

Annex

Supplementary Table A1: Search Strategy to Identify Eligible English-language peer-reviewed reviews focusing on sustainable financing strategies for immunisation programs not related to COVID-19 at an international or regional level (PubMed)

Search Number	Description
1 (Title/Abstract)	(Title/Abstract) invest* OR cost* OR fund* OR donor OR “development assistance” OR OR stakeholder* OR financ* OR government program [MeSH Terms]
2 (Title/ Abstract)	(Title/Abstract) global OR international OR multi-country OR nation*
3 (Title/ Abstract)	(Title/Abstract) "health system*" OR "healthcare system*" OR "healthcare service*" OR "health service*" OR "healthcare security" OR "health security" OR "essential public health functions" OR "health emergenc*" OR vaccin* OR "immunisation program*" OR immunisation OR "immunisation program*" OR immunisation OR "vaccination program*" OR "vaccines" [MeSH Terms]
4 (Title/Abstract)	(Title/Abstract) resilien* OR sustain* OR preparedness OR preparation OR capacit* OR readiness OR strengthen* OR capabilit*

5	#1 AND #2 AND #3 AND #4
Filters	<p>Publication type: Books and Documents, Clinical Trial, Government Publication, Meta-Analysis, Multicenter Study, Preprint, Randomized Controlled Trial, Review, Systematic Review, Technical Report</p> <p>Timing: Restrict from 2020/1/1 - 2023/2/28</p> <p>Language: English</p>
Results	914

Date of search: March 18, 2023

Supplementary Table A2. Characteristics of Included English-language peer-reviewed Studies focusing on sustainable financing strategies for immunisation programs not related to COVID-19 at an international or regional level: study site, objective, type of publication, and reference

Title	Study Site	Objective	Type of publication	Reference
COVID-19 preparedness: capacity to manufacture vaccines, therapeutics and diagnostics in sub-Saharan Africa	Sub-Saharan Africa	We discuss the challenges that countries in sub-Saharan Africa may face with access to COVID-19 vaccine, therapeutics, and diagnostics due to the limited capacity to manufacture them in Africa; and make recommendations on actions to mitigate these challenges and ensure health security.	Review	Bright, B., Babalola, C.P., Sam-Agudu, N.A. <i>et al.</i> COVID-19 preparedness: capacity to manufacture vaccines, therapeutics and diagnostics in sub-Saharan Africa. <i>Global Health</i> 17 , 24 (2021). https://doi.org/10.1186/s12992-021-00668-6
Vaccine Research and Development to Advance Pandemic and Seasonal Influenza Preparedness and Response: Lessons from COVID-19	Global	Vaccine Research and Development to Advance Pandemic and Seasonal Influenza Preparedness and Response focuses on how to leverage the knowledge gained from the COVID-19 pandemic to optimise vaccine research and development (R&D) to support the prevention and control of seasonal and pandemic influenza. The committee's findings address four dimensions of vaccine R&D: (1) basic and	Consensus Study Report	National Academy of Medicine; National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Global Health; Committee on Vaccine Research and Development Recommendations for Advancing Pandemic and Seasonal Influenza Preparedness and Response; Soltani H, Subbarao K, Bond E, editors. Vaccine Research and Development to Advance Pandemic and Seasonal Influenza Preparedness and Response: Lessons from COVID-19. Washington (DC): National Academies Press (US); 2021 Nov 17. Available from:

		translational science, (2) clinical science, (3) manufacturing science, and (4) regulatory science.		https://www.ncbi.nlm.nih.gov/books/NBK578844/ doi: 10.17226/26282
A Research and Development (R&D) roadmap for influenza vaccines: Looking toward the future	Global	This report summarises the major issues and priority areas of research outlined in the IVR. By identifying the key issues and steps to address them, the roadmap not only encourages research aimed at new solutions, but also provides guidance on the use of innovative tools to drive breakthroughs in influenza vaccine R&D	Review/Report	National Academies of Sciences Engineering and Medicine. Vaccine research and development to advance pandemic and seasonal influenza preparedness and response: Lessons from COVID-19 [Internet]. Washington, DC: The National Academies Press; 2022. 1–178 p. Available from: https://doi.org/10.17226/26282
The Race for Global Equitable Access to COVID-19 Vaccines	Global	The review summarises the global efforts with respect to vaccine development, production, allocation, and deployment to achieve equitable access.	Review	Moore KA, Ostrowsky JT, Kraigsley AM, Mehr AJ, Bresee JS, Friede MH, et al. A Research and Development (R&D) roadmap for influenza vaccines: Looking toward the future. Vaccine [Internet]. 2021;39(45):6573–84. Available from: https://www.sciencedirect.com/science/article/pii/S0264410X21010288?via%3Dihub

Countering the pandemic threat through global coordination of vaccines	Global	This study provides recommendations on how to identify and overcome barriers to effective global coordination and sustainable financing for pandemic and seasonal influenza vaccines and vaccinations.	Consensus study report	National Academy of Medicine; National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Global Health; Committee on Global Coordination, Partnerships, and Financing; Winters J, Sands P, editors. Countering the Pandemic Threat Through Global Coordination on Vaccines: The Influenza Imperative. Washington (DC): National Academies Press (US); 2021 Nov 17. Available from: https://www.ncbi.nlm.nih.gov/books/NBK579144/ doi: 10.17226/26284
International Workshop on COVID-19 Lessons to Inform Pandemic Influenza Response	Global	This chapter highlights the panel discussions centring on the localised, bottom-up governance structures that simultaneously support a globalised infectious disease response, augmented by local distributive and manufacturing capacities across regions and various financing and operational solutions to optimise vaccine supply. Additionally, funding and surveillance of One Health is highlighted.	Proceedings of Workshop	National Academy of Medicine. International Workshop on COVID-19 Lessons to Inform Pandemic Influenza Response [Internet]. International Workshop on COVID-19 Lessons to Inform Pandemic Influenza Response. Washington, DC: The National Academies Press; 2022. 1–114 p. Available from: https://www.ncbi.nlm.nih.gov/books/NBK578022/

National decision-making for the introduction of new vaccines: A systematic review, 2010–2020	Global	Competing priorities make using a transparent and evidence-based approach important when deciding to recommend new vaccines. We conducted a literature review to document the processes and frameworks for national decision-making on new vaccine introductions and explored which key features have evolved.	Systematic Review	Donadel M, Panero MS, Ametewee L, Shefer AM. National decision-making for the introduction of new vaccines: A systematic review, 2010–2020. Vaccine [Internet]. 2021;39(14):1897–909. Available from: https://www.sciencedirect.com/science/article/pii/S0264410X21002395?via%3Dihub
Meeting Summary: Global Vaccine and Immunization Research Forum, 2021	Global		Meeting summary (review)	Ford A, Hwang A, Mo AX, Baqar S, Touchette N, Deal C, et al. Meeting Summary: Global Vaccine and Immunization Research Forum, 2021. Vaccine [Internet]. 2023;41(11):1799–807. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9938725/
Global access to COVID-19 vaccines: a scoping review of factors that may influence equitable access for low and middle-income countries	Global	To identify the factors contributing to equitable access to COVID-19 vaccines for low and middle-income countries (LMIC).	Scoping Review using PRISMA for Scoping Reviews, analysis using thematic synthesis, reference to index paper framework	Peacocke, Elizabeth F et al. "Global access to COVID-19 vaccines: a scoping review of factors that may influence equitable access for low and middle-income countries." <i>BMJ open</i> vol. 11,9 e049505. 30 Sep. 2021, doi:10.1136/bmjopen-2021-049505

Vaccine Procurement: A Conceptual Framework Based on Literature Review	Global	The aim was to clarify key concepts and definitions relating to vaccine procurement, describe main vaccine procurement methods, and identify knowledge gaps and future perspectives.	Narrative literature review	Gianfredi V, Filia A, Rota MC, et al. Vaccine Procurement: A Conceptual Framework Based on Literature Review. <i>Vaccines (Basel)</i> . 2021;9(12):1434. Published 2021 Dec 3. doi:10.3390/vaccines9121434
A research and development (R&D) roadmap for broadly protective coronavirus vaccines: A pandemic preparedness strategy	Global	This report summarises the major issues and areas of research outlined in the CVR and identifies high-priority milestones. Included in each topic area are key barriers, gaps, strategic goals, milestones, and additional R&D priorities.	Review (pre-print)	Moore KA, Leighton T, Ostrowsky JT, Anderson CJ, Danila RN, Ulrich AK, et al. A research and development (R&D) roadmap for broadly protective coronavirus vaccines: A pandemic preparedness strategy. <i>Vaccine</i> [Internet]. 2023;41(13):2101–12. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9941884/
Building evidence for improving vaccine adoption and uptake of childhood vaccinations in low- and middle-income countries: a systematic review	Multiple LMICs	This study aims to determine the extent of immunisation coverage among children in LMICs, as well as to fill in the gaps in awareness about system-level obstacles that currently hinder the effective delivery and uptake of immunisation services through EPI.	Systematic review using PRISMA, findings organised and reported using a qualitative methodological technique	Aslam F, Ali I, Babar Z, Yang Y. Building evidence for improving vaccine adoption and uptake of childhood vaccinations in low- and middle-income countries: a systematic review. <i>Drugs Ther Perspect</i> [Internet]. 2022;38(3):133–45. Available from: https://doi.org/10.1007/s40267-021-00890-7

Sustainable Financing for Immunization Agenda 2030	Global	This paper summarises the factors that affect sustainable financing for immunisation and proposes strategic interventions that can be taken to accelerate progress on the IA2030 vision, including increasing spending on PHC and using those funds efficiently and equitably.	Review (pre-print)	World Health Organization. SP6 Sustainable Financing For Immunization [Internet]. Immunization Agenda 2030. 2020 [cited 2023 Apr 22]. p. 1–21. Available from: https://www.immunizationagenda2030.org/strategic-priorities/supply-sustainability
A review of the sustainability of vaccine funding across Europe and implications for post-COVID policymaking	Europe (England, Finland, France, Germany, Italy, Norway, Romania, and Spain)	We review how vaccine budgets are structured in 8 European countries and understand the differences in the role of key stakeholders, how the budget is organised and factors feeding into the setting process. We suggest policy principles to secure prioritisation and sustainability of routine vaccination and NIP budgets in the post-COVID recovery context	Mixed method (literature review followed by expert interviews)	Lawlor R, Wilsdon T, Rémy-Blanc V, Nogal AÁ, Pana A. A review of the sustainability of vaccine funding across Europe and implications for post-COVID policymaking. <i>Health Policy</i> . 2022;126(10):956-969. doi:10.1016/j.healthpol.2022.08.004
A gaps-and-needs analysis of vaccine R&D in Europe: Recommendations to improve the research infrastructure	Europe	During the pandemic, TRANSVAC, the European vaccine-research-infrastructure initiative, undertook an in-depth consultation of stakeholders to identify how best to position	Mixed method (survey and interviews/focus group discussions)	Jungbluth S, Depraetere H, Slezak M, Christensen D, Stockhofe N, Beloeil L. A gaps-and-needs analysis of vaccine R&D in Europe: Recommendations to improve the research infrastructure. <i>Biologicals</i>. 2022;76(February):15–23. doi: 10.1016/j.biologicals.2022.02.003

		and sustain a European vaccine R&D infrastructure.		
Global vaccine action plan lessons learned I: recommendations for the next decade	Global	The Strategic Advisory Group of Experts on Immunisation has made a series of recommendations to ensure that the lessons learned from GVAP inform the development and implementation of IA2030.	Review	MacDonald N, Mohsni E, Al-Mazrou Y, Kim Andrus J, Arora N, Elden S, et al. Global vaccine action plan lessons learned I: Recommendations for the next decade. Vaccine [Internet]. 2020;38(33):5364–71. Available from: https://www.sciencedirect.com/science/article/pii/S0264410X20306095?via%3Dihub
Immunization Agenda 2030 (Sustainable financing for immunisation, supply security - SP6 Annexes)	Global	The Immunization Agenda 2030 (IA2030) sets an ambitious, overarching global vision and strategy for vaccines and immunisation for the decade 2021–2030.	Report	World Health Organization. SP6 Supply Security [Internet]. Immunization Agenda 2030. 2020 [cited 2023 Apr 22]. p. 1–17. Available from: https://www.immunizationagenda2030.org/strategic-priorities/supply-sustainability
Not the last pandemic: Investing now to reimagine public-health systems	Global	The study focused on making an economic case for investments in infectious disease surveillance and preparedness and project requirements to prevent future pandemics.	Report	Craven M.; Sabow A.; Van der Veken L; Wilson Mat. Not the last pandemic: Investing now to reimagine public-health system. McKinsey&Company. 2020;(July):1–12. Available from: Not-the-last-pandemic-Investing-now-to-reimagine-public-health-systems-F.pdf (mckinsey.com)

Ready for the Next Crisis? Investing in Health System Resilience	Global	<u>Relevant chapters: 1) Investing in health system resilience, 2) Incentivising the development of global public goods for health</u>	Report	OECD. Ready for the Next Crisis? Investing in Health System Resilience [Internet]. Paris: OECD Health Policy Studies, OECD Publishing; 2023. 1–475 p. Available from: https://www.oecd-ilibrary.org/social-issues-migration-health/ready-for-the-next-crisis-investing-in-health-system-resilience_1e53cf80-e
The urgency of now (investment case)	Global	For countries seeking to expand their investments in health security, CEPI can offer a global focus, a proven track record, the agility to move 8 quickly, and extensive multisectoral partnerships. CEPI is also able to leverage its unique connecting role—as a coalition of vaccine developers, manufacturers, sovereign governments, philanthropies, civil society and global health organisations—and extensive networks to pool and deploy resources in ways that nation-states often cannot.	Report	CEPI. The Urgency of Now [Internet]. Coalition for Epidemic Preparedness Innovations. 2021 [cited 2023 Apr 22]. p. 1–52. Available from: https://cepi.net/wp-content/uploads/2021/12/02122021-English-investment-case-v3.pdf

A Global Strategy to Manage the Long-Term Risks of COVID-19	Global	<p>There are four key policy implications of such a strategy. First, we need to achieve equitable access beyond vaccines to encompass a comprehensive toolkit. Second, we must monitor the evolving virus and dynamically upgrade the toolkit. Third, we must transition from the acute response to a sustainable strategy toward COVID-19, balanced and integrated with other health and social priorities. Fourth, we need a unified risk-mitigation approach to future infectious disease threats beyond COVID-19. Infectious diseases with pandemic potential are a threat to global economic and health security.</p>	Report	<p>Agarwal R, Farrar J, Gopinath G, Hatchett R, Sands P. A Global Strategy to Manage the Long Term Risks of COVID-19. 2022. Available from: https://www.elibrary.imf.org/view/journals/001/2022/068/article-A001-en.xml</p>
Finance Vaccine Equity: Funding for Day zero of the next pandemic	Global	<p>The paper outlines four options for a financier to absorb some or all of the risk associated with the credit line and discusses how the credit would complement other proposals to strengthen the financing architecture for</p>	Report	<p>Agarwal R, Reed T. Finance Vaccine Equity: Funding for Day-Zero of the Next Pandemic. IMF Work Pap. 2022;2022(099):1. Available from: https://www.imf.org/en/Publications/WP/Issues/2022/05/25/Finance-Vaccine-Equity-Funding-for-Day-Zero-of-the-Next-Pandemic-518280</p>

		pandemic preparedness, prevention, and response.		
Change Cannot Wait: Building Resilient Health Systems in the Shadow of COVID-19	Global	The COVID-19 pandemic has shown the world that fundamental change in health systems cannot wait. The probability of a pandemic with a similar impact to COVID-19 is set to increase three-fold in the next few decades due to increasing risk drivers, such as urbanisation, climate change, land use changes, fragility and conflict, and zoonotic spillovers. This report builds on previous work, leverages new research, and considers countries' frontline experiences during COVID-19. It presents a new framework for making health systems resilient, shows how countries can build them, and where countries and partners can	Report	World Bank. Change Cannot Wait: Building Resilient Health Systems in the Shadow of COVID-19. World Bank. Washington, DC; 2022. Available from: https://www.worldbank.org/en/topic/health/publication/change-cannot-wait-building-resilient-health-systems-in-the-shadow-of-covid-19

		target investments to improve health outcomes.		
The Partnership for Health Sustainability and Resilience: Interim Report of the pilot phase	Global	This interim report of the PHSSR's pilot phase sets out how PHSSR has conceptualised health system sustainability and resilience and presents the initial Framework that was used to guide the development of a set of system-level Country Reports in the pilot phase. It also presents a summary of the key themes and recommendations that have emerged in those reports and a preliminary	Report	Wharton G, Gocke D, McGuire A, Sturm T. The Partnership for Health Sustainability and Resilience. Interim report of the pilot phase. 2021;(July 2020):52. Available from: https://www3.weforum.org/docs/WEF_PHSSR_Interim_Report_of_the_Pilot_Phase.pdf

		assessment of the application of the Framework, identifying areas in which it can be strengthened.		
--	--	--	--	--