €1.5 million¹³⁷ US Department of Health & Human Services (HHS) announced a new agreement with Regeneron to develop life-saving monoclonal antibodies as part of Project NextGen¹³⁸ Africa CDC announced that the Partnerships for African Vaccine Manufacturing (PAVM) would expand its mandate to cover therapeutics and diagnostics¹³⁹ The first oral COVID-19 therapeutics licenced by MPP became available for sale after regulatory approvals¹⁴⁰ Nirmatrelvir/ritonavir from two additional manufacturers licenced by MPP became available for sale in 2023 after approval from the WHO Prequalification Programme¹⁴¹ Generic sub-licensees were announced for ensitrelvir, an oral antiviral developed by Shionogi and approved in Japan, that was licenced to MPP¹⁴² The inaugural INTREPID Alliance Antiviral Summit, "Averting the Next Pandemic Now," took place in Washington, D.C. in March 2023, and involved almost 100 international participants from the pharmaceutical and biotech industries, academia, government, regulatory bodies, foundations, and NGOs¹⁴³ The INTREPID Board reaffirmed its focus on the creation and stewardship of a centralized listing of antiviral compounds with potential utility against the eight pandemic viral families prioritised by the NIH¹⁴⁴ INTREPID Alliance published a landscape of antiviral global R&D efforts in Q4 2023¹⁴⁴ 100DM Therapeutics subgroup convened, comprising around 15 partners – including 100DM STEG members – to develop the 100DM Therapeutics Roadmap 	<ul style="list-style-type: none"> Early-stage antiviral researchers who are already being funded for their work will form a coalition in 2024 to collaborate, avoid duplication, and ensure discovery efforts are spread across different pathogen families, with an initial meeting planned for Q1 2024 International organisations, academics and industry should look towards combining efforts in 2024, ideally into a formal therapeutics coalition, with one organisation leading and hosting the work. The scope of this coalition should take in monoclonal antibodies, host-directed therapies and repurposed treatments, as well as small-molecule antivirals, along with new promising platform technologies The therapeutics coalition should consider the current lack of pull incentives for product development, and the potential breakthrough role of AI in advancing drug discovery, along with critical equitable access enablers such as voluntary licensing <p>Planned partner commitments</p> <ul style="list-style-type: none"> SPRIND will complete pre-clinical demonstration of broad-spectrum activity of candidates from at least 5 platform technologies in 2024 INTREPID will publish a centralised listing of promising antiviral compounds by January 2024, advise academia on prioritising compounds for development, and will develop industry policy perspectives on enablers of R&D pipelines. They will facilitate further collaborations with NIAID, AVIDD centres and government agencies MPP will continue to develop capacities and learnings from voluntary licensing in COVID-19 The Cumming Centre will distribute US\$18m to accelerate Tx target discovery and platform technology development. They will also establish a Future Fellow Fund to develop a global community and network READDI will continue preclinical development of existing leads and develop new leads from our existing hits, with target validation and hit discovery efforts proceeding in parallel Given PAXLOVID's pan-coronavirus potential, Pfizer would plan to evaluate its activity against a new, similar pathogen should one emerge in the future <p>Overarching end goals</p> <ul style="list-style-type: none"> Therapeutics library developed providing broad coverage for priority virus families (antivirals and host directed therapies) Pre-agreed procedures in place for adaption, approval, manufacture, procurement and equitable distribution of therapeutics in the event of a pandemic

135 WHO, 2023." WHO Model List of Essential Medicines - 23rd list, 2023" <https://www.who.int/publications/i/item/WHO-MHP-HPS-EML-2023.02>

136 CEPI, 2023." CEPI-funded project to enhance scientific understanding of deadly Nipah virus strains" https://cepi.net/news_cepi/cepi-funded-project-to-enhance-scientific-understanding-of-deadly-nipah-virus-strains/

137 SPRIND, 2023. "SPRIND Challenge" <https://www.sprind.org/en/challenges/antiviral/>; SPRIND pro forma

138 HHS, 2023." HHS Announces Details of Partnership with Regeneron to Develop Life-Saving Monoclonal Antibodies" <https://www.hhs.gov/about/news/2023/09/08/hhs-announces-details-partnership-regeneron-develop-life-saving-monoclonal-antibodies.html>

139 Africa CDC, 2023." Africa CDC hosts the Partnerships for African Vaccine Manufacturing (PAVM) Forum" <https://africacdc.org/news-item/africa-cdc-hosts-the-partnerships-for-african-vaccine-manufacturing-pavm-forum/>

140 FDA, 2023." FDA Approves First Oral Antiviral for Treatment of COVID-19 in Adults" <https://www.fda.gov/news-events/press-announcements/fda-approves-first-oral-antiviral-treatment-covid-19-adults>

141 WHO, 2023." First nirmatrelvir + ritonavir prequalified for Covid-19" [https://extranet.who.int/prequal/news/first-nirmatrelvir-ritonavir-prequalified-covid-19#:~:text=WHO%20Prequalification%20Unit%20\(PQT\)%20added,tablet%20%2D%20Pfizer%20Limited%20%2D%20UNITED%20KINGDOM](https://extranet.who.int/prequal/news/first-nirmatrelvir-ritonavir-prequalified-covid-19#:~:text=WHO%20Prequalification%20Unit%20(PQT)%20added,tablet%20%2D%20Pfizer%20Limited%20%2D%20UNITED%20KINGDOM)

142 MPP, 2023." Seven manufacturers sign sublicense agreements with MPP to produce generic versions of Shionogi's COVID-19 oral antiviral ensitrelvir to increase access in LMICs" <https://medicinespatentpool.org/news-publications-post/seven-manufacturers-sign-sublicense-agreements-with-the-medicines-patent-pool-to-produce-generic-versions-of-shionogis-covid-19-oral-antiviral-treatment-ensitrelvir-to-increase-access-in-low-and-mid>

143 INTREPID Alliance, 2023."INTREPID alliance antiviral summit: Averting the next pandemic now March 22,2023" https://www.intrepidalliance.org/documents/INTREPID-Alliance_Proceedings-and-Exec-Sum.pdf

144 PID INTREPID Alliance, 2023." Pharmaceutical companies come together to accelerate the development of innovative antiviral treatments in preparation for future pandemics" <https://www.intrepidalliance.org/news/pharmaceutical-companies-partner-to-accelerate-the-development-of-innovative-antiviral-treatments>

TOPIC	RECOMMENDATION	2023 SUMMARY PROGRESS UPDATE	PROPOSED 2024 ACTIONS AND OVERARCHING GOALS
Therapeutics R&D		<ul style="list-style-type: none"> Unitaid has supported late-stage R&D efforts throughout COVID-19, including the DNDi-led ANTICOV platform trial to enable research institutions in 13 African countries to collect required evidence for outpatient care¹⁴⁵ BARDA and NIAID's NextGen programme made investments of almost US\$400m in 2023 in developing next-generation monoclonal antibodies for prophylaxis and treatment¹⁴⁶ 	<ul style="list-style-type: none"> Strengthened international coordination between governments, industry and international organisations on a sustainable therapeutics R&D ecosystem Simplified cheaper routes of mAb production and administration in widespread use ready for rapid roll out in the event of a pandemic
Vaccines R&D	<p>02. Build prototype vaccines [and diagnostic] libraries applicable to representative pathogens of pandemic potential</p> <p>04. Invest in modernising vaccine technology by targeting vaccine preventable diseases</p> <p>12. Stimulate a move towards innovative technologies to reduce the complexity of vaccine manufacturing processes and make technology transfer and scalable manufacturing easier in a pandemic by investing in R&D</p>	<ul style="list-style-type: none"> CEPI and the University of California Davis are developing their ranking of the potential of 'Disease X' emergence from key viral families¹⁴⁷ CEPI are developing the concept for a research roadmap for vaccine libraries, covering priority pathogen families to be developed and aligned with WHO and R&D centres across academia and industry¹⁴⁸ CEPI signed a partnership agreement with Houston Methodist Consortium & Institute for Drug Discovery at Leipzig University to advance its pilot to create prototype vaccines for <i>paramyxoviridae</i> and <i>arenaviridae</i>¹⁴⁹ CEPI partnered with Oxford to develop Disease X Vaccine Library platforms and prototype vaccine for Junin virus¹⁵⁰ CEPI partnered with SK Bioscience to develop Japanese encephalitis virus (JEV) and Lassa vaccine platforms¹⁵¹ CEPI partnered with BioNTech to advance mRNA Mpox vaccine development¹⁵² CEPI expanded its animal model network to consider risk factors associated with spillover risk of domestic animal viruses¹⁵³ CEPI has expanded its Centralized Laboratory Network (CLN) to five new members from Africa and India, bringing the CLN to 15 partner facilities in 13 countries¹⁵⁴ CEPI supported technology innovations to apply to potential next-generation vaccine platforms through partnership agreements with innovators, including Tiba Biotech¹⁵⁵, Celestial Therapeutics¹⁵⁶, Gennova, Vaxxas, 20Med and AVaxzipen¹⁵⁷ NIH are continuing their support in universal influenza vaccines, with US\$260 million for influenza vaccine research this year. SCARDA, AMED, and CEPI have signed a Memorandum of Cooperation (MoC) to strengthen collaboration between the organisations¹⁵⁸ 	<ul style="list-style-type: none"> A global prototype vaccine library should be defined in alignment with the 100 Days Mission goals, with a coalition of supporting partners formalised to include, WHO, CEPI, national R&D funders, companies and regulators CEPI working with funding and delivery partners, will complete preclinical tests for the development of initial prototype vaccines for Lassa virus, Junin virus, Nipah virus, Mpox, Japanese encephalitis and enter further candidates into the pre-clinical phase Innovations made in vaccine platforms should be demonstrated in immunogenicity studies produced by CEPI and partners IPPS will seek to support and highlight all efforts to align behind national and regional strategies such as those set by Africa CDC

145 Unitaid, 2020. "Unitaid supports ANTICOV, an adaptive platform trial in Africa to treat mild to moderate cases of COVID-19" <https://unitaid.org/news-blog/unitaid-supports-anticov-an-adaptive-platform-trial-in-africa-to-treat-mild-to-moderate-cases-of-covid-19/#en>; Unitaid pro forma

146 HHS, 2023. "Project NextGen Selects Initial Vaccine Candidates and Awards Over \$500 Million to Advance Development of Vaccines and Therapeutics" <https://www.hhs.gov/about/news/2023/10/13/project-nextgen-selects-initial-vaccine-candidates-awards-over-500-million-advance-development-vaccines-therapeutics.html>

147 CEPI, 2023. "From Spillover to Disease X: new AI collaboration aims to rank viral families with greatest pandemic threat" https://cepi.net/news_cepi/from-spillover-to-disease-x-new-ai-collaboration-aims-to-rank-viral-families-with-greatest-pandemic-threat/

148 CEPI, 2023. "Using AI to speed up vaccine development against Disease X" https://cepi.net/news_cepi/using-ai-to-speed-up-vaccine-development-against-disease-x/

149 Eden McCleskey, Houston Methodist, 2023. "CEPI and Houston Methodist Announce Partnership to Leverage AI to Combat Next Global Pandemic" <https://www.houstonmethodist.org/leading-medicine-blog/articles/2023/sep/cepi-and-houston-methodist-announce-partnership-to-leverage-ai-to-combat-next-global-pandemic/>

150 CEPI, 2023. "CEPI and University of Oxford advance vaccine work against potentially deadly Arenaviruses" https://cepi.net/news_cepi/cepi-and-university-of-oxford-advance-vaccine-work-against-potentially-deadly-arenaviruses/

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152 CEPI, 2023. "BioNTech and CEPI Announce Partnership to Advance mRNA Mpox Vaccine Development and Support CEPI's 100 Days Mission" https://cepi.net/news_cepi/biontech-and-cepi-announce-partnership-to-advance-mrna-mpox-vaccine-development-and-support-cepis-100-days-mission/

153 CEPI Pro forma; Enabling Sciences, 2023. "Preclinical Model Network" <https://epi.tghn.org/covax-overview/enabling-sciences/preclinical-model-network/>

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TOPIC	RECOMMENDATION	2023 SUMMARY PROGRESS UPDATE	PROPOSED 2024 ACTIONS AND OVERARCHING GOALS
<p>Vaccines R&D</p>		<ul style="list-style-type: none"> • SCARDA, AMED, and CEPI have signed a Memorandum of Cooperation (MoC) to strengthen collaboration between the organisations¹⁵⁹ • SCARDA launched a strategic funding programme supporting vaccine development throughout inter-pandemic and pandemic periods and established R&D centres¹⁶⁰ • The Department of Pharmaceuticals, Government of India, PATH, and CEPI, held a co-branded event 'Global Vaccine Research Collaborative' (GVRC) in June 2023¹⁶¹ • The European Commission and the European Investment Bank announced the creation of HERA Invest which will provide €100 million to the InvestEU programme to support R&D¹⁶². The UK Health Security Agency (UKHSA) unveiled its world-leading Vaccine Development and Evaluation Centre (VDEC), helping to develop life-saving new vaccines for the UK and worldwide¹⁶³ • CEPI extended their collaboration with VDEC to include application of assays for Mpox vaccine assessment and to conduct further coronavirus research¹⁶⁴ • UK also announced a 10-year strategic partnership with Moderna for mRNA R&D¹⁶⁵ • The UK's Department for Health and Social Care's (DHSC) UK Vaccine Network (UKVN) announced a second phase in 2023 with a commitment of up to £103.5million in Official Development Assistance (ODA) funding over five years¹⁶⁶ • Pfizer Vaccine R&D has reached people across the globe with approvals for PREVNAR 20® pediatric, ABRYSVO™ for older adult, ABRYSVO™ first and only RSV vaccine through maternal immunisation, and COMIRNATY® 2023-2024 formulation and a potential approval on the horizon for Meningococcal Pentavalent¹⁶⁷ • Sanofi R&D vaccine programs for pan-coronavirus, paramyxovirus and flavivirus reached pre-clinical stages of development, while Vero cell-based yellow fever (YF) vaccine has completed the Phase 2 trial stage positively¹⁶⁸ • Sanofi are collaborating with the US Walter Reed Army Institute of Research, the Vaccine Research Center from NIH, and Sheba Medical to design and clinically validate a vaccine able to induce broad protective responses against all known (and future) variants of SARS-CoV and to provide a basis for future pandemic response to Sarbecovirus outbreaks¹⁶⁹ 	<p>Overarching end goals</p> <ul style="list-style-type: none"> • Strengthened international coordination between governments, industry and international organisations enables a sustainable vaccine R&D ecosystem without over reliance on any one partner • Prototype vaccine libraries developed for the ten highest priority virus families, with preclinical and clinical trials conducted for as many products as possible pre pandemic • Pre-agreed procedures in place for adaption, approval, manufacture, procurement and equitable distribution of vaccines in the event of a pandemic • Programmable vaccine platform technology (including mRNA vaccine technologies) able to be rapidly re-purposed and deployed globally at scale to an emerging 'Disease X' threat, and accessible for use by all populations in all regions • Industry, academia, and public-private partnerships working to achieve the goal to optimise vaccine platforms for large scale production and simplified routes of administration and storage. (i.e., to comply with the WHO TPPs)

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Vaccines R&D		<ul style="list-style-type: none"> The COVID-19 Technology Access Pool (C-TAP) hosted by WHO, and MPP have announced that three new licence agreements have been concluded with the Spanish National Research Council (CSIC), Medigen Vaccine Biologics Corp, and the University of Chile on three COVID-19 products¹⁷⁰ BMGF invested US\$40 million towards the development of mRNA innovation and production in LMICs to assist the production of low-cost and high-quality vaccines at large scale¹⁷¹ BARDA and NIAID's NextGen programme invested just over US\$1 billion to advance Vaccine R&D in 2023¹⁷² The FDA approved approved Ixchiq, the first vaccine for Chikungunya Virus¹⁷³ PATH's Centre for Vaccine Innovation and Access has partnered with vaccine manufacturers globally to advance multiple vaccines to the global marketplace. PATH have also worked with partners to assess the current state of vaccine manufacturing in Africa and make recommendations for how to advance a sustainable manufacturing ecosystem¹⁷⁴ 	
Improvements to Clinical Trials Capability and Regulation Processes	<p>09. Scope out how an international network of clinical trial platforms could be implemented to enable a coordinated and efficient approach to testing of DTVs</p> <p>18. Explore the creation of regional mechanisms to coordinate and prioritise clinical trials of DTVs</p> <p>10. Develop a common regulatory framework that better defines criteria and standards for effectiveness, quality and use cases for diagnostics</p> <p>11. Transform the approach to clinical trial regulation, shortening the time to authorise trials and streamlining the requirements and guidelines relating to trial conduct</p>	<ul style="list-style-type: none"> GloPID-R have brought 48 member organisations into a Clinical Trial Networks & Funders Working Group to define standards and actions that can prepare clinical trial infrastructure regionally during outbreaks, publishing a Living Roadmap on Clinical Trial Coordination to guide funders¹⁷⁵ GloPID-R's Pandemic Preparedness: Analytical Capacity and Funding Tracking program (Pandemic PACT programme) has secured funding from several funding organisations until the end of 2026¹⁷⁶ GloPID-R has launched a 'Regional Hub Strategy' to support regional preparedness and the coordination of research funding in response to outbreaks regionally¹⁷⁷ In May 2023, Africa CDC and AUDA-NEPAD convened sixty experts from across the continent and the globe to discuss concrete solutions for strengthening the impact and efficiency of the African clinical trials ecosystem, which concluded in the publication of a report¹⁷⁸. The Africa Medicines Agency (AMA) continues to make progress with ratification from almost 28 countries, with 5 countries reaching WHO maturity level 3¹⁷⁹ The African Vaccine Regulatory Forum (AVAREF) continues to deploy its Joint Review Process to enable regulatory alignment across members in Africa¹⁸⁰ The NISH, the National Immunization Technical Advisory Groups (NITAGs) Support Hub, continues to actively support the work of NITAGs in Africa (supported by Wellcome)^{181,182} 	<ul style="list-style-type: none"> 100DM implementation partners will implement clinical trials guidance in regional settings In 2024, the WHO clinical trials guidance will be finalised and adopted, supported by partners such as GCTC, who will co-develop resources with TransCelerate, TGHN and CTTI to help regions implement guidelines GloPID-R's Clinical Trials Working Group will help enable best practices, and develop a monitoring, evaluation and learning framework for its Living Roadmap on Clinical Trial Coordination GloPID-R's Clinical Trials Working Group will publish an update of its scoping review (PEARLES) on the barriers affecting the implementation of clinical research of viruses with pandemic potential. As part of this, there should be regionally coordinated discussions on sustainable clinical trial networks that can remain in use in inter-pandemic periods ICMRA will support further practical steps to bring regulators together and discuss practical steps on moving to a more preparatory regulatory approach The G7 and G20 should support more formalised 'twinning' initiatives to build capacity in LMIC regulators, helping more countries to reach ML3, while FIND will work with regulators to better define criteria and standards for effectiveness, quality and use cases for diagnostics, as part of 100DM diagnostics framework

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<p>Improvements to Clinical Trials Capability and Regulation Processes</p>	<p>19. Stringent Regulatory Authorities and the WHO should form an international alliance in a pandemic to support timely exchange of knowledge and information relating to standards and guidelines for DTVs</p>	<ul style="list-style-type: none"> • The Science for Africa Foundation launched the Clinical Trials Community (CTC) platform¹⁸³ • The Science for Africa Foundation and partners launched the Clinical Trials Community Africa Network (CTCAN) to map clinical trial sites and lab networks in the continent¹⁸⁴ • CEPI is initiating collaborations and engaging in discussions with vaccine manufacturers and regulators to shape the preparedness agenda related to pathogen related information (the pathogen disease development file, PDDF) and the technology platform (platform technology master file, PTMF)¹⁸⁵ • CEPI has successfully applied and received an EDCTP grant, collaborating with Ghana FDA and Paul Ehrlich Institute to conduct simulations of scientific advice procedures and clinical trial applications at the AVAREF forum¹⁸⁶ • EMA hosted a workshop on lessons learned from Mpox and COVID-19 to improve coordinate going forward, including a discussion on strengthening and establishing clinical trial networks¹⁸⁷ • Draft updates to ICH Good Clinical Practice (GCP) guidelines were published for consultation in May 2023. Stated aims include increasing its applicability and flexibility to be fit-for-purpose across a broad range of trials, and to emphasise the importance of thoughtful consideration and planning to ensure high-quality design and conduct for each clinical trial¹⁸⁸ • WHO convened a new Global Clinical Trials Forum to discuss how to ensure robust clinical trials are operationalised sustainably¹⁸⁹ • The Good Clinical Trials Collaborative (GCTC) has launched 'Good Trials Prism', a capacity strengthening collaboration, funded by Wellcome, co-led by four leading research organisations supporting clinical trials in low-resource settings¹⁹⁰ • The GCTC coordinated a joint response to the ICH, on behalf of expert individuals and organisations representing over 50 medical societies and patient organisations¹⁹¹ • Draft WHO guidance on best practices in clinical trials was published for public consultation in July 2023. The guidance explicitly focuses on articulating the fundamental scientific and ethical principles that underpin randomised trials, whilst encouraging flexibility and innovation across a range of health threats and technologies¹⁹² • 1Day Sooner and the UK Pandemic Ethics Accelerator published a joint report with ethical recommendations for advancing human challenge models for pandemic scenarios that allow the development of advanced DTVs library for priority pathogens¹⁹³ 	<p>Planned partner commitments</p> <ul style="list-style-type: none"> • GCTC will continue to support WHO and ICH in implementation of new guidelines, and will co-develop resources with TransCelerate, TGHN, CTTI to help regions implement guidelines • GloPID-R's clinical trials working group will enable best practices, and develop a monitoring, evaluation and learning framework for its Living Roadmap on Clinical Trial Coordination. They will also publish an update of their scoping review (PEARLES) on the barriers affecting the implementation of clinical research of viruses with pandemic potential • Africa CDC to launch a new clinical trials coordination mechanism which will foster collaboration across all parties in the clinical trials ecosystem. Its function will include evaluation of the pipeline of clinical trials in line with African public health and research priorities. In 2024, Africa CDC and AUDA-NEPAD will continue to engage with the African clinical research ecosystem and African member states to shape and refine this coordination role, including through the evolution of a ten-year execution roadmap <p>Overarching End Goals</p> <ul style="list-style-type: none"> • Sustainably funded, regionally dispersed and regularly used network of clinical trial sites ready to respond in an emergency • Pre- agreed clinical trial protocols and regulatory pathways for vaccines, therapeutics and diagnostics from within prototype libraries under emergency protocol • Strengthened regulatory capacity in all regions with regional regulatory harmonisation agreements in place where possible to reduce burden on innovators
	<p>20. Stringent Regulatory Authorities and the WHO exchange experience and best- practice on regulatory evaluation of other types of studies (e.g., human challenge trials, immunogenicity studies) during pandemics to support the development of appropriate protocols and guidelines</p>		

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<p>Improvements to Clinical Trials Capability and Regulation Processes</p>		<ul style="list-style-type: none"> Unitaid, in collaboration with the Global Fund, is supporting the development of advanced pathways through the Expert Review Panel for Diagnostics (ERP-D) to facilitate an expedited regulatory review process for regionally manufactured diagnostics¹⁹⁴ WHO have developed a new Prequalification System (ePQS) portal to enable manufacturers, National Regulatory Agencies and other stakeholders to lodge applications for products¹⁹⁵ 	
<p>Regionalised manufacturing of DTVs</p>	<p>16. Governments and industry should share risk to maintain vaccine manufacturing capacity</p> <p>Note: Recommendation 16 extended to cover manufacturing capacity across DTVs</p>	<ul style="list-style-type: none"> The African Union Commission (AUC) and Gavi signed a memorandum of understanding (MoU) to increase access and accelerate the uptake of life-saving vaccines across African Union member states¹⁹⁶ Gavi developed strategy to support sustainable vaccine manufacturing through a African Vaccine Market Accelerator¹⁹⁷ Gavi sought industry input into the AVMA design through collaboration with the Developing Countries Vaccine Manufacturers Network (DCVMN). In addition, the Africa CDC and Gavi hosted the First Manufacturers Marketplace for Vaccine Manufacturing African Union member states in October 2023, where discussions around sustainability of vaccine manufacturing projects in Africa and preferential procurement of African-manufactured vaccines were held The Gavi Board approved the establishment of AVMA, that will make up to US\$ 1 billion available to support sustainable vaccine manufacturing in Africa¹⁹⁸ UN General Assembly High Level Meeting in September 2023 on Pandemic Preparedness and Response Declaration recognised 'the need to support developing countries in building expertise and in developing local and regional manufacturing capacities for tools, including by building on efforts under the COVID-19 Vaccine Global Access (COVAX) Facility¹⁹⁹ CEPI have signed agreements with three organisations including Aspen and the Institut Pasteur Dakar (IPD), Africa's first GMP vaccine manufacturing facility, with an additional facility to be announced²⁰⁰ CEPI provided technical consultation for supply chain systems modelling by KU Leuven, in conjunction with industrial partners such as BioNTech and IDT²⁰¹ CEPI established reagent standards in partnership with the UK NIBSC and is also working on investigational stockpiles to assess the suitability of materials for interim stockpiles in collaboration with UNICEF, Gavi, and WHO²⁰² 	<ul style="list-style-type: none"> Outside of an emergency response, more detailed discussions are needed between patent holders, manufacturers and recipient countries on the most important components of usable voluntary licences The Medicines Patent Pool's pandemic strategy should be supported by the G7, G20 and a broader coalition of companies to standardise the approach to voluntary licence usage in a pandemic The RVMC will continue to support engagement with ASEAN, LatAm, and GCC regions in 2024, working to promote sustainable practices in manufacturing globally Regional Vaccine Manufacturing diversification is part of the "vaccines ready" PPPR approach. Following the review of the Gavi strategy including the 4th pillar on the African Vaccine Manufacturing Accelerator (AVMA) and approval by the Board in December 2023, Gavi will design the full governance, legal and operational details of AVMA, during the first half of 2024 allowing for potential launch in June 2024 while continue collaboration with other pandemic recovery and PPPR initiatives (TBC). CEPI is strategically establishing partnerships to prioritise rapid-response technology platforms funding, with a specific focus on sustainable manufacturing capacity building in LatAm and SE Asia Pfizer is contributing to sustainable manufacturing by continuing its regional 'Higher Height' training programmes, in partnership with Ministries of Health, emphasising responsible and ethical production practices An upskilled workforce allows for adaptation and customisation of technologies to suit local needs, fostering a culture of continuous improvement Global manufacturers should work towards tertiarising their manufacturing processes in the long term <p>Planned partner commitments</p> <ul style="list-style-type: none"> RVMC will share its multi-year implementation roadmaps to facilitate manufacturing efforts. It will continue to support engagement with AESEAN, LatAm and GCC regions CEPI will establish strategic partnerships to prioritise rapid-response technology platforms funding at further sites in LatAm and SE Asia Pfizer will continue its regional 'Higher Height' training programmes in partnership with Ministries of Health

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TOPIC	RECOMMENDATION	2023 SUMMARY PROGRESS UPDATE	PROPOSED 2024 ACTIONS AND OVERARCHING GOALS
<p>Regionalised manufacturing of DTVs</p>		<ul style="list-style-type: none"> • CEPI provided technical and financial support to strengthen and develop manufacturing capabilities in LMICs, with agreements signed with 3 organisations over 2 regions. Including a 10-year partnership with Bio Farma to boost rapid manufacturing of outbreak vaccines at Indonesia's leading vaccine manufacturer²⁰³ • CEPI Launched funding calls for Mfg (CMC) innovations to enable equitable access via thermostable products, and speed of manufacture. Approximately US\$8 million has been awarded so far to fund proof-of-concept studies for novel microarray patches, solid dose and polymeric nanoparticles, all applicable to mRNA or protein vaccine platforms²⁰⁴ • MPP has made significant progress on the mRNA Technology Transfer Programme, with the mRNA Technology Hub facility at Afrigen, South Africa completed and inaugurated. Afrigen has started knowledge transfer on laboratory scale production of AfriVac 2121 as part of a fast track first step in an extensive technology transfer to capacitate 15 partners in LMICs²⁰⁵ • Pfizer received approval for its regulatory filing to the South Africa Health Products Regulatory Authority (SAHPRA) for COMIRNATY® and received full approval as a supply node in 2023²⁰⁶ • The Canada-UK Biomanufacturing of Biologics and Advanced Therapies fund was launched to invest up to £3.5mill in developing and implementing innovative technologies for biomanufacturing²⁰⁷ • In April 2023, the Engineering and Physical Sciences Research Council (EPSRC), part of UK Research and Innovation (UKRI), announced a £12 million investment to fund the Future Vaccines Manufacturing Hub for the next seven years, up to 2030²⁰⁸ • GHIT and MPP signed a MoU to strengthen their collaboration to improve access to medicines. The partnership between the two organisations is designed to help improve global access to products, especially in LMICs²⁰⁹ • PATH's Center for Vaccine Innovation and Access has supported manufacturers working toward national licensure and World Health Organization prequalification (PQ), including advancing multiple vaccines to the global marketplace through either PQ or Emergency Use Listing with two vaccines receiving PQ in 2023²¹⁰ • Unitaid are collaborating with governments, organisations, and regional manufacturers to improve the profitability and competitiveness of diagnostic products and achieve WHO prequalification²¹¹ • The UK government announced an investment of £650 million in the 'Life Sciences for Growth package' to include funding for manufacturing, skills and infrastructure²¹² 	<p>Overarching end goals</p> <ul style="list-style-type: none"> • Governments, global health funders, and industry, should have collaborated to build expanded capacity for DTV manufacturing available to contribute to meeting regional demand in the event of an outbreak, and contributing to sustainable production in inter pandemic periods, adhering to international standards • Manufacturing technology developed to enable flexibility of production to produce both routine and pandemic products

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TOPIC	RECOMMENDATION	2023 SUMMARY PROGRESS UPDATE	PROPOSED 2024 ACTIONS AND OVERARCHING GOALS
<p>Regionalised manufacturing of DTVs</p>		<ul style="list-style-type: none"> • Strides have been made in advancing the regionalisation of manufacturing through the eight pillar framework being developed by the World Economic Forum's Regionalised Vaccine Manufacturing Collaborative (RVMC)²¹³ • A joint study conducted by the Africa CDC, CHAI and PATH between December 2022 – March 2023 engaged 19 African manufacturers²¹⁴ • Africa CDC hosted the Partnerships for African Vaccine Manufacturing (PAVM) Forum in which AU Member States technical experts met with African vaccine manufacturers and partners to garner consensus to establish a Platform for Harmonized African Health (Product) Manufacturing²¹⁵ • PAVM established a Ministerial Working Group to support expanding the local manufacturing efforts beyond vaccines²¹⁶ • PAVM championed the first manufacturer marketplace in Morocco resulting in AU Communiqué to prioritize procuring vaccines from African producers (and partners to procure 30% for global consumption), and acceleration mechanisms for WHO PQ²¹⁷ 	
<p>Sustainable Pandemic Financing & Procurement for Equitable Access</p>	<p>13. The IMF to explore expanding their Article IV consultation with member countries to include a pandemic preparedness assessment, and draw on the analysis and expertise of others. Concurrently, multilateral development banks continue to support investment to strengthen and prepare health systems as part of their core day-to-day business</p> <p>15. Governments should build in conditions into DTV funding contracts for LMIC access to access DTVs at not for profit and scale, which is to be enacted if a PHEIC is declared</p> <p>23. A PHEIC should trigger the activation of an automatic mechanism to procure and distribute DTVs. Further work is needed to determine how such a facility could operate and we recommend considering basing this on advance commitments that are pre-negotiated well before a pandemic</p>	<ul style="list-style-type: none"> • The IMF reports progress in channelling special drawing rights (SDRs) to the Resilience and Sustainability Trust, a promising instrument for financing pandemic preparedness²¹⁸ • The G20 Joint Finance and Health Ministerial Taskforce (JFHTF) continues to serve as a platform for enhanced collaboration between the finance and health sectors, to mitigate economic vulnerabilities and pandemic-related risks while improving preparedness for large-scale pandemic responses²¹⁹. The 18th summit of the G20 leaders was held in New Delhi, India in September 2023²²⁰ • CEPI has commissioned the development of an integrated vaccine development costing and macro-economic benefits model to understand the optimal combination and interconnection of preparedness and surge investments in a crisis²²¹ • At the G7 Hiroshima Summit, the G7 announced the “the G7 Hiroshima Vision for Equitable Access to Medical Countermeasures (MCMs)” and reconfirmed the importance of ensuring equitable access to MCMs, including therapeutics and vaccines throughout the world²²² 	<ul style="list-style-type: none"> • G20 Joint Finance and Health Task Force (JFHTF) will set their priorities for governments to agree and implement in 2024, completing its work on surge financing • Pandemic Fund should attract increased contributions, involve regional authorities in granting decisions and where funds allow also welcome funding requests for medical countermeasure R&D • Gavi will launch a Day Zero Pandemic Financing Facility for Vaccines and agree IFFIm contingent financing mechanisms by pre-positioning donor commitments to the IFFIm • Funders and recipients are better coordinated to lead to greater coherence of effort, particularly in the therapeutics space • Engage in and contribute to relevant G7 and G20 discussions on solutions to pandemic response financing • Progress and finalise the IFFIm Contingent Financing Mechanism, currently under development, including seeking necessary approvals • Operationalise the First Response Fund, including its financing, treasury mgmt., etc and bring relevant considerations back before the Gavi Board

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TOPIC	RECOMMENDATION	2023 SUMMARY PROGRESS UPDATE	PROPOSED 2024 ACTIONS AND OVERARCHING GOALS
<p>Sustainable Pandemic Financing & Procurement for Equitable Access</p>	<p>24. As part of countries' bilateral DTV procurement, any advance purchase agreements with manufacturers should include a requirement for products provided to LMICs to be provided at not for profit. This must also be done within a similar timeframe to when HICs are supplied</p>	<ul style="list-style-type: none"> Gavi has developed the Day Zero Financing Facility (DZF), a suite of financing tools that will enable the Alliance to deliver a rapid and more equitable end-to-end vaccine response in the next pandemic. It consists of two elements that complement each other: (1) a new First Response Fund that will enable funds to be deployed faster than any other mechanism in Gavi's PPPR toolkit, and (2) the expansion of the use and effectiveness of Gavi's existing surge financing mechanisms so that they can be used beyond COVID-19 (including an adapted EIB Frontloading Facility and DFC Rapid Financing Facility, and the under-development IFFIm Contingent Financing Mechanism²²³) The Pandemic Fund awarded its first round of grants in after a call for proposals which received 179 applications from 133 countries²²⁴ In its Dec. 23 meeting the Gavi Board approved the amendments to the DFC and EIB facilities that allow them to be used beyond COVID-19. The Board additionally approved the financing of a First Response Fund of up to US\$ 500 million, under Gavi's Day Zero Financing Facility, contingent on the available funding from the COVAX AMC Pandemic Vaccine Pool (PVP)²²⁵ 	<p>Overarching end goals</p> <ul style="list-style-type: none"> Globally agreed pre-PHEIC triggers automatically enable the release of financing to support countries to respond to outbreaks Procurement agreements that forefront equitable access to DTVs are established between manufacturers and procurers such as Gavi and Unitaid and are implemented before an outbreak occurs Innovative financing tools are in place to channel funds and meet the immediate needs for vaccines within the first 100 days of a pandemic
	<p>25. Multilateral development bank loans should be made available so LMICs can purchase DTVs above the 30% provided through the DTV financing facility in line with recommendation 23. Normal access limits or policies applied by multilateral development banks should not prevent countries receiving urgent finance during a pandemic</p>		

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Annex B:

Secretariat Governance detail

STEERING GROUP

The Secretariat is led by a small Steering Group which provides oversight, accountability and strategic direction. The Steering Group meets on a quarterly basis and comprises representatives from the following organisations:

Representatives from the current, past year, and incoming G20 and G7 presidencies
World Health Organization (WHO)
Wellcome Trust
Bill and Melinda Gates Foundation (BMGF)
International Federation of Pharmaceutical Manufacturers & Associations (IFPMA)
Science and Technology Expert Group (STEG) Co-Chairs
Patrick Vallance, Former UK Chief Scientific Adviser (Independent Chair)

SCIENCE AND TECHNOLOGY EXPERT GROUP

The Science and Technology Expert Group (STEG) provides technical input to the Secretariat. Reporting to the Steering Group, it delivers an assurance function for the annual report against the 100DM recommendations and galvanises support from the scientific community on pandemic preparedness through meetings, working groups, and assessments. It has subgroups focusing on specific issues, including diagnostics, therapeutics, manufacturing, clinical trials and regulatory matters, and R&D coordination.

Membership was drawn from an open global nominations process and includes members from a wide range of regions and sectors. Its members include:

Dr Victor Dzau	President of the National Academy of Medicine	USA (Co-chair)
Shingai Machingaidze	Ag. Chief Science Officer, Africa CDC	Zimbabwe (Co-chair)
Dr Rick Bright	Bright Global Health, Former Director of BARDA	USA
Dr José Castillo	CTO at Univercells & CEO at Quantoom Biosciences	Spain
Professor Tan Chorh Chuan	Chief Health Scientist, Ministry of Health, Singapore Executive Director, MOH Office for Healthcare Transformation	Singapore
Dr Ruxandra Draghia-Akli	Global Head at Johnson & Johnson Global Public Health R&D	USA
Dr Ranna Eardley Patel	Ag. Chief of Staff, CEPI Manufacturing & Supply Chain division	UK
Professor George Gao	Dean of the Savaid Medical School of the University of Chinese Academy of Sciences	China
Professor Ken Ishii	Director of the International Research and Development Center for Mucosal Vaccines, University of Tokyo	Japan
Dr Yewew Kebede	Head, Division of Laboratory Systems & Networks at Africa CDC	Ethiopia
Lalith Kishore	COO of CCAMP-InDx and CEO of Reprocell	India
Professor Teresa Lambe OBE	Professor of Vaccinology and Immunology at the University of Oxford	UK
Dr Amadou Sall	CEO of Institut Pasteur de Dakar	Senegal
Dr Umesh Shaligram	Executive Director, Serum Institute of India Private Limited	India
Dr Mariângela Simão	Former WHO Assistant Director-General for Drug Access Vaccines and Pharmaceuticals	Brazil
Dr Renu Swarup	Former Secretary of the Department of Biotechnology, Ministry of Science & Technology, Government of India	India
Dr Jean-Francois Toussaint	Head of Research and Development at Sanofi Vaccines	France
Dr Niteen S Wairagkar	Founder and CEO, Vaccines for All, Consultant for Africa CDC Partnership for Africa Vaccine Manufacturing, Consultant in Vaccine Development at CEPI	India
Professor Mayumi Shikano	Professor at Tokyo University of Science	Japan
Professor John-Arne Røttingen	Ambassador for Global Health at the Ministry of Foreign Affairs	Norway

SCIENCE AND TECHNOLOGY EXPERT GROUP SUBGROUPS

To address the challenges highlighted in last year's report five subgroups were formed, composed of STEG members and experts drawn in from international organisations, civil society, industry, regional and national partners.

Its members are as follows:

R&D COORDINATION SUBGROUP

Professor Teresa Lambe OBE	Professor of Vaccinology and Immunology at the University of Oxford	UK
Professor Tan Chorh Chuan	Chief Health Scientist, Ministry of Health, Singapore Executive Director, MOH Office for Healthcare Transformation	Singapore
Professor George Gao	Dean of the Savaid Medical School of the University of Chinese Academy of Sciences	China
Dr Renu Swarup	Former Secretary of the Department of Biotechnology, Ministry of Science & Technology, Government of India	India

THERAPEUTICS SUBGROUP

Dr Ranna Eardley Patel	Ag Chief of Staff, CEPI Manufacturing & Supply Chain division, UK	Esteban Burrone	MPP
Dr Ruxandra Draghia-Akli	Global Head at Johnson & Johnson Global Public Health R&D, USA	Tiwadayo Braimoh	MPP
Professor Ken Ishii	Director of the International Research and Development Center for Mucosal Vaccines, University of Tokyo, Japan	Dr Nathaniel Moorman	READDI
Dr Jean-Francois Toussaint	Head of Research and Development at Sanofi Vaccines, France	James Rosen	READDI
Janet Ginnard	Unitaid	James Anderson	INTREPID Alliance
Carmen Perez-Casas	Unitaid	Dr Lydia Ogden	INTREPID Alliance
Dr Charles Mowbray	DNDi	Pushpa Vijayaraghavan	Director, Healthcare & Life Sciences, Sathguru, Management Consultants
Michelle Childs	DNDi	Dr Akhona Tshangela	PAVM
Dr Peter Sjo	DNDi	Dr Stacey Wooden	CEPI
		Professor Sir Martin Landray	GCTC
		Professor Sharon Lewin	Cumming Centre, Australia
		Dr Ken Duncan	PAD (BMGF)

DIAGNOSTICS SUBGROUP

Dr Rick Bright	CEO, Bright Global Health, Former Director of BARDA, USA
Professor George Gao	Dean of the Savaid Medical School of the University of Chinese Academy of Sciences, China
Dr Daniel Bausch	FIND
Dr Emmanuel Agogo	FIND
Dr Mariângela Simão	Former WHO Assistant Director-General for Drug Access Vaccines and Pharmaceuticals, Brazil
Dr Yewew Kebede	Head, Division of Laboratory Systems & Networks at Africa CDC, Ethiopia
Dr Fifi Rahman	Principal Consultant, Matahari Global Solutions
Professor Rachel McKendry	Professor of Biomedicine and Nanotechnology, London Centre for Nanotechnology

CLINICAL TRIALS AND REGULATORY PROCESSES SUBGROUP

Professor Mayumi Shikano	Professor at Tokyo University of Science, Japan
Shingai Machingaidze	Ag Chief Science Officer, Africa CDC
Professor John-Arne Røttingen	Ambassador for Global Health at the Ministry of Foreign Affairs, Norway
Dr Adam Hacker	Director and Head of Global Regulatory Affairs at CEPI
Professor Sir Landray	GCTC
Dr Vasee Moorthy	WHO

SUSTAINABLE MANUFACTURING SUBGROUP

Dr José Castillo	CTO at Univercells & CEO at Quantoom Biosciences	Spain
Dr Umesh Shaligram	Executive Director, Serum Institute of India Private Limited	India
Dr Amadou Sall	CEO of Institut Pasteur de Dakar	Senegal
Dr Ranna Eardley Patel	Ag Chief of Staff, CEPI Manufacturing & Supply Chain division	UK
Dr Niteen S Wairagkar	Founder and CEO, Vaccines for All, Consultant for Africa CDC Partnership for Africa Vaccine Manufacturing, Consultant in Vaccine Development at CEPI	India

Annex C:

Additional Contributors

The Secretariat would like to extend their thanks to representatives of all organisations listed below who have contributed to the 2023 100DM implementation report and ongoing efforts to prepare medical countermeasures for pandemic response.

ADDITIONAL CONTRIBUTORS

1Day Sooner	Leipzig University
Africa CDC	Médecins Sans Frontières (MSF)
African Medicines Agency (AMA)	Medicines Patent Pool (MPP)
African Union Development Agency-NEPAD (AUDA-NEPAD)	Leipzig University
Afrigen Biologics	Pandemic Action Network (PAN)
Airfinity Ltd	Pandemic Antiviral Discovery (PAD)
Bill & Melinda Gates Foundation (BMGF)	Pandemic Sciences Institute
BioNtech	Pasteur Network
Cumming Global Centre for Pandemic Therapeutics (CGCPT)	Pfizer
Data.org	Policy Cures Research
Development Alternatives Incorporated (DAI) Fleming Fund Indonesia	Program for Appropriate Technology in Health (PATH) Vaccines
Drugs for Neglected Diseases initiative (DNDi)	Rapidly Emerging Antiviral Drug Development Initiative (READDI)
Duke-NUS Medical School, Singapore	RD Therapeutics
European Commission	Regeneron
European Investment Bank	Regionalised Vaccine Manufacturing Collaborative (RVMC)
European Medicines Agency (EMA)	RESULTS UK
Foundation for Innovative New Diagnostics (FIND)	Sanofi
Gavi	Science for Africa Foundation
Global Health Innovative Technology (GHIT) Fund	Serum Institute of India Private Limited
Global Health Technologies Coalition (GHTC)	Singapore Government
Global Research Collaboration for Infectious Disease Preparedness (GloPID-R)	SPRIND
Good Clinical Trials Collaborative (GCTC)	Strategic Center of Biomedical Advanced Vaccine Research and Development for Preparedness and Response (SCARDA)
Government of India	The Centre for Cellular and Molecular Platforms Indigenisation of Diagnostics (CCAMP-InDx) Program
Government of Japan	The Coalition for Epidemic Preparedness Innovations (CEPI)
Health Poverty Action	The Oswaldo Cruz Foundation (Fiocruz)
Institut Pasteur de Dakar (IDP)	UK Government
International AIDS Vaccine Initiative (IAVI)	Unitaid
International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use (ICH)	University College London
International Federation of Pharmaceutical Manufacturers and Associations (IFPMA)	University of Oxford
INTREPID Alliance	US Government
Japan Agency for Medical Research and Development (AMED)	Vaccines for All
Johnson & Johnson Global Public Health R&D	Wellcome
	World Health Organization (WHO)

Annex D:

Methodology

This report provides detailed coverage of progress against the 100DM and each of the 25 recommendations (from January to December 2023), based on three data sources, collected in Q4 of 2022:

- ✓ Desk research for relevant documents and datasets
- ✓ Structured interviews with key global health and PPR stakeholders
- ✓ 30+ Pro-forma surveys from key stakeholders (listed in contributors)

DESK RESEARCH FOR RELEVANT DOCUMENTS AND DATASETS

Sources for desk research includes (but is not limited to):

Implementation and strategy reports of key initiatives related to PPR
Updated guidelines, protocols, and frameworks from regulatory authorities
Press releases and publications from international organisations
Resolutions and agreements from international governance forums
Annual reports and press releases from relevant private sector organisations
Peer reviewed research literature from academic institutions
External evaluations of international progress towards PPR

COLLECTION OF PRO-FORMA SURVEYS FROM KEY STAKEHOLDERS

Written input was requested from implementation partners through standardised pro-formas across the following topics:

Progress in 2023
Plans to take forward 100DM and proposed milestones
Alignment of 100DM with ongoing priorities and approach to implementation
Organisations identified as collaborators and engagement framework
Barriers, risks, and enablers to achieving 100DM by 2026
Future path, progress indicators and what constitutes a successful outcome

The draft report was reviewed by key implementation partners who provided input and was finalised with input from the Secretariat Steering Group and STEG.

Annex E:

Definition of 100DM Scorecard Indicators

INDICATORS	CATEGORY	DEFINITION	SOURCE
 R&D funding for diagnostics, vaccines and therapeutics (DTV)	Now	This indicator shows the total R&D funding invested by disease between 2019 and 2022 broken down by donor.	G-FINDER R&D funding data ¹
 Approved products (as of 2022)	Now	This indicator shows where vaccines, diagnostics and therapeutics have been approved for use for each disease. Approved products were defined as inished pharmaceutical products, drugs, vaccines, biologics, or diagnostics that had been granted a marketing authorisation by a medicines regulatory authority or had obtained WHO prequalification. A preliminary list of approved products was identified through a normative literature review of treatment guidelines, WHO position papers, and essential medicines and diagnostic list databases. This preliminary list was then cross-referenced against regulatory authority databases. ² The outer section of the visualisation also shows where products have been approved for use in LMICs. LMIC approval was defined as a product being approved by a National Regulatory Authorities (NRAs) of vaccine producing countries of maturity level 3 or above (as defined by WHO Listed Authorities framework) or has WHO prequalification. ²	Policy Cures Research's updated infectious disease R&D tracker data ² , and additional data sources for COVID-19 ³⁻⁶ and MERS ⁷
 Clinical candidates tested in humans (as of 2022)	Future Readiness	This indicator shows the number of candidates for each disease that are being tested in humans. These are broken down by R&D stage and include Phase I,II,III for vaccines and therapeutics and late-stage development for diagnostics. Candidates were defined as potential drugs, vaccines, vector control products, diagnostics, or platform technologies, currently under investigation that had yet to be approved by a medicines regulatory authority. ²	Policy Cures Research's updated infectious disease R&D tracker data ² , and additional data sources for COVID-19 ³






¹ <https://gfindexdata.policuresresearch.org/>

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INDICATORS	CATEGORY	DEFINITION	SOURCE
 Platform technologies	Future Readiness	This indicator shows if platform technologies are being used to develop clinical candidates. The outer section shows where multiple technologies (i.e., >3) are being applied to the pipeline. The platform technology category includes vaccine, drug, and biologics platforms; adjuvants and immunomodulators; and general diagnostic platforms.	Policy Cures Research's updated infectious disease R&D tracker data, and additional data sources for COVID-19 ³
 Use of animal rule to support licensure (as of 2022)	R&D enablers	This indicator shows where the animal rule, has been used to support product licensure. The animal rule is a principle for an alternative licensure pathway to allow for the approval of drugs and biological products when human efficacy studies are not feasible and is instead based on well-controlled animal studies, when the results of those studies establish that the drug or biological product is reasonably likely to produce clinical benefit in humans.	US FDA ⁸ and EMA ⁹
 Generally accepted correlates of protection	R&D enablers	This indicator shows where there are generally accepted correlates of protection as defined by CEPI.	CEPI ¹⁰
 WHO Target Product Profiles (TPPs)	R&D enablers	This indicator shows which diseases have active WHO Target Product Profiles for vaccines, diagnostics and therapeutics.	Policy Cures Research's updated infectious disease R&D tracker data ³ and WHO TPP directory ¹¹
 R&D funding for platform technologies	Disease X	This indicator shows total R&D funding invested into platform technologies between 2019 and 2022 broken down by donor. WHO recognises 'Disease X' as an unknown pathogen that could cause a serious international epidemic. In G-FINDER this is captured as non-disease-specific R&D, for this indicator it includes the following categories: Therapeutic platforms include drug and biologic delivery platforms; Vaccines include vaccine platforms and adjuvants and immunomodulators.	G-FINDER R&D funding data ¹

⁶ <https://fdaghana.gov.gh/img/reports/FDA-Approved%20Antigen%20RDTs.pdf>

⁷ Castillo-León et al. (2021), "Commercially available rapid diagnostic tests for the detection of high priority pathogens: status and challenges" <https://doi.org/10.1039/D0AN02286A>

⁸ <https://www.fda.gov/media/150191/download?attachment>

⁹ https://www.ema.europa.eu/en/documents/additional-monitoring/list-medicinal-products-under-additional-monitoring_en.pdf

¹⁰ https://cepi.net/wp-content/uploads/2023/10/Innovations-to-Prepare-for-Future-Epidemics-and-Pandemics_FA1_CFP-Oct2023.pdf

¹¹ <https://www.who.int/tools/target-product-profile-database#>

Annex F:

Glossary of Terms

100DM – 100 Days Mission, A global public-private effort to harness scientific innovation to have safe and effective diagnostics, therapeutics, and vaccines (DTV) ready to be deployed within the first 100 days of a future pandemic threat being identified and be ready to do so equitably by 2026

ACT-A – Access to COVID-19 Tools Accelerator, A global collaboration launched in April 2020 to accelerate the development, production, and equitable access to COVID-19 tests, treatments, and vaccines

ADVANCE-ID – Advancing Clinical Evidence in Infectious Diseases, A global network for infectious disease clinical studies that aims to conduct rapid, cost-effective randomised controlled trials to deliver relevant and high quality evidence to guide clinical practice

AFCAD – Africa Collaborative Initiative to Advance Diagnostics, A strategic partnership between the Africa Centres for Disease Control and Prevention; African Society for Laboratory Medicine; Institut de Recherche, de Surveillance Epidémiologique et de Formation; WHO-AFRO; Clinton Health Access Initiative; African Field Epidemiology Network; UNITAID; and other partners to increase access to quality diagnostics towards the achievement of universal health coverage in Africa

Africa CDC – The Africa Centres for Disease Control and Prevention, A continental autonomous health agency of the African Union established to support public health initiatives of member states and strengthen the capacity of their public health institutions to detect, prevent, control and respond quickly and effectively to disease threats

AHRI – Africa Health Research Institute, An independent, transdisciplinary scientific research institute based across two campuses in the province of KwaZulu-Natal (KZN) in South Africa

AI – Artificial Intelligence, Intelligence demonstrated by machines

AMRH – African Medicines Regulatory Harmonisation, A programme started in 2009 as a response to addressing challenges faced by National Medicine Regulatory Authorities (NMRAs) in Africa

AMA – African Medicines Agency, A Specialized Agency of the African Union (AU) dedicated to improving access to quality, safe and efficacious medical products in Africa

AMED – Japan Agency for Medical Research and Development, An independent Japanese medical research and development organization

Antiviral therapeutics – Therapeutics to treat or prevent viral infections

Anvisa – The Brazilian Health Regulatory Agency

AUC – The African Union Commission, The African Union's secretariat which undertakes the day to day activities of the Union.

AUDA-NEPAD – African Union Development Agency-NEPAD, The pan-African strategic framework for the socio-economic development of the continent

AVAREF – The African Vaccine Regulatory Forum, A network of

African national regulatory authorities and ethics committees that uses harmonisation and reliance as pillars for capacity building

AVIDD – Antiviral Drug Discovery Centers for Pathogens of Pandemic Concern, A set of research centres funded by the U.S. NIAID as part of the Antiviral Program for Pandemics

BARDA – Biomedical Advanced Research and Development Authority, An authority within the U.S. Department of Health and Human Services, for the development of medical countermeasures for public health medical emergencies

BMGF – Bill and Melinda Gates Foundation, A global foundation focused on helping all people lead healthy, productive lives

C-CAMP InDx 2D.0 – The Centre for Cellular and Molecular Platforms Indigenisation of Diagnostics Program, A program launched in August 2020 to boost India's preparedness for current & future pandemics, scale up diagnostics for infectious diseases for COVID & beyond

CEPI – Coalition for Epidemic Preparedness Innovations, A global partnership between public, private, philanthropic, and civil organisations launched to accelerate the development of vaccines and other biological countermeasures against epidemic and pandemic threats so they can be accessible to all people in need

CHAI – Clinton Health Access Initiative, A global health organisation committed to saving lives and reducing the burden of disease in low-and middle-income countries

Clinical trial – A prospective research study on human participants designed to answer specific questions about biomedical or behavioural interventions, including DTVs. Clinical trials generate data on dosage, safety and efficacy

CLN – Centralized Laboratory Network

CMC – Chemistry, manufacturing, and control

COVAX – COVID-19 Vaccines Global Access, The vaccine pillar of ACT-A, co-led by Gavi and CEPI. It houses the COVAX Facility, a COVID-19 vaccine procurement pool led by Gavi and CEPI

COVID-19 – The disease caused by the virus SARS-CoV-2

CPHIA – International Conference on Public Health in Africa, The annual International Conference on Public Health in Africa (CPHIA) provides a unique African-led platform for leaders across the continent to reflect on lessons learned in health and science, and align on a way forward for creating more resilient health systems

CSA – Chief Scientific Adviser (or Chief Scientific Adviser-equivalent) of a government

C-TAP – COVID-19 Technology Access Pool, A single global platform for the developers of COVID-19 therapeutics, diagnostics, vaccines and other health products to share their intellectual property, knowledge, and data with quality-assured manufacturers, and provides support for technology transfer agreements

CTC – Clinical Trials Community Platform, A platform that enable the identification of African clinical trials sites by providing access to African clinical trialists, site feasibility data and regulatory and ethics information

CTCAN – Clinical Trials Community Africa Network, A project that seeks to enable increased, sustainable, and coordinated clinical trials on the African continent

DAI – Development Alternatives Incorporated Fleming Fund Indonesia, A collaboration with the Indonesian government to strengthen systems using a “One Health” approach

DCVMN – Developing Countries Vaccine Manufacturer Network, An international public health driven industry association of vaccine manufacturers from developing countries

DFC – U.S. International Development Finance Corporation, A development finance institution and agency of the United States federal government

DHSC – UK's Department for Health and Social Care, A department in UK Government responsible for government policy on health and adult social care

Diagnostics – Products which diagnose diseases, commonly known as tests

Disease – A deviation from normal healthy functioning, in this report typically refers to infectious diseases that affect humans

Disease X – Term that represents the knowledge that a serious international epidemic could be caused by a pathogen currently unknown to cause human disease

DNDi – Drugs for Neglected Diseases initiative, A not-for-profit research organisation developing new treatments for neglected patients

DRIVE – Division of Research, Innovation, and Ventures, A programme set up by BARDA to form unique public private partnerships and funds early stage companies for life saving innovation

DTVs – Diagnostics, Therapeutics and Vaccines

DZF – Day Zero Pandemic Financing Facility for Vaccines, A facility set up by Gavi that aims to ensure that funds for response will be available from the outset in future pandemics

EC – European Commission, The executive body of the European Union

ECRAID – European Clinical Trial Network for Infectious Disease, A legal entity providing access to a pan-European clinical trial network

EDCTP – The European & Developing Countries Clinical Trials Partnership, A public-public partnership between countries in Europe and sub-Saharan Africa, supported by the European Union

EIOS – Epidemic Intelligence from Open Sources, A collaboration between various international public health stakeholders. It uses publicly available information to bring together new and existing initiatives, networks and systems to strengthen public health intelligence (PHI) by creating a unified all-hazards, One Health approach to early detection, verification, assessment and communication of public health threats

Epidemic disease – A disease that affects a large number of people within a region, population or community

ePQS – An IT solution that brings all core areas of work of WHO's Prequalification Unit into one centralised platform including WHO's collaborative procedures and complaints testing

EPSRC – Engineering and Physical Sciences Research Council, The main UK government agency for funding research and training in engineering and the physical sciences

Equitable access – The notion that those with equal needs have equal access. In this report usually referring to DTVs such that DTVs are distributed globally based on clinical need

EUL – Emergency Use Licensing, A WHO procedure for assessing and listing vaccines with the aim of making them more readily available to people affected by a public health emergency

FDA – Food and Drug Administration, A federal agency of the US Department of Health and Human Services responsible for protecting and promoting public health

FIND – Foundation for Innovative New Diagnostics, An organisation aiming to ensure equitable access to reliable diagnostics around the world

G20 – The Group of 20, a forum for international economic cooperation between 19 countries and the European Union

G7 – The Group of 7 nations, an intergovernmental organisation consisting of Canada, France, Germany, Italy, the United Kingdom, the United States, Japan and the European Union

Gavi – The Vaccine Alliance, an organisation aiming to increase access to immunisation in developing countries. Formerly the Global Alliance for Vaccines and Immunisation

GCP – Good Clinical Practice, A set of internationally recognised ethical and scientific quality requirements that must be followed when designing, conducting, recording and reporting clinical trials that involve people

GCTC – Good Clinical Trials Collaborative, A partnership launched in June 2020 to develop guidance to enable and promote informative, ethical and efficient randomised controlled clinical trials

Genomic sequencing – A scientific methodology to identify the genetic material found in an organism or virus

Genomic surveillance – The collection of statistically significant genomic sequence data to represent populations. Genomic sequence data is then compared to help track the spread of a virus, detect new variants, and monitor trends in circulating variants

GETT – Global EIOS Trainers Team, An international team of expert trainers set up by the EIOS, to enhance the capacity to use EIOS tools effectively around the globe

GHIT – Global Health Innovative Technology Fund, An international public-private partnership between the Government of Japan, 16 pharmaceutical and diagnostics companies, the Bill & Melinda Gates Foundation, the Wellcome Trust and United Nations Development Programme

Global Fund – An international financing and partnership organisation fighting AIDS, Tuberculosis and Malaria epidemics

GloPID-R – Global Research Collaboration for Infectious

Glossary of Terms

Disease Preparedness, A global coalition of research funders, aiming to increase preparedness and speed up the research response to outbreaks with pandemic potential

GPDA – Global Pandemic Data Alliance, An alliance formed in September 2021 to drive forward implementation of the G7 recommendations to improve safe data access and use for health emergencies

GVRC – Global Vaccine Research Collaborative, An event held in June 2023 and co-branded by the Department of Pharmaceuticals, Government of India, PATH, and CEPI

HDT – Host-directed therapy

HERA – Health Emergency Preparedness and Response Authority, An EU department launched in 2020 to improve Europe's capacity and readiness to respond to health emergencies

HHS – US Department of Health & Human Services, A cabinet-level executive branch department of the US federal government created to protect the health of the US people and providing essential human services

HICs – High-Income Countries

IAVI – International AIDS Vaccine Initiative, A non-profit scientific research organisation that develops vaccines and antibodies for HIV, tuberculosis, emerging infectious diseases (including COVID-19), and neglected diseases

ICH – International Council for Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use, An initiative bringing together regulatory authorities and pharmaceutical industry to increase harmonisation through development of technical guidelines and requirements across the pharmaceutical product lifecycle

ICMRA – International Coalition of Medicines Regulatory Authorities, A voluntary coordinating and advocacy group of regulatory authorities

IFFIm – International Finance Facility for immunisation, A multilateral development institution created to accelerate the availability of predictable, long-term funds for health and immunisation programs through the GAVI Alliance in 70 of the poorest countries around the world

IFPMA – International Federation of Pharmaceutical Manufacturers & Associations, An international industry association representing research-based pharmaceutical companies and associations

IHR – International Health Regulations, A binding instrument of international law last revised in 2005 to prevent, protect against, control and provide a public health response to the international spread of disease

i-MCM-Net – Medical Countermeasures Network, An end-to-end medical countermeasures platform for the rapid development of, and equitable access to, pandemic tools

IMF – International Monetary Fund, An international financing agency of the United Nations that promotes global growth through financial stability and monetary cooperation

Infectious diseases – Diseases caused by pathogens that can be spread between organisms

INTREPID Alliance – A research-based pharmaceutical industry initiative to discover and develop antivirals for future pandemics

IPD – Institut Pasteur Dakar, A non-profit foundation of public utility, dedicated to promoting public health and well-being in West Africa

IPSN – International Pathogen Surveillance Network, A global network of pathogen genomic actors, brought together by the WHO Hub for Pandemic and Epidemic Intelligence, to accelerate progress in pathogen genomics, and improve public health decision-making

JEV – Japanese Encephalitis virus

JFHTF – Joint Finance and Health Ministerial Taskforce, A task force created by G20 in 2021 to enhance collaboration and global cooperation on issues relating to pandemic prevention, preparedness, and response, thus ensuring that the international community is better prepared in the eventual case of future health threat outbreaks

LMICs – Low and Middle-Income Countries

MABs – Monoclonal antibodies

MCDP – the MCM Delivery Partnership for Equitable Access, A partnership building on the G7 Hiroshima Vision for Equitable Access to MCMs, that aims to coordinate and mobilise surge financing for production, procurement, and delivery of MCMs

MCM – medical countermeasures, Medicines and medical supplies that can be used to diagnose, prevent, or treat diseases related to chemical, biological, radiological, or nuclear threats

MDB – Multilateral Development Bank, An international financial institution chartered by two or more countries, with a purpose to encourage economic development in developing countries

MHRA – Medicines and Healthcare products Regulatory Agency, An executive agency sponsored by the UK's DHSC. MHRA regulates medicines, medical devices, and blood components for transfusion in the UK. The MHRA is also a WHO designated 'Stringent Regulatory Authority'

ML – Machine Learning, Methods that leverage data to improve performance on a set of tasks

MoC – Memorandum of Cooperation, The consultation on matters of common interest to coordinate their activities and to avoid duplication of efforts, as appropriate

Modular manufacturing processes – Using an assembly line type process for manufacturing, in this report referring particularly to vaccine manufacturing

MoU – Memorandum of Understanding, A cooperative agreement between two parties that can include general terms and goals and is not intended to be legally binding

MPP – Medicines Patent Pool, A United Nations-backed public health organisation working to increase access to and facilitate the development of life-saving medicines for LMICs

mRNA – Messenger ribonucleic acid: in vaccines it stimulates/teaches cells to make a specific protein which generates an immune response

NIAID – US National Institute of Allergy and Infectious Diseases, One of the 27 institutes and centres that make up the US National Institutes of Health, focused on conducting and supporting research to better understand, treat, and ultimately prevent infectious, immunologic, and allergic diseases

NIBSC – National Institute for Biological Standards and Control, A UK government agency that works in the field of biological standardisation and is part of the United Kingdom's Medicines and Healthcare products Regulatory Agency

NIH – US National Institutes of Health, A medical research centre in the US Department of Health

NVAP – New Variant Assessment Platform, A platform set up by the UK government (UKHSA) that deploys the UK's sequencing and virus assessment capabilities to help other countries to build their genomic surveillance capacity and capability to effectively identify, assess and track new COVID-19 variants and is now expanding to cover other pathogens of pandemic potential

ODA – Official Development Assistance, Funding provided by official agencies around the world to promote the economic development and welfare of developing countries

One Health Approach – A collaborative, multisectoral, and transdisciplinary approach, working at the local, regional, national, and global levels, with the goal of achieving optimal health outcomes recognising the interconnection between people, animals, plants, and their shared environment

OUCRU – Oxford University Clinical Research Unit, A locally driven research programme on infectious diseases in Southeast Asia with local, regional and global impact on health

PAD – Pandemic Antiviral Discovery, A research funding initiative created by BMGF, the Novo Nordisk Foundation, and Open Philanthropy

PAHO – Pan-American Health Organisation, The specialised international health agency for the Americas

Pandemic – An epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people

Pandemic PACT programme – GloPID-R's Pandemic Preparedness: Analytical Capacity and Funding Tracking program

PANTHER – Pandemic preparedness platform for Health and Emerging infectious Response, An innovative platform, hosted by DNDi, that is designed as a flexible clinical research response framework to assess DTVs rapidly in Africa

Pasteur Insitute – A private, non-profit foundation aiming to prevent and treat infectious disease through supporting research, teaching and public health initiatives through partnerships with international scientific authorities

PATH – An international, non-profit global health organisation that aims to accelerate health equity

Pathogen – An organism causing disease to its host

PAVM – Partnership for African Vaccine Manufacturing, A partnership formed to strengthen the African vaccine manufacturing ecosystem and set Africa on the path to locally manufacture 60 percent of the continent's routine immunisation needs by 2040

PDDF – Pathogen Disease Development File

Phase 2 – The second phase of clinical trials, following phase 1 safety studies. Phase 2 trials test safety and efficacy in ideal conditions. It precedes (and is sometimes combined with)

large-scale phase 3 trials which test effectiveness in real-world conditions

PHEIC – Public Health Emergency of International Concern, A formal declaration by the WHO of an outbreak of a disease that is a public health risk and can spread between many countries and require an international response

Platform trials – A clinical trial with a single master protocol in which multiple treatments are evaluated simultaneously, with mechanisms to add and remove new treatments throughout the trial

PPR – Pandemic Preparedness and Response

Priority pathogens – A list of diseases and pathogens prioritised for R&D in public health emergency contexts by the WHO R&D Blueprint team, due to be updated in early 2023

Programmable technologies – Denotes the transformative impact of new technology platforms and approaches, like mRNA, which allow scientists to rapidly amend medical tools to respond to a specific pathogen

Prototype diagnostic/therapeutic/vaccine – Broad-spectrum or generic DTVs developed in response to a class of pathogen e.g., coronavirus, that could be rapidly adapted to respond to a specific type of pathogen e.g., COVID-19

Prototype pathogen – Pathogen groups or families with similar characteristics, against which it is possible to produce prototype DTVs

PTMF – Platform Technology Master File

PVP – Pandemic Vaccine Pool

R&D – Research and Development

RCT – Randomised Controlled Trial, A trial in which subjects are randomly assigned to one of two groups: one (the experimental group) receiving the intervention that is being tested, and the other (the comparison group or control) receiving an alternative (conventional) treatment

RDT – Rapid Diagnostic Test, A medical diagnostic test that is easy to use and provides quick results, typically in 20 minutes or less

READDI – Rapidly Emerging Antiviral Drug Development Initiative, A global non-profit initiative aiming to develop new broad-spectrum antiviral drug solutions against viral families of pandemic potential

RECOVERY – Trail Randomised Evaluation of COVID-19 Therapy Trial, A randomised evaluation of COVID-19 therapy, large-enrolment clinical trial of possible treatments for severe COVID-19 infection

RfP – Request for proposals

Rules of the road – Denotes expected protocols of behaviour and collaboration for use in a pandemic context. These protocols should form part of a wider suite of guidance WHO sets out (for instance, covering travel and PPE) which must be agreed in advance and demonstrate a step-change from business as usual when a PHEIC is declared

RVMC – Regionalised Vaccine Manufacturing Collaborative, A WEF-supported Collaborative launched in 2022 to close the Global Vaccine Equity Gap by promoting a new model of Regionalized Vaccine Manufacturing

Glossary of Terms

SAHPRA – South African Health Products Regulatory Authority, An entity of NDOH created by the SA government to ensure that health and well-being of humans and animals health are at its core

SCARDA – Strategic Center of Biomedical Advanced Vaccine Research and Development for Preparedness and Response, A vaccine-research initiative funded by the Japanese government

SDR – Special Drawing Rights, Supplementary foreign exchange reserve assets defined and maintained by the IMF

Small molecule antivirals – Chemical compounds typically comprising only 20-100 atoms. These drugs can enter cells easily due to low molecular weight

Solidarity trial – A global RCT set up by the WHO to provide robust results on life-saving treatments for those hospitalized with severe or critical COVID-19

SPRIND – Federal Agency for Disruptive Innovation, An agency that provides financial support for individual and corporate research and development projects based on novel approaches to solutions on behalf of the German government that have the potential to fundamentally develop existing products, technologies or business models and thereby create new markets

SRA – Stringent Regulatory Authorities, National drug regulatory authorities which are members or observers or associates of the International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use, as defined by WHO

STEG – Science and Technology Expert Group, Advisory group to the International Pandemic Preparedness Secretariat

SUDV – Sudan Ebolavirus

Surge financing – Rapidly deployable technical and financial support that allows regional and national bodies to respond to global health threats at a local level

T&T – Test and Treat

Technology transfer – The process of transferring the knowledge, physical objects, skills and technology management required to manufacture DTVs with a particular emphasis on the challenges and complexity of vaccine manufacturing technology transfer

TGHN – The Global Health Network, The Global Health Network is a platform to enable research by sharing knowledge and research methods

Therapeutics – The branch of medicine concerned with the treatment of disease and the action of remedial agents. Commonly referred to as medicines or treatments

TPP – WHO Target Product Profile, The desired R&D outcome of a product that is aimed at addressing a particular disease or diseases

UKHSA – UK Health Security Agency, An executive agency sponsored by the UK's DHSC, that provides national and local leadership towards security against infectious diseases, chemical, biological, radiological and nuclear incidents and other health threats

UKVN – UK Vaccine Network, A ODA-funded project which makes targeted investments to support the development

of new vaccines and vaccine technologies for emergent infectious disease threats in low and middle-income countries

UMICs – Upper-Middle-Income Countries

UNHLM PPPR – United Nations High-level Meeting on Pandemic Prevention, Preparedness and Response, A meeting convened by the President of the United Nations General Assembly on 20 September 2023. The overall theme of the HLM was "Making the world safer: Creating and maintaining political momentum and solidarity for Pandemic Prevention, Preparedness and Response", and consisted of an opening segment, a plenary segment for general discussion, two multi-stakeholder panels, and a brief closing segment

Unitaid – An international financing and partnership organisation hosted by the WHO funding initiatives to address diseases such as AIDS, Tuberculosis and Malaria

Vaccine – A product that stimulates a person's immune system to produce immunity to a specific disease, protecting the person from that disease

VDEC – Vaccine Development and Evaluation Centre, a unique facility in the UK, delivering multiple critical early pre and post clinical research and evaluation studies

Virus – A submicroscopic infectious agent that replicates only inside the living cells of an organism

Virus families – Classification of viruses according to characteristics (e.g., single or double stranded); viruses in the same family have similar characteristics

WEF – World Economic Forum, An international organisation that brings together its membership of political and business leaders on a yearly basis to discuss major issues concerning the world political economy

Wellcome – A global charitable foundation supporting science to solve urgent health issues

WHA – World Health Assembly, The decision-making body of the World Health Organization

WHO BioHub – A system that aims to offer a reliable, safe, and transparent mechanism for WHO member states to voluntarily share novel biological materials

WHO Pandemic Hub – WHO Hub for Pandemic & Epidemic Intelligence

WHO – World Health Organization, An agency of the United Nations that sets standards for disease control, healthcare, and medicines; conducts education and research programs; and publishes scientific papers and reports

WIPO – World Intellectual Property Organisation, Global database that provides free of charge access to legal information on intellectual property

WTO – World Trade Organisation, An intergovernmental organisation that deals with the global rules of trade between nations to facilitate and regulate international trade





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