Our Global Health Frameworks in Covid-19: Who Was Left Behind?

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Abstract

This article examines whether international institutions' Covid-19 response funding aligned with well-established pre-pandemic measures of countries' long-term health capacity and preparedness, and their anticipated ability to respond to emerging biological threats. In simpler terms, we explore whether Covid-19 funding allocations matched pre-pandemic assessments of countries' needs, based on the WHO's Joint External Evaluation (JEE) scores. We track global health financing provided throughout the SARS-CoV-2 pandemic by both national governments and by multilateral, nonprofit, and philanthropic organizations using the Global Health Security Tracking database. Across all of these funding streams, our descriptive analysis suggests no significant correlation between pre-pandemic assessments of country need and proceeding pandemic funding allocations. We find that countries for which global health institutions determined to have the lowest health capacities prior to the pandemic did not receive greater amounts of global health funding relative to higher capacity peer nations once the pandemic arrived. If we are not using existing rubrics of institutional capacity, then what factors are driving these financial decisions? These results ultimately ask us to consider how many more times our global health systems will have "watershed moments," that reveal how unprepared, uncoordinated, and underfunded we truly are before we get it right.

Abbreviations

- **JEE**: Joint External Evaluation
- **PHEIC**: Public Health Emergencies of International Concern
- **GHS**: Global Health Security
- **GHSI**: Global Health Security Index
- **GHSA**: Global Health Security Agenda
- **WHA**: World Health Assembly
- **IHR**: International Health Regulations
- **WHO**: World Health Organization
- **CDC**: Center for Disease Control
- **IGO**: Intergovernmental Organization
- **HIC**: High Income Country
- **HMIC**: High and Middle Income Countries

Table of Contents

List of Figures

Introduction

The Covid-19 pandemic has exposed the underlying fractures in our global health systems, including supply shortages, insufficient disease surveillance, and vaccine inequity. Yet, these challenges are not new. During past Public Health Emergencies of International Concern (PHEICs), global health experts have called for reforms of core institutions to improve aid, and have crafted new frameworks to guide policy response. Unfortunately, despite efforts to address gaps in emergency preparedness and achieve alignment across systems of global health governance, the outcomes of the ongoing pandemic suggest that these tools are not working. The disparate harms observed across nations and between communities – particularly with regard to resource access – indicate that there are likely structural issues driving negative consequences for global health security. These structural constraints are not limited to our public health infrastructure alone, but an intricate web of institutional interactions which rely upon strong government leadership, a unified civil society, and trust in the scientific community to succeed. To address these systemic burdens, it is critical to assess the efficacy of the existing mechanisms shaping our global health policy priorities.

Current discussions of the Covid-19 pandemic tend to be largely prescriptive. Many scholars have debated the "proper" Covid-19 policies, or provided recommendations for institutional response. Our study instead aims to investigate why our current prescriptions and policy rubrics may not be working on the ground. Our method to understand the effectiveness and direction of our existing policy frameworks is to "follow the money." **To investigate the efficacy of the global health regime during the pandemic, we examined whether our international institutions' Covid-19 response funding aligned with well established pre-pandemic measures of countries' health capacity and preparedness. Simply put, we were interested in whether observed distributions of Covid-19 funding matched our pre-pandemic expectations and assessments of countries' needs.** In order to answer this question, we conducted a de-

scriptive analysis using the World Health Organization's Joint External Evaluation (JEE) data and Covid-19 funding data from the Global Health Security (GHS) Tracker. This study is the first to our knowledge which attempts to link Covid-19 funding streams to pre-pandemic indicators of need.

We found minimal associations between JEE Ready Score's pre-pandemic assessments of countries' public health needs and proceeding allocations of Covid-19 response funding. In particular, our results suggest that lower income nations with higher assessed needs in pre-pandemic times did not receive higher funding flows than less needy peers. Our analysis can only provide correlational explanations of these effects, largely because the observed heterogeneous variations in global and local trends is masked by gaps in our global health data architecture, which has likely selectively excluded poorer and more vulnerable nations from a meaningful analysis.

We also do not attempt to assess or incorporate evaluations of the capacity of recipient countries to utilize response funding once it has been disbursed. Instead, we focus only on unadjusted per capita amounts of disbursed response funding. Formalized assessments of country-level administrative capacity in crisis events are not prevalent in existing literature and therefore are unlikely to have affected the disbursement of response funding in the first place. It is not our intent to predict or declare which countries would have spent their money "more efficiently" in the event of disbursement, but rather to examine where disbursements flowed in the first place.

Perhaps of even more value than our suggestive results are a new set of questions which arise as a result of this research. If we are not using existing rubrics of institutional capacity or emerging evidence on country-specific need to guide where money flows during crisis events, then what factors are driving these institutional decisions? And if we are not using the very tools we created to guide crisis decision-making, how can we ever truly evaluate whether these tools are effective in responding to the exigencies of current or future pandemics? These results ultimately ask us to consider how many more times our global health systems will have "watershed moments," that reveal how unprepared, uncoordinated, and underfunded we truly are before we get it right.

Developing Global Health Governance

In 2005, the World Health Assembly (WHA) made a series of major revisions to the International Health Regulations (IHR) following the SARS pandemic, which had highlighted the need for greater global health governance and collaboration (Fidler & Gostin, 2006; Institute of US Medicine Forum on Microbial Threats, 2010).[1,2] The WHA responded by broadening the IHR's scope beyond cholera, plague, and yellow fever to include other diseases that may constitute Public Health Emergencies of International Concern (PHEICs) as well as requiring Member States to agree to improve disease surveillance and assist in the development of public health systems.

The IHR was meant to herald a new era of international coordination and make the world more secure from emerging infectious disease threats. However, in the aftermath of the 2014 West African Ebola epidemic, many experts criticized the lack of progress on the treaty's implementation and called for major reforms (Katz & Dowell, 2015; T.-L. Lee, 2016).[3,4] At the time of Ebola, many countries had not implemented core IHR pillars — including establishing mechanisms to help experts monitor public health capacities, developing methods to link external support to countries' demonstrated improvements in these capacities, outlining concrete steps for building health systems, and facilitating financial support flows from high-income member states to low and middle-income members (Ottersen et al., 2016).[5]

Amidst probing questions about the IHR's efficacy, the United States and 50 other countries chose not to reform the IHR, and instead drafted an entirely different framework — the Global Health Security Agenda (GHSA) — with the purpose of accelerating efforts in the prevention, detection, and response of biological threats (The Global Health Security

[1] https://journals.sagepub.com/doi/abs/10.1111/j.1748-720X.2006.00011.x
[2] https://www.ncbi.nlm.nih.gov/books/NBK45725/
[3] https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(15)00025-X/fulltext
[4] https://heinonline.org/HOL/LandingPage?handle=hein.journals/vantl49&div=29&id=&page=
[5] https://journals.sagepub.com/doi/full/10.1177/0098858816658273

Agenda, 2019).[6] By 2015, the GHSA included a tool to measure national capacities across 11 different "action packages" — capturing global health security priorities such as Antimicrobial Resistance, Real-Time Surveillance, and National Laboratory Systems — all of which were supposedly informed by pre-existing frameworks such as the IHR (Bell et al., 2017a; Global Health Security Agenda, 2014).[7,8]

Following an initial round of GHSA assessments, the WHO convened a meeting to align the GHSA with the IHR, resulting in the creation of the Joint External Evaluation tool (JEE) in February of 2016 (Bell et al., 2017a).[9] These scores remain operational to this day. The JEE rubric (a completely voluntary assessment under the IHR framework) is committed to identifying gaps in national health systems and thus informing the development of core capacities for health security (Centers for Disease Control, 2021).[10] By identifying strengths and weaknesses across countries and measuring institutional capacity, the results of the GHSA and JEE assessments are intended to strategically align funding priorities for capacity-building and preparedness in collaboration with donors, multilateral agencies, and the public-private sector (Bell et al., 2017a).[11] However, numerous studies have found that the capacities assessed by the JEE and GHSA have been under-prioritized and under-resourced, particularly in low-income countries (Katz et al., 2019; Ottersen et al., 2017a).[12,13]

[6] https://ghsagenda.org/about-the-ghsa/
[7] https://www.cdc.gov/globalhealth/healthprotection/ghs/pdf/ghsa-action-packages_24-september-2014.pdf
[8] https://www.ncbi.nlm.nih.gov/labs/pmc/articles/PMC5711324/
[9] https://www.ncbi.nlm.nih.gov/labs/pmc/articles/PMC5711324/
[10] https://www.cdc.gov/globalhealth/healthprotection/stories/global-jee-process.html
[11] https://www.ncbi.nlm.nih.gov/labs/pmc/articles/PMC5711324/
[12] https://www.ncbi.nlm.nih.gov/labs/pmc/articles/PMC6682579/
[13] https://doi.org/10.1017/S1744133116000505

Motivating Reforms in Global Health Governance

Many scholars have partially attributed the failures of the GHSA and the JEE in improving health systems capacities to underlying flaws in the structures of global health financing. Current global health funding systems overwhelmingly lack transparency and coordination, often leading to incoherent or invisible disbursement decisions (Katz et al., 2019).[14] For instance, during the 2014-2016 outbreak of Ebola in West Africa, limited information-sharing between stakeholders about financing efforts led to duplicative projects, a lack of accountability, and a delayed outbreak response (Quirk et al., 2021).[15] Many of the countries hit hardest by Ebola suffered because they did not have capacity to ensure they had sufficient health infrastructure and trained staff to respond to the outbreak (Gostin & Friedman, 2015).[16] Directed funding and oversight could have helped here. Indeed, during the outbreak, more than $5 billion was committed to the Ebola response. However, the amount actually disbursed to affected countries and the success of the initiatives funded was — and remains — largely unknown (Moon et al., 2015).[17]

Recognizing that bureaucracy and a lack of communication likely led to preventable deaths, the Independent Panel on the Global Response to Ebola developed a set of ten policy recommendations to improve global health emergency response efforts, including the need for greater transparency and accountability in the allocation of funds (World Bank Group, 2019; Ottersen et al., 2017b).[18,19] Unfortunately, even in the wake of Covid-19, few of the suggested changes that were intended to rectify the shaky foundations of

[14] https://www.ncbi.nlm.nih.gov/labs/pmc/articles/PMC6682579/
[15] https://gh.bmj.com/content/6/4/e003923ref-18
[16] https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(15)60644-4/fulltextseccestitle110
[17] https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(15)00946-0/fulltext
[18] https://documents1.worldbank.org/curated/en/241811559646029471/pdf/Lessons-Learned-in-Financing-Rapid-Response-to-Recent-Epidemics-in-West-and-Central-Africa-A-Qualitative-Study.pdf
[19] https://doi.org/10.1017/S1744133116000505

our global health systems have been adopted by the WHO or other institutions governing global health.

Despite these failures, it cannot be disputed that both our global health agencies and our academic community have allocated resources and time towards improving data monitoring and reporting structures in the wake of previous infectious disease outbreaks. Pandemic preparedness indices — which were drafted to assess countries' ability to respond to a potential pandemic — were (and remain) a major feature of these efforts. In 2019, the Johns Hopkins Center for Health Security collaborated with the Nuclear Threat Initiative and Economist Intelligence Unit to construct the Global Health Security Index (GHSI). This initiative, funded by the Gates Foundation, is committed to a similar mission as the previously established JEE index: to improve future pandemic response by measuring countries' anticipated ability to respond to future pandemics. The GHSI is meant to inform public health leaders on the areas in which they should strengthen their health capacity and target future investments. The scores are meant to be considered in parallel to JEE reports to "create a more complete picture of global preparedness (Global Health Security Index, 2019).[20] The GHSI was thus — and still is — pitched as the new wave of health security: a changemaker for our future pandemic response.

Unfortunately, despite the expectations and promises that JEE and GHSI indices would strongly map to global preparedness, and influence funding allocations, the Covid-19 pandemic has demonstrated that the GHSI/JEE programs did not translate to better preparedness or motivate an equitable crisis response. Many studies have found that stronger JEE/GHSI capacity scores failed to predict better health outcomes, and many nations with low JEE/GHSI scores fared better during the pandemic than predicted (Bell et al. 2017b; McPhee et al., 2019; Haider et al., 2020b).[21,22,23] For example, recent evidence suggests that many nations in Africa and South Asia may have managed the pandemic better than a large share of Western countries — largely due to the impressive efforts of state health agencies including the Africa Centers for Disease Control and Korea Disease Control and

[20]https://www.ghsindex.org/ar/the-world-health-organization-who-joint-external-evaluation-jee-tool/
[21]https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5711324/
[22]https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-6978-8
[23]https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7506172/

Prevention Agency (Jha, 2022).[24] Literature has also reported that nations with higher JEE/GHSI scores were amongst the countries who mobilized slowest and had more confirmed cases and deaths compared to low-scoring countries (Aitken et al., 2020; Fu, 2020; Haider et al., 2020).[25,26,27] While the predictive power of JEE/GHSI indices have been well explored with regard to the health outcomes of this pandemic, few scholars have explored how these indices fulfilled their parallel purpose: informing funding allocations within our global health frameworks (Covid-19: Make It the Last Pandemic, n.d.; Covid-19 National Preparedness Collaborators, 2022; C. T. Lee et al., 2021; Haider et al., 2020a).[28,29,30,31] In this particular analysis, we focus on examining the latter aspect.[32] As the only systemic evaluation of health capacity globally, investors must have an awareness of the JEE/GHSI indices to identify funding requirements – whether for short-term or long-term capacities – for pandemic response (Boyce et al., 2020).[33]Our paper seeks to evaluate whether this information was utilized to prioritize Covid-19 assistance.

It remains unclear whether Covid funding allocations from wealthy nations who received high JEE scores and were expected to perform well during the pandemic fulfilled their intended purpose — to transfer funds to poorer nations who received lower JEE scores due to their underdeveloped health capacity and pandemic response infrastructure. Without interrogating response funding, there is no material way to assess whether the IHR/GHSA's attempts to strategically allocate funding to the weakest links in the system succeeded. Understanding whether the systems we built can act under pressure and how they influence decision-making is critical to crafting better frameworks for future pandemic response.

[24]https://www.foreignaffairs.com/articles/united-states/2021-02-16/system-failure
[25]https://dai-global-digital.com/Covid-19-data-analysis-part-3-rethinking-the-global-health-security-index.html
[26]https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7207133/
[27]https://doi.org/10.1017/S0950268820002046
[28]https://www.medrxiv.org/content/10.1101/2021.02.02.21251013v1.full
[29]https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7506172/
[30]https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(22)00172-6/fulltext
[31]https://theindependentpanel.org/wp-content/uploads/2021/05/Covid-19-Make-it-the-Last-Pandemic_final.pdf
[32]In a proximate analysis, our team anticipates examining the relationship between GHSI scores and funding flows. This area is ripe for future research by other interested scholars.
[33]https://papers.ssrn.com/sol3/papers.cfm?abstract$_id = 3608071$

The failures of our global health financing architecture throughout this pandemic have been well recognized. The United States government, for example, recently committed to the "creation of a long-overdue sustainable financing mechanism for health security" (Glassman Smitham, n.d.).[34] However, as of now, our current spending on public health infrastructure is far below even the lowest estimates of financial need in the midst of a global pandemic. Furthermore, it remains unclear how we can track whether the limited funding which has been disbursed has translated to successful health outcomes.Indeed, it is because of the failures of existing metrics (including those outlined in the GHSI and JEE rubrics) to predict pandemic success, that global powers are now debating broad revisions to underlying metrics — and thus necessarily — where money should be funneled to better support the tracking and reporting of these indicators.

It remains important to acknowledge that the structure of assessing need and determining funding flows in regards to global health preparedness is flawed. These processes were created primarily by influences from the Global North and can at times reflect an outdated, colonial, North-South direction. Funding power remains mostly in the hands of those with economic and political power. A simultaneous truth however, is that the Global South relies on global health funding for infrastructure building, and the support given is key for preparedness and other global health aims. We acknowledge that an ideal framework would place funders and recipients in partnership with each other, and lead to a more equal resource allocation. However, since that system does not currently exist — we are instead focusing on ways to ensure the existing system, that relies on the JEE as an indicator for need, provides support where it is needed in an equitable manner.

[34]https://www.cgdev.org/blog/financing-global-health-security-and-pandemic-preparedness-taking-stock-whats-next

Data Sources and Methods

The primary goal of our analysis was to explore whether allocations of pandemic response funding were well-predicted by the global community's ex-ante notions of health capacity and pandemic preparedness, as indicated by JEE scores and pre-2020 national demographics (particularly per capita health expenditures). To do this, we pulled Covid-19 response funding data from the Global Health Security (GHS) Tracking platform (Global Health Security Tracking, n.d.), [35] Covid-19 cases and deaths data from the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (CSSE GIS Data, 2020/2022), [36] national health expenditures, population, and gross national income data from the World Bank and IMF (IMF Data, n.d.; World Development Indicators DataBank, n.d.), [37,38] and the WHO's JEE Ready Scores from Prevent Pandemics (How Prepared Is Your Country For The Next Epidemic?, n.d.).[39]

Our methods were straightforward: we conducted a simple descriptive analysis to assess whether pandemic response funding was meaningfully associated with country-level indicators of need, measured prior to the Covid-19 PHEIC declaration. We captured needs-based indicators through a combination of JEE scores and national per capita health expenditures. In general, we expected that a need-responsive global health framework would correspond to a direct positive relationship between indicators of need and the level of response funding received by countries.

It is important to note that the funding quantities in the data reflect both monetary and in-kind donations received by countries, provided both by other governments (i.e., bilateral donations from one nation to another) and by inter-governmental or non-governmental organizations (i.e., funding projects from an IGO such as the World Bank or WHO to mul-

[35] https://tracking.ghscosting.org/data
[36] https://github.com/CSSEGISandData/Covid-19/blob/master/csse_Covid_19_data/csse_Covid_19_daily_reports/10-04-2021.csv
[37] https://databank.worldbank.org/source/world-development-indicators
[38] https://www.imf.org/en/Data
[39] https://preventepidemics.org/

tiple nations). We considered only countries that received Ready Scores through the JEE process (which is completely voluntary) and are recorded by the GHS Tracking platform as recipients of Covid-19 response funding. In total, our sample covers 88 countries. [40]. While this sample is not completely representative of the global health landscape, it does include countries across the entire global income distribution and multiple demographic and political identities.[41] A detailed discussion of in-sample and out-of-sample countries is provided in Section 5.

Importantly, our data was collected prior to the Omicron variant outbreak and thus does not reflect aid responses or cases and deaths associated with that recent development.[42] We might expect the associations between funding and need during Omicron to rapidly and dynamically shift due to the evolving and exponential nature of this new strain. Furthermore, in the GHS Tracking data, funding amounts are not rigorously timestamped (only dated by year of disbursement), and thus we cannot actively track funding disbursements over time (at least at a high-frequency). We plan to conduct follow-up analyses of these time trends as Omicron develops and better data is published. However, the purpose of this initial descriptive analysis is to derive associations in the first phase of the pandemic, using gross funding amounts. We hope that these illustrative findings might motivate a change in our strategies as the Covid-19 pandemic continues in new forms, and potentially during future PHEIC-level events.

[40] The complete dataset can be found on our GitHub

[41] Following sample exclusions which removed countries without funding or JEE scores. Our initial dataset consisted of 190 countries. Interested readers can find a breakdown of the sample here.

[42] Covid-19 response funding and Covid-19 cases and deaths data were downloaded on October 10th, 2021 and reflect cumulative data prior to that date

Results: Have Our Global Health Frameworks Failed?

Our findings show that allocations of Covid-19 response funding largely have not corresponded to pre-pandemic assessments of need, across multiple indices.

As shown in Figure 1, the amount of Covid-19 response funding received by countries with very low JEE scores does not differ meaningfully from the amount of Covid-19 response funding received by countries with relatively higher scores, when measured on either a gross (Figure 1a) or per capita basis (Figure 1b). Only countries with very high JEE scores — which are also predominantly wealthy[43] - appear to have received consistently lower amounts of aid than countries with relatively higher indication of need (and are more likely to be donors rather than recipients). The implications of this visual are stark: **countries that were assessed to have the weakest pandemic response capacity — as measured by JEE scores — prior to the pandemic did not receive a greater level of assistance.**

Extending this analysis to pre-outbreak per capita health expenditures (from 2019) as a measurement of need (as opposed to JEE scores) returns a nearly identical result, as seen in Figure 2. Countries with very low levels of per capita health expenditures did not receive greater amounts of response funding, despite their vulnerabilities. **Similar to our finding with regards to JEE scores, only middle-income countries with high levels of per capita health expenditures appear to have received levels of response funding corresponding to pre-outbreak indication of need.**

[43] Measured by 2019 Per Capita Gross National Income.

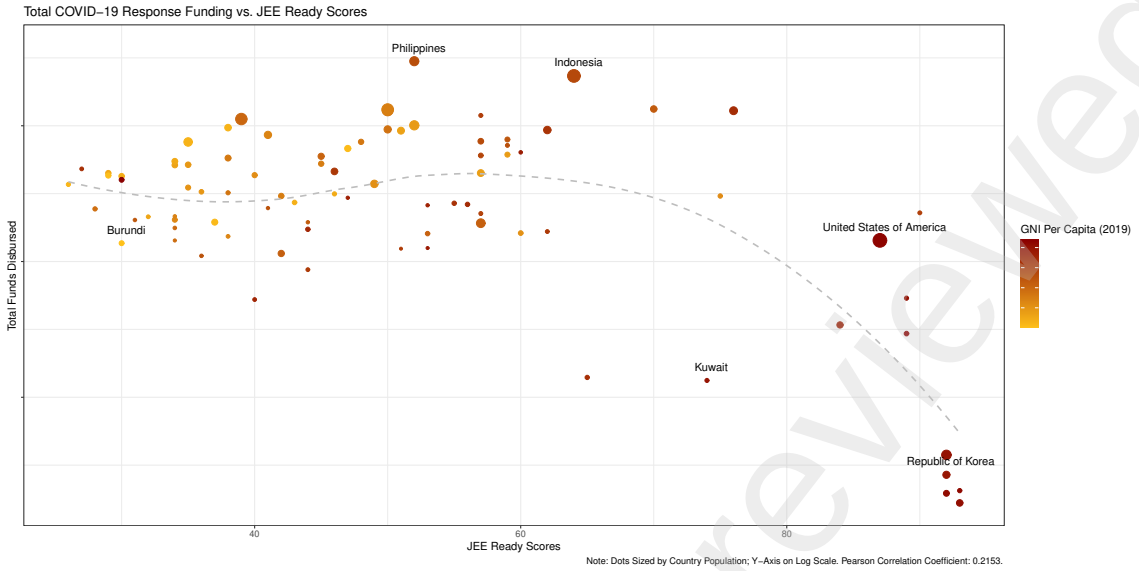

Figure 1a: Low JEE scores do not correspond to higher levels of total funding disbursed. Only a few countries with high JEE scores receive noticeably less total funding than those with lower scores.

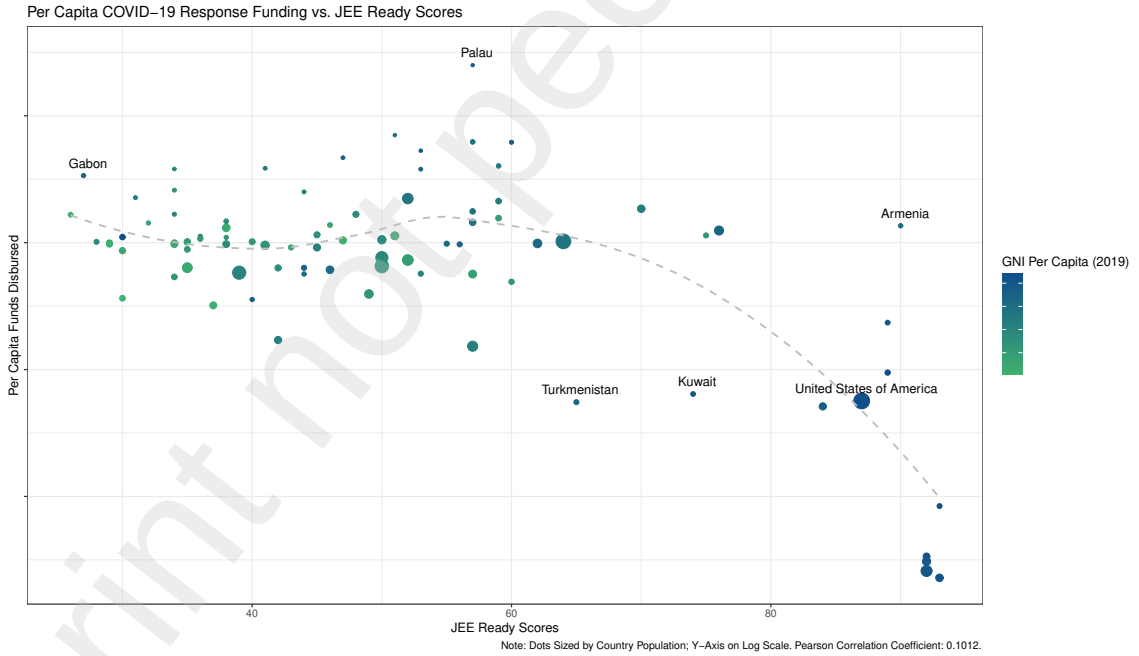

Figure 1b: Low JEE scores do not correspond to higher levels of per capita funding disbursed. Only a few countries with high JEE scores receive noticeably less per capita funding than those with lower scores.

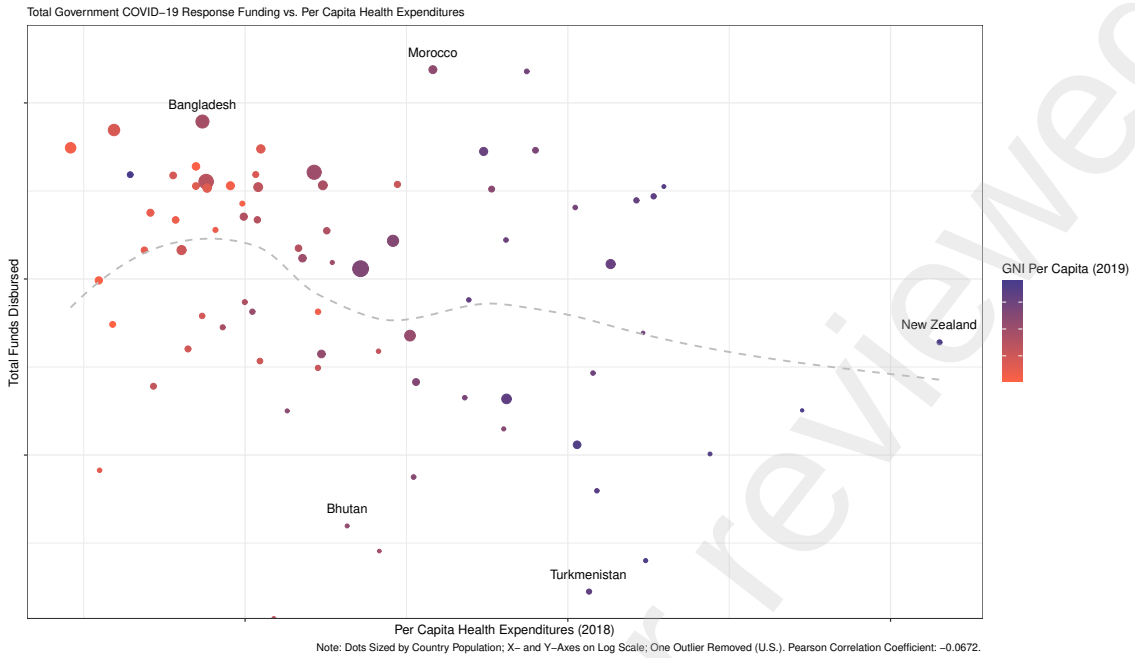

Figure 2a: Per capita health expenditures do not correspond to levels of total funding disbursed by governments.

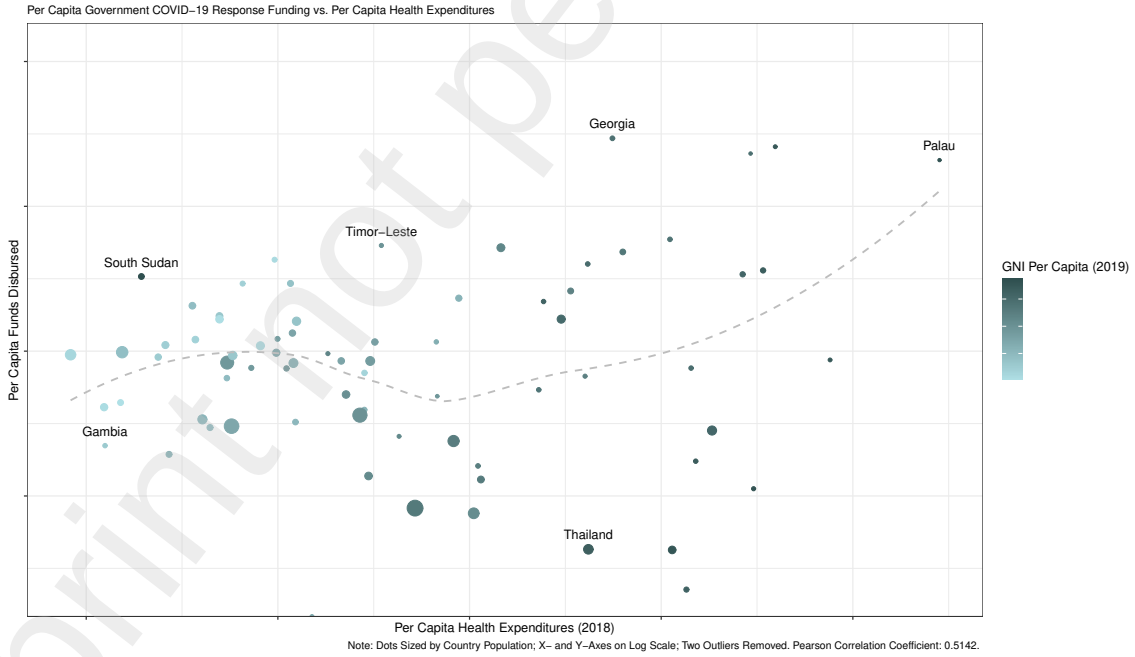

Figure 2b: Per capita health expenditures do not correspond to levels of per capita funding disbursed by governments.

After dis-aggregating the data by funder type, our analysis indicates that governments provided roughly $2.4B (USD) of total Covid-19 funding, while organizations — i.e., "a range of non-governmental entities such as foundations, academic institutions, and non-governmental organizations (NGOs)"[44] — provided $15.7B. A much smaller amount of $2.8M is provided by funders categorized as "other" in the GHS Tracker data (i.e., private donors). Even when considering these funder types separately, neither JEE scores nor per capita health expenditures are predictive of aggregate aid allocations.

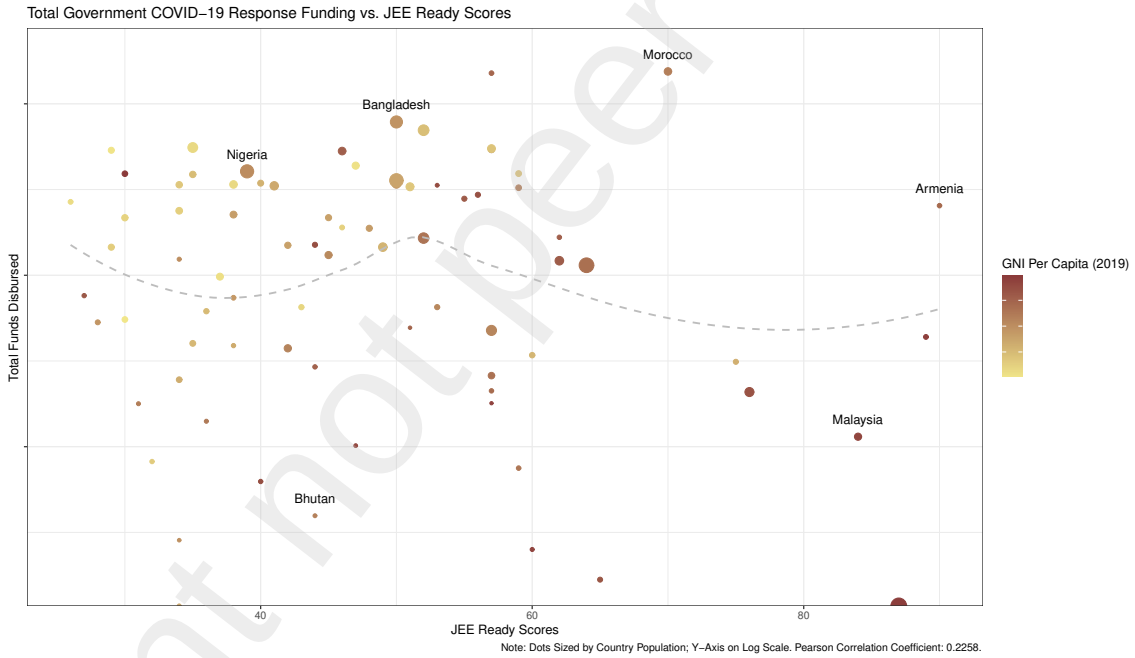

Figure 3a: JEE scores do not correspond to levels of total funding disbursed by governments.

[44]https://tracking.ghscosting.org/about/background

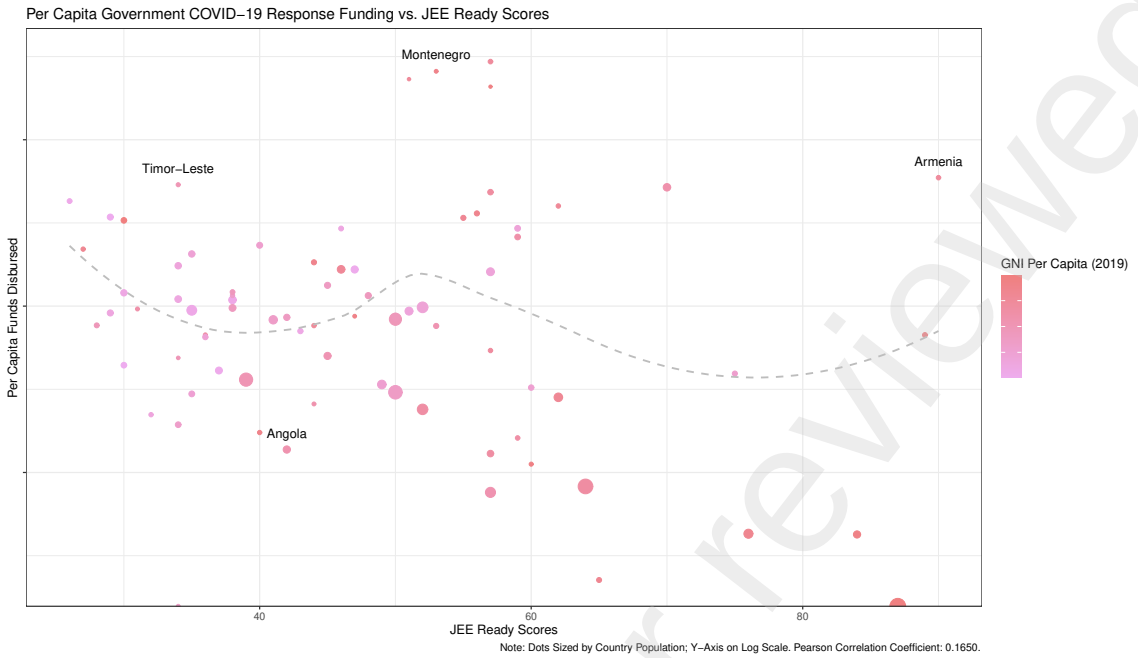

Figure 3b: JEE scores do not correspond to levels of per capita funding disbursed by governments.

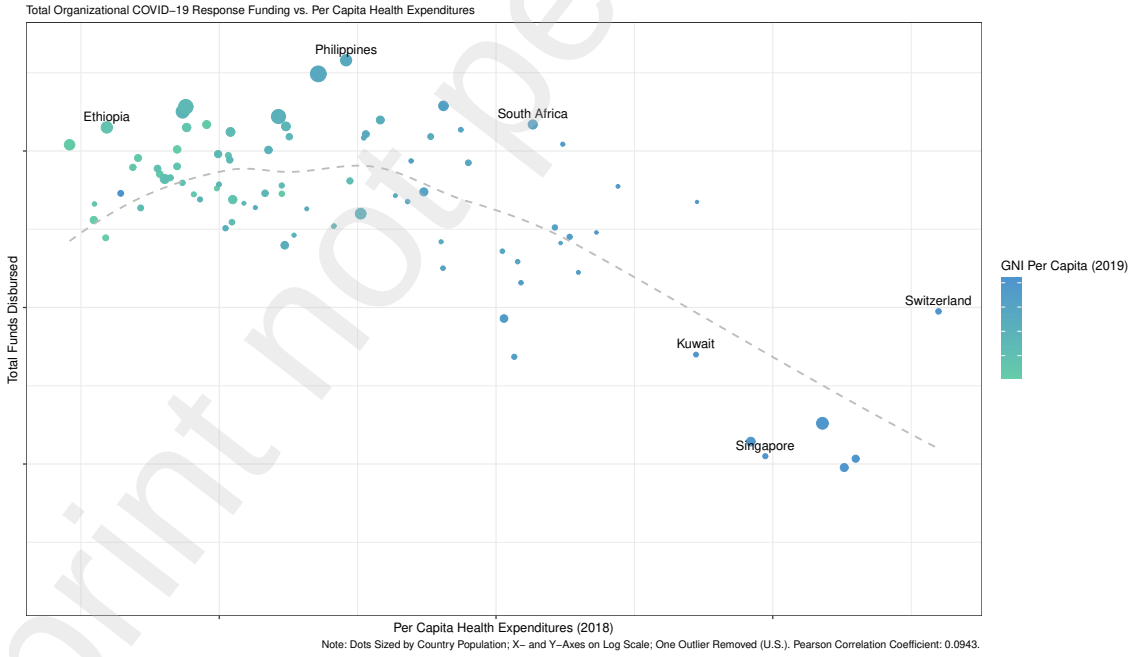

Figure 4a: Low JEE scores do not generally correspond to higher levels of total funding disbursed by organizations; although a few countries with very high JEE scores do receive noticeably less total funding.

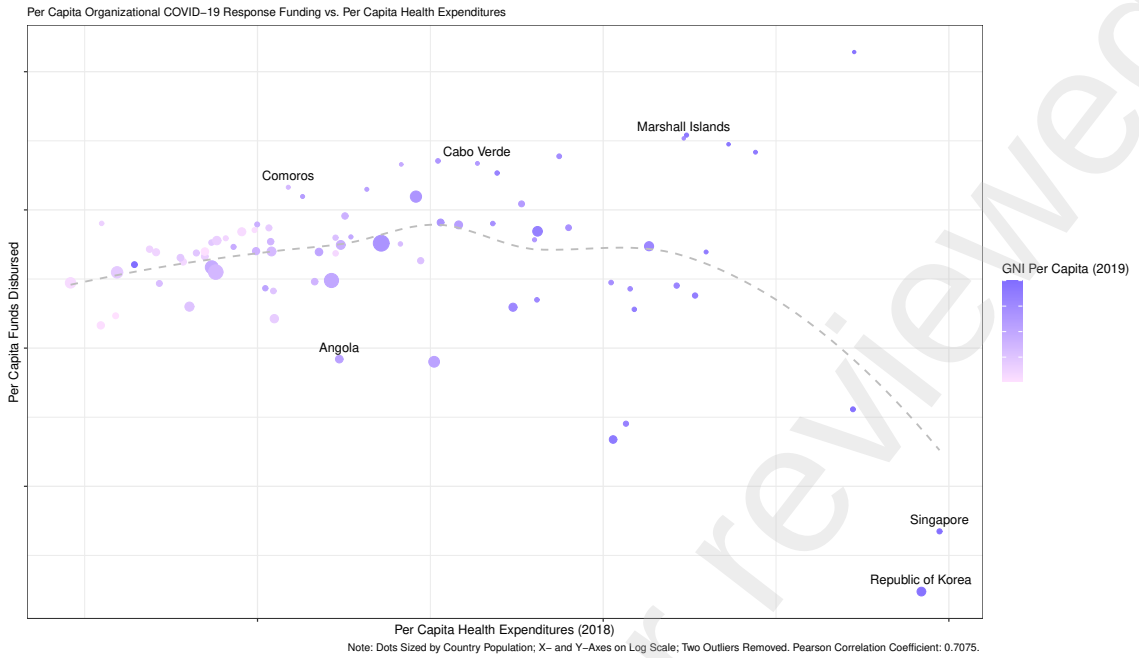

Figure 4b: Low JEE scores do not generally correspond to higher levels of per capita funding disbursed by organizations; although a few countries with very high JEE scores do receive noticeably less per capita funding.

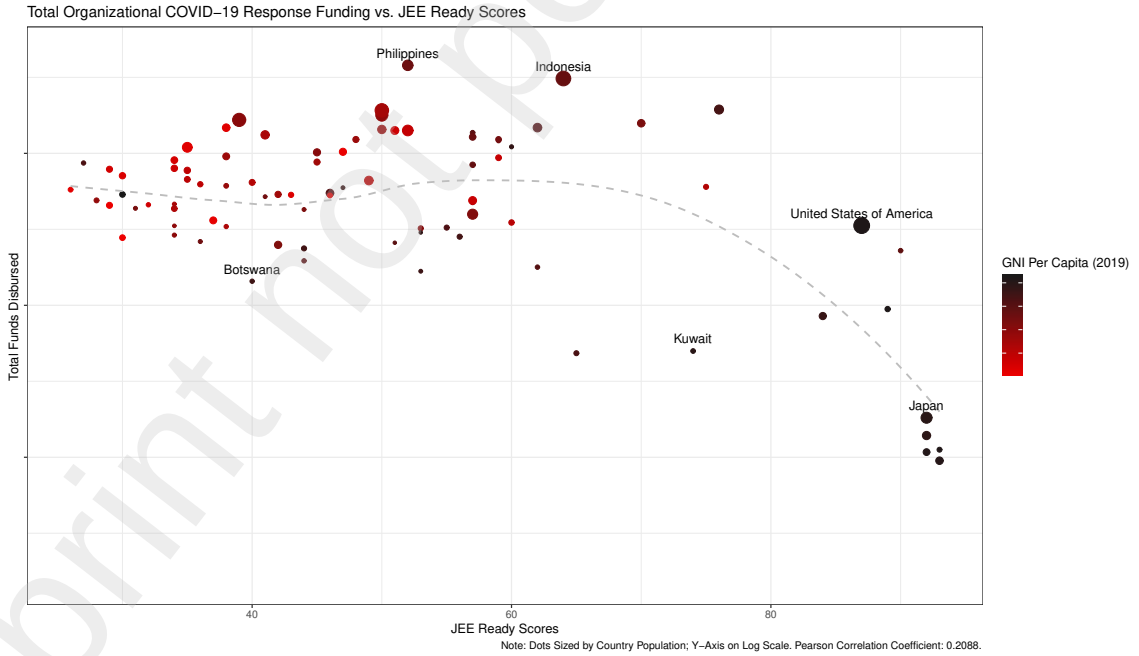

Figure 5a: Low per capita health expenditures do not generally correspond to higher levels of total funding disbursed by organizations; although a few countries with very high per capita health expenditures scores do receive noticeably less total funding.

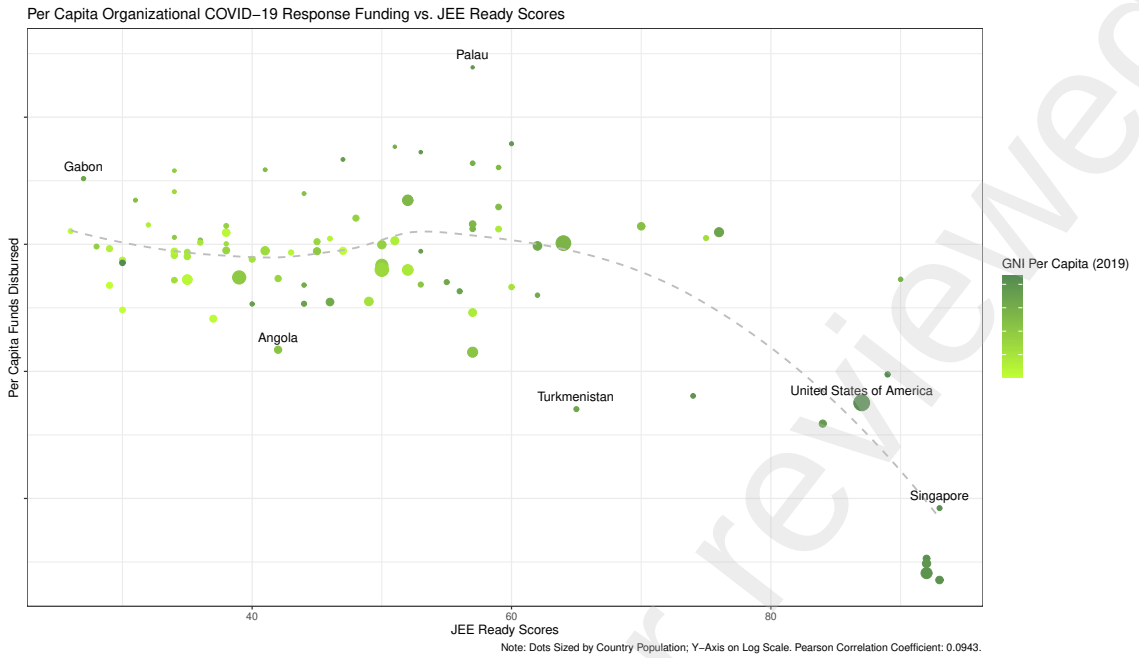

Figure 5b: Low per capita health expenditures do not generally correspond to higher levels of per capita funding disbursed by organizations; although a few countries with very high per capita health expenditures scores do receive noticeably less per capita funding.

Figures 3 - 5 show that bilateral aid has no discernible association with JEE scores or per capita health expenditures. Interestingly most aid we track throughout the pandemic has been provided by organizations such as IGOs and nonprofits, rather than governments. Regardless of the funding source, our findings once more suggest a troubling aggregate trend whereby countries with the most need have not received amounts of funding that scale with need. This result is unsurprising, given that governments and organizations face distinct incentives, decision-making processes, and objectives — but nevertheless highlights a troubling shortfall of equitable distribution within our current global health financing framework.

Discussion: Who Have Our Global Health Frameworks Left Behind?

Our analysis suggests that, by-and-large, Covid-19 response funding has been distributed in a manner that does not meaningfully correspond to pre-PHEIC measurements of need, based on a sample of 88 countries representative across a range of demographic features. However, a comprehensive appraisal of global health systems during the Covid-19 pandemic must also consider the countries outside of this group that either have not undergone the JEE process (out of 190 countries we originally considered in our analysis, 67 did not have JEE scores) or have not been identified as recipients of Covid-19 response funding (14 countries did not have funding data available), or both (21 additional countries had neither JEE scores nor funding data). This analysis does not evaluate the effectiveness of the JEE program as a predictor of pandemic outcomes based on pre-pandemic public health capacity, rather it highlights (1) a lack of collective buy-in for the JEE program during the pre-pandemic period and (2) the limited utility of the JEE as an instrument for directing pandemic aid.

Figure 6a illustrates the variations in the subset of countries included and excluded from our analysis. The red dots in the figure correspond to the average (mean) demographic values for the set of countries which were dropped from the analysis because they were missing either JEE scores, funding data, or a combination of these factors. The blue dots represent mean values for countries which were included in the analysis.

Excluded countries tended to be much wealthier on average, and also recorded a higher number of population-adjusted deaths and cases. The latter result might follow from other analyses referenced above, which showed that high-income nations actually performed relatively worse throughout the pandemic. Alternatively, the data and

reporting architecture in these wealthier nations might be much stronger — in which case a larger share of infections and deaths would be recorded, compared to in lower-income nations. It is likely that these two forces are complementary, rather than contradictory.

Figure 6b provides a more detailed breakdown of out-of-sample countries, in particular the countries that were excluded from our analysis due to missing JEE scores. We find that the countries which are missing JEE scores — but nevertheless received response funding — are a combination of low-income and lower-middle income nations which never were integrated into the JEE process (the assignment of scores is both voluntary and third-party moderated).

Concerningly, the subset of countries missing JEE scores is also highlighted by a number of HMICs who were highly influential in drafting the JEE rubric, and yet did not themselves participate in evaluations (for example: China, France, Italy, Russia, and the U.K.). In both of these instances — for the wealthiest nations who chose not to partake in the JEE process despite their influence in its drafting, and for the poorest nations who theoretically would benefit most from this rubric — the JEE framework has clearly failed to live up to its purpose. Instead, the countries which did have JEE scores tended to fall around the middle of the income distribution.

Finally, although only a few countries in our sample were missing both JEE scores and funding data, the demographic distribution of these countries is particularly heterogeneous (for example, the U.K., Portugal, and Norway are missing both sets of data, but so too are Iran, Bolivia, and Venezuela). In some nations, poor data collection or reporting architecture might explain these gaps (although we should not, at this point in the pandemic, be facing these issues) - but the inclusion of powerful HICs on this list is particularly concerning. Mean demographics across these nations are generally higher than in nations missing only JEE scores (see Figure 6B below).

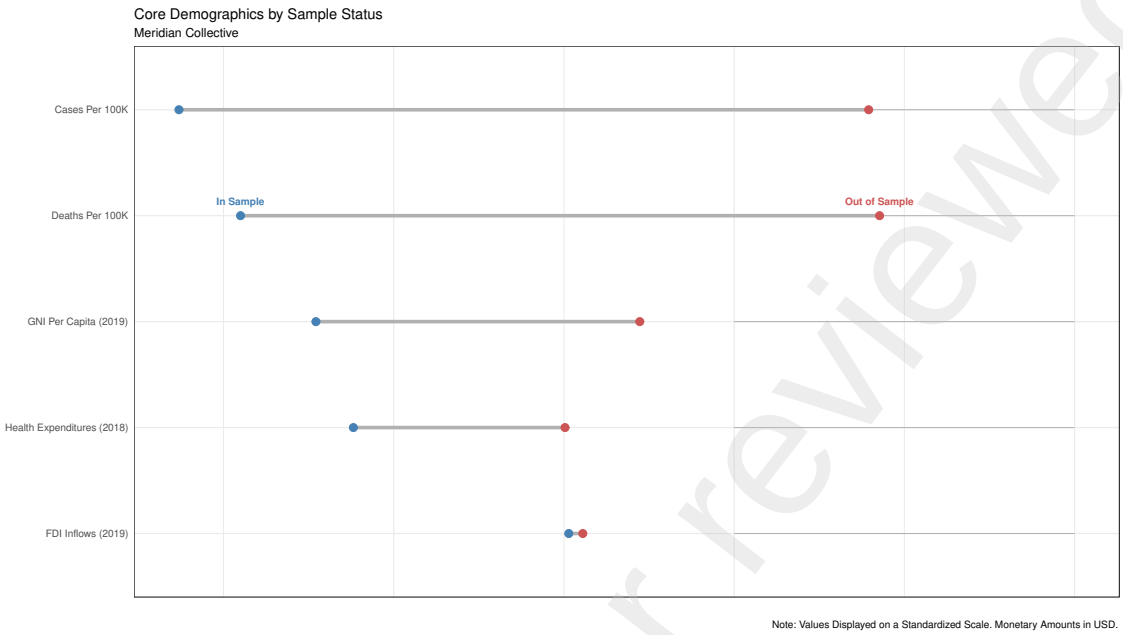

Figure 6a: We observe noticeable differences between in-sample and out-of-sample countries, with out-of-sample countries tending to be wealthier and more affected by Covid-19 outbreaks.

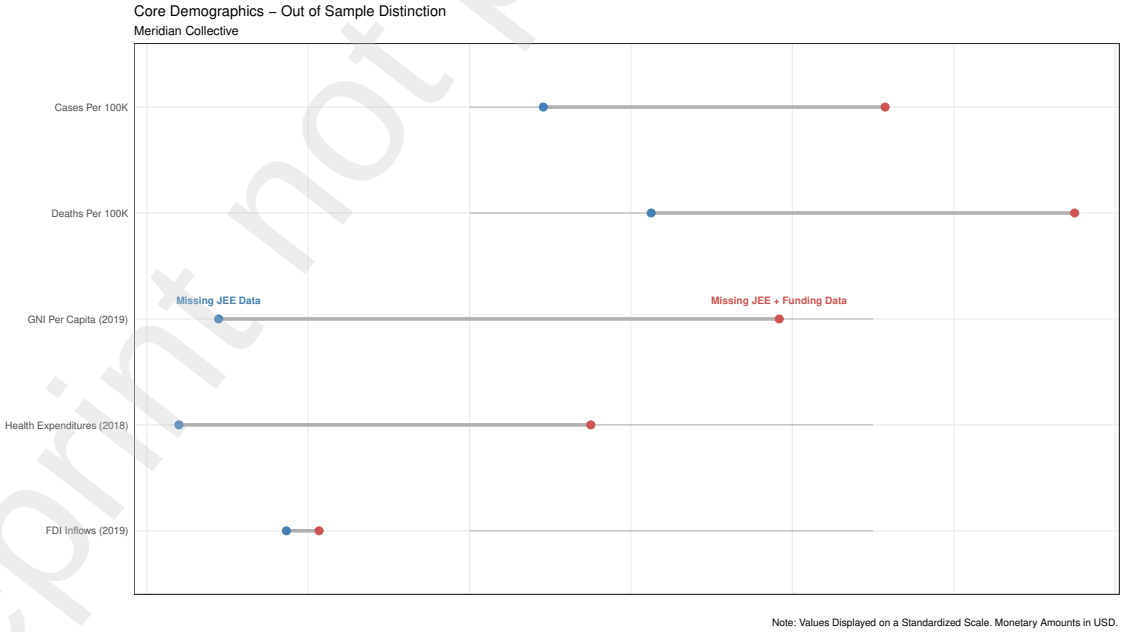

Figure 6b: Among out-of-sample countries, we observe noticeable differences between the non-JEE countries, with those who received response funding tending to be less wealthy and less affected by Covid-19 outbreaks.

Conclusion

These findings — that pre-pandemic indices of need developed by inter-governmental organizations and world governments have not aligned with funding allocations by these very same institutions during the pandemic, nor do they fully capture preparedness for those most in need — illustrate the failures and contradictions of our current global health systems.

In the aftermath of the SARS epidemic in 2005, we drafted these need indices with the purpose of strengthening health institutions and better-preparing us for the next pandemic through a spirit of global collaboration and a mechanism of needs-based support. Unfortunately, when faced with a pandemic with the scale and scope of Covid-19, these systems failed to live up to their promises. Our analysis shows that funding did not correspond with pre-pandemic indices of need compiled by our systems of global governance.

Our results raise many questions. First, how do we get our systems to live up to their principles and actually more equitably distribute resources? Our failure to execute on the front of equity is only prolonging this pandemic. It is easy to draw parallels here to the case of vaccine allocation — where rich, Western nations have largely hoarded vaccine resources. Rich nations continue to hold out-sized power in determining where vaccines go, significantly harming nations without the resources to adequately protect themselves and strengthen their healthcare institutions. Second, we have to consider whether conceptions of need and proceeding funding allocation are simply indicative of a larger political problem: our failure to execute on agreed upon global governance structures. If existing systems — founded and pitched on the principles of partnership — were ignored during a public health emergency, Covid-19, what was their purpose? How can we know whether the funding they provided resulted in stronger health infrastructure?

Without better data, it is difficult to answer these questions. What is clear though, is

that 5.6 million deaths later, the consequences of this failure, to provide resources as-needed, are obvious and unacceptable. Future global collaborations on pandemic preparedness must not only accurately measure capacity to predict, detect, and respond to emerging threats, but should also finally construct a robust system for tracking and allocating global health funds so that equity can be hardwired into the process, rather than based on more empty promises. This inability of the global community to stay true to the standards they set for themselves is harmful now, and potentially catastrophic given the likelihood of future pandemics.

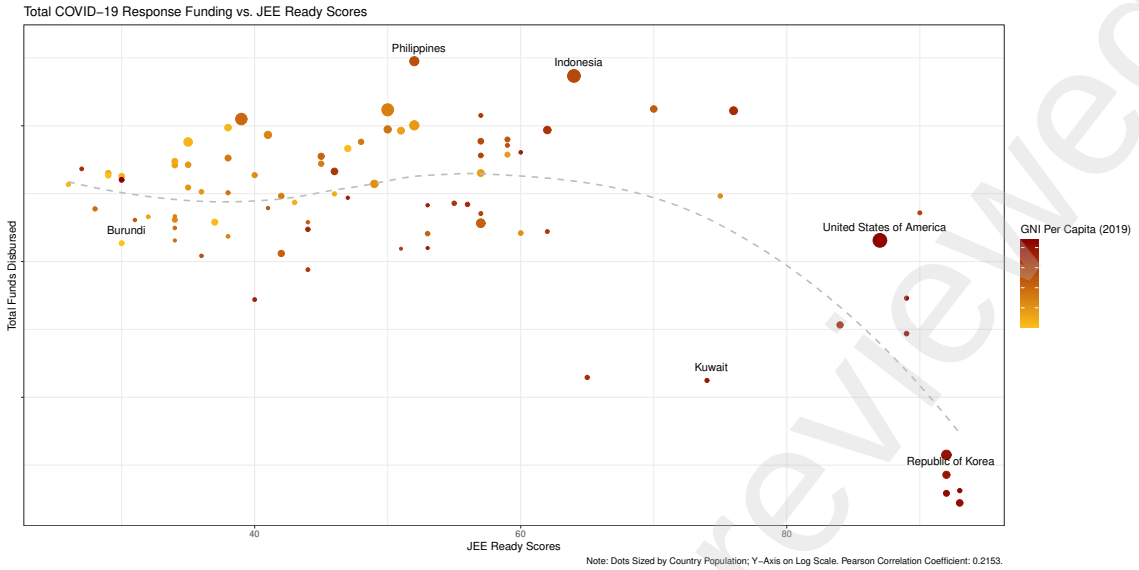

Figure 1a: Total COVID−19 Response Funding vs. JEE Ready Scores.

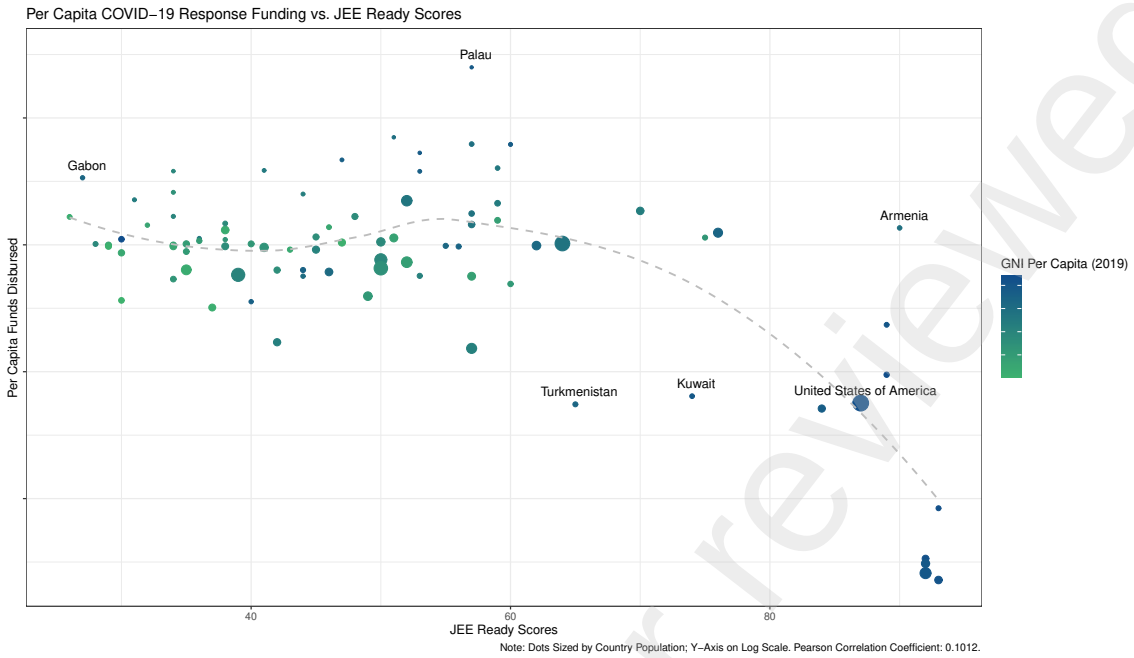

Figure 1b: Per Capita COVID−19 Response Funding vs. JEE Ready Scores.

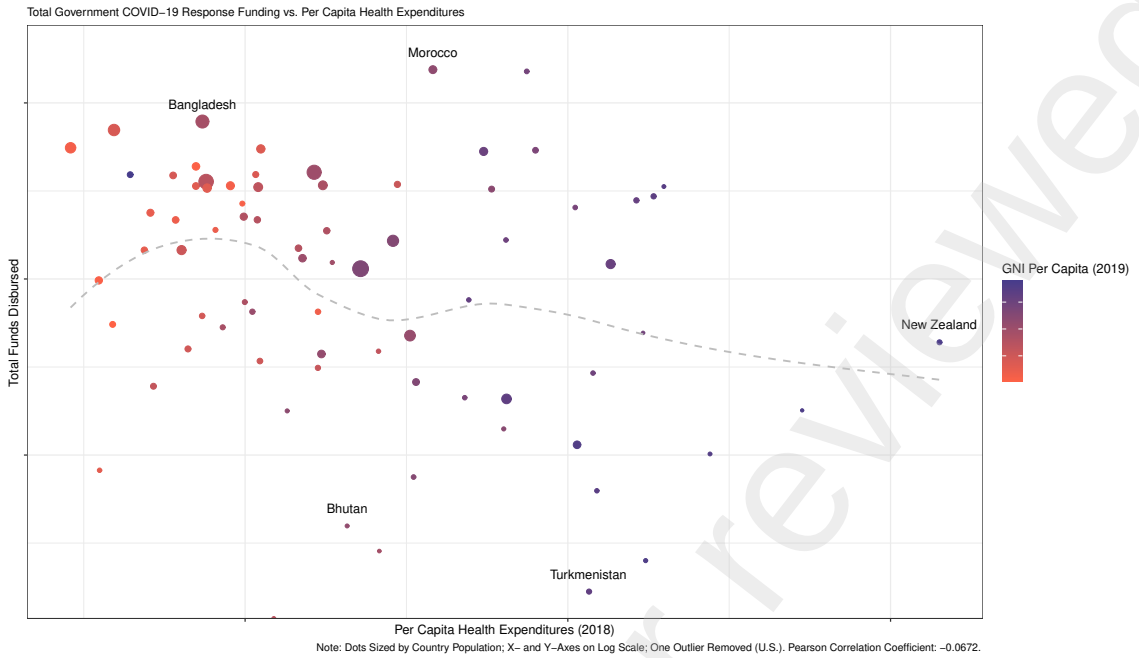

Figure 2a: Total Government COVID−19 Response Funding vs. Per Capita Health Expenditures.

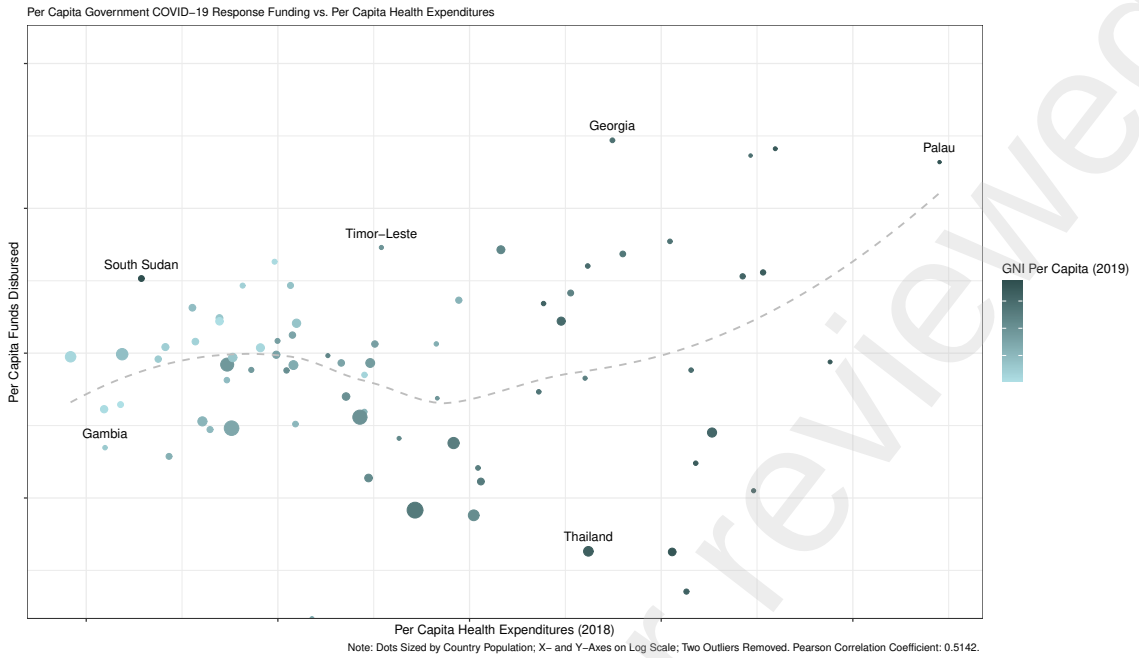

Figure 2b: Per Capita Government COVID−19 Response Funding vs. Per Capita Health Expenditures.

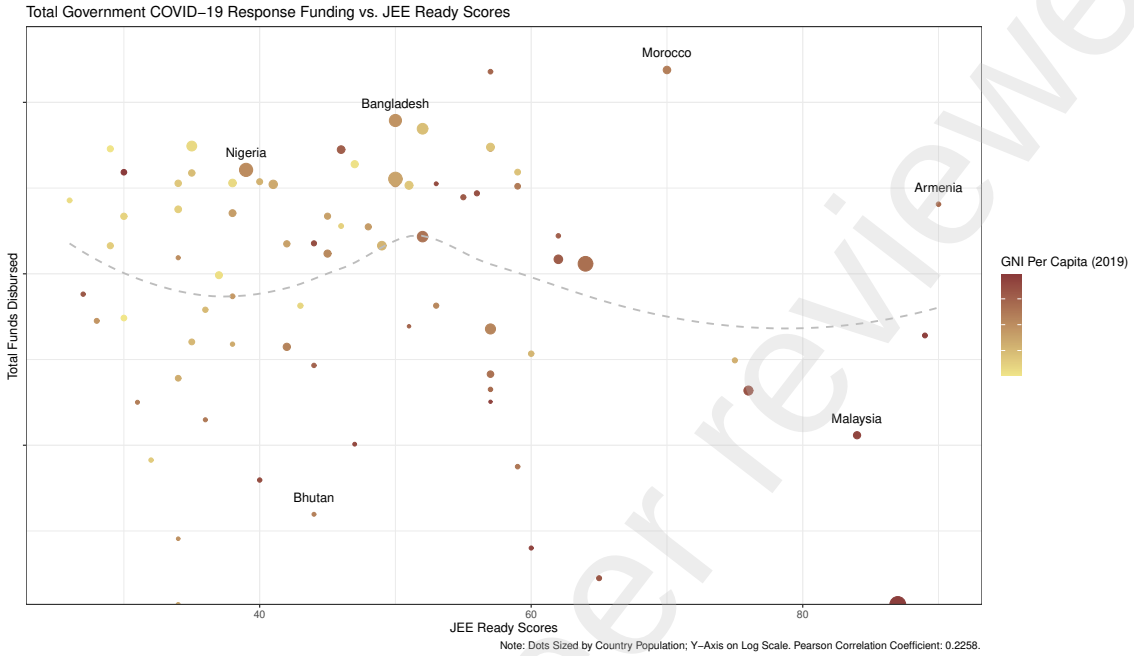

Figure 3a: Total Government COVID−19 Response Funding vs. JEE Ready Scores.

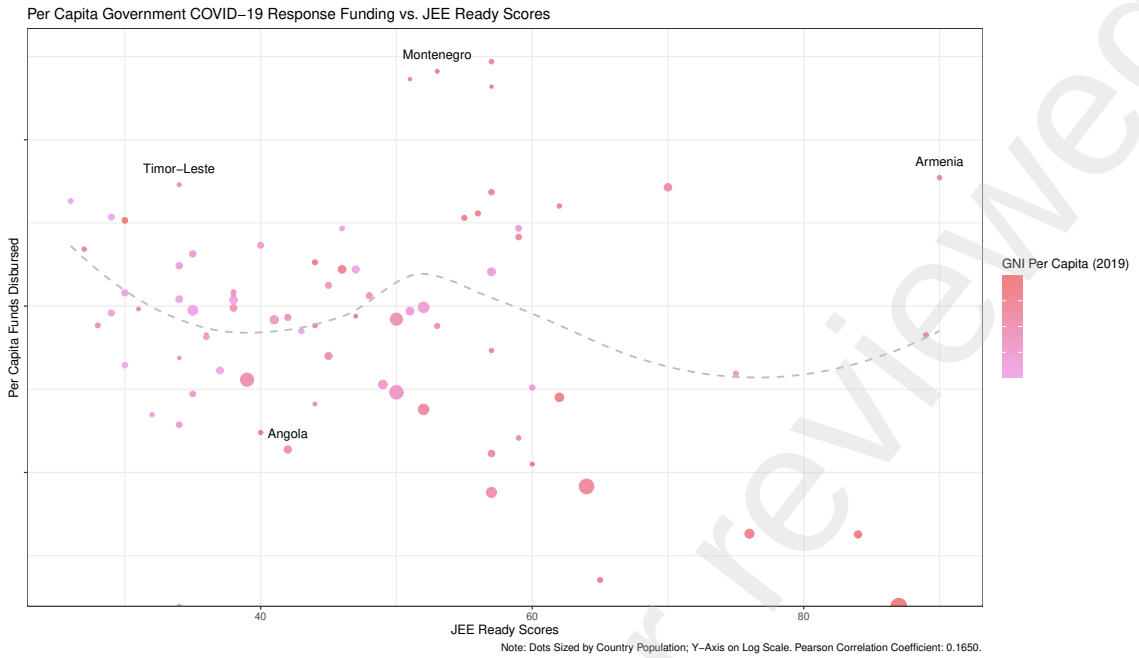

Figure 3b: Per Capita Government COVID−19 Response Funding vs. JEE Ready Scores.

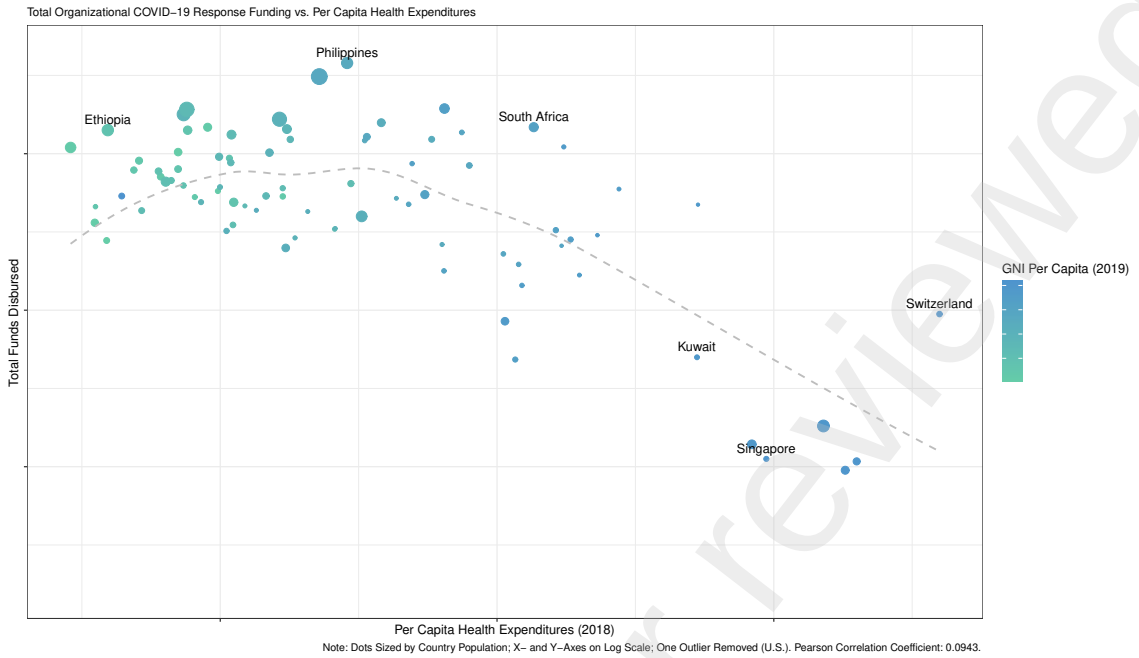

Figure 4a: Total Organizational COVID−19 Response Funding vs. Per Capita Health Expenditures.

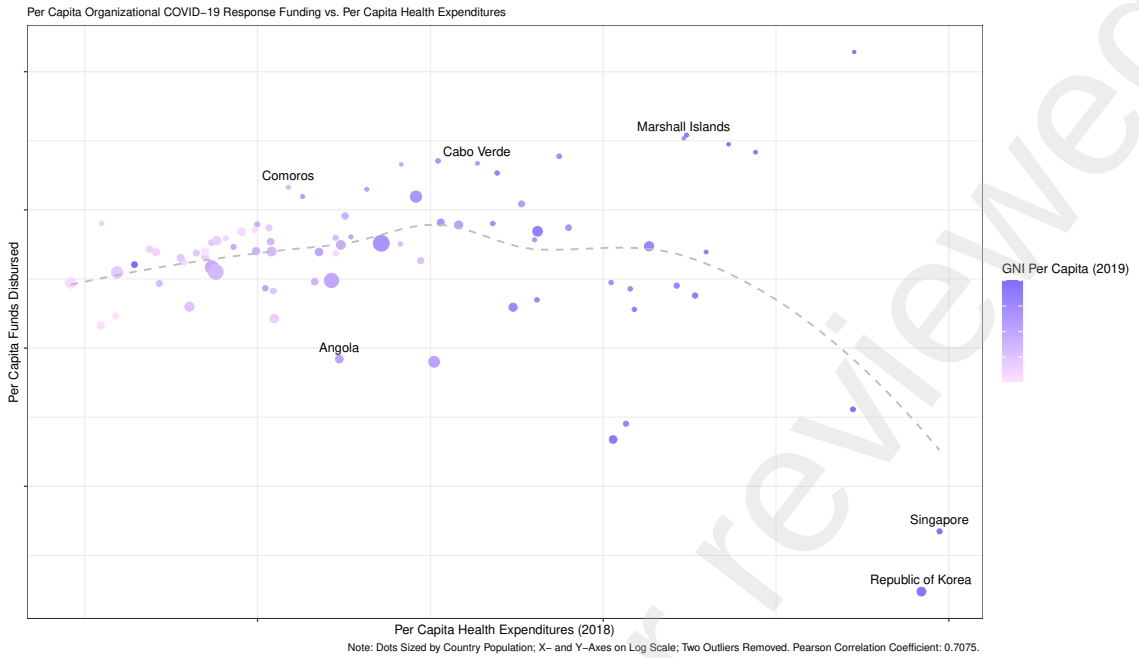

Figure 4b: Per Capita Organizational COVID−19 Response Funding vs. Per Capita Health Expenditures.

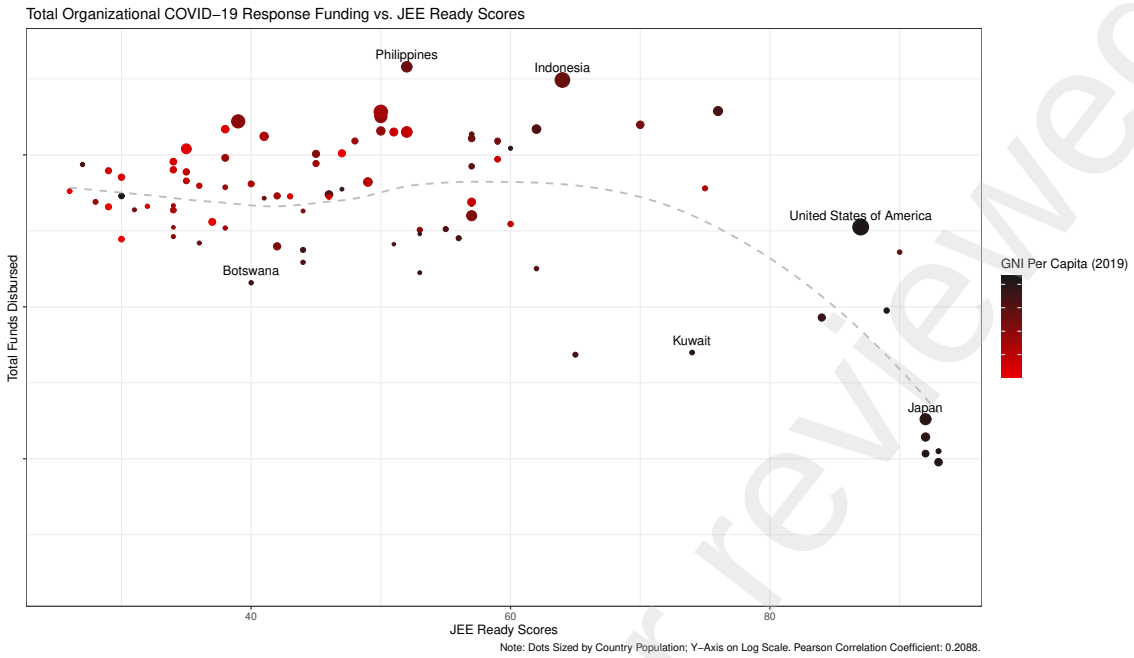

Figure 5a: Total Organizational COVID−19 Response Funding vs. JEE Ready Scores.

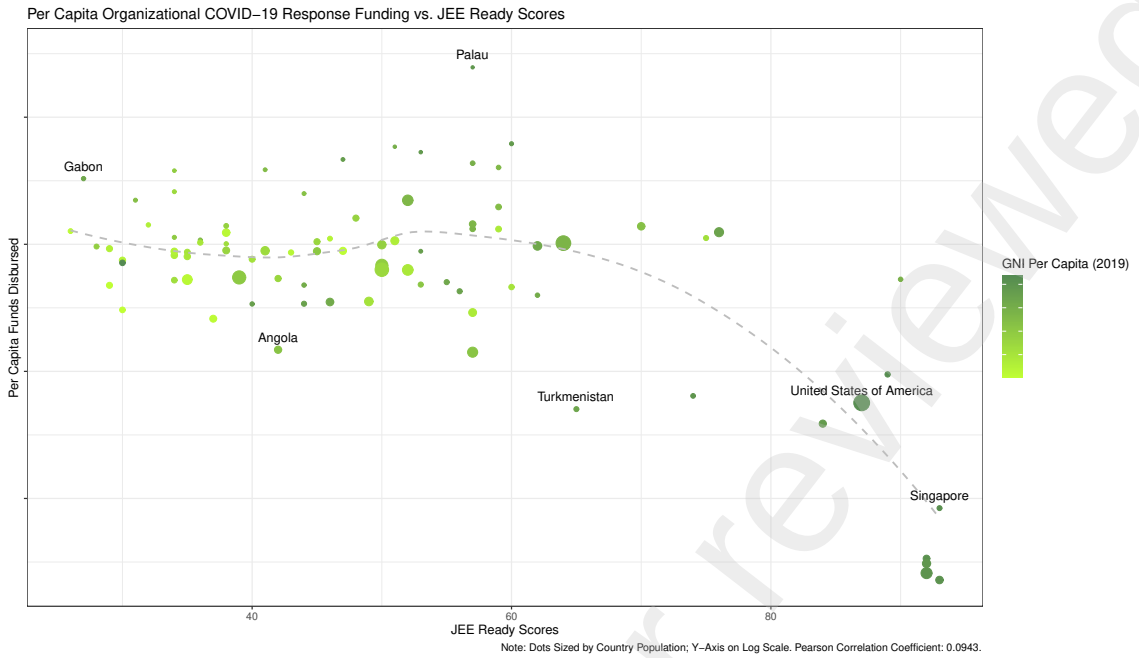

Figure 5b: Per Capita Organizational COVID−19 Response Funding vs. JEE Ready Scores.

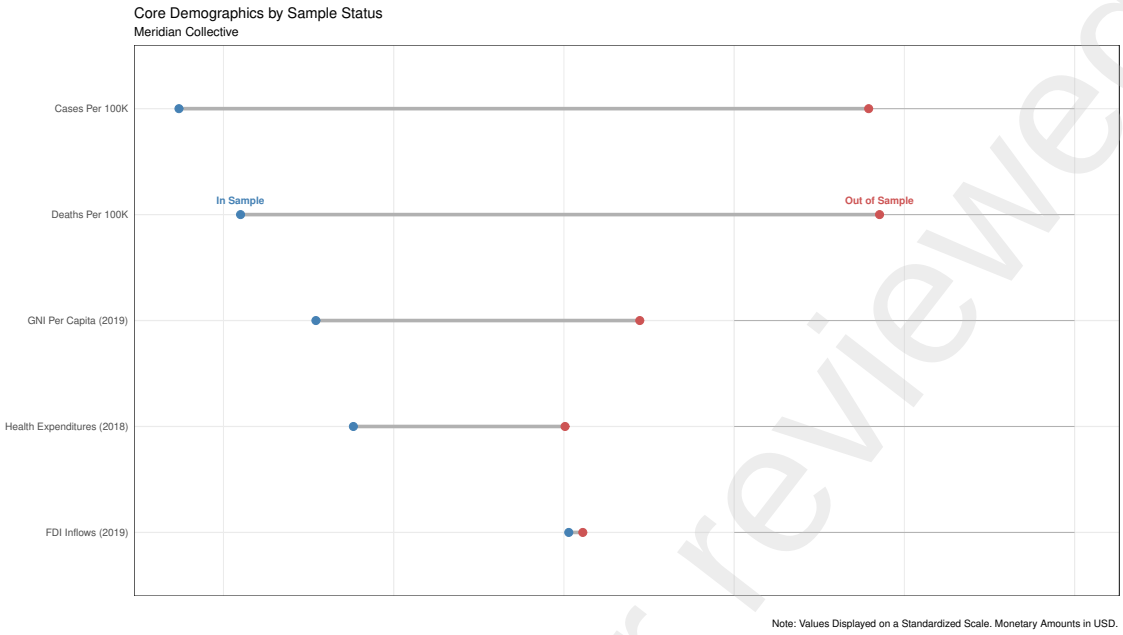

Figure 6a: Core Demographics by Sample Status.

Figure 6b: Core Demographics – Out of Sample Distinction.

Figure Captions

- **Figure 1a: Total COVID19 Response Funding vs. JEE Ready Scores**
- **Figure 1b: Per Capita COVID19 Response Funding vs. JEE Ready Scores**
- **Figure 2a: Total Government COVID19 Response Funding vs. Per Capita Health Expenditures**
- **Figure 2b: Per Capita Government COVID19 Response Funding vs. Per Capita Health Expenditures**
- **Figure 3a: Total Government COVID19 Response Funding vs. JEE Ready Scores**
- **Figure 3b: Per Capita Government COVID19 Response Funding vs. JEE Ready Scores**
- **Figure 4a: Total Organizational COVID19 Response Fudning vs. Per Capita Health Expenditures**
- **Figure 4b: Per Capita Organizational COVID19 Response Funding vs. Per Capita Health Expenditures**
- **Figure 5a: Total Organizational COVID19 Response Funding vs. JEE Ready Scores**
- **Figure 5b: Per Capita Organizational COVID19 Response Funding vs. JEE Ready Scores**
- **Figure 6a: Core Demographics by Sample Status**
- **Figure 6b: Core Demographics Out of Sample Distinction**

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