BMJ Global Health

Financing global health security: estimating the costs of pandemic preparedness in Global Fund eligible countries

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To cite: Eaneff S, Boyce MR, Graeden E, *et al*. Financing global health security: estimating the costs of pandemic preparedness in Global Fund eligible countries. *BMJ Global Health* 2023;**8**:e008960. doi:10.1136/bmjgh-2022-008960

Handling editor Seye Abimbola

► Additional supplemental material is published online only. To view, please visit the journal online (http://dx.doi.org/10.1136/bmjgh-2022-008960).

Received 3 March 2022
Accepted 30 December 2022

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INTRODUCTION

The COVID-19 pandemic demonstrated that the world was not well prepared to respond to an infectious disease threat of this magnitude. Countries across all socioeconomic and development categories have struggled to implement effective national responses. Substantial amounts of additional investment are required to support the development of country capacities to prevent, detect and respond to both existing and emerging infectious disease threats. Prior research efforts have estimated that between US$96 and $204 billion is required, globally, to advance country-level health security capacities, with US$63–131 billion needed over a 3-year period.[1–4] Given the substantial costs of ongoing COVID-19 response, estimated to be over US$12.5 trillion through 2024,[5] and an estimated 12.1–22.7 million excess deaths, globally, due to COVID-19 as of January 2022,[6] the importance and potential return on investment of such upfront investments in capacity building are more evident than ever before.

The Global Fund to Fight AIDS, TB, and Malaria (the Global Fund) is a partnership between governments, private sector organisations, civil society and communities that support health programmes in over 120 countries and regions.[7] The Global Fund plays a major role in funding global health activities and responded to the COVID-19 pandemic by pivoting many of its investments and personnel, procuring necessary diagnostics, personal protective equipment and other essential health products, and supporting countries in their response to the virus through its COVID-19 Response Mechanism.[8]

SUMMARY BOX

- ⇒ The costs, globally, to build country-level public health capacity to address gaps in global health security over the next 5 years have been previously estimated as US$96–$204 billion, with an estimated US$63–131 billion in investment required over the next 3 years.
- ⇒ Research conducted prior to the COVID-19 pandemic indicated that over one-third of Global Fund's budgets in 10 case study countries aligned with health security priorities articulated by the Joint External Evaluation, particularly in the areas of laboratory systems, antimicrobial resistance and workforce development.
- ⇒ We estimate that over 85% of investments needed to build country-level capacities in health security, globally, over the next 3 years are in countries eligible for Global Fund support.
- ⇒ Areas of investment opportunity aligned with the Global Fund's core mandate include financing for surveillance and laboratory systems, combating antimicrobial resistance and developing and supporting robust healthcare and public health workforces.
- ⇒ In aggregate, global-level data highlight areas of opportunity for the Global Fund to expand and further develop its support of global health security in areas aligned with its mandate and programmatic scope.
- ⇒ Such investment opportunities have implications for existing budgeting and allocation processes and for implementation models, partners, programming and governance structures should these areas of potential expansion be prioritised.
- ⇒ This work emphasises a role for targeted, action-based cost estimation to identify gaps and to inform strategic investment decisions in global health.

INVESTMENT REQUIREMENTS IN COUNTRIES ELIGIBLE FOR GLOBAL FUND SUPPORT

Investments to build country-level capacities in health security are critical to ensure that the global community is better poised to prevent, detect and respond to outbreaks. In a prior

analysis of investment requirements for global health security, we estimated that a minimum initial investment of US$76 billion is required, globally, in the next 3 years, to fund country-level health security capacities.[1] These investments, which would enable countries to progress towards a score of 'demonstrated capacity' based on the expectations set by the Joint External Evaluation (JEE),[9] reflect the upfront costs of capacity building and assume additional and sustained financing and support for a 5-year period and beyond.

The majority of country-level financing requirements in global health security occur in countries already eligible for Global Fund support. Of the estimated US$76 billion required to progress towards 'demonstrated capacity' on the JEE over the next 3 years,[1] we find that approximately US$66 billion is required in countries eligible for Global Fund funding as of 2021. This investment requirement in over 120 eligible countries comprises over 85% of the US$76 billion required, globally, to fund country-level capacity in the same time period.

INVESTMENT OPPORTUNITIES FOR THE GLOBAL FUND

Based on these prior estimates of investment requirements,[1] we completed an in-depth review to assess which of over 700 costed activities may contribute directly or indirectly to health systems strengthening efforts in support of HIV, Tuberculosis (TB) and/or malaria (HTM) disease programmes. Direct contributions were defined as interventions, activities or resources critical to the delivery of quality HTM services, including support for skilled health and public health workers whose work is significantly focused on these disease areas (eg, personnel trained to identify and manage infections caused by AMR resistant pathogens); indirect contributions were defined as interventions, activities or resources focused primarily on non-HTM disease areas but that could be pivoted to use directly towards HTM efforts during times of need (eg, diagnostics for COVID-19 that could be repurposed for TB). Additional information on the methodological approach of this analysis is included in the online supplemental appendix.

Of the global investment needs (US$76 billion), we estimate that approximately US$27 billion (36%) relates either directly or indirectly (US$6 billion and US$21 billion, respectively) to systems strengthening in support of HTM efforts in Global Fund eligible countries (figure 1). Of note, in the case of investments identified as 'directly' or 'indirectly' related to HTM efforts, the assumption was made that resources could, and would, be able to be pivoted during times of need to support multiple disease areas, including HTM. Such investments included skilled healthcare and public health workforce support, general consumable laboratory materials and laboratory training, transportation resources and

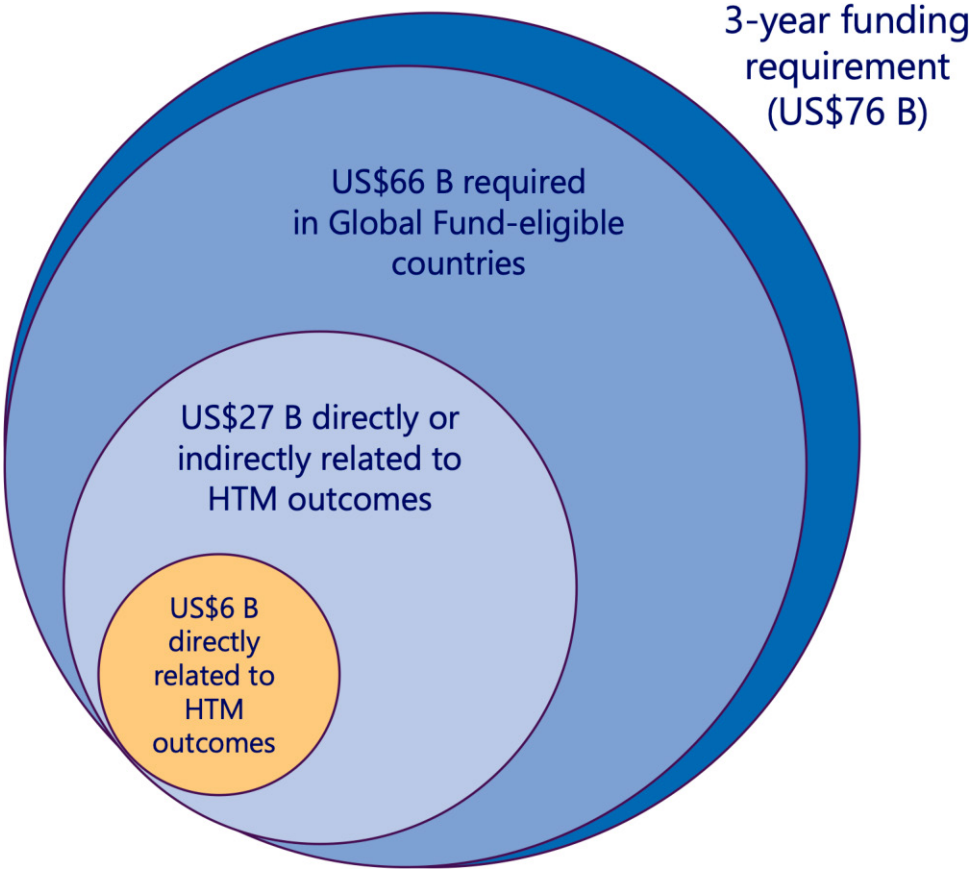

Figure 1 3-year funding required for system strenghtening in support of HTM efforts. HTM, HIV, TB and/or malaria.

Table 1 Select investments that are directly or indirectly related to HIV, TB and/or malaria (HTM) efforts by core capacity of the JEE

JEE core capacity	3-year costs directly and indirectly related to HTM efforts	Selected examples of costed activities directly and indirectly related to HTM efforts
Real-time surveillance	US$13 billion	Training, capacity building and ongoing support for skilled healthcare and public health workforce to enable both indicator and event-based surveillance; development and maintenance of electronic disease surveillance data platforms.
Antimicrobial resistance	US$8 billion	Resources to support and enable infection prevention and control in healthcare facilities, including decontamination kits, airborne infection isolation rooms and hand hygiene kits; outbreak investigation kits; training, development and ongoing support for skilled healthcare, animal health and public health workforce.
National laboratory system	US$3 billion	Durable and consumable laboratory materials that support efforts aligned with multiple disease areas (eg, virus culture, serology and PCR capability, microscopy and bacterial culture capability); select rapid diagnostic tests.
Workforce development	US$1 billion	Expand national field epidemiology training capability and provide programmatic support and essential supplies for training; develop, maintain and evaluate national workforce strategy.

Of note, these costs represent overlap between investments related to HTM efforts and need as assessed for progress against the specified JEE indicators; as such, they do not represent the total magnitude of global need in each area.
All costs estimated in 2021 US$; results reported rounded to the nearest billion or million, depending on the order of magnitude. Selected activities are intended as illustrative examples but do not cover the full costs for each core capacity.
JEE, Joint External Evaluation.

personal protective equipment that could be shared to support cross-cutting efforts across disease verticals during public health emergencies or other times of need. Additional examples of interventions considered directly or indirectly related HTM efforts are included in the online supplemental appendix.

Potential priority investments

Research conducted before the COVID-19 pandemic based on historical Global Fund budgeting patterns highlighted areas of opportunity for Global Fund investments to support global health security in domains including laboratory systems, efforts to combat antimicrobial resistance and workforce development.[10] These results are consistent with the findings of this analysis, which also highlighted substantial investment opportunities related to real-time surveillance, in particular, the training, capacity building and ongoing salary support for skilled healthcare and public health workforce to enable surveillance efforts (table 1). Importantly, cost estimates presented in each of these areas represent overlap in investment requirements for HTM efforts *and* in support of JEE benchmarks; as such, they do not represent the total magnitude of global need in each area, which is substantially greater.

Clear cost drivers eligible for future Global Fund support include capacity building for surveillance and laboratory systems; such systems would also support broader health security objectives if they are designed and implemented in a way that allows for them to be used across disease areas. Similarly, efforts to combat antimicrobial resistance are also eligible for substantial financial support and have the potential to broadly strengthen health systems if implemented cross-functionally. Within each of these areas, costs for the training, development and ongoing salary support of personnel are the greatest contributors to total cost estimates. These reflect the requirements for developing and maintaining a robust workforce of skilled healthcare, public health and animal health professionals. While surveillance, laboratory and antimicrobial resistance capacities comprise a significant proportion of the global costs identified as directly or indirectly relevant to HTM efforts, additional cross-functional investment requirements identified (ie, those across core capacities) include risk communication, emergency response operations and support for national legislation, policy and financing.

IMPLEMENTATION CONSIDERATIONS

These substantial investment opportunities come hand in hand with considerations for implementation. Translating budget alignment to implementation impact in health security will require adjustments and the adaptation of existing practices—new and expanded governance structures, additional technical expertise and coordination efforts and a systems approach to implementation across vertical disease verticals. Increased health financing for pandemic preparedness via the Global Fund would hold important implications for country governance and planning, implementation arrangements, monitoring and accountability, and partnerships, which are beyond the immediate scope of this analysis.

This report has several important limitations. The WHO has recently revised the SPAR/JEE framework that was the basis of the activity-based costing. However, the updated versions of these tools were not yet officially released at the time this analysis was conducted. The original, costed version of the JEE did not fully reflect some components of pandemic preparedness,

including investment in water, sanitation and hygiene, robust infection prevention and control activities and support for community health workers, which are likely to be important cost drivers in future operational plans. Moreover, cost calculations in this analysis do not take into consideration changes in country capacities (either increases or decreases) that occurred during COVID-19 response, given that the JEE/SPAR assessments used to assess country capacity in this analysis were completed prior to the COVID-19 pandemic. Finally, it is critical to note that the cost estimates referenced in this analysis represent the overlap between the Global Fund's programmatic scope and global need as assessed by the JEE; these estimates are not representative of the magnitude of either overall cost estimate, individually, which are likely far greater.

The investment opportunities highlighted in this document are not intended to be comprehensive; instead, we aim to illustrate particular areas in which investments related to the Global Fund's mandate align with existing efforts for capacity building under the benchmarks articulated by the JEE. We note, in particular, that 'a rising tide lifts all boats'; broad investments across all public health domains, particularly those related to the development and ongoing support of a robust public health, animal health and healthcare workforce, are necessary to develop and maintain global capacities to prevent, detect and respond to infectious disease threats.

In sum, these results underscore the potential of country-level, action-based costing analyses to inform medium and long-term strategic investment planning in global health security. Specific, national and subnational investment requirements are best informed by local expertise and context-specific knowledge of imminent risks, response performance gaps and community needs. However, in aggregate, global-level data highlight clear areas of opportunity for the Global Fund to expand its support for health security and pandemic preparedness and response with a transparent, representative and country-driven approach.

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Acknowledgements The authors wish to thank Richard Grahn (Global Fund), Johannes Hunger (Global Fund) and Mehran Hossini (Global Fund) for their collaboration and feedback on the interpretation of data, and Hailey Robertson (Georgetown) for assistance with data collection and tagging.

Contributors SE, MRB, EG, MM and RK contributed to conceptualisation and design of the analysis. SE, MRB, MM, DL and RK made significant contributions toward data analysis, and all authors contributed towards the interpretation of results. SE created the figures and drafted the manuscript that was subsequently reviewed and revised by all authors. All authors have read and approved of the final version of the manuscript.

Funding This work was funded by Resolve to Save Lives: An Initiative of Vital Strategies.

Competing interests This work was funded by Resolve to Save Lives: An Initiative of Vital Strategies. DL is an employee of the Global Fund.

Patient consent for publication Not applicable.

Ethics approval Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon request.

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REFERENCES

1 Eaneff S, Graeden E, McClelland A, *et al*. Investing in global health security: estimating cost requirements for country-level capacity building. *PLOS Glob Public Health* 2022;2:e0000880.
2 Center for Global Development and Pandemic Action Network. Ending boom or bust: what will it cost to pandemic proof the planet? 2020. Available: https://www.cgdev.org/event/ending-boom-or-bust-what-will-it-cost-pandemic-proof-planet [Accessed 19 Jan 2022].
3 G20 high level independent panel on financing the global commons for pandemic preparedness and response. A global deal for our pandemic age. 2021. Available: https://pandemic-financing.org/report/introduction/ [Accessed 18 Jan 2022].
4 Craven M, Sabow A, Van der Veken L, *et al*. Not the last pandemic: Investing now to reimagine public health systems. McKinsey & Company; 2021 May 21. Available: https://www.mckinsey.com/industries/public-and-social-sector/our-insights/not-the-last-pandemic-investing-now-to-reimagine-public-health-systems# [Accessed 16 Jan 2022].
5 Reuters. IMF sees cost of COVID pandemic rising beyond $12.5 trillion estimate. Available: https://www.reuters.com/business/imf-sees-cost-covid-pandemic-rising-beyond-125-trillion-estimate-2022-01-20/ [Accessed 7 Feb 2022].
6 The Economist. The pandemic's true death toll. Available: https://www.economist.com/graphic-detail/coronavirus-excess-deaths-estimates [Accessed 18 Jan 2022].
7 The Global Fund. Results report 2021. Available: https://www.theglobalfund.org/en/results/ [Accessed 23 Jan 2022].
8 The Global Fund. COVID-19 response mechanism (C19RM). Available: https://www.theglobalfund.org/en/covid-19/response-mechanism/ [Accessed 23 Jan 2022].
9 WHO. *Joint external evaluation tool: international health regulations (2005), 1st edition*. Geneva: World Health Organization, 2016.
10 Boyce MR, Attal-Juncqua A, Lin J, *et al*. Global fund contributions to health security in ten countries, 2014-20: mapping synergies between vertical disease programmes and capacities for preventing, detecting, and responding to public health emergencies. *Lancet Glob Health* 2021;9:e181–8.