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Revealing priorities and power asymmetries in global health governance using twitter data

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Title: Revealing priorities and power asymmetries in global health governance using twitter data

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Structured Abstract:

Objectives: Despite increases in global health actors and funding levels, health inequities persist. We empirically tested whether global health governance (GHG) operates under the Rational Actor Model (RAM) and characterized GHG power dynamics.

Design: We collected approximately 75,000 tweets of 20 key global health actors, between 2016 and 2020 using Twitter API. We generated priorities from tweets collected using a topic modeling algorithm. Priorities from tweets were compared with stated priorities from content analyses of policy documents and with revealed priorities from network analyses of development assistance for health (DAH) funding data. Comparing priorities derived from Twitter, policy documents, and DAH funding data, we are able to test if GHG operates under RAM and to characterize power dynamics in GHG.

Participants: 20 key global health actors were identified based on consensus of 3 peerreviewed articles mapping global health networks. All tweets of global health actors were collected in three-month intervals from November 2016 to May 2020. Policy documents and DAH financial data for each actor were collected for the same time period.

Results: We find all 20 actors and the global health system collectively fulfill the 3 conditions of RAM based on stated and revealed priorities. We also find compulsory and institutional power asymmetries in GHG. Funding organizations have compulsory power over channels of DAH and implementing institutions they directly fund. Funding organizations also have transitive influence over implementing institutions receiving DAH funding.

Conclusions: GHG operates under RAM, the rational choice for all actors is to align their priorities with the priorities of wealthy funding organizations. Priorities of the entire global health system are determined by the priorities of wealthy funding organizations that have compulsory and institutional power over other actors. If health inequities are to be addressed, a reassessment of current global health governance is imperative.

Strengths and limitations of this study:

- This study utilizes an alternative methodology of using Twitter data in understanding global health governance and priority-setting.
- This study triangulates findings from multiple data sources to test the rational actor model and power asymmetries in global health governance.
- Because the scope of this study is from 2016 to 2020, the findings may not be fully representative of global health governance during the COVID-19 pandemic.
- Only the key 20 actors of the hundreds of global health actors today were included in the study.

INTRODUCTION

The turn of the 21st century introduced an unprecedented volume of new public and private actors in global health accompanied by stratospheric levels of funding.[1] While some argue that this multiplicity of new actors promotes cooperation, what persists is a politically fragmented network of actors with competing priorities and preferences.[2–4] Academics studying the complex network of global health actors have described it as a "congested" and "chaotic" network that causes inefficiencies in the practice and delivery of global health programs and aid.[5]

Inequities in global health have increasingly been attributed to the actions of transnational actors with varying degrees of power and divergent interests.[6] While more actors have entered global health with ostensible benevolent purposes, health inequities and inefficiencies in delivery still exist today. Fierce competition among donor priorities and requirements overwhelms the institutional capacities of recipient countries,[7,8] disrupts national health planning,[9] delays the delivery of aid,[10] and creates duplications and resource waste.[11,12]

Paradoxically, the increase in global health actors and funding has exacerbated inequities and inefficiencies in global health. Researchers have presented arguments explaining this paradox through the lens of economics, politics, and power.

The current global health governance (GHG) has been theorized as operating under the rational actor model (RAM) where "each actor has its own set of goals and objectives, and these actors take actions based on analysis of the costs and benefits of various available options."[13] Current GHG based on the RAM fails to "justify an obligation to help meet the health needs of others."[13]

The Lancet-University of Oslo Commission on Global Governance for Health (2014) argues that "power asymmetry and global social norms limit the range of choice and constrain action on health inequity."[6] The actions of powerful global actors in pursuit of their own interests "are not designed to harm health but can have negative side-effects that create health inequities."[6]

The explanations by the Commission on Global Governance for Health and the hypothesis that GHG operates under the RAM are conceptual ideas about the behaviors of global health actors founded on a collection of studies within specific nations, regions, or institutions. What is necessary is empirical evidence at the global level that can confirm, deny or recharacterize these characterizations of how global health currently operates. Empirical evidence at the global level eliminates doubts of how decisions are currently made in global health and can guide GHG towards addressing the world's inequities in health.

We aim to empirically test the following research questions at the global level: (1) does GHG operate under the RAM? and (2) how can we characterize power dynamics in GHG?

We hypothesize that GHG operates under RAM and that there are power asymmetries in GHG that limit the range of health priorities as presented by the Commission on Global Governance for Health. This study analyzed empirical evidence from Twitter,

funding data, and policy documents at the global level to test whether GHG operates under RAM and to characterize the power dynamics in GHG.

METHODS

We test if GHG operates under the RAM and characterize the power dynamics in GHG through the lens of global health priority-setting. All global health actors have certain preferences for health issues and act in alignment with these priorities.

Priorities can either be stated or revealed. Stated priorities are those preferences explicitly stated in a health actor's official documents or websites. For example, the first article in the constitution of the World Health Organization (WHO) states: "the objective of the [WHO] shall be the attainment by all peoples of the highest possible level of health."[14] The attainment of highest possible level of health by all is the WHO's stated priority. Revealed priorities are preferences that are gleaned from records of past behaviors and choices such as health funding allocations and accounts of actually implemented programs and policies. Revealed priorities may or may not be aligned with stated priorities. For example, the WHO has annual financial reports that break down how much each health area or issue is funded in proportion of their total budget. The most allocated health areas are the revealed priorities of the WHO.

We use evidence for both stated and revealed priorities from 2016 to 2020 to test both of our research questions.

Study Sample

In this study, we identified 20 key global health actors based on a consensus among three past studies that mapped the global health network using quantitative and qualitative methodologies.[4,15,16] As shown in Table 1, the key global health actors were categorized based on their nature of work in global health. Global health actors were either funding organizations, channels of developmental assistance for health (DAH) or implementing institutions. While most actors fall into more than one of these categories in practice, for the integrity of this analysis, organizations were limited to only one category based on the nature of their main line of work.

 Table 1. Summary of Global Health Actors. Characteristics of the 20 global health actors analyzed in this study.

Nature of Work in Global Health	Organizational Category	Twitter Username	Global Health Actor
	Global health initiative	gavi	Gavi, the Vaccine Alliance
		UNITAID	Unitaid
		GlobalFund	Global Fund to Fight AIDS,
			Tuberculosis and Malaria
Channels of Developmental	UNITAID Unitaid GlobalFund Global Fund to Fight AIDS, Tuberculosis and Malaria Multilateral Development Bank WorldBank World Bank United Nations System WHO World Health Organization UNAIDS Joint United Nations Programme on HIV/AIDS (UNAIDS) UNFPA United Nations Population Fund (UNFPA) UNICEF United Nations Children's Fund		
Assistance for Health	United Nations System	WHO	World Health Organization
Assistance for Health		UNAIDS	Joint United Nations Programme on HIV/AIDS (UNAIDS)
	Health United Nations System WHO World UNAIDS Joint HIV/A UNFPA United (UNF) UNFPA UNIted	United Nations Population Fund (UNFPA)	
		UNICEF	Gavi, the Vaccine Alliance Unitaid Global Fund to Fight AIDS, Tuberculosis and Malaria World Bank World Health Organization Joint United Nations Programme on HIV/AIDS (UNAIDS) United Nations Population Fund (UNFPA) United Nations Children's Fund (UNICEF) United States Agency for International Development (USAID) United Kingdom Department for International Development (UK DFID)
	National Government	USAID	United States Agency for International
Funding Organizations			Development (USAID)
		DFID_UK	United Kingdom Department for
			International Development (UK DFID)

	Philanthropic Organization	gatesfoundation	Bill and Melinda Gates Foundation
	Global CSO/NGO	MSF	Doctors Without Borders (MSF)
		PATHtweets	PATH
		SavetheChildren	Save the Children
		Oxfam	Oxfam International
	United Nations System	FAO	Food and Agriculture Organization (FAO)
Implementing Institutions		UNDP	United Nations Development Programme (UNDP)
	National Government	CDCgov	Centers for Disease Control and Prevention (CDC)
		ECDC_EU	European Centre for Disease Prevention and Control (ECDC)
		NIH	National Institutes of Health (NIH)

Patient and public involvement

Patients and the public were not involved in the development of the research questions and outcome measures.

Data Sources

We analyze stated and revealed priorities of 20 key global health actors from three data sources – policy documents, DAH funding data, and tweets. As summarized in Table 2, stated priorities are obtained from a manual content analysis of policy documents, annual reports, and official websites of global health actors. Revealed priorities are derived using a network analysis and descriptive statistics of financial flows in DAH funding data. To obtain the revealed priorities of each global health actor, we use topic modeling in natural language processing (NLP) and a network analysis of the tweets of each global health actor. Further explanation of data collection from each source follows.

 Table 2. Summary of Data Source, Collection, and Analysis.
 Description of how data is collected and analyzed in the study.

Data Source	Data Collection	Analysis	Type of Priorities Derived from Source
Policy Documents	Manual collection of annual reports, policy documents, and official communications from official websites of each global health actor	Manual content analysis	Stated
DAH Funding Data	Queried funding allocation data of each global health actor from the International Health Metrics and Evaluation (IHME) DAH Database	Descriptive statistics; network analysis	Revealed
Twitter Data	Collected all the tweets of each global health actor from November 2016 to May 2020 in three month intervals using the Twitter API	Natural language processing (topic modeling); network analysis	Revealed

Drawing stated priorities from policy documents

Available policy documents, annual reports, and relevant official communications from the websites of each global health actor within the timeframe of the study were collected. Documents not published between 2016 and 2020 were not collected. Manual content analysis was conducted to evaluate the available policy documents for each global health actor and identify their respective stated priorities.

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59 60 The stated priorities drawn from these documents were commonly obtained from official statements that fall under the following headings: "strategic priorities," "program priorities," "strategic objectives," "focus areas," "strategic work areas," "program focus," "Strategy 20XX-20XX," "strategic goals," "priority areas," among others. The first column of Supplementary Table 1 contains the stated priorities obtained from each actor.

Deriving revealed priorities from funding data

Data from the Institute for Health Metrics and Evaluation's (IHME) Developmental Assistance for Health Database was collected for 2019.[17] The database includes approximately 800,000 transactions of financing for health programs and aid from funding organizations to channels of DAH and to implementing countries.

Descriptive statistics were conducted to determine the allocations of funding for each health area and geographic region for the 20 global health actors in 2019.

Network analysis was conducted to observe the funding relationships between global health actors. Gephi 0.9.2 was used in constructing and analyzing the network map. The network modelled in the study allows for a graphical visualization of the flows of global health funding in 2019. The network map was designed such that each global health actor is represented by a node and lines or "edges" indicate a flow of funding in global health. The Fruchterman-Reingold algorithm was used in modelling the network map. The algorithm "calculates the optimal layout so that nodes with less strength and less connections are placed further apart, and those with more and/or stronger connections are placed closer to each other." [18] The thickness of edges represents the amount of funding transferred between actors. The modelled network map can be found and will be discussed in the findings section.

Twitter data

Using the Twitter API, we collected all the tweets of each global health actor by username from November 2016 to May 2020 in three month intervals. This means that all the tweets of each global health actor were collected for each day in the months of February, May, August, and November for each year. An interval of three months was decided for two reasons. First, a variation in the issues, topics, and themes that global health actors tweet can be observed in three month intervals. Initial small sample testing indicates that collecting all the tweets of every month for each actor yields redundancy in issues and topics observed. Redundancy is eliminated in three month intervals. Second, it also allows for efficient usage of the data request limits of the Twitter API. As Twitter limits the number of tweets one is able to collect from the Twitter API, this interval is an efficient way of collecting data for all 20 global health actors for the timeframe. A total of 74,241 tweets were collected from 2016 to 2020 for the 20 global health actors. Supplementary Tables 2 and 3 further describe the tweets collected.

Using Twitter as a data source plays an important role in analyzing GHG, examining whether it operates under the RAM, and characterizing power dynamics. In the academic area of communications studies, researchers suggest that there are two forms of utility that motivate actors to post content on Twitter. First, intrinsic utility assumes that a user receives inherent satisfaction from posting content on Twitter.[19] On its about page, Twitter positions "itself as a real-time information network powered

by people all around the world that lets you share and discover what's happening now...to millions across the globe." By this definition, global health actors acquire more intrinsic utility as their tweets reach a greater number of users. Second, image-related utility assumes that the perceptions of others,[20,21] and seeking status or prestige are strong motivators for posting content.[22,23] As global health actors operate best with high public approval, posting content on Twitter can improve public perception. Twitter is the ideal platform for global health actors to simultaneously share their work to a greater number of individuals and to improve their public perception. The utility received from using Twitter explains the social media's ubiquity among global health actors.

Because Twitter limits each post to 280 characters, the platform promotes short, frequent, and straightforward manners of communication. The tweets of global health actors are regular ways of communicating their work, preferences, and priorities to the public.[24–27] The tweets of global health actors act as an archive, a record of historical preferences, priorities, goals, and implemented programs.[28]

Obtaining priorities from Twitter data

NLP is a subfield in artificial intelligence, computer science, and linguistics at the intersection of the human language and computers. NLP is concerned about how to utilize computers to process and analyze large quantities of human language data. We use NLP in analyzing the tweets of the global health actors for two reasons. First, NLP allows for the efficient analysis of tens of thousands of rows of text data that could not be done manually.[29–31] Second, NLP allows for a technique called topic modeling where an algorithm generates lists of words that are frequently used together.[32–34] These lists of words can then be interpreted to identify specific themes, topics, or issues to identify the top 10 priorities of each global health actor from 2016 to 2020. The results of the topic modeling are then used in a network analysis that visualizes where each actor converges or diverges in global health priorities with other actors.

As seen in Table 3, ten topics were generated using the Latent Dirichlet Allocation (LDA) topic model for each global health actor's tweets to reveal their priorities from 2016 to 2020. LDA is a generative probabilistic modeling method where words in a corpus of text that are frequently used together are categorized into topics.[35] This follows the assumption that documents, or in this case Twitter profiles, can be broken down into multiple topics that are identified by certain combinations of words.

Table 3. Revealed Priorities from Twitter Topic Modeling. Ten revealed priorities of each of the 20 global health actors based on their tweets from 2016 to 2020. Priorities are alphabetically arranged. Red indicates Funding Organizations. Blue indicates Channels of DAH. Gray indicates Implementing Institution.

United States	United Kingdom	Gates Foundation	wно	World Bank	UNAIDS	UNFPA	UNICEF	UNITAID	GAVI
Africa	Africa	Africa	Africa	Africa	Access	Africa	Africa	Access	Africa
Children	Agriculture	Breastfeeding	Breastfeeding	Agriculture	Africa	Child Marriage	Breastfeeding	Cancer	Cancer
Education	Children	Children	Children	Children	Discrimination	Children	Children	Children	Children
Food Security	Development	Education	Ebola	Climate Change	HIV/AIDS	Family Planning	Climate Change	Hepatitis	Cholera
HIV/AIDS	Ebola	HIV/AIDS	HIV/AIDS	Food Security	Human Rights	FGM	Ebola	HIV/AIDS	Ebola
Humanitarian Aid	Education	Malaria	Malaria	Humanitarian Aid	Innovation	Human Rights	Education	Malaria	Measles
Mothers	Food Security	Mothers	Measles	Poverty	Prevention	Humanitarian Aid	Human Rights	Testing	Pneumonia

South America	HIV/AIDS	Polio	Mothers	Sanitation	Testing	Nutrition	Online	Treatment	Polio
Water	Humanitarian Aid	Sanitation	Polio	Water	Treatment	Violence	Violence	Tuberculosis	Poverty
Women	Water	Women	Women	Women	Women	Women	Water	Vaccines	Vaccines
Global Fund	CDC	EU CDC	NIH	FAO	UNDP	MSF	PATH	Save the Children	Oxfam
Africa	Children	Ebola	Africa	Africa	Africa	Africa	Access	Africa	Africa
Children	Diarrhea	Hepatitis	Cancer	Agriculture	Children	Children	Africa	Children	Climate Change
Cholera	E. Coli	HIV/AIDS	Funding	Biodiversity	Climate Change	Cholera	Breastfeeding	Donations	Ebola
Ebola	Influenza	Influenza	Heart Disease	Climate Change	Education	Ebola	Cancer	Education	Food Security
HIV/AIDS	Measles	Measles	HIV/AIDS	Families	FGM	HIV/AIDS	Children	Food Security	Humanitarian Aid
Malaria	Prevention	Outbreaks	News	Farmers	Food Security	Humanitarian Aid	Ebola	Humanitarian Aid	Malaria
Pneumonia	Vaccines	Report	Rare Disease	Fisheries	HIV/AIDS	Refugees	Innovation	Pneumonia	Pneumonia
Polio	Water	Surveillance	Research	Food Security	Malaria	Treatment	Malaria	Refugees	Refugees
Tuberculosis	Women	Tuberculosis	Stress	Forests	Water	Tuberculosis	Pneumonia	Schools	Water
Women	Zika	West Nile	Veterans	Water	Women	Violence	Vaccines	Water	Women

Additionally, we model a network map from the priorities generated using the LDA topic model also using the Fruchterman-Reingold algorithm. This network map visualizes the similarities in priorities between the 20 actors. Data used for this network map can be found in Supplementary Table 4. This network map is compared with the network map generated using financial data from IHME in the findings section. This comparison between network maps can illustrate if priorities from tweets and from financial data are aligned.

Testing if GHG operates under the RAM

By combining evidence for stated and revealed priorities of 20 key global health actors, we can determine if GHG operates under the RAM.

The rational actor model (RAM) in international cooperation is categorized as the "linchpin of foreign policy decision making."[36] This approach is rooted in expected utility theory in microeconomics introduced by von Neumann and Morgenstern in the 1940s and subsequent theories of rationality.[37]

RAM is most useful in explanations of economic behavior if the three conditions of the rationality assumption are fulfilled.[36] First, it is assumed that an actor's goal is predetermined before intentionally acting to achieve it.[36] Second, actors are assumed to "display consistent preferences as manifested in the ability to rank the preferences in transitive order."[36] Third, actors are assumed to maximize utility while choosing an alternative that provides the highest amount of net personal benefit.[36]

GHG operates under RAM if each of the 20 global health actors and the global health system collectively fulfill the three assumptions of pre-determined goal, rank order preferences, and benefit maximization.

To test the first assumption of pre-determined goal, we determine the stated priorities of each global health actor from policy documents. We test whether there exist explicit statements on goals and priorities and note what health areas or issues are the stated priorities of each global health actor.

To test the second assumption of consistent rank order preferences, we compare revealed priorities from DAH funding data and revealed priorities from tweets. From the DAH funding data, we can determine rank order preferences based on which health issues are allocated the most funding in 2019. From tweets, we can determine rank order preferences based on the top 10 topics each global health actor tweeted about from 2016 to 2020. If there is consistency in rank order preferences between the revealed priorities from DAH funding data and revealed priorities from tweets, then the second assumption is fulfilled.

To test the third assumption of benefit maximization, we compare the stated and revealed priorities from all three data sources. The priorities that are consistent across stated priorities from policy documents and revealed priorities from DAH funding data and from tweets are revealed to be the priority that the global health actor determines to be benefit maximizing.

We also test the three assumptions at the global health system level. Pre-determined goals are obtained from stated priorities from collective stated commitments to global health. Consistent rank order preferences are derived from the alignment between aggregated DAH funding allocations of all global health actors and the most common topics generated from tweets across all global health actors. The consistent preferences across stated and revealed priorities are inferred to be what the global health systems decides to be benefit maximizing.

If each global health actor fulfills the three assumptions, and if the global health system collectively fulfills the three assumptions, then GHG operates under the RAM.

Definitions and types of power

"Power is exercised everywhere in global health although its presence may be more apparent in some instances than others,"[38] one global health researcher notes. The power concept in global health does not stray far from Robert Dahl's (1957) definition in his seminal study where he describes "A has power over B to the extent that he can get B to do something B would not otherwise do." [39] Specifically, power can be categorized into four types introduced by Barnett and Duvall (2005), each manifesting in different manners in global health.[40] Supplementary Table 5 summarizes Barnett and Duvall's four types of power. First, compulsory power is defined as "direct control of one actor over the conditions of existence or the actions of another."[40] In global health, compulsory power can be seen in how donor countries dictate the conditions in low and middle-income countries (LMICs) through development aid.[41] Second, institutional power is "the control actors exercise indirectly over others through diffuse relations of interactions." [40] High-income countries control funding allocations for LMICs through institutional power via their contributions to the WHO and other multilateral organizations. Third, structural power refers to the "constitution of subjects' capacities in direct structural relation to one another." [40] The structural and historical disempowerment of indigenous populations have resulted in their disproportionate outcomes in health.[42,43] Fourth, "productive power works through diffuse constitutive relations to produce the situated social capacities of actors."[40] Research institutions funded by high-income countries direct what health issues are studied and addressed.[44]

Characterizing power dynamics in GHG

To characterize the power dynamics manifested in GHG, we analyze the interplay of stated and revealed priorities between funding organizations, channels of DAH, and implementing organizations. Particularly, we identify which global health actors have the most influence in setting global health priorities. The global health actors which have the most priorities aligned with the stated and revealed priorities of the global health system are determined to have the most influence and power in priority-setting.

FINDINGS

GHG operates under RAM

As seen in Supplementary Table 1, we find that each of the 20 key global health actors fulfills the three assumptions of the RAM. Each actor has a pre-determined goal stated in mission statements, strategic plans, multi-year strategies, and other policy documents. Each actor has consistent rank order preferences as observed in the alignment of order of preferences in DAH funding data and top identified topics from tweets. Consistent, top ranking preferences across policy documents, funding data, and tweets are the alternatives that maximize benefits for each global health actor based on their pre-determined goal.

As shown in the last row of Supplementary Table 1, we find that the global health system collectively fulfills the three assumptions of the RAM. The pre-determined goal of the global health system can be found in the WHO constitution and the 9 target areas for Sustainable Development Goal (SDG) 3 on good health and well-being. All 20 global health actors have stated commitments to the WHO mission and the SDGs. The alignment of DAH funding allocations and most common health issues from Twitter reveal that in terms of rank order, HIV/AIDS, child health, and maternal health are the top 3 priorities of the global health system collectively. To maximize benefits of the predetermined goal of "health for all" and "SDG3: good health and well-being", the global health system prioritizes HIV/AIDS, child health, and maternal health. Among all 9 stated targets in SDG3, only these three issues are prioritized. Effectively, the 6 other stated targets in SDG3 are deprioritized and underfunded by the global health system.

Since each global health actor and the global health system collectively fulfills the three assumptions, we find that GHG operates under the RAM. However, this does not imply cooperation of global health actors. This finding demonstrates the fact that each global health actor operates based on their rational self-interest and that the global health system operates based on the pursuit of only some of the stated priorities. Who determines which priorities are pursued by the global health system? The findings on power dynamics in GHG reveal the actors who determine global priorities.

Compulsory and institutional power asymmetries in GHG

As demonstrated in the following network maps, we find that there is compulsory and institutional power asymmetry in GHG.

Compulsory power asymmetry can be found in how funding organizations strongly influence channels of DAH and implementing institutions based on their relationship. Channels of DAH and implementing institutions rely on funding organizations for resources to continue operating. We find that the top priorities of the 3 funding

organizations in this study are also the priorities of channels of DAH and implementing institutions.

As seen in Figure 1, HIV/AIDS is 1st priority of United States Agency for International Development (USAID), 2nd priority of United Kingdom Department for International Development (UK-DFID), and 2nd priority of the Bill and Melinda Gates Foundation (BMGF) based on the alignment of stated and revealed priorities. HIV/AIDS is a priority of 4 of 8 channels of DAH and 4 of 9 implementing institutions based on its presence in policy documents, DAH funding, and tweets of each actor.

Figure 1 also demonstrates that maternal and child health is 2nd priority of USAID, 1st priority of UK-DFID, and 1st priority of BMGF based on the alignment stated and revealed priorities. Maternal and child health is a priority of 6 of 8 channels of DAH and 7 of 9 implementing institutions based on its presence in policy documents, DAH funding, and tweets of each actor.

Following the flow of the funding in Figure 2 and the similarities in tweets in Figure 1, we can see that institutional power asymmetry can be found in how funding organizations strongly influence implementing institutions through outsized influence of channels of DAH that allocate funding to these implementing institutions. As some implementing institutions do not get direct funding from funding organizations, but through channels of DAH, channels of DAH have direct control of funding of implementing institutions. Because wealthy funding organizations influence the priorities of channels of DAH, transitively, funders have power over implementing institutions. Implementing institutions in turn align their priorities with the priorities of channels of DAH, and transitively with the priorities of funding organizations.

Both network analyses of revealed priorities from DAH funding data and from tweets show how there is asymmetric levels of power held by the United States, United Kingdom, and the Gates Foundation in comparison to other actors. Figure 2 reveals how these three funding organizations are the largest funders for the work of the Global Fund, WHO, World Bank, US Foundations, UN organizations, and Gavi. The IHME DAH database reveals that 24% of all DAH funding was allocated to HIV/AIDS, 21% to child health, and 12% to maternal health – the three top priorities of funding organizations.[17]¹⁷ Only 14% was allocated to health system strengthening and 2% to non-communicable diseases.[17]¹⁷

Figure 1 reveals how the most common topics generated across all global health actors include Africa, HIV/AIDS, child health, women health, and infectious diseases. These are the same health issues highly prioritized by the United States, United Kingdom, and Gates foundation. Comparing figures 1 and 2, we find that these three funding organizations have outsized influence in priority-setting. Funding organizations have outsized influence because of how much DAH funding these three organizations have provided in comparison to other funding organizations. We find that the programs implemented and issues prioritized from 2016 to 2020 as documented through the tweets of the actor revolve around the main priorities of funding organizations of HIV/AIDS, child health, maternal health, infectious disease, and Africa.

CONCLUSION

We find empirical evidence at the global level showing that GHG operates under the RAM. Additionally, we find that at the global level, there is asymmetric compulsory and institutional power held by funding organizations, allowing global health priorities to be set by funders that have the money to spend on global health. In the past years, these funders have been the United States, United Kingdom, and the Gates Foundation. The rational choice for all global health actors is to align their priorities with those of funding organizations in order to continue with their programs. The priorities of funders of HIV/AIDS, child health, and maternal health have been prioritized from 2016-2020. While global health has seen improvements in these three areas, other important health issues are deprioritized and underfunded, leading to a persistence in global health inequity. If "health for all" and the SDG3 targets are to be achieved, then there must be a reassessment of current GHG under the RAM.

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Ethics approval: The study did not have any human or animal participants. Additionally, the study did not require ethical approval as the Twitter data used were already in the public domain.

Data and materials availability: Under the "Content Redistribution" section of Twitter's Developer Agreement and Policy, "We restrict the redistribution of Twitter Content to third parties. If you provide Twitter Content to third parties, including downloadable datasets or via an API, you may only distribute Tweet IDs, Direct Message IDs, and/or User IDs." Because the data collected using the Twitter API does not allow for redistribution under the Twitter Developer Agreement and Policy, tweets cannot be made publicly available. Only Tweet ID's and User ID's are allowed to be redistributed according to the Twitter policy. Please email jenpr@upenn.edu if you wish to receive a copy of the Tweet ID's and User ID's of the data and/or the code used in the study. The IHME DAH Database can be found at http://ghdx.healthdata.org/record/ihme-data/development-assistance-health-database-1990-2019

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Figure 1. Network Analysis of Revealed Priorities from Tweets. Line thickness represents how many similar priorities one global health actor has with another. Font size of global health priorities represent the number of organizations have it as a priority. Data used found in Supplementary Table 4.

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Figure 2. Network Analysis of Revealed Priorities from Funding for DAH (2019). Line thickness represents the amount of funding for health that was transferred between two actors. Font size represents the total amount of funding for health donated or received in 2019.

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Supplemental Material

Supplementary Table 1. Evidence and Testing RAM by Actor. Evidence for stated and revealed priorities and testing of RAM for each actor and the global health system as a whole. Light red indicates funding organization, blue indicates channel of DAH, yellow indicates implementing institution, and dark red indicates global health system as a whole.

		Evidence		Testing			
	Stated Priorities from Policy Documents	Revealed Priorities from DAH Data	Revealed Priorities from Tweets	Pre-determined goal?	Consistent preferences?	Utility maximizing?	Operates under RAM?
USAID	"On behalf of the American	Health Focus Area	Topics from 2016-2020	National security	HIV/AIDS,	HIV/AIDS,	Yes
	people, we promote and	49.0% of 2019 US	tweets	National interests	child and	child and	
	demonstrate democratic	DAH (\$6.0 billion)	(no order)	Clobal baalth	maternal	maternal	
	free peaceful and prosperous	7.0% (\$862.5 million)	Africa	focus	Africa are	consistent	
	world. In support of America's	supported malaria;	Children	Child and	consistent	across stated	
	foreign policy, the U.S. Agency	11.4% (\$1.4 billion)	Education	maternal health,	across DAH	and revealed	
	for International Development	was disbursed for	Food Security	HIV/AIDS, malaria,	data and	priorities.	
	leads the U.S. Government's	child health, and	HIV/AIDS	tuberculosis	tweets		
	international development	10.8% (\$1.3 billion)	Humanitarian Aid			To maximize	
	and disaster assistance	went to maternal	Nothers South Amorica			benefits for	
	investments that save lives	nearth.	Water			security and	
	reduce poverty, strengthen	Region	Women			interests,	
	democratic governance, and	In 2017, the most				USAID	
	help people emerge from	recent year for				prioritizes	
	humanitarian crises and	which regional DAH				HIV/AIDS and	
	progress beyond assistance."	estimates are				child and	
	(2019 USAID Financial Report)	available, the US				maternal	
	"For over 50 years LISAID's	resources to sub-				Africa	
	global health programs have	Saharan Africa.					
	saved lives, protected people	sending 50.5%, or					
	most vulnerable to disease,	\$6.9 billion, of 2017	• • • • • • • • • • • • • • • • • • •				
	and promoted the stability of	DAH.					
	communities and nations,						
	while advancing American	Channel The US provided					
	Security and prosperity.	59.2% of its funding					
	when people can live healthy	in 2019 through its					
	and productive lives and	own bilateral					
	when nations around the	agencies, including					
	world are self-reliant and	the United States					
	resilient." (<u>USAID Website</u>)	Agency for					
		International					
	Website)	(IISAID) the					
	Child and	President's Malaria					
	maternal death	Initiative (PMI), and					
	HIV/AIDS	PEPFAR. UN					
	• Malaria	agencies received					
	Tuberculosis	6.2% of US DAH in					
		2019, or \$761.4					
		received \$307.0					
		million, up 9.0%					
		from 2018, and the					
		Global Fund					
		received \$636.5					
		million, down 25.8%.					
		NGOs received					
		20.8% OF US DAH IN 2019 or \$3.3 billion					
UK DEID	"We pursue our national	Health Focus Area	Topics from 2016-2020	National interests	Child and	Child and	Yes
	interests and project the UK	Reproductive.	tweets	National security	maternal	maternal	103
	as a force for good in the	maternal, newborn.	(no order)	,	health,	health,	
	world. We promote the	and child health was		Global peace,	HIV/AIDS, and	HIV/AIDS, and	
	interests of British citizens,	the focus of \$1.4	Africa	security, and	Africa are	Africa are	
	safeguard the UK's security,	billion (38.5%) of the	Agriculture	governance;	consistent	consistent	
	defend our values, reduce	UK's DAH in 2019,	Children	Crisis response	across DAH	across stated	
	poverty and tackle global	followed by	Ebola	Global prosperity:	data and tweets	and revealed	
	challenges with our	HIV/AIDS with	Education	Extreme poverty	weels.	priorities.	
	international partners." (UK	\$553.9 million	Food Security	and helping most		To maximize	
	FCDO, formerly DFID website)	(15.8%).	HIV/AIDS	vulnerable;		benefits for	
			Humanitarian Aid	Value for money		national	
	"We are responsible for:	Region	Water			security and	
	 honouring the 	By GBD super-				interests, UK	
	UK's	regions, the UK				DFID	
	commitments	billion, or 37 3% of				child and	
	and taking	its 2017 DAH. to sub-				maternal	
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	 action to achieve the United Nations' Global Goals making British aid more effective by improving transparency, openness and value for money targeting British international development policy on economic growth and wealth creation improving the coherence and performance of British international development policy in fragile and conflict- affected countries improving the lives of girls and women through better education and a greater choice on family planning preventing violence against girls and women in the developing to or family planning preventing violence against girls and women in the developing world helping to prevent climate change and encouraging adaptation and low-carbon growth in developing countries strengthening resilience and resilience and resilien	Saharan Africa; \$301.0 million (8.7%) to South Asia; \$163.9 million (4.7%) to Southasta, East Asia, and Oceania; \$237.9 million (6.9%) to North Africa and the Middle East; and \$41.0 million (1.2%) to Central Europe, Eastern Europe, Eastern Europe, Central Asia. Channel Of the UK's 2019 DAH, \$990.3 million (28.2%) was Channeled to UK bilateral agencies; \$524.6 million (24.9%) to UN agencies; \$306.4 million (2.3.%) to the Global Fund.				health and HIV/AIDS in Africa.	
BMGF	for money" (UK DFID About Page) "Strategic Investments. We	Health Focus Area	Topics from 2016-2020	Strategic	Child and	Child and	Yes
	companies, and other organizations to create incentives that harness the power of private enterprise to create change for those who need it most." (BMGF: how we work) Global development. "Our Global Development Division focuses on improving the delivery of high-impact health	Foundation directed \$1.5 billion, or 38.3%, of its DAH to reproductive, maternal, newborn, and child health; \$709.3 million, or 18.1%, to HIV/AIDS; \$303.9 million, or 7.8% to malaria; \$237.6 million, or 6.1%, to	(no order) Africa Breastfeeding Children Education HIV/AIDS Malaria Mothers Polio Sanitation Women	private enterprise solutions for most disadvantaged; High-impact health products and services to world's poorest Stated global development areas: Emergency	health, HIV/AIDS, malaria, and Africa are consistent across DAH data and tweets.	health, HIV/AIDS, malaria, and Africa are consistent across stated and revealed priorities. To maximize returns of their strategic	

	products and services to the world's poorest communities and helps countries expand access to health coverage. Areas: Emergency Response, Family Planning ,Global Delivery Programs, Global Libraries, Maternal, Newborn & Child Health, Nutrition, Polio" (BMGF: our work) Global health. "Our Global Health Division aims to reduce inequities in health by developing new tools and strategies to reduce the burden of infectious disease and the leading causes of child mortality in developing countries. Areas: Discovery & Translational Sciences, Enteric and Diarrheal Diseases. HIV, Innovative Technology Solutions, Institute for Disease Modeling, Integrated Development, Malaria, Maternal, Newborn & Child Health, Discovery & Tools, Neglected Tropical Diseases, Pneumonia Tuberculosis, Vaccine Development and Surveillance" (BMGF: our work)	tuberculosis; \$266.5 million, or 6.8%, to health systems strengthening; and \$72.4 million, or 1.9%, to non- communicable diseases. <u>Region</u> In 2017, the Foundation provided 41% of its DAH to global recipients and programs and 18% to sub-Saharan Africa. <u>Channel</u> The Gates Foundation's 2019 DAH total of \$3.9 billion was an increase of 9.9% from 2018. Of this, \$2.5 billion of 64.0% was channeled through the Gates Foundation feates Foundation feates Foundation feates Foundation feates Foundation Incretty to implementing institutions. In 2019, \$266.8 million (7%) in Gates Foundation DAH went to UN agencies, \$256.9 million (7%) went to the Global Fund, and \$406.1 million (10%) was directed to Gavi.		Response, Family Planning, Global Delivery Programs, Global Libraries, Maternal, Newborn & Child Health, Nutrition, Polio Stated global health areas: Discovery & Translational Sciences, Enteric and Diarrheal Diseases. HIV, Innovative Technology Solutions, Institute for Disease Modeling, Integrated Development, Malaria, Maternal, Newborn & Child Health, Discovery & Tools, Neglected Tropical Diseases, Pneumonia Tuberculosis, Vaccine Development and Surveillance		investments, BMGF prioritizes child and maternal health, HIV/AIDS, and malaria in Africa.	
WHO	 "Health for all. Ensuring universal health coverage without impoverishment is the foundation for achieving the health objectives of the Sustainable Development Goals – because when people are healthy, their families, communities and countries benefit. Our top priority must be to support national health authorities' efforts to strengthen all the building blocks of health systems and to enact policies aimed at ensuring health care is equitable and affordable for all. Health emergencies. In today's interconnected world, public health emergencies can affect anyone, anywhere – and the Ebola crisis in West Africa showed us the dangers of being unprepared. The development of resilient and robust global and local health systems capable of preventing, monitoring, detecting and responding to public health emergencies must therefore be a key priority, closely linked to our efforts to achieve universal health coverage. Women, children and adolescents. We cannot achieve the ambitious health and development targets in the Sustainable Development Goals unless we secure the health, dignity and rights of women, children and adolescents. Yet, in too many places, gender gaps, harmful cultural and social practices and gender-based violence are negatively impacting these individuals. Because of that, 	Health Focus Area WHO provided \$2.5 billion of DAH in 2019, down 1.2% from 2018. Of this, \$630.7 million or 24.9% was disbursed to other infectious diseases and \$1.0 billion or 39.8% to health systems strengthening. <u>Region</u> DAH data for the WHO in 2019 have unallocated or unspecified regions.	Topics from 2016-2020 tweets (no order) Africa Breastfeeding Children Ebola HIVA/AIDS Malaria Measles Mothers Polio Women	Universal health coverage, health systems strengthening, health equity, health emergencies, infectious diseases, maternal and child health, gender equity, climate and environmental impacts on health, improved WHO governance	Infectious diseases (ebola, HIV/AIDS, malaria, measles, polio) are consistent across DAH data and tweets.	Infectious diseases (ebola, HIV/AIDS, malaria, measles, polio) are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of health for all, WHO prioritizes on infectious diseases like Ebola, HIV/AIDS, malaria, measles, and polio.	Yes

	women, children and adolescents at the centre of global health and development. The health impacts of climate and environmental change. Climate and environmental change impact many aspects of life that are inextricably linked to health – food security, economic livelihoods, air safety and water and sanitation systems – and WHO estimates that 12.6 million people die each year as a result of living or working in an unhealthy environment. To address this, WHO has a key role to play advancing both mitigation and adaptation strategies for climate and environmental change, working in close partnership with other UN agencies and stakeholders. A transformed WHO. Building WHO into a more effective, transparent and accountable agency will require striking a balance between bold reform and stability of the organization. To meet the evolving needs and challenges of the 21st century and deliver game-changing, sustainable results, WHO will need to focus its work where it has the most value, broaden and intensify its engagement across stakeholders, attract						
	more predictable, flexible financing, and work to identify and retain the best global talent." (WHO Priorities)		0				
World Bank	"The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Finance Human Development Private Sector Development Public Sector Management Social Development and Protection Urban and Rural Development" (World Bank Annual Report 2019)	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed 51.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$11.1 billion of DAH, up 25.4% from 2018. Funds were targeted at reproductive, maternal, newborn, and child health; vaccination programs; infectious diseases; and NCDs.	Topics from 2016-2020 tweets (no order) Africa Agriculture Children Climate change Food security Humanitarian aid Poverty Sanitation Water Women	End poverty and boost prosperity through sustainable economic growth, investing in people, and building resilience to shocks and threats; Maternal and child health, health emergencies, nutrition, infectious diseases, tobacco control, mental health	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending proserity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes

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	"World Bank Health Focus Areas: 1. Women and children's health 2. Health emergencies 3. Nutrition 4. Infectious diseases 5. Tobacco control 6. Mental health" (World Bank Health Focus Areas)	as group went to sub-Saharan Africa and 20.5% to North Africa and the Middle East.					
UNAIDS	 "Strategic leadership agenda In the light of the need for change, this Strategy seeks to achieve a set of far-reaching and people-centred goals and targets that must be met by 2020 if we are to reach our 2030 ambition of ending the AIDS epidemic. The goals correspond to each of the three strategic directions, and include achieving by 2020: Fewer than 500 000 people newly infected with HIV Fewer than 500 000 people dying from AIDS-related causes Elimination of HIV-related discrimination" (UNAIDS 2016- 2021 Strategy) 	Health Focus Area UNAIDS is leading the global effort to end AIDS as a public health threat by 2030. In addition, the agency is working toward its 2020 90-90-90 targets: for 90% of people living with HIV/AIDS to know their status; for 90% of those diagnosed with infections to receive antiretroviral treatments; and for 90% of patients receiving antiretroviral therapy to have viral suppression. In 2019, the agency disbursed \$207.3 million, up 1.7% from 2018. The top five contributors to UNAIDS in 2019 were the US, Sweden, the Netherlands, the UK, and Norway. Region DAH data for UNAIDS in 2019 have unallocated or unspecified regions	Topics from 2016-2020 tweets (no order) Access Africa Discrimination HIV/AIDS Human Rights Innovation Prevention Testing Treatment Women	Ending the AIDS epidemic by 2030.	HIV/AIDS prevention, testing, and treatment is consistent across DAH data and tweets.	HIV/AIDS prevention, testing, and treatment are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of ending the AIDS epidemic by 2030, UNAIDS focuses on HIV/AIDS prevention, testing, and treatment.	Yes
UNFPA	"Our goal is to achieve universal access to sexual and reproductive health, realize reproductive rights, and accelerate progress on the agenda of the Programme of Action of the International Conference on Population and Development (ICPD), to improve the lives of women, adolescents and youth, enabled by population dynamics, human rights and gender equality. Priority Areas • Sexual and reproductive health services and reproductive rights • Adolescent and youth empowerment • Gender equality and women's empowerment • Population data for development" (UNFPA Strategic Plan)	Inspective regions. Health Focus Area The United Nations' Sexual and reproductive health agency. UNFPA's programs include the Maternal and Newborn Health Thematic Fund, focused on preventing maternal deaths through strategic interventions. Training midwives and ending fistula, a childbirth injury caused by prolonged obstructed labor, are also part of the Maternal and Newborn Health Thematic Fund, In 2019, UNFPA disbursed \$1.1 billion in DAH, down 1.7% from 2018. Of this, UNFPA received Ş466.8 million, or 43.8%, from governments. In	Topics from 2016-2020 tweets (no order) Africa Child Marriage Children Family planning FGM Human Rights Humanitarian Aid Nutrition Violence Women	Universal access to sexual and reproductive health, reproductive rights, maternal mortality, child health	Sexual and reproductive health, and maternal and child health are consistent across DAH data and tweets.	HIV/AIDS prevention, testing, and treatment are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of ending the AIDS epidemic by 2030, UNAIDS focuses on HIV/AIDS prevention, testing, and treatment.	Yes

		2018, the US withheld funding from UNFPA for the third year in a row under the Kemp- Kasten amendment. Region DAH data for UNFPA in 2019 have unallocated or unspecified register					
UNICEF	 "Vision: Realizing the rights of every child, especially the most disadvantaged. Goal areas: Every child survives and thrives Every child learns Every child is protected from violence and exploitation Every child lives in a safe and clean environment Every child has an equitable chance in life" (UNICEF Strategic Plan 2018-2021) 	unspecified regions. Health Focus Area UNICEF provides long-term humanitarian and development assistance to children and mothers, with a specific focus on nutrition, immunization, and HIV/AIDS, as well as emergency (i.e., pandemic) assistance. UNICEF disbursed \$2.6 billion in DAH in 2019, up 12.5% from 2018. Private philanthropies provided UNICEF with \$519.3 million, or 19.8% of its funding in 2019, and the US contributed \$316.9 million, or 12.1%. Region DAH data for UNICEF in 2019 have unallocated or	Topics from 2016-2020 tweets (no order) Africa Breastfeeding Children Climate Change Ebola Education Human Rights Online Violence Water	Realizing the rights of every child, especially the most disadvantaged. Health related: child health, child mortality	Child and maternal health are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of realizing the rights of every child, UNICEF focuses on child and maternal health.	Yes
UNITAID	 "Unitaid's Strategy for 2017-2021 is firmly grounded in its Constitution, which states that Unitaid aims to 'contribute to scale up access to treatment for HIV/AIDS, malaria and tuberculosis for the people in developing countries by leveraging price reductions of quality drugs and diagnostics, which currently are unaffordable for most developing countries, and to accelerate the pace at which they are made available.' Innovation, access, and scalability. They guide the design of unitaid's interventions, which Promote innovation. Unitaid connects those who are developing innovations with people who need them the most. Innovation means both using existing commodities in new ways and developing new products and approaches. Catalyze equitable access to better health products. Unitaid leverages its market expertise and its relationships with partners to design a portfolio of projects that will overcome barriers to access to better 	unspecified regions. Health Focus Area In 2019, Unitaid disbursed \$154.1 million in DAH, up 35.2% from 2018. Projects Unitaid has been working on include a net program to combat malaria and a program to combat malaria and a program to distribute and distribute and promote HIV self- testing kits in Africa. US contributed \$316.9 million, or 12.1%. Region DAH data for UNITAID in 2019 have unallocated or unspecified regions.	Topics from 2016-2020 tweets (no order) Access Cancer Children Hepatitis HIV/AIDS Malaria Testing Treatment Tuberculosis Vaccines	Access to treatment of, affordability of drugs, and innovation in addressing HIV/AIDS, malaria, tuberculosis	Increasing access, testing, and treatment of HIV/AIDS, malaria, and tuberculosis are consistent across DAH data and tweets.	HIV/AIDS, malaria, and tuberculosis are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of scaling up treatment for HIV/AIDS, malaria, and tuberculosis in developing countries, UNITAID prioritizes HIV/AIDS, malaria, and tuberculosis.	Yes

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		innovative health						
		 Create the right conditions for scale up, so better health 						
		products reach all people who need						
		them. From conception through						
		Implementation, Unitaid works with						
		that projects						
		(<u>Unitaid Strategy</u> 2017-2021)						
	Gavi	"Our 2016–2020 mission, to save children's lives and				Child health, vaccination.		Yes
		protect people's health by increasing equitable use of				infectious diseases, and		
		vaccines in lower-income countries, is guided by four				Africa are consistent		
		strategic goals 1. Accelerate equitable				across DAH data and		
		uptake and coverage of				tweets.		
		vaccines. 2. Increase						
		effectiveness and efficiency of						
		immunisation delivery as an						
		integrated part of strengthened health						
		systems. 3. Improve						
		sustainability of national	<u>Health Focus Area</u> In 2019, Gavi					
		immunisation programmes.	channeled \$1.8 billion in				Child health, vaccination,	
		 Shape markets for vaccines and other 	assistance for health				diseases, and	
		products.	(94.4% of Gavi				consistent	
		was approved by the Board in	communicable				and revealed	
		implementation of the	programs. Top				To maximizo	
		countries immunise 300	for Gavi in 2019				benefits of	
		million lives in the long term.	Melinda Gates	Topics from 2016-2020			determined goal of "saving	
		the core of our current strategy. While we continue to	United States, and the United Kingdom.	tweets (no order)			children's lives	
		support countries to introduce new vaccines, our focus is	Region	Africa			equitable use of vaccines in	
		expanding to reach every child with these vaccines. With as	In 2017, 52.6% of DAH disbursed by	Cancer Children			lower-income countries",	
		many as 20 countries transitioning out of our	Gavi went to sub- Saharan Africa and	Cholera Ebola	Increasing overall		Gavi prioritizes child health	
		financial support in this period, ensuring that	25.5% to South Asia. DAH data for Gavi in	Measles Pneumonia	coverage and equity in		and vaccination of	
		programmes are sustainable in the long term is essential. "	2019 have unallocated or	Polio Poverty	vaccinating children in lower-		infectious diseases in	
ŀ	Global	(<u>Gavi Strategy 2016-2020</u>) "The Global Fund Strategy	unspecified regions. Health Focus Area	Vaccines Topics from 2016-2020	income countries. To end HIV/AIDS,	HIV/AIDS,	Africa. HIV/AIDS,	Yes
	Fund	2017-2022: Investing to End Epidemics outlines our	In 2019, the Global Fund channeled a	<u>tweets</u> (no order)	malaria, and tuberculosis	malaria, tuberculosis,	malaria, tuberculosis,	
		partnership's bold agenda for 2017-2022 based on an	total of \$3.5 billion to programs	Africa	epidemics	and Africa are consistent	and Africa are consistent	
		ambitious vision to end the epidemics. These four	worldwide. Leading sources of Global	Children Cholera		across DAH data and	across stated and revealed	
		strategic objectives are at the core of the strategy:	Fund contributions were the United	Ebola HIV/AIDS		tweets.	priorities.	
		 iviaximize impact against HIV, TB, and 	States, the United Kingdom, and Japan.	iviaiaria Pneumonia Polio			benefits of	
		Promote and	\$817.1 million or	Polio Tuberculosis			determined	
		rights and gender	Fund in 2019, more	women			"ending the	
		Mobilize increased resources	contributor. The US				the Global	
		Build resilient and	million or 18.1%,				prioritizes	
		for health" (<u>Global</u>	\$442.4 million or 12.6%, and Germany				and vaccination of	
L			dia demany					1

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	<u>Fund Strategy 2017-</u> 2022)	contributed \$396.7 million or 11.3%.				infectious diseases in Africa.	
		50.4% of funding were allocated to address HIV/AIDS , 31.7% to Malaria , and 17.8% to					
		Tuberculosis.					
		In 2019, 72.7% of DAH disbursed by the Global Fund					
		went to sub-Saharan Africa and 10.5% to Southeast Asia, East					
		Asia, and Oceania. DAH data for the Global Fund in 2019 have unallocated or					
CDC	"CDC's Strategic Framework	unspecified regions. Health Focus Area	Topics from 2016-2020	National security	Protecting	HIV/AIDS,	Yes
	consists of five core capabilities that enable the agency's three strategic	Protecting Americans from Infectious Diseases	tweets (no order)	from infectious diseases	the USA from infectious diseases is	malaria, tuberculosis, and Africa are	
	one mission: protect America's safety, health, and	(\$3.0 billion) Preventing the	Diarrhea E. Coli	health and national	across DAH data and	across stated and revealed	
	security. Our work is underscored by the agency's	Leading Causes of Disease, Disability, &	Influenza Measles	preparedness	tweets.	priorities.	
	Pledge to the American People.	Death (\$2.0 billion) Protecting	Prevention Vaccines			To maximize benefits of	
	Securing global health	Americans from Natural Disasters,	Water Women			their pre- determined	
	preparedness • By stonning	Environmental &	ZIKd			"protecting	
	the spread of	Hazards (\$1.5 billion) Monitoring Health &				safety, health, and security".	
	contagions, addressing	Ensuring Laboratory Excellence (\$496				the CDC prioritizes	
	public health terror	million) Cross-cutting				infectious disease	
	threats, and protecting	Support & PHHS Block Grant &				protection in the US and	
	people from vector-borne	Buildings & Facilities (\$357 million)				globally.	
	Eliminating disease By	Region United States and					
	controlling vaccine-	global		4			
	preventable disease,						
	targeting Hepatitis C,						
	and reducing the maternal mortality				5		
	 Ending epidemics 						
	 Such as HIV, decreasing 						
	opioia overdoses, improving						
	strategies						
	interventions to stem						
	seasonal influenza,						
	developing and						
	deploying new answers						
	for antibiotic resistance,						
	and reducing new						
	incidents of diabetes.						
	World-class data and analytics						
	State-of-the-art		1				1

	Elite public health expertise Besponding to						
	outbreaks at their source						
	 Global capacity and domestic 						
511 050	preparedness" (<u>CDC</u> <u>Strategic Framework</u>)		T : (2016 2020				
	at strengthening Europe's defences against infectious diseases. The core functions cover a wide spectrum of activities: surveillance, epidemic intelligence, response, scientific advice, microbiology, preparedness,	All funding is spent on expenses for staff, buildings and equipment, and operations for surveillance, research, and response to	tweets (no order) Ebola Hepatitis HIV/AIDS Influenza Measles Outbreaks	from infectious disease	disease surveillance, reporting, and research are consistent across DAH data and tweets.	disease surveillance, reporting, and research are consistent across stated and revealed priorities.	
	public health training, international relations, health communication, and the scientific journal Eurosurveillance. Strategic Work Areas	epidemics. <u>Region</u> European Union and global	Report Surveillance Tuberculosis West Nile			To maximize benefits of their pre- determined goal of "strengthening Europe's	
	 Providing evidence for effective and efficient decision-making: We support efficient public health decisionmaking by providing timely, accurate and relevant 	No.				defences against infectious diseases", the EU CDC prioritizes infectious disease	
	 Support the strengthening of public health systems: We strengthen European capacities and 		0			surveillance, reporting, and research.	
	capabilities effectively prevent and control communicable diseases		e e				
	Supporting response to threats: We support effective health threats detection, assessment and control "		L	10			
	(ECDC Annual Report 2019)						
NIH	and control." (ECDC Annual Report 2019) "NIH's mission is to seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability. The goals of the agency are: to foster fundamental creative discoveries, innovative research strategies, and their applications as a basis for ultimately protecting and improving health; to develop, maintain, and renew scientific human and physical resources that will ensure the Nation's capability to prevent disease; to enhance the Nation's economic well-being and ensure a continued high return on the public	Health Focus Area In 2019, NIH had a \$39.28 discretionary budget. 1. NCI (14.7%) - cancer 2. NIAID (14.1%) – allergy and infectious disease 3. NHLBI (8.9%) – heart, lung, and blood 4. NIA (7.9%) - instate on aging 5. NIGMS (7.3%) – general medical sciences Region United States (with some global research)	Topics from 2016-2020 tweets (no order) Africa Cancer Funding Heart Disease HIV/AIDS News Rare Disease Research Stress Veterans	National security through developing new knowledge in enhancing health and lengthening life.	Research on cancer, HIV/AIDS, heart disease, and rare diseases are consistent across DAH data and tweets.	Research on cancer, HIV/AIDS, heart disease, and rare diseases are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of seeking knowledge to enhance life and ensure the US's capability to prevent disease, the NIH prioritizes research on cancer, HIV/AIDS, heart disease, and rare diseases.	Yes

	 level of scientific integrity, public accountability, and social responsibility in the conduct of science. In realizing these goals, the NIH provides leadership and direction to programs designed to improve the health of the Nation by conducting and supporting research: in the causes, diagnosis, prevention, and cure of human diseases; in the processes of human growth and development; in the biological effects of environmental contaminants; in the understanding of mental, addictive and physical disorders; and in directing programs for the collection, dissemination, and exchange of information in medicine and health, including the development and support of medical librarias and other health information specialists. 						
FAO	 "Today, member states face an increasing number of demands and challenges in agricultural development. To support them, FAO has identified five key priorities on which it is best placed to intervene. These priorities, or Strategic Objectives, represent our main areas of work to achieve our vision of a world free from hunger and malnutrition, where food and agriculture help to improve the living standards of all, especially the poorest, in an economically, socially and environmentally sustainable manner – contributing to the implementation of the 2030 Agenda for Sustainable Development. Help eliminate hunger, food insecurity, and malnutrition Make agriculture, forestry, and fisheries more productive and sustainable Reduce rural poverty Enable inclusive and efficient agricultural food systems Increase the resilience of livelihoods to threats and crises" (FAO Strategic Objectives 2019) 	Health Focus Area All received funding is spent on staffing and program expenses in addressing hunger, food insecurity, malnutrition, and improving resiliency of food systems. Region Funding data for FAO in 2019 have unallocated or unspecified regions.	Topics from 2016-2020 tweets (no order) Africa Agriculture Biodiversity Climate Change Families Farmers Fisheries Food Security Forests Water	Addressing hunger, food insecurity, and malnutrition through improving food and agricultural systems.	Food insecurity, malnutrition, and food systems are consistent across DAH data and tweets.	Food insecurity, malnutrition, and food systems are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of a world free from hunger and malnutrition, the FAO prioritizes eliminating hunger, food insecurity, and malnutrition	Yes

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		responsive to the wide diversity of the countries we	\$5.7 billion budget in 2019	(no order)	accelerate structural	child and maternal	child and maternal	
		serve. The diversity is		Africa	transformations,	health are	health are	
		reflected in three broad	By UNDP tocus Eradicating poverty	Children	build resilience to	consistent	consistent	
		Eradicate poverty in	(43%), accelerate	Education	Shocks and chises	data and	and revealed	
		all its forms and	structural	FGM	SDG 3: Ensure	tweets.	preferences.	
		dimensions	transformations	Food Security	healthy lives and			
		 Accelerate structural transformations 	(32%), build	HIV/AIDS	promote well-		To maximize	
		Build resilience to	and crises (11 5%)	Water	ages (includes:		their pre-	
		shocks and crises	others (13.2%)	Women	maternal		determined	
		To respond to these issues,			mortality, child		global health	
		and better focus its resources	By health focus area		mortality,		goal of	
		2030 Agenda, UNDP has	\$504M (9%) of total		tuberculosis.		healthy lives	
		identified a set of approaches	budget in 2019 –55%		malaria, infectious		and promoting	
		that we call our Signature	to HIV/AIDS,		diseases, mental		well-being for	
		Solutions:	tuberculosis, and		health, substance		all, the UNDP	
		POVERTY	26% to universal		accidents, sexual		HIV/AIDS,	
		GOVERNANCE for	health coverage		and reproductive		malaria, and	
		peaceful, just, and	(target 3.8), 9% to		health, universal		child and	
		Crisis prevention and	(target 3.2)		deaths from		health.	
		increased RESILIENCE	,		environmental			
		ENVIRONMENT:	Region		pollution)			
		nature-based solutions for	23% of 2019 budget was allocated to				l	
		development	Africa, 19% to Asia				l	
		Clean, affordable	and the Pacific, 18%					
		ENERGY • Women's	to Latin America and				l	
		empowerment and	the carlubeall.				l	
		GENDER equality					l	
		In all our activities, we					l	
		human rights and the					l	
		empowerment of women,					l	
		minorities and the poorest and most vulnerable " (UNDP					l	
		About us)					l	
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		UNDP is the lead development			1	1 1	1	
		agency in heining the					1	
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		agency in helping the achievement of the Sustainable Development		2				
		agency in heiping the achievement of the Sustainable Development Goals.		7				
		agency in helping the achievement of the Sustainable Development Goals. SDG 3: Ensure healthy lives		1				
		agency in neiping the achievement of the Sustainable Development Goals. SDG 3: Ensure healthy lives and promote well-being for			ie.			
	мсе	agency in neiping the achievement of the Sustainable Development Goals. SDG 3: Ensure healthy lives and promote well-being for all at all ages. (UNDP: SDGS) "Médicing Sane Erentitions	Health Focus Area	Topics from 2016-2020	Medical	Humanitarian	Humanitarian	Ves
	MSF	agency in neiping the achievement of the Sustainable Development Goals. SDG 3: Ensure healthy lives and promote well-being for all at all ages. (UNDP: SDGs) "Médecins Sans Frontières brings medical humanitarian	Health Focus Area "81% of our financial	Topics from 2016-2020 tweets	Medical	Humanitarian aid, HIV/AIDS,	Humanitarian aid, HIV/AIDS,	Yes
	MSF	agency in neiping the achievement of the Sustainable Development Goals. SDG 3: Ensure healthy lives and promote well-being for all at all ages. (UNDP: SDGs) "Médecins Sans Frontières brings medical humanitarian assistance to victims of	Health Focus Area "81% of our financial resources are	Topics from 2016-2020 tweets (no order)	Medical humanitarian assistance to	Humanitarian aid, HIV/AIDS, infectious	Humanitarian aid, HIV/AIDS, infectious	Yes
	MSF	agency in neiping the achievement of the Sustainable Development Goals. SDG 3: Ensure healthy lives and promote well-being for all at all ages. (UNDP: SDGs) "Médecins Sans Frontières brings medical humanitarian assistance to victims of conflict, natural disasters,	Health Focus Area "81% of our financial resources are allocated to fulfilling our social discipa:	Topics from 2016-2020 tweets (no order) Africa	Medical humanitarian assistance to victims of conflict, natural disasters	Humanitarian aid, HIV/AIDS, infectious diseases, and child health	Humanitarian aid, HIV/AIDS, infectious diseases, and child health	Yes
	MSF	agency in neiping the achievement of the Sustainable Development Goals. SDG 3: Ensure healthy lives and promote well-being for all at all ages. (UNDP: SDGs) "Médecins Sans Frontières brings medical humanitarian assistance to victims of conflict, natural disasters, epidemics or healthcare	Health Focus Area "81% of our financial resources are allocated to fulfiling our social mission: 65% to our	Topics from 2016-2020 tweets (no order) Africa Children	Medical humanitarian assistance to victims of conflict, natural disasters, epidemics, or	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent	Yes
	MSF	agency in neiping the achievement of the Sustainable Development Goals. SDG 3: Ensure healthy lives and promote well-being for all at all ages. (UNDP: SDGs) "Médecins Sans Frontières brings medical humanitarian assistance to victims of conflict, natural disasters, epidemics or healthcare exclusion" (MSF About Us)	Health Focus Area "81% of our financial resources are allocated to fulfiling our social mission: 65% to our humanitarian	Topics from 2016-2020 tweets (no order) Africa Children Cholera	Medical humanitarian assistance to victims of conflict, natural disasters, epidemics, or healthcare	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across DAH	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across stated	Yes
	MSF	agency in neiping the achievement of the Sustainable Development Goals. SDG 3: Ensure healthy lives and promote well-being for all at all ages. (UNDP: SDGs) "Médecins Sans Frontières brings medical humanitarian assistance to victims of conflict, natural disasters, epidemics or healthcare exclusion" (MSF About Us) "Program Priorities	Health Focus Area "81% of our financial resources are allocated to fulfiling our social mission: 65% to our humanitarian programmes, 12% to support our accident	Topics from 2016-2020 tweets (no order) Africa Children Cholera Ebola HIV/NDS	Medical humanitarian assistance to victims of conflict, natural disasters, epidemics, or healthcare exclusion.	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across DAH data and bueate	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across stated and revealed preferencer	Yes
	MSF	agency in neiping the achievement of the Sustainable Development Goals. SDG 3: Ensure healthy lives and promote well-being for all at all ages. (UNDP: SDGs) "Médecins Sans Frontières brings medical humanitarian assistance to victims of conflict, natural disasters, epidemics or healthcare exclusion" (MSF About Us) "Program Priorities • Outpatient	Health Focus Area "81% of our financial resources are allocated to fulfilling our social mission: 65% to our humanitarian programmes, 12% to support our projects and programmes,	Topics from 2016-2020 tweets (no order) Africa Children Cholera Ebola HIV/AIDS Humanitarian Aid	Medical humanitarian assistance to victims of conflict, natural disasters, epidemics, or healthcare exclusion.	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across DAH data and tweets.	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across stated and revealed preferences.	Yes
	MSF	agency in neiping the achievement of the Sustainable Development Goals. SDG 3: Ensure healthy lives and promote well-being for all at all ages. (UNDP: SDGs) "Médecins Sans Frontières brings medical humanitarian assistance to victims of conflict, natural disasters, epidemics or healthcare exclusion" (MSF About Us) "Program Priorities Outpatient consultations Birth assistance	Health Focus Area "81% of our financial resources are allocated to fulfilling our social mission: 65% to our humanitarian programmes, 12% to support our projects and programmes, and 4% to	Topics from 2016-2020 tweets (no order) Africa Children Cholera Ebola HIV/AIDS Humanitarian Aid Refugees	Medical humanitarian assistance to victims of conflict, natural disasters, epidemics, or healthcare exclusion.	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across DAH data and tweets.	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across stated and revealed preferences. To maximize	Yes
	MSF	agency in neiping the achievement of the Sustainable Development Goals. SDG 3: Ensure healthy lives and promote well-being for all at all ages. (UNDP: SDGs) "Médecins Sans Frontières brings medical humanitarian assistance to victims of conflict, natural disasters, epidemics or healthcare exclusion" (MSF About Us) "Program Priorities • Outpatient consultations • Birth assistance (including C-section)	Health Focus Area "81% of our financial resources are allocated to fulfilling our social mission: 65% to our humanitarian programmes, 12% to support our projects and programmes, and 4% to awareness-raising, the Across	Topics from 2016-2020 tweets (no order) Africa Children Cholera Ebola HIV/AIDS Humanitarian Aid Refugees Treatment Tuberculosic	Medical humanitarian assistance to victims of conflict, natural disasters, epidemics, or healthcare exclusion.	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across DAH data and tweets.	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across stated and revealed preferences. To maximize benefits of their pro-	Yes
-	MSF	agency in neiping the achievement of the Sustainable Development Goals. SDG 3: Ensure healthy lives and promote well-being for all at all ages. (UNDP: SDGs) "Médecins Sans Frontières brings medical humanitarian assistance to victims of conflict, natural disasters, epidemics or healthcare exclusion" (MSF About Us) "Program Priorities • Outpatient consultations • Birth assistance (including C-section) • Cholera treatment	Health Focus Area "81% of our financial resources are allocated to fulfilling our social mission: 65% to our humanitarian programmes, 12% to support our projects and programmes, and 4% to awareness-raising, the Access Campaign, and the	Topics from 2016-2020 tweets (no order) Africa Children Cholera Ebola HIV/AIDS Humanitarian Aid Refugees Treatment Tuberculosis Violence	Medical humanitarian assistance to victims of conflict, natural disasters, epidemics, or healthcare exclusion.	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across DAH data and tweets.	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across stated and revealed preferences. To maximize benefits of their pre- determined	Yes
-	MSF	agency in neiping the achievement of the Sustainable Development Goals. SDG 3: Ensure healthy lives and promote well-being for all at all ages. (UNDP: SDGs) "Médecins Sans Frontières brings medical humanitarian assistance to victims of conflict, natural disasters, epidemics or healthcare exclusion" (MSF About Us) "Program Priorities • Outpatient consultations • Birth assistance (including C-section) • Cholera treatment • Inpatient care	Health Focus Area "81% of our financial resources are allocated to fulfilling our social mission: 65% to our humanitarian programmes, 12% to support our projects and programmes, and 4% to awareness-raising, the Access Campaign, and the Drugs for Neglected	Topics from 2016-2020 tweets (no order) Africa Children Cholera Ebola HIV/AIDS Humanitarian Aid Refugees Treatment Tuberculosis Violence	Medical humanitarian assistance to victims of conflict, natural disasters, epidemics, or healthcare exclusion.	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across DAH data and tweets.	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across stated and revealed preferences. To maximize benefits of their pre- determined goal of	Yes
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		Funding data for MSF in 2019 have unallocated or					
PATH	 "At PATH, we are a global team of innovators working to accelerate health equity so all people and communities can thrive. We advise and partner with public institutions, businesses, grassroots groups, and investors to solve the world's most pressing health challenges." (PATH About US) "2019 Achievements Controlling and eliminating malaria Differentiating services for HIV patients Reimagining primary health care Creating innovative devices and diagnostics Maximizing impact through policy Advancing essential medicines Reducing the cost of sanitation and cleaning Expanding access to contraception" 	Unspecified regions. Health Focus Area Of the \$303 million 2019 budget, 48% was allocated to global health programs, 37% to essential medicines, 11% to technology and innovation, 3.5% to other. Region Funding data for PATH in 2019 have unallocated or unspecified regions.	Topics from 2016-2020 tweets (no order) Access Africa Breastfeeding Cancer Children Ebola Innovation Malaria Pneumonia Vaccines	Accelerating health equity Areas: Malaria, HIV/AIDS, primary health care, health innovations, health policy, essential medicines, sanitation, contraceptives	Malaria, vaccines, and innovations are consistent across DAH data and tweets.	Malaria, vaccines, and innovations are consistent across stated and revealed preferences. To maximize benefits of their pre- determined goal of "accelerating health equity", PATH prioritizes malaria, vaccines, and health innovations.	Yes
Save the Children	 (FATI Autility export 2019) "For 100 years, we've been giving children in the U.S. and around the world a healthy start in life, the opportunity to learn and protection from harm. When crisis strikes, we are always among the first to respond and the last to leave. We do whatever it takes to save children, transforming their lives and the future we share." (Save the Children About Us) Focus Areas Health and Nutrition Education Hunger and Livelihoods Public Policy and Advocacy HIV/AIDS Child Protection and Rights Governance (Save the Children Annual Report 2019) 	Health Focus Area In 2019, Save the Children had a budget of \$836 million. • Health & Nutrition (38%) • Education (19%) • Hunger & Livelihoods (13%) • Public Policy & Advocacy (11%) • Public Policy & Advocacy (11%) • Othic Policy & Child Funding data for Save the Children in 2019 have unallocated or unspecified regions.	Topics from 2016-2020 tweets (no order) Africa Children Donations Education Food Security Humanitarian Aid Pneumonia Refugees Schools Water	Health related: "giving children a healthy start", "protection from harm"	Child health, nutrition, and food security are consistent across DAH data and tweets.	Child health, nutrition, and food security are consistent across stated and revealed priorities. To maximize benefits of their pre- determined global health goals of "giving children a healthy start and protection from harm", Save the Children prioritizes child health, nutrition, and food security.	Yes
Oxfam	"Oxfam is a global organization working to end the injustice of poverty. We help people build better futures for themselves, hold the powerful accountable, and save lives in disasters." (About Oxfam) "Across Yemen, Puerto Rico, Bangladesh, Syria, Central America, and Mozambique, among many other places, our work is delivering tangible, measurable impact: providing lifesaving aid, partnering with local organizations to achieve long-term solutions, and using	Health Focus Area Of the \$88 million 2019 budget, 36% was allocated to emergency response and preparedness, 28% to overcoming poverty, 28% to social justice campaigns, 8% to public education. <u>Region</u> Of the budget spent on emergency response and preparedness, 40% was allocated to Africa, 24% to Latin	Topics from 2016-2020 tweets (no order) Africa Climate Change Ebola Food Security Humanitarian Aid Malaria Pneumonia Refugees Water Women	Health related: "help people build better futures for themselves," "save lives in disasters"	Emergency response (humanitarian aid, Ebola, food security, and infectious disease) is consistent across DAH data and tweets.	Emergency response (humanitarian aid, Ebola, food security, and infectious disease) is consistent across stated and revealed preferences. To maximize benefits of their pre- determined global health goals of "helping	Yes

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	our strong policy voice to advocate for change. Program Services Saving Lives: Emergency Response and Preparedness Programs to overcome poverty Campaigning for social justice Public education" (Oxfam Annual Report 2019)	America and the Caribbean, and 13% to Asia and the Pacific				people build better futures for themselves" and "saving lives in disasters", Oxfam prioritizes emergency response, humanitarian aid, Ebola, food security, and infectious diseases.	
health system	 "Health for All" and the right to the highest attainable standard of health. Declaration of Alma-Ata (1978): universal access to primary health care. MDGs (2000): reduce child mortality (4), improve maternal health (5), combat HIV/AIDS and other diseases (6) SDGs (2015) [Relevant to study's time period]: good health and well-being (3) By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births (3.1) By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births (3.2) By 2030, red the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and other communicable diseases (3.3) By 2030, reduce by one third premature mortality from noncommunicable diseases through prevention and treatment and promote mental health and well-being (3.4) Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol (3.5) By 2030, ensure universal access to 	Of the \$41 billion DAH transferred across all global health actors in 2019, 24% was allocated to HIV/AIDS, 21% to newborn and child health, 14% to health system strengthening, 12% to reproductive and maternal health, 6% to other infectious diseases, 6% to malaria, 4% to tuberculosis, and 2% to non- communicable diseases. <u>Region</u> Funding data in 2019 have unallocated or unspecified regions. In 2017, 33% of all DAH funding was allocated to sub- Saharan Africa and the Middle East, 3% to South Asia, 4% to North Africa and the Middle East, 3% to Latin America and the Caribbean, 2% to Europe and Central Asia, 15% globally, and 32% unallocated.	from 2016-2020 across 20 Key actors (number in parenthesis indicates count of actors that had the topic as a priority from 2016-2020 tweets) 1. Africa (17), 2. Children (15), 3. HIV/AIDS (11), 4. Women (10), 5. Ebola (9), 6. Water (9), 7. Food security (7), 8. Humanitarian aid (7), 9. Malaria (7), 10. Education (6), 11. Climate change (5), 12. Pneumonia (5), 13. Breastfeeding (4), 14. Cancer (4), 15. Measles (4), 16. Polio (4), 17. Tuberculosis (4), 18. Vaccines (4), 19. Access (3), 21. Cholera (3), 22. Human Rights (3), 23. Mothers (3), 24. Refugees (3), 27. FGM (2), 28. Hepatitis (2),	the right to highest attainable standard of health. 9 important target areas under SDG 3.	child and maternal health, and infectious diseases are consistent across DAH data and tweets.	child and maternal health, and infectious diseases are consistent across stated and revealed priorities. To maximize benefits of the pre- determined goal of "health for all" and "SDG3: good health and well-being", the global health system prioritizes 3 of the 9 target areas of SDG 3: HIV/AIDS, child and maternal health, and infectious diseases. Note: These benefit- maximizing priorities are the same top priorities are the same top priorities of the three funding organizations.	

sexual and				
reproductive health-				
care services, including				
for family planning,				
information and				
education, and the				
integration of				
reproductive health				
into national strategies				
and programmes (3.7)				
Achieve universal				
health coverage,				
including financial risk				
protection, access to				
quality essential				
health-care services				
and access to safe,				
effective, quality and				
affordable essential				
medicines and vaccines				
for all (3.8)				
By 2030, substantially				
reduce the number of				
deaths and illnesses				
from hazardous				
chemicals and air,				
water and soil				
pollution and				
contamination (3.9)	· ·			

nntamination (3.9)

Supplementary Table 2. Breakdown of Collected Tweets by Actor and Month. Total tweets and average tweets per month for each of the 20 global health actors.

Global Health Actor	Total Tweets	Average Tweets per Month
World Health Organization	10,827	722
Oxfam International	5,694	380
Doctors Without Borders (MSF)	5,553	370
UN Children's Fund (UNICEF)	5,395	360
World Bank	5,365	358
UN Development Programme (UNDP)	4,912	327
UN Population Fund (UNFPA)	3,908	261
UK Department of International Development	3,823	255
Centers for Disease Control and Prevention (CDC)	3,701	247
United States Agency for International Development (USAID)	3,604	240
Food and Agriculture Organization (FAO)	3,263	218
Save the Children	3,121	208
Gavi, the Vaccine Alliance	2,739	183
National Institutes of Health (NIH)	2,664	178
Joint UN Programme on HIV/AIDS (UNAIDS)	2,214	148
PATH	1,954	130
Global Fund	1,727	115
European Centre for Disease Prevention and Control (ECDC)	1,311	87
Gates Foundation	1,249	83
Unitaid	1,217	81
Total	74,241	4,949

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Supplementary Table 3. Breakdown of Collected Tweets by Year and Month Tweets per month and					
per year for all the tweets collect	ed.				
	Tweets per Month	Tweets per Year			

2016		5,973
November	5,973	
2017		21,193
February	4,474	
Мау	5,582	
August	5,103	
November	6,034	
2018		18,562
February	4,145	
May	4,965	
August	4,205	
November	5,247	
2019		17,884
February	4,500	
Мау	4,886	
August	3,987	
November	4,511	
2020		10,629
February	4,446	
May	6,183	
Total	74,241	74,241
Supplementary Table 4. Priority Similarity Matrix Scores are generated by comparing the list of 10 health priorities of actor A with that of actor B and the number of matching priorities is counted. Topic similarity scores range from 0-10.

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Supplementary Table 5. Types of Power. A summary of the four types of power as presented by Barnett and Duvall (2005) with examples in global health.

Power Type	Relational specificity	Power works through	Definition according to Barnett & Duvall (2005)	Global Health Example
Compulsory Power	Direct	Interactions of specific actors	"Direct control of one actor over the conditions of existence or the actions of another." (p. 48)	Donor countries dictate the conditions in low and middle-income countries (LMICs) through dictating requirements in development aid.
Institutional Power	Diffuse	Interactions of specific actors	"Control actors exercise indirectly over others through diffuse relations of interactions." (p. 43)	High-income countries control funding allocations for LMICs through institutional power via their contributions to the WHO and other multilateral organizations.
Structural Power	Direct	Social relations of constitution	"Constitution of subjects' capacities in direct structural relation to one another." (p. 43)	The structural and historical disempowerment of indigenous populations have resulted in their disproportionate outcomes in health.
Productive Power	Diffuse	Social relations of constitution	"Power [that] works through diffuse constitutive relations to produce the situated social capacities of actors." (p. 48)	High-income countries direct what research institutions prioritize and study, and ultimately determine what health issues are addressed.

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Title: Examining power dynamics in global health governance using topic modeling and network analysis

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Structured Abstract:

Objectives: Despite increases in global health actors and funding levels, health inequities persist. We empirically tested whether global health governance (GHG) operates under the Rational Actor Model (RAM) and characterized GHG power dynamics.

Design: We collected approximately 75,000 tweets of 20 key global health actors, between 2016 and 2020 using Twitter API. We generated priorities from tweets collected using a topic modeling algorithm. Priorities from tweets were compared with stated priorities from content analyses of policy documents and with revealed priorities from network analyses of development assistance for health (DAH) funding data. Comparing priorities derived from Twitter, policy documents, and DAH funding data, we are able to test if GHG operates under RAM and to characterize power dynamics in GHG.

Participants: 20 key global health actors were identified based on consensus of 3 peerreviewed articles mapping global health networks. All tweets of global health actors were collected in three-month intervals from November 2016 to May 2020. Policy documents and DAH financial data for each actor were collected for the same time period.

Results: We find all 20 actors and the global health system collectively fulfill the 3 conditions of RAM based on stated and revealed priorities. We also find compulsory and institutional power asymmetries in GHG. Funding organizations have compulsory power over channels of DAH and implementing institutions they directly fund. Funding organizations also have transitive influence over implementing institutions receiving DAH funding.

Conclusions: GHG operates under RAM, the rational choice for all actors is to align their priorities with the priorities of wealthy funding organizations. Priorities of the entire global health system are determined by the priorities of wealthy funding organizations that have compulsory and institutional power over other actors. If health inequities are to be addressed, a reassessment of current global health governance is imperative.

Strengths and limitations of this study:

- This study utilizes an alternative methodology of using Twitter data in understanding global health governance and priority-setting.
- This study triangulates findings from multiple data sources to test the rational actor model and to characterize power asymmetries in global health governance.
- Because the scope of this study is from 2016 to 2020, the findings may not be fully representative of global health governance during the COVID-19 pandemic.
- Only the key 20 actors of the hundreds of global health actors today were included in the study.

INTRODUCTION

 The turn of the 21st century introduced an unprecedented volume of new public and private actors in global health accompanied by stratospheric levels of funding.[1] While some argue that this multiplicity of new actors promotes cooperation, what persists is a politically fragmented network of actors with competing priorities and preferences.[2–4] Academics studying the complex network of global health actors have described it as a "congested" and "chaotic" network that causes inefficiencies in the practice and delivery of global health programs and aid.[5]

Inequities in global health have increasingly been attributed to the actions of transnational actors with varying degrees of power and divergent interests.[6] While more actors have entered global health with ostensible benevolent purposes, health inequities and inefficiencies in delivery still exist today. Fierce competition among donor priorities and requirements overwhelms the institutional capacities of recipient countries,[7,8] disrupts national health planning,[9] delays the delivery of aid,[10] and creates duplications and resource waste.[11,12] Paradoxically, despite the exponential increases in global health actors and funding, preventable global health inequities have persisted. Some argue that, to an extent, the multiplicity and fragmentation of global health actors contribute to the persistence of inequities and inefficiencies in global health.

Researchers have presented at least two arguments attempting to understand this paradox through the lens of economics, politics, and power. First, global health governance (GHG) has been theorized as operating under the rational actor model (RAM) where "each actor has its own set of goals and objectives, and these actors take actions based on analysis of the costs and benefits of various available options."[13] With each actor acting on their own set of explicit goals in the form of mission statements, bylaws, and other founding documents, and implicit goals revealed from past decisions and behaviors, prioritization in GHG is not based on a shared ethical commitment to a common global health goal co-created by various health actors but is based on the aggregation of individual explicit and implicit objectives. GHG based on the RAM fails to "justify an obligation to help meet the health needs of others" and may have contributed to the persistence of global health inequities.[13]

Second, the Lancet-University of Oslo Commission on Global Governance for Health (2014) argues that "power asymmetry and global social norms limit the range of choice and constrain action on health inequity."[6] The actions of powerful global health actors in pursuit of their own interests "are not designed to harm health but can have negative side-effects" that may have contributed to the persistence of inequities.[6] The lack of power of global health beneficiaries and smaller health actors, and the outsized wielded power of large global health funders may also have contributed to the slow rate of reduction in global health inequities.

The argument that GHG operates under the RAM and the Commission on Global Governance for Health's argument about power asymmetry are mainly theoretical ideas about the behaviors of global health actors founded on a collection of studies within specific nations, regions, or institutions. What is necessary is empirical evidence at the global level that can confirm, deny or recharacterize these characterizations of how

global health currently operates. Empirical evidence at the global level eliminates doubts of how decisions are currently made in global health and can guide GHG towards addressing the world's inequities in health.

We aim to empirically test the following research questions at the global level: (1) does GHG operate under the RAM? and (2) how can we characterize power dynamics in GHG?

We hypothesize that GHG operates under RAM and that there are power asymmetries in GHG that limit the range of health priorities. We analyzed empirical evidence from Twitter, funding data, and policy documents at the global level to test whether GHG operates under RAM and to characterize the power dynamics in GHG.

METHODS

We test if GHG operates under the RAM and characterize the power dynamics in GHG through the lens of global health priority-setting. All global health actors have certain preferences for health issues and act in alignment with these priorities.

Priorities can either be stated or revealed. Stated priorities are those preferences explicitly stated in a health actor's founding documents, websites, and annual reports. The mission statements and the health areas each actor explicitly mention in their official documents and websites are stated priorities. Revealed priorities are preferences that are gleaned from records of past behaviors and choices. Past health funding allocations and accounts of actually implemented programs and policies are revealed priorities. Revealed priorities may or may not be aligned with stated priorities.

We use evidence for both stated and revealed priorities from 2016 to 2020 to test both of our research questions.

Study Sample

We identified 20 key global health actors based on a consensus among three past studies that mapped the global health network using quantitative and qualitative methodologies.[4,14,15] As shown in Table 1, the key global health actors were categorized based on their nature of work in global health. Global health actors were either funding organizations, channels of developmental assistance for health (DAH) or implementing institutions. While most actors fall into more than one of these categories in practice, for the integrity of this analysis, organizations were limited to only one category based on the nature of their main line of work.

 Table 1. Summary of Global Health Actors.
 Characteristics of the 20 global health actors analyzed in this study.

Nature of Work in Global Health	Organizational Category	Twitter Username	Global Health Actor	Number of Twitter Followers (as of October 2021)
	Global health initiative	gavi	Gavi, the Vaccine Alliance	153,000
		UNITAID	Unitaid	17,200
Channels of Developmental		GlobalFund	Global Fund to Fight AIDS, Tuberculosis and Malaria	240,100
Assistance for Health	Multilateral	WorldBank	World Bank	3,500,000
	Development Bank			
	United Nations System	WHO	World Health Organization	10,000,000

		UNAIDS	Joint United Nations Programme on HIV/AIDS (UNAIDS)	286,800
		UNFPA	United Nations Population Fund (UNFPA)	260,800
		UNICEF	United Nations Children's Fund (UNICEF)	8,900,000
	National Government	USAID	United States Agency for International Development (USAID)	843,200
Funding Organizations		DFID_UK*	United Kingdom Department for International Development (UK DFID)*	1,000,000
	Philanthropic Organization	gatesfoundation	Bill and Melinda Gates Foundation	2,100,000
	Global CSO/NGO	MSF	Doctors Without Borders (MSF)	165,100
		PATHtweets	PATH	59,500
		SavetheChildren	Save the Children	2,700,000
		Oxfam	Oxfam International	836,300
	United Nations System	FAO	Food and Agriculture Organization (FAO)	469,600
Implementing Institutions	6	UNDP	United Nations Development Programme (UNDP)	1,600,000
	National Government	CDCgov	Centers for Disease Control and Prevention (CDC)	4,300,000
		ECDC_EU	European Centre for Disease Prevention and Control (ECDC)	90,600
		NIH	National Institutes of Health (NIH)	1,400,000

* UK DFID is now the Foreign, Commonwealth, and Development Office. During the time of the analysis, the UK's agency for aid was known as DFID.

Patient and public involvement

Patients and the public were not involved in the development of the research questions and outcome measures.

Data Sources

We analyze stated and revealed priorities of 20 key global health actors from three data sources – policy documents, DAH funding data, and tweets. Table 2 summarizes each data source, how they were collected, how they were analyzed, and what types of priorities can be derived.

Table 2. Summary of Data Source, Collection, and Analysis. Description of how data is collected and analyzed in the study.

Data Source	Data Collection	Analysis	Type of Priorities Derived from Source
Policy Documents	Manual collection of annual reports, policy documents, and official communications from official websites of each global health actor	Manual content analysis	Stated
DAH Funding Data	Queried funding allocation data of each global health actor from the International Health Metrics and Evaluation (IHME) DAH Database	Descriptive statistics; network analysis	Revealed
Twitter Data	Collected all the tweets of each global health actor from November 2016 to May 2020	Natural language processing (topic modeling); network analysis	Revealed

int	hree month intervals using	
the	Twitter API	

Drawing stated priorities from policy documents

Stated priorities are obtained from a manual content analysis of policy documents, annual reports, and official websites of global health actors.

Available policy documents, annual reports, and relevant official communications from the websites of each global health actor within the timeframe of the study were collected. Documents not published between 2016 and 2020 were not collected. Manual content analysis was conducted to evaluate the available policy documents for each global health actor and identify their respective stated priorities.

The stated priorities drawn from these documents were commonly obtained from official statements that fall under the following headings: "strategic priorities," "program priorities," "strategic objectives," "focus areas," "strategic work areas," "program focus," "Strategy 20XX-20XX," "strategic goals," "priority areas," among others. The first column of Supplementary Table 1 contains the stated priorities obtained from each actor.

Deriving revealed priorities from funding data

Revealed priorities are derived using a network analysis and descriptive statistics of financial flows in DAH funding data. To obtain the revealed priorities of each global health actor, we use topic modeling in natural language processing (NLP) and a network analysis of the tweets for each global health actor. Further explanation of data collection from each source follows.

Data from the Institute for Health Metrics and Evaluation's (IHME) Developmental Assistance for Health Database was collected for 2019.[16] The database includes approximately 800,000 transactions of financing for health programs and aid from funding organizations to channels of DAH and to implementing countries.

Descriptive statistics were conducted to determine the allocations of funding for each health area and geographic region for the 20 global health actors in 2019.

Network analysis is an analytic method that has proved to be useful in understanding relational dynamics across actors in global and public health.[17,18] Network analysis was conducted to observe the funding relationships between global health actors. Gephi 0.9.2 was used in constructing and analyzing the network map. The network modelled in the study allows for a graphical visualization of the flows of global health funding in 2019. The network map was designed such that each global health actor is represented by a node and lines or "edges" indicate a flow of funding in global health. The Fruchterman-Reingold algorithm was used in modelling the network map. The algorithm "calculates the optimal layout so that nodes with less strength and less connections are placed further apart, and those with more and/or stronger connections are placed closer to each other."[19] The thickness of edges represents the amount of funding transferred between actors. The modelled network map can be found and will be discussed in the findings section.

Twitter data

Using the Twitter API, we collected all the tweets of each global health actor by username from November 2016 to May 2020 in three month intervals. This means that all the tweets of each global health actor were collected for each day in the months of February, May, August, and November for each year. An interval of three months was decided for two reasons. First, a variation in the issues, topics, and themes that global health actors tweet can be observed in three month intervals. Initial small sample testing indicates that collecting all the tweets of every month for each actor yields redundancy in issues and topics observed. Redundancy is eliminated in three month intervals. Second, it also allows for efficient usage of the data request limits of the Twitter API. As Twitter limits the number of tweets one is able to collect from the Twitter API, this interval is an efficient way of collecting data for all 20 global health actors for the timeframe. A total of 74,241 tweets were collected from 2016 to 2020 for the 20 global health actors. Supplementary Tables 2 and 3 further describe the tweets collected.

Using Twitter as a data source plays an important role in analyzing GHG, examining whether it operates under the RAM, and characterizing power dynamics. In the academic area of communications studies, researchers suggest that there are two forms of utility that motivate actors to post content on Twitter. First, intrinsic utility assumes that a user receives inherent satisfaction from posting content on Twitter.[20] While global health actors do not necessarily receive the same "inherent satisfaction" as individual Twitter users, global health actors acquire more intrinsic utility assumes that the perceptions of others,[21,22] and seeking status or prestige are strong motivators for posting content.[23,24] As global health actors operate best with high public approval, posting content on Twitter can improve public perception. Twitter is the ideal platform for global health actors to simultaneously share their work to a greater number of individuals and to improve their public perception. The utility received from using Twitter explains the social media's ubiquity among global health actors.

Because Twitter limits each post to 280 characters, the platform promotes short, frequent, and straightforward manners of communication. The tweets of global health actors are regular ways of communicating their work, preferences, and priorities to the public.[25–28] The tweets of global health actors act as an archive, a record of historical preferences, priorities, goals, and implemented programs.[29]

While tweets can represent both stated and revealed priorities, for this study, we use tweets to represent revealed priorities. Since this study analyzes tweets in aggregation, our findings reveal the top themes discussed by each actor from 2016-2020. Because we do not analyze each tweet at an individual level, tweets are considered revealed priorities and not stated priorities.

Obtaining revealed priorities from Twitter data

NLP is a subfield in artificial intelligence, computer science, and linguistics at the intersection of the human language and computers. NLP is concerned about how to utilize computers to process and analyze large quantities of human language data. We use NLP in analyzing the tweets of the global health actors for two reasons. First, NLP allows for the efficient analysis of tens of thousands of rows of text data that could not be done manually.[30–32] Second, NLP allows for a technique called topic modeling

where an algorithm generates lists of words that are frequently used together.[33–35] These lists of words can then be interpreted to identify specific themes, topics, or issues to identify the top 10 priorities of each global health actor from 2016 to 2020. The results of the topic modeling are then used in a network analysis that visualizes where each actor converges or diverges in global health priorities with other actors.

As seen in Table 3, ten topics were generated using the Latent Dirichlet Allocation (LDA) topic model for each global health actor's tweets to reveal their priorities from 2016 to 2020. LDA is a generative probabilistic modeling method where words in a corpus of text that are frequently used together are categorized into topics.[36] This follows the assumption that documents, or in this case Twitter profiles, can be broken down into multiple topics that are identified by certain combinations of words.

Table 3. Revealed Priorities from Twitter Topic Modeling. Ten revealed priorities of each of the 20 global health actors based on their tweets from 2016 to 2020. Priorities are alphabetically arranged. Red indicates Funding Organizations. Blue indicates Channels of DAH. Gray indicates Implementing Institution.

United States	United Kingdom	Gates Foundation	wно	World Bank	UNAIDS	UNFPA	UNICEF	UNITAID	GAVI
Africa	Africa	Africa	Africa	Africa	Access	Africa	Africa	Access	Africa
Children	Agriculture	Breastfeeding	Breastfeeding	Agriculture	Africa	Child Marriage	Breastfeeding	Cancer	Cancer
Education	Children	Children	Children	Children	Discrimination	Children	Children	Children	Children
Food Security	Development	Education	Ebola	Climate Change	HIV/AIDS	Family Planning	Climate Change	Hepatitis	Cholera
HIV/AIDS	Ebola	HIV/AIDS	HIV/AIDS	Food Security	Human Rights	FGM	Ebola	HIV/AIDS	Ebola
Humanitarian Aid	Education	Malaria	Malaria	Humanitarian Aid	Innovation	Human Rights	Education	Malaria	Measles
Mothers	Food Security	Mothers	Measles	Poverty	Prevention	Humanitarian Aid	Human Rights	Testing	Pneumonia
South America	HIV/AIDS	Polio	Mothers	Sanitation	Testing	Nutrition	Online	Treatment	Polio
Water	Humanitarian Aid	Sanitation	Polio	Water	Treatment	Violence	Violence	Tuberculosis	Poverty
Women	Water	Women	Women	Women	Women	Women	Water	Vaccines	Vaccines
Global Fund	CDC	EU CDC	NIH	FAO	UNDP	MSF	PATH	Save the Children	Oxfam
Africa	Children	Ebola	Africa	Africa	Africa	Africa	Access	Africa	Africa
Children	Diarrhea	Hepatitis	Cancer	Agriculture	Children	Children	Africa	Children	Climate Change
Cholera	E. Coli	HIV/AIDS	Funding	Biodiversity	Climate Change	Cholera	Breastfeeding	Donations	Ebola
Ebola	Influenza	Influenza	Heart Disease	Climate Change	Education	Ebola	Cancer	Education	Food Security
HIV/AIDS	Measles	Measles	HIV/AIDS	Families	FGM	HIV/AIDS	Children	Food Security	Humanitarian Aid
Malaria	Prevention	Outbreaks	News	Farmers	Food Security	Humanitarian Aid	Ebola	Humanitarian Aid	Malaria
Pneumonia	Vaccines	Report	Rare Disease	Fisheries	HIV/AIDS	Refugees	Innovation	Pneumonia	Pneumonia
Polio	Water	Surveillance	Research	Food Security	Malaria	Treatment	Malaria	Refugees	Refugees
Tuberculosis	Women	Tuberculosis	Stress	Forests	Water	Tuberculosis	Pneumonia	Schools	Water

Additionally, we model a network map from the priorities generated using the LDA topic model also using the Fruchterman-Reingold algorithm. This network map visualizes the similarities in priorities between the 20 actors. Data used for this network map can be found in Supplementary Table 4. This network map is compared with the network map generated using financial data from IHME in the findings section. This comparison between network maps can illustrate if priorities from tweets and from financial data are aligned.

Testing if GHG operates under the RAM

By combining evidence for stated and revealed priorities of 20 key global health actors, we can determine if GHG operates under the RAM.

The rational actor model (RAM) in international cooperation is categorized as the "linchpin of foreign policy decision making."[37] This approach is rooted in expected utility theory in microeconomics introduced by von Neumann and Morgenstern in the 1940s and subsequent theories of rationality.[38]

RAM is most useful in explanations of economic behavior if the three conditions of the rationality assumption are fulfilled.[37] First, it is assumed that an actor's goal is predetermined before intentionally acting to achieve it.[37] Second, actors are assumed to "display consistent preferences as manifested in the ability to rank the preferences in transitive order."[37] Third, actors are assumed to maximize utility while choosing an alternative that provides the highest amount of net personal benefit.[37]

"Rational" in this case does not simply mean a dispassionate calculation of costs and benefits. In the case of global health actors, acting rationally means weighing both economic and political factors, and acting according to the three assumptions of RAM.

GHG operates under RAM if each of the 20 global health actors and the global health system collectively fulfill the three assumptions of pre-determined goal, rank order preferences, and benefit maximization.

To test the first assumption of pre-determined goal, we determine the stated priorities of each global health actor from policy documents. We test whether there exist explicit statements on goals and priorities and note what health areas or issues are the stated priorities of each global health actor.

To test the second assumption of consistent rank order preferences, we compare revealed priorities from DAH funding data and revealed priorities from tweets. From the DAH funding data, we can determine rank order preferences based on which health issues are allocated the most funding in 2019. From tweets, we can determine rank order preferences based on the top 10 topics each global health actor tweeted about from 2016 to 2020. If there is consistency in rank order preferences between the revealed priorities from DAH funding data and revealed priorities from tweets, then the second assumption is fulfilled.

To test the third assumption of benefit maximization, we compare the stated and revealed priorities from all three data sources. The priorities that are consistent across stated priorities from policy documents and revealed priorities from DAH funding data and from tweets are revealed to be the priority that the global health actor determines to be benefit maximizing. An alignment of a preference across the three different sources can lead us to believe with high probability that it is the actor's benefit maximizing preference.

We also test the three assumptions at the global health system level. Pre-determined goals are obtained from stated priorities from collective stated commitments to global health based on Sustainable Development Goal 3 (SDG-3) of "good health and well-being" as all 20 of the actors in this study have stated commitments to this goal. Consistent rank order preferences are derived from the alignment between aggregated

DAH funding allocations of all global health actors and the most common topics generated from tweets across all global health actors. The consistent preferences across stated and revealed priorities are inferred to be what the global health systems decides to be benefit maximizing.

If each global health actor fulfills the three assumptions, and if the global health system collectively fulfills the three assumptions, then GHG operates under the RAM.

Characterizing power dynamics in GHG

We use the following typology of power when characterizing power dynamics in GHG. "Power is exercised everywhere in global health although its presence may be more apparent in some instances than others,"[39] one global health researcher notes. The power concept in global health does not stray far from Robert Dahl's (1957) definition in his seminal study where he describes "A has power over B to the extent that he can get B to do something B would not otherwise do." [40] Specifically, one way to categorize power is through the four types introduced by Barnett and Duvall (2005), each manifesting in different manners in global health.[41] Supplementary Table 5 summarizes Barnett and Duvall's four types of power. First, compulsory power is defined as "direct control of one actor over the conditions of existence or the actions of another."[41] In global health, compulsory power can be seen in how donor countries dictate the conditions in low and middle-income countries (LMICs) through development aid.[42] Second, institutional power is "the control actors exercise indirectly over others through diffuse relations of interactions."[41] High-income countries control funding allocations for LMICs through institutional power via their contributions to the WHO and other multilateral organizations. Third, structural power refers to the "constitution of subjects' capacities in direct structural relation to one another."[41] The structural and historical disempowerment of indigenous populations have resulted in their disproportionate outcomes in health.[43,44] Fourth, "productive power works through diffuse constitutive relations to produce the situated social capacities of actors."[40] Research institutions funded by high-income countries direct what health issues are studied and addressed.[45]

To characterize the power dynamics manifested in GHG, we analyze the interplay of stated and revealed priorities between funding organizations, channels of DAH, and implementing organizations. Particularly, we identify which global health actors have the most influence in setting global health priorities. The global health actors which have the most priorities aligned with the stated and revealed priorities of the global health system are determined to have the most influence and power in priority-setting.

DISCUSSION

GHG operates under RAM

As seen in Supplementary Table 1, we find that each of the 20 key global health actors fulfills the three assumptions of the RAM. Each actor has a pre-determined goal stated in mission statements, strategic plans, multi-year strategies, and other policy documents. Each actor has consistent rank order preferences as observed in the

alignment of order of preferences in DAH funding data and top identified topics from tweets. Consistent, top-ranking preferences across policy documents, funding data, and tweets are the alternatives that maximize benefits for each global health actor based on their pre-determined goal.

As an example, USAID's pre-determined goal is protecting national security through the providing aid the health areas of child and maternal health, HIV/AIDS, malaria, and tuberculosis as stated on their official website.[46] In 2019, 49% of aid from USAID support HIV/AIDS, 22% supported child and maternal health, and 7% to malaria.[47] The topic modelling for USAID's tweets shows that HIV/ADIS, child and maternal health, and malaria are the top themes tweeted about by the organization from 2016-2020 (See Supplementary Table 1). USAID behaves under the RAM since their revealed priorities from past funding behavior and from tweets align with their pre-determined goal.

As shown in the last row of Supplementary Table 1, we find that the global health system collectively fulfills the three assumptions of the RAM. The pre-determined goal of the global health system can be found in the WHO constitution and the 9 target areas for Sustainable Development Goal (SDG) 3 on good health and well-being. All 20 global health actors have stated commitments to the WHO mission and the SDGs. The alignment of DAH funding allocations and most common health issues from Twitter reveal that in terms of rank order, HIV/AIDS, child health, and maternal health are the top 3 priorities of the global health system collectively. To maximize benefits of the predetermined goal of "health for all" and "SDG3: good health and well-being", the global health system prioritizes HIV/AIDS, child health, and maternal health. Among all 9 stated targets in SDG3, only these three issues are prioritized. Effectively, the 6 other stated targets in SDG3 are deprioritized and underfunded by the global health system.

Since each global health actor and the global health system collectively fulfills the three assumptions, we find that GHG operates under the RAM. However, this does not imply cooperation of global health actors. This finding demonstrates the fact that each global health actor operates based on their rational self-interest and that the global health system operates based on the pursuit of only some of the stated priorities. Who determines which priorities are pursued by the global health system? The findings on power dynamics in GHG reveal the actors who determine global priorities.

Compulsory and institutional power asymmetries in GHG

As demonstrated in the following network maps, we find that there is compulsory and institutional power asymmetry in GHG.

Compulsory power asymmetry can be found in how funding organizations strongly influence channels of DAH and implementing institutions based on their relationship. Channels of DAH and implementing institutions rely on funding organizations for resources to continue operating. We find that the top priorities of the 3 funding organizations in this study are also the priorities of channels of DAH and implementing institutions.

As seen in Figure 1, HIV/AIDS is 1st priority of United States Agency for International Development (USAID), 2nd priority of United Kingdom Department for International Development (UK-DFID), and 2nd priority of the Bill and Melinda Gates Foundation

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Limitations

It is necessary to acknowledge the three limitations of this study. First, we assume stated priorities match what is specified in organizational documents. It may be the case

(BMGF) based on the alignment of stated and revealed priorities. HIV/AIDS is a priority of 4 of 8 channels of DAH and 4 of 9 implementing institutions based on its presence in policy documents, DAH funding, and tweets of each actor.

Figure 1 also demonstrates that maternal and child health is 2nd priority of USAID, 1st priority of UK-DFID, and 1st priority of BMGF based on the alignment stated and revealed priorities. Maternal and child health is a priority of 6 of 8 channels of DAH and 7 of 9 implementing institutions based on its presence in policy documents, DAH funding, and tweets of each actor.

13 Following the flow of the funding in Figure 2 and the similarities in tweets in Figure 1, we 14 can see that institutional power asymmetry can be found in how funding organizations 15 strongly influence implementing institutions through outsized influence of channels of 16 DAH that allocate funding to these implementing institutions. As some implementing 17 18 institutions do not get direct funding from funding organizations, but through channels of 19 DAH, channels of DAH have direct control of funding of implementing institutions. 20 Because wealthy funding organizations influence the priorities of channels of DAH, 21 transitively, funders have power over implementing institutions. Implementing 22 institutions in turn align their priorities with the priorities of channels of DAH, and 23 transitively with the priorities of funding organizations. 24

25 Both network analyses of revealed priorities from DAH funding data and from tweets 26 show how there is asymmetric levels of power held by the United States, United 27 Kingdom, and the Gates Foundation in comparison to other actors. Figure 2 reveals 28 how these three funding organizations are the largest funders for the work of the Global Fund, WHO, World Bank, US Foundations, UN organizations, and Gavi. The IHME DAH database reveals that 24% of all DAH funding was allocated to HIV/AIDS, 21% to child health, and 12% to maternal health – the three top priorities of funding organizations.[16] Only 14% was allocated to health system strengthening and 2% to non-communicable diseases.[16]

Figure 1 reveals how the most common topics generated across all global health actors include Africa, HIV/AIDS, child health, women health, and infectious diseases. These are the same health issues highly prioritized by the United States, United Kingdom, and Gates Foundation. Comparing figures 1 and 2, we find that these three funding organizations have outsized influence in priority-setting. Funding organizations have outsized influence because of how much DAH funding these three organizations have provided in comparison to other funding organizations. We find that the programs implemented and issues prioritized from 2016 to 2020 as documented through the tweets of the actor revolve around the main priorities of funding organizations of HIV/AIDS, child health, maternal health, infectious disease, and Africa. This outsized influence of global health funders limits the range of funded programs and policies that effectively reduce health inequities, especially making it difficult for smaller implementers to fund local programs and policies that do not neatly align with the priorities of major funders.

that some organizations communicate priorities differently from what is written in their foundational documents. Moreover, what is fundable may not necessarily be what is most important. Second, we assume that health funding is indeed spent on what it is ostensibly spent on when deriving revealed preferences from past health funding data, although may not be the case. Third, our scope is limited to examining 20 global health actors from 2016 to 2020. There is a multiplicity of non-health actors and processes that likely influence overall health outcomes of populations. Studying the stated and revealed priorities of non-health actors and processes such as foreign relations between nations and the influence of the private sector on health can improve the characterization of current GHG.

CONCLUSION

We find empirical evidence at the global level showing that GHG operates under the RAM. Additionally, we find that at the global level, there is asymmetric compulsory and institutional power held by funding organizations, allowing global health priorities to be set by funders that have the money to spend on global health. In the past years, these funders have been the United States, United Kingdom, and the Gates Foundation. As shown by the triangulated evidence, the rational choice for all global health actors is to align their priorities with those of funding organizations in order to continue with their programs. These findings are in alignment with current literature discussing how "philantrocapitalists" and large funders having an outsized influence on global health agenda setting even without necessarily having an ethical framework for decision-making.[48,49]

Our paper complements the current research on agenda-setting in global health. Jeremy Shiffman's (2016) discussion of how agenda-setting is not purely a rational deliberation of evidence but the convergence of problems, solutions, and political developments.[50] This study attempts to deepen the understanding of the manifestation and influence of power in agenda-setting through the lens of stated and revealed priorities.

The priorities of funders of HIV/AIDS, child health, and maternal health have been prioritized from 2016-2020. While global health has seen improvements in these three areas, the existence of significant and severe preventable health inequalities demonstrates that this funding architecture does not necessarily promote equity and justice in global health. Additionally, other core health issues such as horizontal health system improvements do not appear to be prioritized that may have led to the persistence of global health inequity. We have empirical evidence supporting the arguments that current GHG operates under the RAM, and existing power asymmetries limit the range of choice for health policies and programs that aim to reduce inequities. If "health for all" and the SDG3 targets are to be achieved, then there must be a reassessment of current GHG under the RAM.

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Competing interests: No author has competing interests to declare.

Ethics approval: The study did not have any human or animal participants. Additionally, the study did not require ethical approval as the Twitter data used were already in the public domain.

Data and materials availability: Under the "Content Redistribution" section of Twitter's Developer Agreement and Policy, "We restrict the redistribution of Twitter Content to third parties. If you provide Twitter Content to third parties, including downloadable datasets or via an API, you may only distribute Tweet IDs, Direct Message IDs, and/or User IDs." Because the data collected using the Twitter API does not allow for redistribution under the Twitter Developer Agreement and Policy, tweets cannot be made publicly available. Only Tweet ID's and User ID's are allowed to be redistributed according to the Twitter policy. Please email jenpr@upenn.edu if you wish to receive a copy of the Tweet ID's and User ID's of the data and/or the code used in the study. The IHME DAH Database can be found at http://ghdx.healthdata.org/record/ihme-data/development-assistance-health-database-1990-2019

FIGURE LEGENDS

Figure 1. Network Analysis of Revealed Priorities from Tweets. Line thickness represents how many similar priorities one global health actor has with another. Font size of global health priorities represent the number of organizations have it as a priority. Data used found in Supplementary Table 4.

Figure 2. Network Analysis of Revealed Priorities from Funding for DAH (2019).

Line thickness represents the amount of funding for health that was transferred between two actors. Font size represents the total amount of funding for health donated or received in 2019.

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Figure 1. Network Analysis of Revealed Priorities from Tweets. Line thickness represents how many similar priorities one global health actor has with another. Font size of global health priorities represent the number of organizations have it as a priority. Data used found in Supplementary Table 4.

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Supplemental Material

Supplementary Table 1. Evidence and Testing RAM by Actor. Evidence for stated and revealed priorities and testing of RAM for each actor and the global health system as a whole. Light red indicates funding organization, blue indicates channel of DAH, yellow indicates implementing institution, and dark red indicates global health system as a whole.

	Evidence			Testing			
	Stated Priorities from Policy Documents	Revealed Priorities from DAH Data	Revealed Priorities from Tweets	Pre-determined goal?	Consistent preferences?	Utility maximizing?	Operates under RAM?
USAID	Documents "On behalf of the American people, we promote and demonstrate democratic values abroad, and advance a free, peaceful, and prosperous world. In support of America's foreign policy, the U.S. Agency for International development leads the U.S. Government's international development and disaster assistance through partnerships and investments that save lives, reduce poverty, strengthen democratic governance, and help people emerge from humanitarian crises and progress beyond assistance." "For over 50 years, USAID's global health programs have saved lives, protected people most vulnerable to disease, and promoted the stability of communities and nations, while advancing American security and prosperity. America is safer and stronger when people can live healthy and productive lives and when nations around the world are self-reliant and resilient." (USAID Website) Health Focus Area (USAID Website) • Child and maternal death • HIV/AIDS • Malaria • Tuberculosis	trom DAH Data Health Focus Area 49.0% of 2019 US DAH (\$6.0 billion) supported HIV/AIDS; 7.0% (\$862.5 million) supported malaria; 11.4% (\$1.4 billion) was disbursed for child health, and 10.8% (\$1.3 billion) went to maternal health. Region In 2017, the most recent year for which regional DAH estimates are available, the US directed much of its resources to sub- Saharan Africa, sending 50.5%, or \$6.9 billion, of 2017 DAH. Channel The US provided 59.2% of its funding in 2019 through its own bilateral agencies, including the United States Agency for International Development (USAID), the President's Malaria Initiative (PMI), and PEPFAR. UN agencies received 6.2% of US DAH in 2019, or \$761.4 million, up 9.0% from 2018, and the Global Fund received \$636.5 million, down 25.8%. NGOS received 26.8% of US DAH in 2019, or \$3.3 billion.	Trom Tweets Topics from 2016-2020 Tweets (no order) Africa Children Education Food Security HIV/AIDS Humanitarian Aid Mothers South America Water Women	goal? National security National interests Global health focus: Child and maternal health, HIV/AIDS, malaria, tuberculosis	Preferences? HIV/AIDS, child and maternal health, and Africa are consistent across DAH data and tweets	maximizing? HIV/AIDS, child and maternal health are consistent across stated and revealed priorities. To maximize benefits for national security and interests, USAID prioritizes HIV/AIDS and child and maternal health in Africa.	Yes
UK DFID	"We pursue our national interests and project the UK as a force for good in the world. We promote the interests of British citizens, safeguard the UK's security, defend our values, reduce poverty and tackle global challenges with our international partners." (UK FCDO, formerly DFID website) "We are responsible for: 1. honouring the UK's international commitments and taking	Health Focus Area Reproductive, maternal, newborn, and child health was the focus of \$1.4 billion (38.5%) of the UK's DAH in 2019, followed by HIV/AIDS with \$553.9 million (15.8%). Region By GBD super- regions, the UK contributed \$1.3 billion, or 37.3% of tis 2017 DAH, to sub-	I opics from 2016-2020 tweets (no order) Africa Agriculture Children Development Ebola Education Food Security HIV/AIDS Humanitarian Aid Water	National interests National security Global peace, security, and governance; Crisis response and resilience; Global prosperity; Extreme poverty and helping most vulnerable; Value for money	Child and maternal health, HIV/AIDS, and Africa are consistent across DAH data and tweets.	Child and maternal health, HIV/AIDS, and Africa are consistent across stated and revealed priorities. To maximize benefits for national security and interests, UK DFID prioritizes child and maternal	Yes

	 action to achieve the United Nations' Global Goals making British aid more effective by improving transparency, openness and value for money targeting British international development policy on economic growth and wealth creation improving the coherence and performance of British international development policy in fragile and conflict- affected countries improving the coherence and performance of British international development policy in fragile and conflict- affected countries improving the lives of girls and women through better education and a greater choice on family planning preventing violence against girls and women in the developing world helping to prevent climate change and encouraging adaptation and low-carbon growth in developing countries strengthening resilience and response to crisis promoting global peace, security and governance strengthening resilience and response to crisis promoting global prosperity tackling extreme poverty and helping the world's most vulnerable delivering value for money" 	Saharan Africa; §301.0 million (8.7%) to South Asia; §163.9 million (4.7%) to Southeast Asia, East Asia, and Oceania; §237.9 million (6.9%) to North Africa and the Middle East; and §41.0 million (1.2%) to Central Europe, Eastern Europe, and Central Asia. Channel Of the UK's 2019 DAH, §990.3 million (28.2%) was Channeled to UK bilateral agencies; §524.6 million (14.9%) to UN agencies; §306.4 million (23.3%) to the Global Fund.				health and HIV/AIDS in Africa.	
BMGE	delivering value for money" (UK DFID About Page) "Strategic Investments, We	Health Focus Area	Topics from 2016-2020	Strategic	Child and	Child and	Yes
	artner with entrepreneurs, companies, and other organizations to create incentives that harness the power of private enterprise to create change for those who need it most." (BMGF: how we work) Global development. "Our Global Development Division focuses on improving the delivery of high-impact health	In 2019, the Gates Foundation directed \$1.5 billion, or 38.3%, of its DAH to reproductive, maternal, newborn, and child health; \$709.3 million, or 18.1%, to HIV/AIDS; \$303.9 million, or 7.8% to malaria; \$237.6 million, or 6.1%, to	Africa Breastfeeding Children Education HIV/AIDS Malaria Mothers Polio Sanitation Women	investments private enterprise solutions for most disadvantaged; High-impact health products and services to world's poorest Stated global development areas: Emergency	maternal health, HIV/AIDS, malaria, and Africa are consistent across DAH data and tweets.	maternal health, HIV/AIDS, malaria, and Africa are consistent across stated and revealed priorities. To maximize returns of their strategic	

	 products and services to the world's poorest communities and helps countries expand access to health coverage. Areas: Emergency Response, Family Planning ,Global Delivery Programs, Global Libraries, Maternal, Newborn & Child Health, Nutrition, Polio" (BMGF: our work) Global health. "Our Global Health Division aims to reduce inequities in health by developing new tools and strategies to reduce the burden of infectious disease and the leading causes of child mortality in developing countries. Areas: Discovery & Translational Sciences, Enteric and Diarrheal Diseases. HIV, Innovative Technology Solutions, Institute for Disease Modeling, Integrated Development, Malaria, Maternal, Newborn & Child Health, Discovery & Tools, Neglected Tropical Diseases, Pneumonia Tuberculosis, Vaccine Development and Surveillance" (BMGF: our work) 	tuberculosis; \$266.5 million, or 6.8%, to health systems strengthening; and \$72.4 million, or 1.9%, to non- communicable diseases. Region In 2017, the Foundation provided 41% of its DAH to global recipients and programs and 18% to sub- Saharan Africa. Channel The Gates Foundation's 2019 DAH total of \$3.9 billion was an increase of 9.9% from 2018. Of this, \$2.5 billion or 64.0% was channeled through the Gates Foundation directly to implementing institutions. In 2019, \$266.8 million (7%) in Gates Foundation DAH went to UN agencies, \$256.9 million (7%) went to the Global Fund, and \$406.1 million (10%)		Response, Family Planning, Global Delivery Programs, Global Libraries, Maternal, Newborn & Child Health, Nutrition, Polio Stated global health areas: Discovery & Translational Sciences, Enteric and Diarrheal Diseases. HIV, Innovative Technology Solutions, Institute for Diseases Modeling, Integrated Development, Malaria, Maternal, Newborn & Child Health, Discovery & Tools, Neglected Tropical Diseases, Pneumonia Tuberculosis, Vaccine Development and Surveillance		investments, BMGF prioritizes child and maternal health, HIV/AIDS, and malaria in Africa.	
WHO	 "Health for all. Ensuring universal health coverage without impoverishment is the foundation for achieving the health objectives of the Sustainable Development Goals – because when people are healthy, their families, communities and countries benefit. Our top priority must be to support national health authorities' efforts to strengthen all the building blocks of health systems and to enact policies aimed at ensuring health care is equitable and alfordable for all. Health emergencies. In today's interconnected world, public health emergencies can affect anyone, anywhere – and the Ebola crisis in West Africa showed us the dangers of being unprepared. The development of resilient and robust global and local health systems capable of preventing, monitoring, detecting and responding to public health emergencies must therefore be a key priority, closely linked to our efforts to achieve universal health coverage. Women, children and adolescents. We cannot achieve the ambitious health and development targets in the Sustainable Development Goals unless we secure the health, dignity and rights of women, children and adolescents. Yet, in too many places, gender gaps, harmful cultural and social practices and gender-based violence are negatively impacting these individuals. Because of that, 	Health Focus Area WHO provided \$2.5 billion of DAH in 2019, down 1.2% from 2018. Of this, \$630.7 million or 24.9% was disbursed to other infectious diseases and \$1.0 billion or 39.8% to health systems strengthening. Region DAH data for the WHO in 2019 have unallocated or unspecified regions.	Topics from 2016-2020 tweets (no order) Africa Breastfeeding Children Ebola HIVA/AIDS Malaria Measles Mothers Polio Women	Universal health coverage, health systems strengthening, health equity, health equity, health equity, climate and environmental impacts on health, improved WHO governance	Infectious diseases (ebola, HIV/AIDS, malaria, measles, polio) are consistent across DAH data and tweets.	Infectious diseases (ebola, HIV/AIDS, malaria, measles, polio) are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of health for all, WHO prioritizes on infectious diseases like Ebola, HIV/AIDS, malaria, measles, and polio.	Yes

2								
3		we must put the well-being of						
4		women, children and						
r		adolescents at the centre of global bealth and						
2		development.						
6		The health impacts of climate						
7		and environmental change.						
8		change impact many aspects						
0		of life that are inextricably						
9		linked to health – food						
10		air safety and water and						
11		sanitation systems – and WHO						
12		estimates that 12.6 million						
12		result of living or working in						
13		an unhealthy environment. To						
14		address this, WHO has a key role to play advancing both						
15		mitigation and adaptation						
16		strategies for climate and						
17		environmental change,						
17		with other UN agencies and						
IŎ		stakeholders.						
19		A transformed WHO. Building	~~					
20		transparent and accountable	· · ·					
21		agency will require striking a						
 วว		balance between bold reform						
~~		organization. To meet the						
23		evolving needs and challenges						
24		game-changing, sustainable						
25		results, WHO will need to						
26		focus its work where it has the						
27		intensify its engagement						
20		across stakeholders, attract						
28		more predictable, flexible						
29		and retain the best global						
20								
30		talent." (WHO Priorities)						
30 31	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of	Health Focus Area Focused on ending			Child and maternal	Child and maternal	Yes
30 31 32	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a	Health Focus Area Focused on ending poverty in the	2		Child and maternal health and	Child and maternal health are	Yes
30 31 32 33	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical	Health Focus Area Focused on ending poverty in the world's poorest countries the World	2	1	Child and maternal health and Africa are consistent	Child and maternal health are consistent across stated	Yes
30 31 32 33	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help	<u>Health Focus Area</u> Focused on ending poverty in the world's poorest countries, the World Bank's International		ic	Child and maternal health and Africa are consistent across DAH	Child and maternal health are consistent across stated and revealed	Yes
30 31 32 33 34	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development		ie	Child and maternal health and Africa are consistent across DAH data and	Child and maternal health are consistent across stated and revealed priorities.	Yes
30 31 32 33 34 35	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disburged 51.1		ies	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize	Yes
30 31 32 33 34 35 36	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face.	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed 51.1 billion of DAH in		ien	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of	Yes
30 31 32 33 34 35 36 37	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face.	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018 The		ien	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined	Yes
30 31 32 33 34 35 36 37 38	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank		ien	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending	Yes
30 31 32 33 34 35 36 37 38 20	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction		ien	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and	Yes
30 31 32 33 34 35 36 37 38 39	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a plohal		ien	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for	Yes
30 31 32 33 34 35 36 37 38 39 40	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development		ien	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for the porest	Yes
30 31 32 33 34 35 36 37 38 39 40 41	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience the challenge and building resilience	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned bu 190 countries A:		ien	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for the poorest people, the World Poorly	Yes
30 31 32 33 34 35 36 37 38 39 40 41 42	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress.	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest		ien	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for the poorest people, the World Bank prioritizes on	Yes
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30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes • Economic Policy • Environment	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend		ien	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes • Economic Policy • Environment and Resource	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of		End poverty and	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
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30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Finance Human	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD		End poverty and boost prosperity through sustainable	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Finance Human Development and Gender.	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$1.1 billion of DAH un	Topics from 2016-2020	End poverty and boost prosperity through sustainable economic growth, investing in	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Finance Human Development and Gender Private Sector	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$11.1 billion of DAH, up 25.4% from 2018.	Topics from 2016-2020 tweets	End poverty and boost prosperity through sustainable economic growth, investing in people, and	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Human Development Development Evelopment	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$11.1 billion of DAH, up 25.4% from 2018. Funds were targeted	Topics from 2016-2020 tweets (no order)	End poverty and boost prosperity through sustainable economic growth, investing in people, and building resilience	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Human Development Development Private Sector Development Public Sector Management	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$11.1 billion of DAH, up 25.4% from 2018. Funds were targeted at reproductive, maternal. newhorn	Topics from 2016-2020 tweets (no order) Africa	End poverty and boost prosperity through sustainable economic growth, investing in people, and building resilience to shocks and threats:	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Finance Human Development and Gender Private Sector Management Social	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$1.1 billion of DAH, up 25.4% from 2018. Funds were targeted at reproductive, maternal, newborn, and child health;	Topics from 2016-2020 tweets (no order) Africa Agriculture	End poverty and boost prosperity through sustainable economic growth, investing in people, and building resilience to shocks and threats;	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Finance Human Development Development Private Sector Management Social Development Potenting	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$11.1 billion of DAH, up 25.4% from 2018. Funds were targeted at reproductive, maternal, newborn, and child health; vaccination	Topics from 2016-2020 tweets (no order) Africa Agriculture Children	End poverty and boost prosperity through sustainable economic growth, investing in people, and building resilience to shocks and threats; Maternal and child health bestth	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Finance Human Development Private Sector Development Social Development and Protection Urban and	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$11.1 billion of DAH, up 25.4% from 2018. Funds were targeted at reproductive, maternal, newborn, and child health; vaccination programs; infectious disease; and NCDS.	Topics from 2016-2020 tweets (no order) Africa Agriculture Children Climate change Food security	End poverty and boost prosperity through sustainable economic growth, investing in people, and building resilience to shocks and threats; Maternal and child health, health emergencies,	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Finance Human Development Private Sector Development Social Development And Protection Urban and Rural Rural	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$11.1 billion of DAH, up 25.4% from 2018. Funds were targeted at reproductive, maternal, newborn, and child health; vaccination programs; infectious diseases; and NCDs.	Topics from 2016-2020 tweets (no order) Africa Agriculture Children Climate change Food security Humanitarian aid	End poverty and boost prosperity through sustainable economic growth, investing in people, and building resilience to shocks and threats; Maternal and child health, health emergencies, nutrition,	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Finance Human Development Private Sector Development Social Development Netterion Urban and Rural Development" (World Bank	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$11.1 billion of DAH, up 25.4% from 2018. Funds were targeted at reproductive, maternal, newborn, and child health; vaccination programs; infectious disease; and NCDs. Region 27.6% of DAH	Topics from 2016-2020 tweets (no order) Africa Agriculture Children Climate change Food security Humanitarian aid Poverty Sanitation	End poverty and boost prosperity through sustainable economic growth, investing in people, and building resilience to shocks and threats; Maternal and child health, health emergencies, nutrition, infectious diseases, toharco	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Finance Human Development Private Sector Development Social Development Social Development Nerdetiona Rural Development (World Bank Annual Report	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$11.1 billion of DAH, up 25.4% from 2018. Funds were targeted at reproductive, maternal, newborn, and child health; vaccination programs; infectious diseases; and NCDs. Region 27.6% of DAH disbursed by	Topics from 2016-2020 tweets (no order) Africa Agriculture Children Climate change Food security Humanitarian aid Poverty Sanitation Water	End poverty and boost prosperity through sustainable economic growth, investing in people, and building resilience to shocks and threats; Maternal and child health, health emergencies, nutrition, infectious diseases, tobacco control, mental	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Finance Human Development Private Sector Development Social Development Social Development Werd Bank Annual Report 2019)	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$11.1 billion of DAH, up 25.4% from 2018. Funds were targeted at reproductive, maternal, newborn, and child health; vaccination programs; infectious diseases; and NCDs. Region 27.6% of DAH disbursed by development banks	Topics from 2016-2020 tweets (no order) Africa Agriculture Children Climate change Food security Humanitarian aid Poverty Sanitation Water Women	End poverty and boost prosperity through sustainable economic growth, investing in people, and building resilience to shocks and threats; Maternal and child health, health emergencies, nutrition, infectious diseases, tobacco control, mental health	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes

	"World Bank Health Focus Areas: 1. Women and children's health 2. Health emergencies 3. Nutrition 4. Infectious diseases 5. Tobacco control 6. Mental health" (World Bank Health Focus Areas)	as group went to sub-Saharan Africa and 20.5% to North Africa and the Middle East.					
UNAIDS	 "Strategic leadership agenda In the light of the need for change, this Strategy seeks to achieve a set of far-reaching and people-centred goals and targets that must be met by 2020 if we are to reach our 2030 ambition of ending the AIDS epidemic. The goals correspond to each of the three strategic directions, and include achieving by 2020: Fewer than 500 000 people newly infected with HIV Fewer than 500 000 people dying from AIDS-related causes Elimination of HIV-related discrimination" (UNAIDS 2016- 2021 Strategy) 	Health Focus Area UNAIDS is leading the global effort to end AIDS as a public health threat by 2030. In addition, the agency is working toward its 2020 90-90-90 targets: for 90% of people living with HIV/AIDS to know their status; for 90% of those diagnosed with infections to receive antiretroviral treatments; and for 90% of patients receiving antiretroviral therapy to have viral suppression. In 2019, the agency disbursed \$207.3 million, up 1.7% from 2018. The top five contributors to UNAIDS in 2019 were the US, Sweden, the Netherlands, the UK, and Norway. Region DAH data for UNAIDS in 2019 have unallocated or	Topics from 2016-2020 tweets (no order) Access Africa Discrimination HIV/AIDS Human Rights Innovation Prevention Testing Treatment Women	Ending the AIDS epidemic by 2030.	HIV/AIDS prevention, testing, and treatment is consistent across DAH data and tweets.	HIV/AIDS prevention, testing, and treatment are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of ending the AIDS epidemic by 2030, UNAIDS focuses on HIV/AIDS prevention, testing, and treatment.	Yes
UNFPA	"Our goal is to achieve universal access to sexual and reproductive health, realize reproductive rights, and reduce maternal mortality to accelerate progress on the agenda of the Programme of Action of the International Conference on Population and Development (ICPD), to improve the lives of women, adolescents and youth, enabled by population dynamics, human rights and gender equality. Priority Areas • Sexual and reproductive health services and reproductive rights • Adolescent and youth empowerment • Gender equality and women's empowerment • Population data for development" (UNFPA Strategic Plan)	Health Focus Area The United Nations Population Fund (UNFPA) is the United Nations' sexual and reproductive health agency. UNFPA's programs include the Maternal and Newborn Health Thematic Fund, focused on preventing maternal deaths through strategic interventions. Training midwives and ending fistula, a childbirth injury caused by prolonged obstructed labor, are also part of the Maternal and Newborn Health Thematic Fund. In 2019, UNFPA disbursed \$1.1 billion in DAH, down 1.7% from 2018. Of this, UNFPA received \$466.8 million, or 43.8%, from	Topics from 2016-2020 tweets (no order) Africa Child Marriage Children Family planning FGM Human Rights Humanitarian Aid Nutrition Violence Women	Universal access to sexual and reproductive health, reproductive rights, maternal mortality, child health	Sexual and reproductive health, and maternal and child health are consistent across DAH data and tweets.	HIV/AIDS prevention, testing, and treatment are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of ending the AIDS epidemic by 2030, UNAIDS focuses on HIV/AIDS prevention, testing, and treatment.	Yes

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		2018, the US withheld funding from UNFPA for the third year in a row under the Kemp- Kasten amendment. <u>Region</u> DAH data for UNFPA in 2019 have unallocated or unspecified regions.					
UNICEF	 "Vision: Realizing the rights of every child, especially the most disadvantaged. Goal areas: Every child survives and thrives Every child learns Every child is protected from violence and exploitation Every child lives in a safe and clean environment Every child has an equitable chance in life" (UNICEF Strategic Plan 2018-2021) 	Health Focus Area UNICEF provides long-term humanitarian and development assistance to children and mothers, with a specific focus on nutrition, immunization, and HIV/AIDS, as well as emergency (i.e., pandemic) assistance. UNICEF disbursed \$2.6 billion in DAH in 2019, up 12.5% from 2018. Private philanthropies provided UNICEF with \$519.3 million, or 19.8% of its funding in 2019, and the US contributed \$316.9 million, or 12.1%. <u>Region</u> DAH data for UNICEF in 2019 have unallocated or	Topics from 2016-2020 tweets (no order) Africa Breastfeeding Children Climate Change Ebola Education Human Rights Online Violence Water	Realizing the rights of every child, especially the most disadvantaged. Health related: child health, child mortality	Child and maternal health are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of realizing the rights of every child, UNICEF focuses on child and maternal health.	Yes
UNITAID	 "Unitaid's Strategy for 2017- 2021 is firmly grounded in its Constitution, which states that Unitaid aims to 'contribute to scale up access to treatment for HIV/AIDS, malaria and tuberculosis for the people in developing countries by leveraging price reductions of quality drugs and diagnostics, which currently are unaffordable for most developing countries, and to accelerate the pace at which they are made available.' Innovation, access, and scalability. They guide the design of unitaid's interventions, which Promote innovation. Unitaid connects those who are developing innovations with people who need them the most. Innovation means both using existing commodities in new ways and developing new products and approaches. Catalyze equitable access to better health products. Unitaid leverages its market expertise and its relationships with partners to design a portfolio of projects that will overcome barriers to access to 	unspecified regions. Health Focus Area In 2019, Unitaid disbursed \$154.1 million in DAH, up 35.2% from 2018. Projects Unitaid has been working on include a net program to combat malaria and a program to distribute and promote HIV self- testing kits in Africa. US contributed \$316.9 million, or 12.1%. <u>Region</u> DAH data for UNITAID in 2019 have unallocated or unspecified regions.	Topics from 2016-2020 tweets (no order) Access Cancer Children Hepatitis HIV/AIDS Malaria Testing Treatment Tuberculosis Vaccines	Access to treatment of, affordability of drugs, and innovation in addressing HIV/AIDS, malaria, tuberculosis	Increasing access, testing, and treatment of HIV/AIDS, malaria, and tuberculosis are consistent across DAH data and tweets.	HIV/AIDS, malaria, and tuberculosis are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of scaling up treatment for HIV/AIDS, malaria, and tuberculosis in developing countries, UNITAID prioritizes HIV/AIDS, malaria, and tuberculosis.	Yes

	innovative boalth	1	1	1	1	I	1
	products						
	Create the right						
	conditions for scale						
	up, so better health						
	products reach all						
	them. From						
	conception through						
	implementation,						
	Unitaid works with						
	that projects						
	transition to scale."						
	(Unitaid Strategy						
<u> </u>	<u>2017-2021</u>)			-			
Gavi	"Our 2016–2020 mission, to				Child health,		Ye
	protect people's health by				infectious		
	increasing equitable use of				diseases, and		
	vaccines in lower-income				Africa are		
	countries, is guided by four				consistent		
	1 Accelerate equitable				data and		
	uptake and				tweets.		
	coverage of						
	vaccines.						1
	 increase effectiveness and 						1
	efficiency of						
	immunisation						
	delivery as an						
	integrated part of strengthened health						
	systems.						
	3. Improve						
	sustainability of	Health Focus Area					
	national	In 2019, Gavi				Child hoalth	
	programmes	billion in				vaccination	
	4. Shape markets for	development				infectious	
	vaccines and other	assistance for health				diseases, and	
	immunisation	to child health				Africa are	
	products.	(94.4% of Gavi				consistent	
	was approved by the Board in	communicable				and revealed	
	June 2014 – the full	disease-related				priorities.	
	implementation of the	programs. Top					
	strategy will see developing	sources of funding	•			To maximize	
	million children saving 5–6	were the Bill &				their pre-	
	million lives in the long term.	Melinda Gates				determined	
	Coverage and equity are at	Foundation, the	Topics from 2016-2020			goal of "saving	
	the core of our current	United States, and	tweets			children's lives	
	strategy. While we continue to	the United Kingdom.	(no order)			by increasing	
	new vaccines, our focus is	Region	Africa			of vaccines in	
	expanding to reach every child	In 2017, 52.6% of	Cancer			lower-income	1
	with these vaccines. With as	DAH disbursed by	Children			countries",	
	many as 20 countries	Gavi went to sub-	Cholera Ebola	Increasing guarall		Gavi prioritizes	1
	financial support in this	25.5% to South Asia	Measles	coverage and		and	1
	period, ensuring that	DAH data for Gavi in	Pneumonia	equity in		vaccination of	
	programmes are sustainable	2019 have	Polio	vaccinating		infectious	1
	in the long term is essential. "	unallocated or	Poverty	children in lower-		diseases in	1
Global	"The Global Fund Strategy	Health Focus Area	Topics from 2016-2020	To end HIV/AIDS	HIV/AIDS	HIV/AIDS	٧e
Fund	2017-2022: Investing to End	In 2019, the Global	tweets	malaria, and	malaria,	malaria,	
	Epidemics outlines our	Fund channeled a	(no order)	tuberculosis	tuberculosis,	tuberculosis,	1
	partnership's bold agenda for	total of \$3.5 billion	A.6.1	epidemics	and Africa are	and Africa are	1
	2017-2022 based on an	to programs	Africa Children		consistent	consistent	1
	epidemics. These four	sources of Global	Cholera		data and	and revealed	1
	strategic objectives are at the	Fund contributions	Ebola		tweets.	priorities.	
	core of the strategy:	were the United	HIV/AIDS				1
	Maximize impact	States, the United	Malaria			To maximize	1
	against HIV, TB, and Malaria	The LIK provided	Prieumonia Polio			benefits of their pre-	1
	Promote and	\$817.1 million or	Tuberculosis			determined	1
	protect human	23.3% to the Global	Women			goal of	1
	rights and gender	Fund in 2019, more				"ending the	1
	equality	than any other				epidemics",	1
	 Mobilize increased 	contributor. The US				the Global Fund	1
	Build resilient and	million or 18.1%				prioritizes	1
	sustainable systems	Japan contributed				child health	1
	for health" (<u>Global</u>	\$442.4 million or				and	1
		12.6% and Germany	1	1	1	vaccination of	1

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	Fund Strategy 2017-	contributed \$396.7				infectious	
	<u>2022</u>)	million or 11.3%.				diseases in Africa.	
		50.4% of funding were allocated to					
		address HIV/AIDS, 31.7% to Malaria					
		and 17.8% to					
		Tuberculosis.					
		<u>Region</u> In 2019, 72,7% of					
		DAH disbursed by					
		went to sub-Saharan					
		Africa and 10.5% to Southeast Asia. East					
		Asia, and Oceania.					
		Global Fund in 2019					
		have unallocated or unspecified regions.					
CDC	"CDC's Strategic Framework	Health Focus Area	Topics from 2016-2020	National security	Protecting	HIV/AIDS,	Yes
	capabilities that enable the	Americans from	(no order)	diseases	infectious	tuberculosis,	
	agency's three strategic priorities, all united behind	Infectious Diseases at Home and Abroad	Children	Securing global	diseases is consistent	and Africa are consistent	
	one mission: protect	(\$3.0 billion)	Diarrhea	health and	across DAH	across stated	
	security. Our work is	Leading Causes of	L. COII Influenza	preparedness	tweets.	priorities.	
	underscored by the agency's Pledge to the American	Disease, Disability, & Death (\$2.0 billion)	Measles Prevention			To maximize	
	People.	Protecting	Vaccines			benefits of	
	Securing global health	Natural Disasters,	Women			determined	
	and America's preparedness	Terrorist Threats, Environmental &	Zika			goal of "protecting	
	By stopping the spread of	Occupational				America's	
	pandemic	Monitoring Health &				and security",	
	contagions, addressing	Ensuring Laboratory Excellence (\$496				the CDC prioritizes	
	public health terror	million) Cross-cutting				infectious disease	
	threats, and	Support & PHHS				protection in	
	protecting people from	Block Grant & Buildings & Facilities	6			the US and globally.	
	vector-borne diseases.	(\$357 million)					
	Eliminating disease	Region					
	controlling	global					
	vaccine- preventable						
	disease,						
	Hepatitis C,						
	and reducing the maternal						
	mortality						
	Ending epidemics						
	 Such as HIV, decreasing 						
	opioid overdoses.						
	improving						
	and						
	interventions to stem						
	seasonal						
	developing						
	and deploying						
	new answers						
	resistance,						
	and reducing new						
	incidents of diabetes						
	Core Capabilities						
	 World-class data and analytics 						
	 State-of-the-art laboratory capacity 						
	aboratory capacity	1	1	1	1	1	

	 Elite public health expertise Responding to outbreaks at their source Global capacity and domestic preparedness" (CDC Strategic Framework) 						
EU CDC	 ""ECDC is an EU agency aimed at strengthening Europe's defences against infectious diseases. The core functions cover a wide spectrum of activities: surveillance, epidemic intelligence, response, scientific advice, microbiology, preparedness, public health training, international relations, health communication, and the scientific journal Eurosurveillance. Strategic Work Areas Providing evidence for effective and efficient decision-making: We support efficient public health decisionmaking by providing timely, accurate and relevant information. Support the strengthening of public health systems: We strengthen European capacities and capabilities effectively prevent and control communicable diseases. Support ing response to threats: We support effective health threats detection, assessment 	Health Focus Area All funding is spent on expenses for staff, buildings and equipment, and operations for surveillance, research, and response to infectious disease epidemics. <u>Region</u> European Union and global	Topics from 2016-2020 tweets (no order) Ebola Hepatitis HIV/AIDS Influenza Measles Outbreaks Report Surveillance Tuberculosis West Nile	European security from infectious disease	Infectious disease surveillance, reporting, and research are consistent data and tweets.	Infectious disease surveillance, reporting, and research are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of "strengthening Europe's defences against infectious diseases", the EU CC prioritizes infectious disease surveillance, reporting, and research.	Yes
NIH	 (ECDC Annual Report 2019) "NIH's mission is to seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability. The goals of the agency are: to foster fundamental creative discoveries, innovative research strategies, and their applications as a basis for ultimately protecting and improving health; to develop, maintain, and renew scientific human and physical resources that will ensure the Nation's capability to prevent disease; to expand the knowledge base in medical and associated sciences in order to enhance the Nation's economic well-being and ensure a continued high 	Health Focus Area In 2019, NIH had a \$39.28 discretionary budget. 1. NCI (14.7%) – cancer 2. NIAID (14.1%) – allergy and infectious disease 3. NHLBI (8.9%) – heart, lung, and blood 4. NIA (7.9%) – instate on aging 5. NIGMS (7.3%) – general medical sciences <u>Region</u> United States (with some global research)	Topics from 2016-2020 tweets (no order) Africa Cancer Funding Heart Disease HIV/AIDS News Rare Disease Research Stress Veterans	National security through developing new knowledge in enhancing health and lengthening life.	Research on cancer, HIV/AIDS, heart disease, and rare diseases are consistent across DAH data and tweets.	Research on cancer, HIV/AIDS, heart disease, and rare diseases are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of seeking knowledge to enhance life and ensure the US's capability to prevent disease, the NIH prioritizes research on cancer, HIV/AIDS, heart disease, and rare diseases.	Yes

FAO	 b) to be the highest level of scientific integrity, public accountability, and social responsibility in the conduct of science. In realizing these goals, the NIH provides leadership and direction to programs designed to improve the health of the Nation by conducting and supporting research: in the causes, diagnosis, prevention, and cure of human diseases; in the processes of human growth and development; in the biological effects of environmental contaminants; in the understanding of mental, addictive and physical disorders; and in the understanding of mental, addictive and physical disorders; and in directing programs for the collection, dissemination, and exchange of information in medicine and health, including the development and support of medical libraries and the training of medical libraries and other health information is specialists. "Today, member states face an increasing number of demands and challenges in agricultural development. To support them, FAO has identified five key priorities on which it is best placed to intervene. These priorities, or Strategic Objectives, represent our main areas of work to achieve our vision of a world free from hunger and malnutrition, where food and agriculture help to improve the living standards of all, especially the poorest, in an economically, socially and environmentally sustainable manner – contributing to the implementation of the 2030 Agenda for Sustainable Development. Help eliminate hunger, food insecurity, and fisheries more productive and sustainable Reduce rural poverty Enable inclusive and efficient agricultural food systems Increase the resilience of livelihoods to threats and crises" (FAO Strategic Objectives 2019) 	Health Focus Area All received funding is spent on staffing addressing hunger, food insecurity, malnutrition, and improving resiliency of food systems. Region Funding data for FAO in 2019 have unallocated or unspecified regions.	Topics from 2016-2020 tweets (no order) Africa Agriculture Biodiversity Climate Change Families Farmers Fisheries Food Security Forests Water Water	Addressing hunger, food insecurity, and mainutrition through improving food and agricultural systems.	Food insecurity, malnutrition, and food systems are consistent across DAH data and tweets.	Food insecurity, malnutrition, and food systems are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of a world free from hunger and malnutrition, the FAO prioritizes eliminating hunger, food insecurity, and malnutrition	Yes
UNDP	"UNDP's Strategic Plan (2018- 2021) has been designed to be	Tot/al budget	Topics from 2016-2020	Poverty	HIV/AIDS,	HIV/AIDS,	Yes

	responsive to the wide diversity of the countries we serve. The diversity is reflected in three broad development contexts: • Eradicate poverty in all its forms and dimensions • Accelerate structural transformations • Build resilience to shocks and crises To respond to these issues, and better focus its resources and expertise to deliver on the 2030 Agenda, UNDP has identified a set of approaches that we call our Simostree	\$5.7 billion budget in 2019 By UNDP focus Eradicating poverty (43%), accelerate structural transformations (32%), build resilience to shocks and crises (11.5%), others (13.2%) By health focus area SDG3 was allotted \$504M (9%) of total budget in 2019 – 55% to HIV/UNS	(no order) Africa Children Climate Change Education FGM Food Security HIV/AIDS Malaria Water Women	accelerate structural transformations, build resilience to shocks and crises SDG 3: Ensure healthy lives and promote well- being for all at all ages (includes: maternal mortality, child mortality, child mortality, HIV/AIDS, tuberculosis, malaria, infectious	child and maternal health are consistent across DAH data and tweets.	child and maternal health are consistent across stated and revealed preferences. To maximize benefits of their pre- determined global health goal of ensuring healthy lives and promoting well heing for
	 Solutions: Keeping people out of POVERTY GOVERNANCE for peaceful, just, and inclusive societies Crisis prevention and increased RESILIENCE ENVIRONMENT: nature-based solutions for development Clean, affordable ENERGY Women's empowerment and GENDER equality In all our activities, we encourage the protection of human rights and the empowerment of women, minorities and the poorest and most vulnerable." (UNDP About us) UNDP is the lead development agency in helping the 	tuberculosis, and malaria (target 3.3), 26% to universal health coverage (target 3.8), 9% to child mortality (target 3.2) <u>Region</u> 23% of 2019 budget was allocated to Africa, 19% to Asia and the Pacific, 18% to Latin America and the Caribbean.		health, substance abuse, road traffic accidents, sexual and reproductive health, universal health coverage, deaths from environmental pollution)		wein-being of UNDP prioritizes HIV/AIDS, malaria, and child and maternal health.
	achievement of the Sustainable Development Goals. SDG 3: Ensure healthy lives and promote well-being for all at all ages. (UNDP: SDGs)			10		
MSF	 "Médecins Sans Frontières brings medical humanitarian assistance to victims of conflict, natural disasters, epidemics or healthcare exclusion" (MSF About Us) "Program Priorities Outpatient Consultations Birth assistance (including C-section) Cholera treatment Inpatient care Vaccinations against measles Malaria treatment Sexual violence Meningitis treatment Inpatient feeding programs for malnourished children TB treatment HIV ART treatment Mental health services Distribution of relief goods" 	Health Focus Area "81% of our financial resources are allocated to fulfilling our social mission: 65% to our humanitarian programmes, 12% to support our projects and programmes, and 4% to awareness-raising, the Access Campaign, and the Drugs for Neglected Diseases initiative (DNDI). The rest is spent on general management and fundraising costs. We also maintain reserves that allow us to respond immediately to a crisis without having to wait for an appeal." Funding is allocated mostly to outpatient consultations, malaria treatment, and birth assistance	Topics from 2016-2020 tweets (no order) Africa Children Cholera Ebola HIV/AIDS Humanitarian Aid Refugees Treatment Tuberculosis Violence	Medical humanitarian assistance to victims of conflict, natural disasters, epidemics, or healthcare exclusion.	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across DAH data and tweets.	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across stated and revealed preferences. To maximize benefits of their pre- determined goal of bringing medical humanitarian assistance to victims of crises, MSF prioritizes humanitarian aid, HIV/AIDS, infectious diseases, and child health.

		Funding data for MSF in 2019 have unallocated or unspecified regions.					
PATH	"At PATH, we are a global team of innovators working to accelerate health equity so all people and communities can thrive. We advise and partner with public institutions, businesses, grassroots groups, and investors to solve the world's most pressing health challenges." (PATH About US) "2019 Achievements Controlling and eliminating malaria Differentiating services for HIV patients Reimagining primary health care Creating innovative devices and diagnostics Maximizing impact through policy Advancing essential medicines Reducing the cost of sanitation and cleaning Expanding access to contraception"	Health Focus Area Of the \$303 million 2019 budget, 48% was allocated to global health programs, 37% to essential medicines, 11% to technology and innovation, 3.5% to other. Region Funding data for PATH in 2019 have unallocated or unspecified regions.	Topics from 2016-2020 tweets (no order) Access Africa Breastfeeding Cancer Children Ebola Innovation Malaria Pneumonia Vaccines	Accelerating health equity Areas: Malaria, HIV/AIDS, primary health care, health innovations, health policy, essential medicines, sanitation, contraceptives	Malaria, vaccines, and innovations are consistent across DAH data and tweets.	Malaria, vaccines, and innovations are consistent across stated and revealed preferences. To maximize benefits of their pre- determined goal of "accelerating health equity", PATH prioritizes malaria, vaccines, and health innovations.	Yes
Save the Children	 (For 100 years, we've been giving children in the U.S. and around the world a healthy start in life, the opportunity to learn and protection from harm. When crisis strikes, we are always among the first to respond and the last to leave. We do whatever it takes to save children, transforming their lives and the future we share." (Save the Children About Us) Focus Areas Health and Nutrition Education Hunger and Livelihoods Public Policy and Advocacy HIV/AIDS Child Protection and Rights Governance (Save the Children Annual Report 2019) 	Health Focus Area In 2019, Save the Children had a budget of \$836 million. • Health & Nutrition (38%) • Education (19%) • Hunger & Livelihoods (13%) • Public Policy & Advocacy (11%) • HIV/AIDS (7%) • Child Protection & Rights Governance (4%) • Other (8%) <u>Region</u> Funding data for Save the Children in 2019 have unallocated or	Topics from 2016-2020 tweets (no order) Africa Children Donations Education Food Security Humanitarian Aid Pneumonia Refugees Schools Water	Health related: "giving children a healthy start", "protection from harm"	Child health, nutrition, and food security are consistent across DAH data and tweets.	Child health, nutrition, and food security are consistent across stated and revealed priorities. To maximize benefits of their pre- determined global health goals of "giving children a healthy start and protection from harm", Save the Children prioritizes child health, nutrition, and food security.	Yes
Oxfam	"Oxfam is a global organization working to end the injustice of poverty. We help people build better futures for themselves, hold the powerful accountable, and save lives in disasters." (About Oxfam) "Across Yemen, Puerto Rico, Bangladesh, Syria, Central America, and Mozambique, among many other places, our work is delivering tangible, measurable impact: providing lifesaving aid, partnering with local organizations to achieve long-term solutions, and using	Health Focus Area Of the \$88 million 2019 budget, 36% was allocated to emergency response and preparedness, 28% to overcoming poverty, 28% to social justice campaigns, 8% to public education. <u>Region</u> Of the budget spent on emergency response and preparedness, 40% was allocated to Africa, 24% to Latin	Topics from 2016-2020 tweets (no order) Africa Climate Change Ebola Food Security Humanitarian Aid Malaria Pneumonia Refugees Water Women	Health related: "help people build better futures for themselves," "save lives in disasters"	Emergency response (humanitarian aid, Ebola, food security, and infectious disease) is consistent across DAH data and tweets.	Emergency response (humanitarian aid, Ebola, food security, and infectious disease) is consistent across stated and revealed preferences. To maximize benefits of their pre- determined global health goals of "helping	Yes
our strong policy voice to advocate for change. Program Services • Saving Lives: Emergency Response and Preparedness • Programs to overcome poverty • Campaigning for social justice • Public education" (Oxfam Annual Report 2019)	America and the Caribbean, and 13% to Asia and the Pacific				people build better futures for themselves" and "saving lives in disasters", Oxfam prioritizes emergency response, humanitarian aid, Ebola, food security, and infectious		
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Global health system WHO constitution (1948): "Health for All" and the right to the highest attainable standard of health. Declaration of Alma-Ata (1978): universal access to primary health care. MDGs (2000): reduce child mortality (4), improve maternal health (5), combat HIV/AIDS and other diseases (6) SDGS (2015) [Relevant to study's time period]: good health and well-being (3) By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births (3.1) By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births (3.2) By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and other communicable diseases (3.3) By 2030, reduce by one third premature mortality, to at least as low as 25 per 1,000 live births (3.2) By 2030, reduce by one third premature mortality form non- communicable diseases (3.3) By 2030, reduce by one third premature mortality form non- communicable diseases through prevention and treatment and promote mental health and well-being (3.4) By 2020, halve the number of global deaths and injuries from road traffic acidents (3.6) By 2020, nesure universal access to	Health Focus Areas Of the \$41 billion DAH transferred across all global health actors in 2019, 24% was allocated to HIV/AIDS, 21% to newborn and child health, 14% to health system strengthening, 12% to reproductive and maternal health, 6% to other infectious diseases, 6% to malaria, 4% to tuberculosis, and 2% to non- communicable diseases. <u>Region</u> Funding data in 2019 have unallocated or unspecified regions. In 2017, 33% of all DAH funding was allocated to sub- Saharan Africa, 5% to South Asia, 4% to North Africa and the Middle East, 3% to Latin America and the Middle East, 3% to Europe and Central Asia, 15% globally, and 32% unallocated.	Most common topics from 2016-2020 across20 key actors(number in parenthesis indicates count of actors that had the topic as a priority from 2016-2020 tweets)1.Africa (17), 2.2.Children (15), 3.3.HIV/AIDS (11), 4.4.Women (10), 5.5.Ebola (9), 6.6.Water (9), 7.7.Food security (7), 8.8.Humanitarian aid (7), 9.9.Malaria (7), 10.10.Education (6), 11.11.Climate change (5), 13.13.Breastfeeding (4), 14.14.Cancer (4), 15.15.Measies (4), 16.16.Polio (4), 17.17.Tuberculosis (4), 18.18.Vaccines (4), 19.20.Agriculture (3), 20.21.Cholera (3), 22.22.Human Rights (3), 23.23.Mothers (3), 24.24.Refugees (3), 25.25.Treatment (3), 26.26.Violence (3), 27.27.FGM (2), 28.28.Hepatitis (2), 29.29.Influenza (2), 30.31.Poverty (2), 32.32.Prevention (2), 33.33.Sanitation (2), 34.34.Testing (2)	Health for all and the right to highest attainable standard of health. 9 important target areas under SDG 3.	HIV/AIDS, child and maternal health, and infectious diseases are consistent across DAH data and tweets.	HIV/AIDS, child and maternal health, and infectious diseases are consistent across stated and revealed priorities. To maximize benefits of the pre- determined goal of "health for all" and "SDG3: good health and well-being", the global health system prioritizes 3 of the 9 target areas of SDG 3: HIV/AIDS, child and maternal health, and infectious diseases. Note: These benefit- maximizing priorities of the stare funding organizations.	Yes	

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5	information and			
0	education, and t integration of	the		
/	reproductive he	alth		
8	into national str and programme	ategies (3.7)		
9	Achieve univers	al		
10	health coverage	e, ial risk		
11	protection, acce	ess to		
12	quality essential health-care serv	l		
13	and access to sa	fe,		
14	effective, quality affordable esser	y and ntial		
15	medicines and v	vaccines		
16	• By 2030, substa	ntially		
17	reduce the num	ber of		
18	deaths and illne from hazardous	esses		
10	chemicals and a	ir,		
19	water and soil pollution and			
20	contamination ((3.9)		
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Supplementary Table 2. Breakdown of Collected Tweets by Actor and Month. Total tweets and average tweets per month for each of the 20 global health actors.

Global Health Actor	Total Tweets	Average Tweets per Month
World Health Organization	10,827	722
Oxfam International	5,694	380
Doctors Without Borders (MSF)	5,553	370
UN Children's Fund (UNICEF)	5,395	360
World Bank	5,365	358
UN Development Programme (UNDP)	4,912	327
UN Population Fund (UNFPA)	3,908	261
UK Department of International Development	3,823	255
Centers for Disease Control and Prevention (CDC)	3,701	247
United States Agency for International Development (USAID)	3,604	240
Food and Agriculture Organization (FAO)	3,263	218
Save the Children	3,121	208
Gavi, the Vaccine Alliance	2,739	183
National Institutes of Health (NIH)	2,664	178
Joint UN Programme on HIV/AIDS (UNAIDS)	2,214	148
PATH	1,954	130
Global Fund	1,727	115
European Centre for Disease Prevention and Control (ECDC)	1,311	87
Gates Foundation	1,249	83
Unitaid	1,217	81
Total	74,241	4,949

1,217 81 74,241 4,949

	Tweets per Month	Tweets per Year
2016		5,973
November	5,973	
2017		21,193
February	4,474	
May	5,582	
August	5,103	
November	6,034	
2018		18,562
February	4,145	
May	4,965	
August	4,205	
November	5,247	
2019		17,884
February	4,500	
May	4,886	
August	3,987	
November	4,511	
2020		10,629
February	4,446	
May	6,183	
Total	74,241	74,241

Supplementary Table 3. Breakdown of Collected Tweets by Year and Month Tweets per month and per year for all the tweets collected.

	USA	UK	BMGF	WHO	World Bank	UNAIDS	UNFPA	UNICEF	UNITAID	GAVI	Oxfam	Global Fund	CDC	EU CDC	NIH	FAO	UNDP	MSF	PATH	the Children
USA	7	7	6 4	5	6	3	4	4	2	2	5	4	3	1	2	3	7	4	2	6
BMGF	6	4	- -	8	4	3	3	4	3	3	3	6	2	1	2	1	6	3	4	3
Who World Bank	6	6	4	3	5	2	4	4	1	3	6	3	3	0	1	5	6	3	2	5
UNAIDS UNFPA	3	2	3 3	3 3	2	3	3	2 4	4	1	2	3 3	2	1 0	2	1	3 4	3 4	3 2	1 3
	4	5	4	4	4	2	4	1	1	3	4	3 4	2	1	1	3	5 3	4	4	4
GAVI	2	3	3	5	3	1	2	3	3	2	3	6	3	2	2	1	2	4	5	2
Global Fund	3 4	5 4	6	4	3	2	3	4	4	3 6	5	Э	2	3	2	4	5	4	3	5 2
CDC EU CDC	3 1	2	2	3	3	2	2	2	2	3 2	2	2	2	2	0 1	1 0	3 1	1 3	2	2
NIH	2	2	2	2	1	2	1	1	2	2	1	2	0	1	1	1	2	2	2	1
UNDP	7	6	6	5	6	3	4	5	3	2	6	5	3	1	2	4	Ŧ	3	3	5
MSF PATH	4	5 3	3 4	4 5	3	3	4	4	4 5	4 5	4 3	6 4	1	3	2	1	3	3	3	4

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Supplementary Table 5. Types of Power. A summary of the four types of power as presented by Barnett and Duvall (2005) with examples in global health.

Power Type	Relational specificity	Power works through…	Definition according to Barnett & Duvall (2005)	Global Health Example
Compulsory Power	Direct	Interactions of specific actors	"Direct control of one actor over the conditions of existence or the actions of another." (p. 48)	Donor countries dictate the conditions in low and middle-income countries (LMICs) through dictating requirements in development aid.
Institutional Power	Diffuse	Interactions of specific actors	"Control actors exercise indirectly over others through diffuse relations of interactions." (p. 43)	High-income countries control funding allocations for LMICs through institutional power via their contributions to the WHO and other multilateral organizations.
Structural Power	Direct	Social relations of constitution	"Constitution of subjects' capacities in direct structural relation to one another." (p. 43)	The structural and historical disempowerment of indigenous populations have resulted in their disproportionate outcomes in health.
Productive Power	Diffuse	Social relations of constitution	"Power [that] works through diffuse constitutive relations to produce the situated social capacities of actors." (p. 48)	High-income countries direct what research institutions prioritize and study, and ultimately determine what health issues are addressed.

_____ actors." (p. 48)

SUPPLEMENTARY MATERIALS

Materials and Methods

Rationale for choosing the 20 global health actors

- 1. Hoffman & Cole (2018), Frenk & Moon (2013), and Szlezak et al. (2010) were the basis for the 20 global health actors in this study.[4, 15, 16]
 - a. Hoffman & Cole (2018) used the related search function in Google in order to systematically map global health actors 20 global health actors were identified as most important based on their methodology and was validated by 9 identified global health experts.
 - b. Frenk & Moon (2013) identifies 9 primary types of actors in global health with 24 examples in their study on pluralism and other challenges in global health.
 - c. Zlezak et al. (2010) describes their 8 identified types of actors in global health as a partnership in their article that argues for the norms and roles of each actor in the transition of global health.
- 2. The identified global health actors across the 3 studies were compared, and the 20 actors that were identified most important by all 3 studies were chosen.

Collection of tweets

- 1. Twitter is one of the social media platforms where global health actors actively and consistently share their work, research, and news to the general global public.
- 2. Using the <u>Twitter Application Programming Interface (API)</u>, tweets from of the 20 global health actors were collected from November 2016 to May 2020 in three month intervals.
 - a. All the tweets of each of the 20 global health actors were collected for the following 15 months:
 - i. 2016: November
 - ii. 2017: February, May, August, November
 - iii. 2018: February, May, August, November
 - iv. 2019: February, May, August, November
 - v. 2020: February, May
 - b. November 2019 is the identified beginning of the COVID-19 outbreak.
 - c. This scope allows an analysis of tweets of global health actors 3 years leading up to the COVID-19 outbreak and 6-months into the pandemic.
- 3. Three month intervals were chosen with the assumption that a variance in the issues, topics, and themes that global health actors tweet can be seen in three month intervals while allowing for efficient usage of the request limit from the Twitter API.

Topic modelling

1. Topic Modeling was conducted to identify the 10 most tweeted global health issues/topics by each actor in each of the 15 months in the study.

1	
2	
3	2. The 10 most tweeted global health issues/topics were used to describe the set of
4	issues/problems a specific global health actor prioritizes in a given month.
5	3. Latent Dirichlet Allocation (LDA) was used in topic modeling.
6	1 Topic modeling answers the guestions:
/	Topic modeling answers the questions.
8	a. What are the most phontized issues among the identified global health
9	actors from 2016 to 2020?
10	b. "When did global health actors have pandemic preparedness as a priority
11	in the three years leading up to the COVID-19 pandemic?"
12	c. "What are the trends in prioritization of global health issues between and
13	among different types of global health actors?
14	among amoroni ()poo or grobal noallir actoror
15	EAOs shout how I DA was used in this study
10	PAGS about now LDA was used in this study
17	 What did the authors do with tweets that mentioned both "breastfeeding" and
10	"mothers"? Do the authors believe that the revealed priorities of an organization
19	that references both breastfeeding and mothers are substantively different than
20	those of an organization that just references breastfeeding, and so on?
21	 For context I DA topic modeling is a form of "unsupervised machine
<u>∠∠</u> 23	learning" where the data used is "unlabeled." This means that when we
23	rep the algorithm we did not define what statements will be estagorized
25	ran the algorithm, we did not define what statements will be categorized
25	as "breastreeding" and what will be categorized as "mothers." We also did
20	not define what words would fall under any other topics that were
28	generated by the model. The only input from us is was how many topics
20	we want the LDA algorithm to categorize the corpus of text. In our
30	analysis, we generated 10 topics for each of the 20 actors. The LDA
31	algorithm generates topics based on a generative probabilistic model that
32	assumes each topic is a mixture over an underlying set of words, and
33	assumes each topic is a mixture over an underlying set of words, and
34	each corpus of text is a mixture of sets of topic probabilities. In a nuisneil,
35	the algorithm analyzes all the words in all the tweets of a specific actor. It
36	then generates probabilities of each unique word appearing with other
37	words in a certain tweet or sentence. Topics are then generated by the
38	model based on these sets of probabilities.
39	• Some topics are quite general (e.g., "Poverty", "Treatment", "News"), while others
40	are more specific ("Fisheries" "Henatitis" "Veterans") In cases where one tonic
41	could be subsumed by another (e.g. "Schools" could be subsumed by
42	"Education") how did the outhors disaggregate these?
43	Education), now did the authors disaggregate these?
44	 vve did not nave any input in categorizing any of the topics generated. The
45	topics generated are based on the words and language used by each
46	respective actor in their tweets. The algorithm uses the words/language
47	used by the actor in their tweets to generate topics. We did not make any
48	other edits to the topics after they were generated.
49	
50	Code for collecting tweets
51	
52	# CREDENTIALS
53	import yamı
54	<pre>config = dict(</pre>
55	<pre>searcn_tweets_ap1 = dict(account type = 'premium',</pre>
56	endpoint = 'https://api.twitter.com/1.1/tweets/search/fullarchive/datacollection.json',
57	
58	
59	For neer review only - http://hmionen.hmi.com/sita/about/auidalinas.yhtml
60	r or peer review only " http://binjopen.binj.com/site/about/guidennes.xhtml

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)

```
)
with open('twitter_keys_fullarchive.yaml', 'w') as config_file:
   yaml.dump(config, config_file, default_flow_style=False)
# LOAD CREDENTIALS
from searchtweets import load_credentials
premium_search_args = load_credentials("twitter_keys_fullarchive.yaml",
                                     yaml_key="search_tweets_api",
                                     env_overwrite=False)
print(premium_search_args)
# OUERY RULE SET UP
from searchtweets import gen_rule_payload
rule = gen_rule_payload("from:username"
                       results_per_call=500,
                      from_date="2020-02-01",
                      to date="2020-03-01"
                      )
# WRITE TO JSONL config_file
import json
with open('tweets_feb_2020.jsonl', 'a', encoding='utf-8') as f:
   n = 0
    for tweet in rs.stream():
       n += 1
       if n % 10 == 0:
           print('{0}: {1}'.format(str(n), tweet['created_at']))
                                                a
       json.dump(tweet, f)
       f.write('\n')
print('done')
# REPEAT FOR OTHER USERS AND MONTHS
Code for topic modelling
# Importing modules
import pandas as pd
# Read data into tweets df
tweets_df = pd.read_csv('tweets_nov2016-may2020.csv')
# Print head
tweets.head()
# Remove the columns
tweets_df = tweets_df[["username","user_id","created_at","tweet"]]
# Print out the first rows of tweets_df
tweets_df.head()
# Create dataframe for each month in analysis
tweets_feb = tweets.loc[tweets.created_at.str.contains("Feb")]
tweets_feb_17 = tweets_feb.loc[tweets_feb.created_at.str.contains("2017")]
tweets_feb_18 = tweets_feb.loc[tweets_feb.created_at.str.contains("2018")]
tweets_feb_19 = tweets_feb.loc[tweets_feb.created_at.str.contains("2019")]
tweets_feb_20 = tweets_feb.loc[tweets_feb.created_at.str.contains("2020")]
tweets_may = tweets.loc[tweets.created_at.str.contains("May")]
tweets_may_17 = tweets_may.loc[tweets_may.created_at.str.contains("2017")]
tweets_may_18 = tweets_may.loc[tweets_may.created_at.str.contains("2018")]
tweets_may_19 = tweets_may.loc[tweets_may.created_at.str.contains("2019")]
tweets_may_20 = tweets_may.loc[tweets_may.created_at.str.contains("2020")]
tweets_aug = tweets.loc[tweets.created_at.str.contains("Aug")]
tweets_aug_17 = tweets_aug.loc[tweets_aug.created_at.str.contains("2017")]
tweets_aug_18 = tweets_aug.loc[tweets_aug.created_at.str.contains("2018")]
tweets_aug_19 = tweets_aug.loc[tweets_aug.created_at.str.contains("2019")]
```

```
2
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                 tweets_nov = tweets.loc[tweets.created_at.str.contains("Nov")]
                 tweets_nov_16 = tweets_nov.loc[tweets_nov.created_at.str.contains("2016")]
4
                 tweets_nov_17 = tweets_nov.loc[tweets_nov.created_at.str.contains("2017")]
5
                 tweets_nov_18 = tweets_nov.loc[tweets_nov.created_at.str.contains("2018")]
                 tweets_nov_19 = tweets_nov.loc[tweets_nov.created_at.str.contains("2019")]
6
7
                 # Helper function
                 def plot_10_most_common_words(count_data, count_vectorizer):
8
                     import matplotlib.pyplot as plt
9
                     words = count_vectorizer.get_feature_names()
                     total_counts = np.zeros(len(words))
10
                     for t in count_data:
11
                         total_counts+=t.toarray()[0]
12
                     count_dict = (zip(words, total_counts))
count_dict = sorted(count_dict, key=lambda x:x[1], reverse=True)[1:23]
13
14
                     words = [w[0] for w in count_dict]
                     counts = [w[1] for w in count_dict]
15
                     x_pos = np.arange(len(words))
16
                     plt.figure(2, figsize=(15, 2))
17
                     plt.subplot(title=f'10 Most Common Words')
18
                     sns.set_context("notebook", font_scale=1.25, rc={"lines.linewidth": 2.5})
                     sns.barplot(x_pos, counts, palette='husl')
19
                     plt.xticks(x_pos, words, rotation=90)
20
                     plt.xlabel('words')
                     plt.ylabel('counts')
21
                     plt.show()
22
                 # Import Libraries
23
                 from sklearn.feature_extraction.text import CountVectorizer
24
                 import numpy as np
25
                 import matplotlib.pyplot as plt
26
                 import seaborn as sns
27
                 import re
28
                 import string
29
                 # Identify top 10 keywords, issues, topics of each actor for a given month
30
                 tweets = tweets nov 16[tweets nov 16["username"] == username]
31
                 tweets = tweets_df[tweets_df['username'].isin(username)]
                 printable = set(string.printable)
32
                33
34
35
36
37
                                 1
                 exclusions = '|'.join(exclusionList)
38
                tweets['paper_text_processed'] = tweets['tweet'].map(lambda x: re.sub(exclusions, '', x))
tweets['paper_text_processed'] = tweets['paper_text_processed'].map(lambda x: x.lower())
39
40
                 tweets['paper_text_processed'].head()
                 sns.set_style('whitegrid')
41
                 %matplotlib inline
42
                 count_vectorizer = CountVectorizer(stop_words='english')
                 count_data = count_vectorizer.fit_transform(tweets['paper_text_processed'])
43
                 import warnings
44
                 warnings.simplefilter("ignore")
                 plot_10_most_common_words(count_data, count_vectorizer)
45
46
                 # LDA Topic Modeling
                 import warnings
47
                 warnings.simplefilter("ignore", DeprecationWarning)
48
                 # Load the LDA model from sk-learn
                 from sklearn.decomposition import LatentDirichletAllocation as LDA
49
50
                 # Helper function
                 def print_topics(model, count_vectorizer, n_top_words):
51
                     words = count_vectorizer.get_feature_names()
52
                     for topic_idx, topic in enumerate(model.components_):
    print("\nTopic #%d:" % topic_idx)
53
                         print(" ".join([words[i]
54
                                          for i in topic.argsort()[:-n_top_words - 1:-1]]))
55
                 # Tweak the two parameters below
56
                 number_topics = 5
57
58
59
```

number_words = 10
Create and fit the LDA model
lda = LDA(n_components=number_topics, n_jobs=-1)
lda.fit(count_data)
Print the topics found by the LDA model
print("Topics found via LDA:")
print_topics(lda, count_vectorizer, number_words)

How network maps were analyzed

- What is network analysis? Network analysis is an analytic method that has proved to be useful in understanding relational dynamics across actors in global and public health. (Lopreite et al. 2021 and Quisell et al. 2018).
- Why use network analysis for the study? Network analysis was conducted to observe the funding relationships between global health actors.
- What tool was used? Gephi 0.9.2 was used in constructing and analyzing the network map.

• How was the network map designed?

- The network modelled in the study allows for a graphical visualization of the flows of global health funding in 2019.
- The network map was designed such that each global health actor is represented by a node and lines or "edges" indicate a flow of funding in global health.

• The Fruchterman-Reingold algorithm was used in modelling the network map.

- The algorithm "calculates the optimal layout so that nodes with less strength and less connections are placed further apart, and those with more and/or stronger connections are placed closer to each other."[18]
- The thickness of edges represents the amount of funding transferred between actors.
- The modelled network map can be found and will be discussed in the findings section.

DAH funding data network analysis summary statistics

Network Overview			
Average Degree	25.403	Run	(?)
Avg. Weighted Degree	254.124	Run	0
Network Diameter	4	Run	0
Graph Density	0.113	Run	0
HITS		Run	(?)
Modularity	0.093	Run	3
PageRank		Run	3
Connected Components	1	Run	0

Twitter data network analysis summary statistics

Network Overview			
Average Degree	2.181	Run	3
Avg. Weighted Degree	4.614	Run	3
Network Diameter	3	Run	(?)
Graph Density	0.027	Run	0
HITS		Run	3
Modularity	0.172	Run	3
PageRank		Run	(?)
Connected Components	14	Run	0

DAH funding data network analysis statistics report

	Label	indegree	outdegree	Degree	weighted indegree	weighted outdegree	Weighted Degree	Eccentricity	closnesscentrality	harmonicclosnesscentrality	between esscentrality	modularity_class	strongcompnum
African Development Bank		25	57	82	1149	1149	2298	1	1.00	1.00	54.18	1	57
Asian Development Bank		26	48	74	723	723	1446	3	0.42	0.53	52.20	0	160
United Arab Emirates		1	79	80	79	79	158	1	1.00	1.00	7.28	2	161
Australia		1	151	152	137	1021	1158	2	0.85	0.91	0.00	2	175
Austria		1	128	129	112	1083	1195	2	0.76	0.85	0.00	0	179
Belgium		1	140	141	123	1278	1401	2	0.80	0.87	0.00	0	181
Canada		1	163	164	146	1564	1710	2	0.89	0.94	0.00	2	183
Switzerland		1	138	139	124	866	990	2	0.82	0.89	0.00	2	184
China		39	12	51	251	380	631	2	0.52	0.53	661.00	1	160
Germany		1	165	166	147	1476	1623	2	0.90	0.94	0.00	0	185
Denmark		1	131	132	115	1229	1344	2	0.77	0.85	0.00	0	186
Spain		1	152	153	134	1498	1632	2	0.84	0.91	0.00	0	188
Finland		1	160	161	144	1210	1354	2	0.88	0.93	0.00	0	189
France		1	172	173	154	1466	1620	2	0.92	0.96	0.00	0	192
United Kingdom		1	168	169	150	1552	1702	2	0.91	0.95	0.00	0	193
Greece		1	148	149	133	1031	1164	2	0.83	0.90	0.00	0	194
Ireland		1	120	121	104	1081	1185	2	0.74	0.82	0.00	2	195
Italy		1	160	161	143	1433	1576	2	0.88	0.93	0.00	0	196
Japan		1	169	170	155	1111	1266	2	0.94	0.97	0.00	2	198
Korea		1	138	139	125	876	1001	2	0.82	0.89	0.00	2	199
Luxembourg		1	130	131	114	1124	1238	2	0.77	0.85	0.00	2	200

Netherlands	1	158	159	142	1380	1522	2	0.87	0.93	0.00	0	201
Norway	1	157	158	138	1221	1359	2	0.86	0.92	0.00	2	203
New Zealand	1	129	130	118	633	751	2	0.78	0.86	0.00	3	204
Portugal	1	73	74	57	885	942	3	0.62	0.69	0.00	0	205
Sweden	1	155	156	139	1464	1603	2	0.86	0.92	0.00	0	206
United States	1	165	166	150	1390	1540	2	0.92	0.96	0.00	2	207
Bill & Melinda Gates Foundation	1	162	163	146	1280	1426	2	0.89	0.94	0.00	1	208
Coalition for Epidemic Preparedness Innovations	10	1	11	10	10	20	1	1.00	1.00	0.23	1	163
European Commission	15	148	163	2184	2184	4368	3	0.83	0.92	53.93	0	178
European Economic Area	3	7	10	17	17	34	1	1.00	1.00	8.85	2	202
Gavi	28	118	146	2024	2024	4048	3	0.65	0.81	110.05	1	160
Global Fund	29	155	184	4119	4119	8238	3	0.91	0.96	336.01	2	160
Inter-American Development Bank	15	34	49	269	269	538	1	1.00	1.00	49.50	2	119
International NGOs	27	151	178	2323	2323	4646	3	0.86	0.94	198.03	2	171
US NGOs	27	158	185	442	442	884	3	0.90	0.95	306.65	1	174
Pan American Health Organization	23	44	67	318	318	636	3	0.41	0.52	28.46	2	162
UNAIDS	30	133	163	612	612	1224	3	0.73	0.87	198.05	1	160
UNFPA	30	141	171	1630	1630	3260	3	0.79	0.90	226.79	0	160
UNICEF	30	146	176	1913	1913	3826	3	0.83	0.92	250.51	1	160
UNITAID	9	2	11	14	14	28	1	1.00	1.00	0.28	1	187
US Foundations	1	164	165	164	164	328	3	0.92	0.96	23.90	1	210
World Bank	21	129	150	1134	1134	2268	3	0.71	0.85	32.25	0	176
WB_IBRD	20	153	173	1369	1369	2738	3	0.84	0.93	247.82	0	169
WB_IDA	27	117	144	2596	2596	5192	3	0.64	0.81	163.51	3	160
WHO	29	154	183	2476	2476	4952	3	0.90	0.95	314.53	0	160
Corporate Donations	0	2	2	0	2	2	4	0.48	0.49	0.00	1	211
Debt Repayments	0	2	2	0	173	173	4	0.47	0.48	0.00	3	212
Non-OECD DAC Countries	0	17	17	0	710	710	2	0.52	0.55	0.00	2	213
Other	0	11	11	0	285	285	3	0.52	0.53	0.00	2	214
Other OECD DAC Countries	0	8	8	0	220	220	3	0.51	0.52	0.00	2	215
Private Other	0	14	14	0	941	941	3	0.52	0.54	0.00	1	216
Unallocable	0	4	4	0	4	4	4	0.46	0.49	0.00	1	217
Afghanistan	40	0	40	275	0	275	0	0.00	0.00	0.00	0	134
Albania	34	0	34	190	0	190	0	0.00	0.00	0.00	3	122
Algeria	36	0	36	138	0	138	0	0.00	0.00	0.00	2	3
Angola	39	0	39	279	0	279	0	0.00	0.00	0.00	1	21
Anguilla	3	0	3	3	0	3	0	0.00	0.00	0.00	2	170
Antigua and Barbuda	19	0	19	65	0	65	0	0.00	0.00	0.00	2	87
Argentina	34	0	34	118	0	118	0	0.00	0.00	0.00	2	113
Armenia	36	0	36	218	0	218	0	0.00	0.00	0.00	3	75
Azerbaijan	36	0	36	199	0	199	0	0.00	0.00	0.00	3	74
Bahrain	1	0	1	1	0	1	0	0.00	0.00	0.00	0	190
Bangladesh	39	0	39	271	0	271	0	0.00	0.00	0.00	0	135
Barbados	6	0	6	47	0	47	0	0.00	0.00	0.00	2	107

1													
2													
3	Belarus	30	0	30	119	0	119	0	0.00	0.00	0.00	2	144
4	Belize	33	0	33	119	0	119	0	0.00	0.00	0.00	2	94
5	Benin	30	0	30	273	0	273	0	0.00	0.00	0.00	1	/3
7	Deuton	24	0	24	162	0	160	0	0.00	0.00	0.00	2	70
8	Brutan	54	0	54	103	0	103	0	0.00	0.00	0.00	3	70
9	Bolivia	38	0	38	180	0	180	0	0.00	0.00	0.00	2	108
10	Bosnia and Herzegovina	35	0	35	182	0	182	0	0.00	0.00	0.00	3	121
11	Botswana	39	0	39	210	0	210	0	0.00	0.00	0.00	0	18
12	Brazil	37	0	37	131	0	131	0	0.00	0.00	0.00	2	117
13	Bulgaria	5	0	5	34	0	34	0	0.00	0.00	0.00	2	156
14 15	Burkina Faso	39	0	39	280	0	280	0	0.00	0.00	0.00	1	50
16	Burundi	39	0	39	264	0	264	0	0.00	0.00	0.00	1	19
17	Cambodia	37	0	37	266	0	266	0	0.00	0.00	0.00	0	130
18	Cameroon	39	0	39	277	0	277	0	0.00	0.00	0.00	1	37
19	Cape Verde	24	0	24	117	0	117	0	0.00	0.00	0.00	3	12
20	Central African Republic	39	0	39	259	0	259	0	0.00	0.00	0.00	1	14
21	Chad	39	0	39	266	0	266	0	0.00	0.00	0.00	1	29
22	Chile	34	0	34	112	0	112	0	0.00	0.00	0.00	2	102
25 74	Christmas Island	J	0	1	1	0	1	0	0.00	0.00	0.00	1	200
25			0	1	1	0	1	0	0.00	0.00	0.00	1	209
26	Colombia	36	0	36	126	0	126	0	0.00	0.00	0.00	2	118
27	Comoros	39	0	39	223	0	223	0	0.00	0.00	0.00	3	5
28	Congo	39	0	39	249	0	249	0	0.00	0.00	0.00	1	7
29	Cook Islands	9	0	9	49	0	49	0	0.00	0.00	0.00	2	149
30	Costa Rica	35	0	35	131	0	131	0	0.00	0.00	0.00	2	97
31 20	Cote d'Ivoire	39	0	39	276	0	276	0	0.00	0.00	0.00	1	20
33	Croatia	22	0	22	61	0	61	0	0.00	0.00	0.00	2	153
34	Cuba	36	0	36	166	0	166	0	0.00	0.00	0.00	2	92
35	Czech Republic	2	0	2	2	0	2	0	0.00	0.00	0.00	1	173
36	Democratic Republic of the Congo	37	0	37	199	0	199	0	0.00	0.00	0.00	1	46
37	Djibouti	39	0	39	247	0	247	0	0.00	0.00	0.00	1	25
38	Dominica	26	0	26	83	0	83	0	0.00	0.00	0.00	2	89
39	Dominican Republic	37	0	37	159	0	159	0	0.00	0.00	0.00	2	112
40	Ecuador	37	0	37	128	0	128	0	0.00	0.00	0.00	2	106
42	Favot	30	0	30	254	0	254	0	0.00	0.00	0.00	1	35
43		27	0	27	161	0	161	0	0.00	0.00	0.00	2	100
44		20	0	57	101	0	101	0	0.00	0.00	0.00	2	100
45	Equatorial Guinea	38	0	38	197	0	197	0	0.00	0.00	0.00	3	51
46	Eritrea	39	0	39	255	0	255	0	0.00	0.00	0.00	1	16
4/	Estonia	5	0	5	31	0	31	0	0.00	0.00	0.00	2	154
40 49	Ethiopia	39	0	39	288	0	288	0	0.00	0.00	0.00	1	41
50	Federated States of Micronesia	24	0	24	64	0	64	0	0.00	0.00	0.00	2	64
51	Fiji	26	0	26	81	0	81	0	0.00	0.00	0.00	2	139
52	Gabon	38	0	38	210	0	210	0	0.00	0.00	0.00	0	47
53	Georgia	36	0	36	245	0	245	0	0.00	0.00	0.00	3	81
54	Ghana	39	0	39	284	0	284	0	0.00	0.00	0.00	1	40
55	Global	43	0	43	260	0	260	0	0.00	0.00	0.00	1	6
50 57													

2													
3	Grenada	30	0	30	85	0	85	0	0.00	0.00	0.00	2	90
4		30	0	50	170	0	170	0	0.00	0.00	0.00	2	50
5	Guatemala	37	0	37	170	0	170	0	0.00	0.00	0.00	2	115
6	Guinea	39	0	39	270	0	270	0	0.00	0.00	0.00	1	31
/	Guinea-Bissau	39	0	39	259	0	259	0	0.00	0.00	0.00	1	30
8	Guyana	34	0	34	156	0	156	0	0.00	0.00	0.00	2	98
9 10	Haiti	38	0	38	234	0	234	0	0.00	0.00	0.00	2	111
10	Honduras	38	0	38	186	0	186	0	0.00	0.00	0.00	2	109
12	Hungary	3	0	3	3	0	3	0	0.00	0.00	0.00	1	166
13	India	30	0	30	27/	0	274	0	0.00	0.00	0.00	0	136
14	Indenesia	20	0	20	2/4	0	2/4	0	0.00	0.00	0.00	0	122
15	Indonesia	39	U	39	265	0	265	U	0.00	0.00	0.00	0	132
16	Iran	36	0	36	142	0	142	0	0.00	0.00	0.00	2	73
17	Iraq	37	0	37	195	0	195	0	0.00	0.00	0.00	0	76
18	Jamaica	36	0	36	143	0	143	0	0.00	0.00	0.00	2	103
19	Jordan	37	0	37	198	0	198	0	0.00	0.00	0.00	0	80
20	Kazakhstan	37	0	37	212	0	212	0	0.00	0.00	0.00	3	78
21	Kenva	39	0	39	285	0	285	0	0.00	0.00	0.00	1	48
22	Kirihati	28	0	28	98	0	98	0	0.00	0.00	0.00	2	58
25	Kasava	20	ů	20	142	0	140	0	0.00	0.00	0.00	2	142
25	KOSOVO	32		32	142	0	142	0	0.00	0.00	0.00	3	145
26	Kyrgyzstan	36	0	36	225	0	225	0	0.00	0.00	0.00	3	77
27	Laos	37	0	37	258	0	258	0	0.00	0.00	0.00	0	127
28	Latvia	5	0	5	7	0	7	0	0.00	0.00	0.00	1	157
29	Lebanon	38	0	38	162	0	162	0	0.00	0.00	0.00	0	68
30	Lesotho	39	0	39	253	0	253	0	0.00	0.00	0.00	1	22
31	Liberia	39	0	39	269	0	269	0	0.00	0.00	0.00	1	33
32	Libva	33	0	33	123	0	123	0	0.00	0.00	0.00	0	2
33	Lithuania	5	0	5	7	0	7	0	0.00	0.00	0.00	1	158
34 25		3	0	20	121	ů	121	0	0.00	0.00	0.00	-	1.45
35	Macedonia	30	0	30	131	0	151	0	0.00	0.00	0.00	Z	145
37	Madagascar	39	0	39	276	0	276	0	0.00	0.00	0.00	1	38
38	Malawi	39	0	39	277	0	277	0	0.00	0.00	0.00	1	44
39	Malaysia	31	0	31	132	0	132	0	0.00	0.00	0.00	0	140
40	Maldives	32	0	32	110	0	110	0	0.00	0.00	0.00	3	66
41	Mali	40	0	40	282	0	282	0	0.00	0.00	0.00	1	45
42	Malta	1	0	1	1	0	1	0	0.00	0.00	0.00	0	180
43	Marshall Islands	21	0	21	76	0	76	0	0.00	0.00	0.00	0	138
44	Mauritania	39	0	39	259	0	259	0	0.00	0.00	0.00	1	34
45	Mauritius	22	0	22	112	0	112	0	0.00	0.00	0.00	2	0
46		55	0	55	112	0	112	0	0.00	0.00	0.00	2	0
47	Mayotte	1	0	1	1	0	1	0	0.00	0.00	0.00	0	191
40	Mexico	37	0	37	161	0	161	0	0.00	0.00	0.00	2	114
50	Moldova	33	0	33	185	0	185	0	0.00	0.00	0.00	3	125
51	Mongolia	37	0	37	213	0	213	0	0.00	0.00	0.00	0	124
52	Montenegro	31	0	31	137	0	137	0	0.00	0.00	0.00	3	142
53	Montserrat	25	0	25	72	0	72	0	0.00	0.00	0.00	2	91
54	Morocco	39	0	39	218	0	218	0	0.00	0.00	0.00	1	55
55	Mozambique	30	n	39	288	0	288	n	0.00	0.00	0.00	1	36
56		39	U	55	200	0	200	0	0.00	5.00	0.00	1	50
57													

58

60

1													
2													
3	Myanmar	37	0	37	258	0	258	0	0.00	0.00	0.00	0	131
4	Namibia	39	0	39	222	0	222	0	0.00	0.00	0.00	1	17
6	Nauru	19	0	19	52	0	52	0	0.00	0.00	0.00	2	59
7	Nepal	39	0	39	265	0	265	0	0.00	0.00	0.00	0	86
8	Netherlands Antilles	2	0	2	12	0	12	0	0.00	0.00	0.00	0	177
9	Nicaragua	37	0	37	201	0	201	0	0.00	0.00	0.00	2	110
10	Nigor	20	0	20	201	0	201	0	0.00	0.00	0.00	1	42
11	Niger	39	0	39	270	0	270	0	0.00	0.00	0.00	1	42
12	Nigeria	39	0	39	287	0	287	0	0.00	0.00	0.00	1	52
14	Niue	18	0	18	64	0	64	0	0.00	0.00	0.00	2	63
15	North Korea	32	0	32	127	0	127	0	0.00	0.00	0.00	2	72
16	Northern Mariana Islands	2	0	2	2	0	2	0	0.00	0.00	0.00	2	197
17	Oman	5	0	5	5	0	5	0	0.00	0.00	0.00	1	164
18	Pakistan	39	0	39	273	0	273	0	0.00	0.00	0.00	0	137
19	Palau	18	0	18	50	0	50	0	0.00	0.00	0.00	2	62
20	Palestine	34	0	34	125	0	125	0	0.00	0.00	0.00	2	151
22	Panama	35	0	35	142	0	142	0	0.00	0.00	0.00	2	105
23	Papua New Guinea	32	0	32	138	0	138	0	0.00	0.00	0.00	0	128
24	Paraguay	36	0	36	116	0	116	0	0.00	0.00	0.00	2	95
25	Peru	37	0	37	131	0	131	0	0.00	0.00	0.00	2	104
26	Philippines	39	0	39	248	0	248	0	0.00	0.00	0.00	0	120
2/	Poland	4	0	4	6	0	6	0	0.00	0.00	0.00	1	168
20	Romania	5	0	5	34	0	34	0	0.00	0.00	0.00	2	155
30	Russia	8	0	8	36	0	36	0	0.00	0.00	0.00	2	147
31	Rwanda	39	0	39	276	0	276	0	0.00	0.00	0.00	1	27
32	Saint Holona	22	0	22	120	Ű	120	0	0.00	0.00	0.00	-	10
33	Saint Relena	55	0	55	150	0	150	0	0.00	0.00	0.00	0	150
34		0	0	0	47	0	47	0	0.00	0.00	0.00	2	152
35	Saint Lucia	33	0	33	107	0	107	0	0.00	0.00	0.00	2	93
37	Saint Vincent and the Grenadines	32	0	32	95	0	95	0	0.00	0.00	0.00	2	88
38	Samoa	26	0	26	106	0	106	0	0.00	0.00	0.00	3	65
39	Sao Tome and Principe	38	0	38	230	0	230	0	0.00	0.00	0.00	3	4
40	Saudi Arabia	5	0	5	5	0	5	0	0.00	0.00	0.00	1	172
41	Senegal	39	0	39	283	0	283	0	0.00	0.00	0.00	1	39
42	Serbia	35	0	35	167	0	167	0	0.00	0.00	0.00	2	146
43 <i>AA</i>	Seychelles	33	0	33	97	0	97	0	0.00	0.00	0.00	2	1
45	Sierra Leone	39	0	39	270	0	270	0	0.00	0.00	0.00	1	49
46	Slovakia	2	0	2	2	0	2	0	0.00	0.00	0.00	1	165
47	Slovenia	8	0	8	8	0	8	0	0.00	0.00	0.00	0	159
48	Solomon Islands	26	0	26	128	0	128	0	0.00	0.00	0.00	3	82
49	Somalia	39	0	39	252	0	252	0	0.00	0.00	0.00	1	15
50 51	South Africa	39	0	39	260	0	260	0	0.00	0.00	0.00	0	24
51 52	South Korea	7	0	7	7	0	7	0	0.00	0.00	0.00	0	167
53	South Sudan	39	0	39	245	n N	245	n	0.00	0.00	0.00	1	13
54	Sri Lanka	27	0	27	2-13	0	273	0	0.00	0.00	0.00	•	176
55	Sudan	20	0	20	231	0	231	0	0.00	0.00	0.00	1	120
56	Suuan	39	U	39	212	U	272	U	0.00	0.00	0.00	1	26
57													

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Suriname	34	0	34	107	0	107	0	0.00	0.00	0.00	2	96
Swaziland	38	0	38	201	0	201	0	0.00	0.00	0.00	0	11
Syria	38	0	38	195	0	195	0	0.00	0.00	0.00	0	67
Tajikistan	37	0	37	248	0	248	0	0.00	0.00	0.00	0	83
Tanzania	39	0	39	285	0	285	0	0.00	0.00	0.00	1	53
Thailand	38	0	38	193	0	193	0	0.00	0.00	0.00	0	85
The Gambia	39	0	39	248	0	248	0	0.00	0.00	0.00	1	28
Timor-Leste	37	0	37	231	0	231	0	0.00	0.00	0.00	0	79
Тодо	39	0	39	255	0	255	0	0.00	0.00	0.00	1	9
Tokelau	13	0	13	18	0	18	0	0.00	0.00	0.00	2	148
Tonga	23	0	23	99	0	99	0	0.00	0.00	0.00	3	60
Trinidad and Tobago	11	0	11	52	0	52	0	0.00	0.00	0.00	2	116
Tunisia	37	0	37	172	0	172	0	0.00	0.00	0.00	2	8
Turkey	29	0	29	142	0	142	0	0.00	0.00	0.00	0	141
Turkmenistan	36	0	36	158	0	158	0	0.00	0.00	0.00	3	69
Turks and Caicos Islands	2	0	2	2	0	2	0	0.00	0.00	0.00	2	182
Tuvalu	21	0	21	93	0	93	0	0.00	0.00	0.00	3	61
Uganda	39	0	39	286	0	286	0	0.00	0.00	0.00	1	54
Ukraine	32	0	32	181	0	181	0	0.00	0.00	0.00	0	123
Unallocated/Unspecified	45	0	45	357	0	357	0	0.00	0.00	0.00	1	56
Uruguay	31	0	31	78	0	78	0	0.00	0.00	0.00	2	101
Uzbekistan	35	0	35	253	0	253	0	0.00	0.00	0.00	0	129
Vanuatu	25	0	25	76	0	76	0	0.00	0.00	0.00	2	71
Venezuela	34	0	34	106	0	106	0	0.00	0.00	0.00	2	99
Vietnam	39	0	39	270	0	270	0	0.00	0.00	0.00	0	133
Wallis and Futuna Islands	18	0	18	27	0	27	0	0.00	0.00	0.00	0	150
Yemen	37	0	37	249	0	249	0	0.00	0.00	0.00	3	84
Zambia	39	0	39	283	0	283	0	0.00	0.00	0.00	1	32
Zimbabwe	39	0	39	275	0	275	0	0.00	0.00	0.00	1	23

Twitter network analysis statistics report

Label	indegree	outdegree	Degree	weighted indegree	weighted outdegree	Weighted Degree	Eccentricity	closnesscentrality	harmonicclosnesscentrality	between esscentrality	modularity_class	strongcompnum
United States	0	8	8	0	30	30	3	0.38	0.44	0.00	0	67
Kingdom	0	8	8	0	29	29	3	0.38	0.44	0.00	1	68
BMGF	0	8	8	0	35	35	3	0.38	0.44	0.00	0	69
WHO	3	9	12	17	29	46	2	0.54	0.58	23.50	0	66
World Bank	3	8	11	16	31	47	2	0.54	0.58	19.65	1	65
UNAIDS	3	9	12	8	18	26	2	0.54	0.58	23.50	0	64

BMJ Open

1														
2														
3		2	0	11	10	20	20	2	0.54	0 5 9	10.65	1	62	
4	UNFFA	5	0	11	10	20	50	2	0.54	0.56	19.05	1	05	
5	UNICEF	3	9	12	13	28	41	2	0.54	0.58	23.50	1	62	
6	UNITAID	3	8	11	7	21	28	2	0.54	0.58	20.21	4	61	
7	GAVI	3	9	12	9	24	33	2	0.54	0.58	23.50	4	60	
8	GFATM	3	9	12	14	30	44	2	0.54	0.58	23.50	3	59	
9	Oxfam	8	10	18	28	10	38	1	1 00	1 00	40 64	1	58	
10	CDC		10	10	10	10	20	-	1.00	1.00	72.46	2	56	
11	CDC	8	10	18	19	10	29	1	1.00	1.00	72.46	2	50	
12	EU CDC	6	10	16	13	10	23	1	1.00	1.00	62.06	3	51	
13	NIH	8	10	18	13	10	23	1	1.00	1.00	87.07	4	43	
14	FAO	7	9	16	13	9	22	1	1.00	1.00	67.06	1	35	
15	UNDP	8	10	18	33	10	43	1	1.00	1.00	41.00	1	28	
10	MSE	8	10	18	32	10	42	1	1 00	1 00	56 78	з	23	
17	DATU	0	10	10	32	10	-12	-	1.00	1.00	50.70		23	
10	Save the	8	10	18	30	10	40	1	1.00	1.00	59.94	4	17	
20	Children	8	9	17	20	9	29	1	1.00	1.00	46.99	1	9	
20	Access	1	0	1	1	0	1	0	0.00	0.00	0.00	4	16	
21	Africa	7	0	7	7	0	7	0	0.00	0.00	0.00	1	8	
22	Agriculture	1	0	1	1	0	1	0	0.00	0.00	0.00	1	24	
23	Agriculture	1	0	1		0		U	0.00	0.00	0.00	1	54	
25	Biodiversity	1	0	1	1	0	1	0	0.00	0.00	0.00	1	33	
26	Breastfeeding	1	0	1	1	0	1	0	0.00	0.00	0.00	4	15	
27	Cancer	2	0	2	2	0	2	0	0.00	0.00	0.00	4	14	
28	Child Marriage	0	0	0	0	0	0	0	0.00	0.00	0.00	5	70	
29	Children	5	0	5	5	0	5	0	0.00	0.00	0.00	1	7	
30	Chalana	1	0	1	1	0	1	0	0.00	0.00	0.00	-	,	
31	Climate	T	0	T	T	0	1	0	0.00	0.00	0.00	- 3	22	
32	Change	3	0	3	3	0	3	0	0.00	0.00	0.00	1	27	
33	Development	0	0	0	0	0	0	0	0.00	0.00	0.00	6	71	
34	Diarrhea	1	0	1	1	0	1	0	0.00	0.00	0.00	2	55	
35	Discrimination	0	0	0	0	0	0	0	0.00	0.00	0.00	7	72	
36			0	0	0	0	0	0	0.00	0.00	0.00	10	12	
37	Donations	1	0	1	1	0	1	0	0.00	0.00	0.00	1	6	
38	E. Coli	1	0	1	1	0	1	0	0.00	0.00	0.00	2	54	
39	Ebola	4	0	4	4	0	4	0	0.00	0.00	0.00	3	13	
40	Education	2	0	2	2	0	2	0	0.00	0.00	0.00	1	5	
41	FGM	1	0	1	1	0	1	0	0.00	0.00	0.00	1	26	
42	Families	1	0	1	1	0	1	0	0.00	0.00	0.00	1	32	
43	Family	1	0	1	1	0	1	0	0.00	0.00	0.00	1	52	
44	Planning	0	0	0	0	0	0	0	0.00	0.00	0.00	8	73	
45	Farmers	1	0	1	1	0	1	0	0.00	0.00	0.00	1	31	
46	Fisheries	1	0	1	1	0	1	0	0.00	0.00	0.00	1	30	
47	Food Security	4	0	4	4	0	4	0	0.00	0.00	0.00	1	4	
48	Forests	1	0	1	1	0	1	0	0.00	0.00	0.00	1	20	
49	Forests	I	0	1	1	0	1	0	0.00	0.00	0.00	1	29	
50 51	Funding	1	0	1	1	0	1	0	0.00	0.00	0.00	4	42	
50 50	HIV/AIDS	4	0	4	4	0	4	0	0.00	0.00	0.00	1	21	
52 53	Heart Disease	1	0	1	1	0	1	0	0.00	0.00	0.00	4	41	
55	Hepatitis	1	0	1	1	0	1	0	0.00	0.00	0.00	3	50	
55	Human Rights	0	n	0	n	0	0	0	0.00	0.00	0.00	9	74	
56		5	Ũ	U	Ū	Ū	Ū	Ũ	0.00	0.00	0.00	5		
57														

Aid 3 0 3 0 3 0 3 0 0.00 0.00 0.00 3 4 Infuncation 1 0 2 2 0 2 0 0.00 0.00 0.00 0.00 4 4 Innovation 1 0 3 0 0.00 0.00 0.00 1.0 1.1 Maiaria 3 0 2 0 0 0.0 0.00 0.00 1.0 1.1 Messles 2 0 0 0 0.0 0.00 0.00 0.00 1.0 7 Newsion 1 0 1 1.0 0 1.0 0.0 0.00 0.00 0.00 1.0 7 Outbreaks 1 0 1 0.0 1.0 0.0 0.00 0.00 0.00 1.0 1 7 Preuomonia 1 0 1 0 1.0	Add 3 0 3 0 0 0 0.00 0.00 0.00 2 4 Influera 1 0 1 1 0 0 0 0.00 0.00 4 12 Innovation 1 0 1 1 0 0 0 0.00 0.00 1 1 Malaria 3 0 1 1 0 0 0.00 0.00 1.0 1 Maseles 1 0 1 1 0 1 0 0.0 0.00 0.00 1.0 1 Nutriton 1 0 1 1 0 1 0 0.0 0.00 0.0 1.0 1.0 Polutrorats 1 0 1 1 0 1 0 0.0 0.00 0.00 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 0.0 0.00	Humanitarian Irelation30330300000.000.000.001.01.0Infleera200330000.000.000.001.01.0Malaria30022000.000.000.000.001.01.0Messes100220000.000.000.001.01.0Mothers1000000000.00.01.01.0News100000000.00.000.001.01.0Others100000000.00.001.01.01.0Othersex100000000.00.00.01.01.0Prevention100000000.00.00.01.01.0Prevention10000000000.01.01.0Prevention1000000000001.01.0Prevention10000000000000 <th></th>														
Humanitarian Influenza203030000.000.0033Influenza2011011010101011Malaria3033011000.000.00111Messles20000000000011Messles101101000000011Netrito00000000000017Netrito10110100000017Netrito10110100000017Netrito10110100000017Preuomonia101101000000117Preuomonia10110100000011Preuomonia10110100000001<	Alumanitarian A S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S S <ths< th=""> S S <t< th=""><th>Auranitzian Id333303000.000.000.0033Infuenca101110101000.000.0011Infuenca30022000.000.00111Malare3000000.001110000011Mathers10000000000011Nutrito000110100000111Outreake100110100000111Poeronona10110100000111Poeronona10110100000111Poeronona101101000001111Poeronona101101000000111Poeronona10110000000<</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<></ths<>	Auranitzian Id333303000.000.000.0033Infuenca101110101000.000.0011Infuenca30022000.000.00111Malare3000000.001110000011Mathers10000000000011Nutrito000110100000111Outreake100110100000111Poeronona10110100000111Poeronona10110100000111Poeronona101101000001111Poeronona101101000000111Poeronona10110000000<														
Aid 3 0 3 0 3 0 0.00 0.00 0.00 3 3 Influenza 2 0 1 1 0 1 0 1 0 0.00 0.00 0.00 2 4 Malaria 3 0 3 3 0 3 0 0.00 0.00 0.00 1 1 Messles 2 0 2 2 0 0 0 0.00 0.00 0.00 1 1 Methers 0 0 0 0 0 0 0.00 0.00 0.00 1 7 Nutrition 0 0 1 0 1 0 0.00 0.00 0.00 1 7 Outbreaks 1 0 1 0 1 0 0.00 0.00 0.00 1 7 Preumonia 1 0 1 0 1 0 0.00 0.00 0.00 1 7 Preumonia 1 0 1 0 1 0 0.00 0.00 0.00 1 7 Prevention 1 0 1 <th>Aid3030300.000.003.033Infuenza1011010100.000.000.0011Innovation10110100.000.000.0011Malaria200000.000.000.001011Measles2000000.000.000.001075News10110100.000.000.001176Outreks10110100.000.000.001177Preumonia10110100.000.000.001378Preumonia10110100.000.0010171Preumonia101100.000.000.001378Preumonia1011000.000.001378Preumonia1010100.000.001378Prevention101000.000.001311Prevention101000.000.000.0014<!--</th--><th>Aid3030300.000.000.0033Influenca10110000.000.0011Innovation100330000.000.0011Malaria200000000000011Measles20000000000011Measles101101000.000.001011Measles10000000000111Measles101101000.000.001111Measles101101000.000.001111Outbreaks101101000.000.001311Peerentoni101101000.000.001311Peerentoni10110100.000.000.001311Peerentoni10110000.000.0</th><th>Humanitarian</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></th>	Aid3030300.000.003.033Infuenza1011010100.000.000.0011Innovation10110100.000.000.0011Malaria200000.000.000.001011Measles2000000.000.000.001075News10110100.000.000.001176Outreks10110100.000.000.001177Preumonia10110100.000.000.001378Preumonia10110100.000.0010171Preumonia101100.000.000.001378Preumonia1011000.000.001378Preumonia1010100.000.001378Prevention101000.000.001311Prevention101000.000.000.0014 </th <th>Aid3030300.000.000.0033Influenca10110000.000.0011Innovation100330000.000.0011Malaria200000000000011Measles20000000000011Measles101101000.000.001011Measles10000000000111Measles101101000.000.001111Measles101101000.000.001111Outbreaks101101000.000.001311Peerentoni101101000.000.001311Peerentoni10110100.000.000.001311Peerentoni10110000.000.0</th> <th>Humanitarian</th> <th></th>	Aid3030300.000.000.0033Influenca10110000.000.0011Innovation100330000.000.0011Malaria200000000000011Measles20000000000011Measles101101000.000.001011Measles10000000000111Measles101101000.000.001111Measles101101000.000.001111Outbreaks101101000.000.001311Peerentoni101101000.000.001311Peerentoni10110100.000.000.001311Peerentoni10110000.000.0	Humanitarian													
Influenza 2 0 2 0 2 0 0.00 0.00 2 4 Malaria 3 0 3 3 0 3 0 0.00 0.00 0.00 4 12 Malaria 3 0 2 2 0 0 0.00 0.00 0.00 1 1 Messles 2 0 2 2 0 0 0.00 0.00 0.00 1 1 Methers 1 0 1 0 0 0 0.00 0.00 1.00 1 75 News 1 0 1 1 0 1 0 0.00 0.00 10 1 75 News 1 0 1 0 1 0 0.00 0.00 10 1 77 Outbreaks 1 0 1 1 0 10 0.00 0.00	Influenza 2 0 2 1 0 1 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Innerstion 1 0 2 0 0 0.00 0.00 4 12 Innovation 1 0 1 0 1 0 0.00 0.00 4 12 Mealaria 2 0 2 2 0 0 0.00 0.00 1 1 1 Mealaria 1 0 2 2 0 0 0.00 0.00 1.0 1 1 Mothers 0 0 0 0 0 0.0 0.00 0.00 1.0 1 1 Nurtho 0 0 1 1 0 1 0 0.00 0.00 0.00 1.0 1 1 1 1 1 1 1 0 1 0 1.0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Aid	3	0	3	3	0	3	0	0.00	0.00	0.00	3	3	
Innovation 1 0 1 0 1.0 0 0.00 0.00 4 1 Measies 2 0 2 2 0 2 0 0.00 0.00 0.00 1 11 Measies 2 0 1 0 0.0 0.00 0.00 0.00 10 1 11 Measies 1 0 1 0 1 0 0 0 0.00 0.00 0.00 10 1 News 1 0 1 1 0 1 0 0.00 0.00 0.00 1.00 1.1 76 Online 0 0 1 0 1 0 0.00 0.00 0.00 1.1 76 Outbreaks 1 0 1 1 0 1 0 0.00 0.00 0.00 1.1 76 Proutomonia 1 0 1	Inrovation 1 0 1 0 0.00 0.00 0.00 1 1 Malaia 2 0 2 0 2 0 2 0 0 0.00 0.00 0.00 1 1 Measles 2 0 0 0 0 0 0 0.00 0.00 0.00 1 1 Nutrition 0 0 0 0 0 0 0.00 0.00 0.00 1.0 1 76 Online 0 0 1 1 0 1 0 0.00 0.00 0.00 1.0 1 76 Outbreaks 1 0 1 1 0 1 0 0.00 0.00 0.00 1.0 76 Preuemonia 1 0 1 1 0 1 0 0.00 0.00 0.00 1.0 76 Preuemonia 1	Innovation10101000.000.00412Malaria30000000111Measles200000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000 <td>Influenza</td> <td>2</td> <td>0</td> <td>2</td> <td>2</td> <td>0</td> <td>2</td> <td>0</td> <td>0.00</td> <td>0.00</td> <td>0.00</td> <td>2</td> <td>49</td> <td></td>	Influenza	2	0	2	2	0	2	0	0.00	0.00	0.00	2	49	
Malaria 3 0 3 0 0.00 0.00 0.00 1 11 Measles 2 0 2 0 0.00 0.00 0.00 0.00 0.00 0.00 0.00 10 75 News 1 0 1 1 0 1 0 0.00 0.00 0.00 0.00 10 75 News 1 0 1 1 0 1 0 0.00 0.00 0.00 0.00 10 1 76 Outbreaks 1 0 1 0 1 0 1 0 0.00 0.00 0.00 11 76 Pneumonia 2 0 2 0 0.00 0.00 0.00 13 78 Powerty 0 0 1 1 0 1 0 0.00 0.00 0.00 14 39 Refugees 3 0	Malaria 3 0 3 0 3.0 0 0.00 0.00 1 1 Measies 2 0 2 2 0 0 0.00 0.00 0.00 0.00 75 Mothers 1 0 1 1 0 1 0 0.00 0.00 0.00 0.00 1.0 1 News 1 0 1 1 0 1.0 0 0.00 0.00 0.00 1.0 1 Nutrition 0 0 1 1 0 1.0 0 0.00 0.00 0.00 1.1 76 Outbreaks 1 0 1 0 1.0 0 0.00 0.00 0.00 1.1 77 Preumonia 1 0 1 1 0 1.0 0 0.00 0.00 1.0 1.1 Preumonia 1 0 1 0 1 0 0.00 0.00 0.00 1.1 78 Prevention 1 0 1 0 1 0 0.00 0.00 0.00 1.0 1.0 Rare biassof 1 0 <t< td=""><td>Malaria 3 0 3 0 2 0 0.00 0.00 1 11 Measles 2 0 2 0 2 0 0.00 0.00 0.00 10 75 Mews 1 0 1 1 0 1 0 0.00 0.00 0.00 11 75 Nutrition 0 0 0 0 0 0 0 0.00 0.00 0.00 12 77 Outrais 1 0 1 0 1 0 0 0.00 0.00 0.00 13 47 Pneumonia 1 0 1 0 1 0 0 0.00 0.00 0.00 13 78 Pneumonia 1 0 1 1 0 1 0 0.00 0.00 0.00 14 39 Pneumonia 1 0 1 0 <</td><td>Innovation</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0.00</td><td>0.00</td><td>0.00</td><td>4</td><td>12</td><td></td></t<>	Malaria 3 0 3 0 2 0 0.00 0.00 1 11 Measles 2 0 2 0 2 0 0.00 0.00 0.00 10 75 Mews 1 0 1 1 0 1 0 0.00 0.00 0.00 11 75 Nutrition 0 0 0 0 0 0 0 0.00 0.00 0.00 12 77 Outrais 1 0 1 0 1 0 0 0.00 0.00 0.00 13 47 Pneumonia 1 0 1 0 1 0 0 0.00 0.00 0.00 13 78 Pneumonia 1 0 1 1 0 1 0 0.00 0.00 0.00 14 39 Pneumonia 1 0 1 0 <	Innovation	1	0	1	1	0	1	0	0.00	0.00	0.00	4	12	
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Title: Examining power dynamics in global health governance using topic modeling and network analysis of twitter data

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Structured Abstract:

Objectives: Despite increases in global health actors and funding levels, health inequities persist. We empirically tested whether global health governance (GHG) operates under the Rational Actor Model (RAM) and characterized GHG power dynamics.

Design: We collected approximately 75,000 tweets of 20 key global health actors, between 2016 and 2020 using Twitter API. We generated priorities from tweets collected using topic modeling. Priorities from tweets were compared with stated priorities from content analyses of policy documents and with revealed priorities from network analyses of development assistance for health funding data. Comparing priorities derived from Twitter, policy documents, and funding data, we can test if GHG operates under RAM and characterize power dynamics in GHG.

Participants: 20 global health actors were identified based on a consensus of 3 peerreviewed articles mapping global health networks. All tweets of each actor were collected in three-month intervals from November 2016 to May 2020. Policy documents and DAH financial data for each actor were collected for the same period.

Results: We find all 20 actors and the global health system collectively fulfill the 3 conditions of RAM based on stated and revealed priorities. We also find compulsory and institutional power asymmetries in GHG. Funding organizations have compulsory power over channels of DAH and implementing institutions they directly fund. Funding organizations also have transitive influence over implementing institutions receiving DAH funding.

Conclusions: We find that there is a correlation between the priorities of large funders and the priorities of health actors. This correlation in conjunction with GHG operating under the RAM and the asymmetric power held by funders raises issues. GHG under the RAM grants large funders majority of the power to determine global health priorities, and ultimately influencing outcomes while implementing organizations, especially those that work closest with populations, have little to no influence in priority-setting.

Strengths and limitations of this study:

- This study utilizes an alternative methodology of using Twitter data in understanding global health governance and priority-setting.
- This study triangulates findings from multiple data sources to test the rational actor model and to characterize power asymmetries in global health governance.
- Because the scope of this study is from 2016 to 2020, the findings may not be fully representative of global health governance during the COVID-19 pandemic.
- Only the key 20 actors of the hundreds of global health actors today were included in the study.

INTRODUCTION

 The turn of the 21st century introduced an unprecedented volume of new public and private actors in global health accompanied by stratospheric levels of funding.[1] While some argue that this multiplicity of new actors promotes cooperation, what persists is a politically fragmented network of actors with competing priorities and preferences.[2–4] Academics studying the complex network of global health actors have described it as a "congested" and "chaotic" network that causes inefficiencies in the practice and delivery of global health programs and aid.[5]

Inequities in global health have increasingly been attributed to the actions of transnational actors with varying degrees of power and divergent interests.[6] While more actors have entered global health with ostensible benevolent purposes, health inequities and inefficiencies in delivery still exist today. Fierce competition among donor priorities and requirements overwhelms the institutional capacities of recipient countries,[7,8] disrupts national health planning,[9] delays the delivery of aid,[10] and creates duplications and resource waste.[11,12] Paradoxically, despite the exponential increases in global health actors and funding, preventable global health inequities have persisted.

Researchers have presented at least two arguments attempting to understand this paradox through the lens of economics, politics, and power. First, global health governance (GHG) has been theorized as operating under the rational actor model (RAM) where "each actor has its own set of goals and objectives, and these actors take actions based on analysis of the costs and benefits of various available options."[13] Under RAM, each actor acts on their own set of explicit and implicit goals. Explicit goals come in the form of mission statements, bylaws, and other founding documents. Implicit goals are priorities revealed from past decisions and behaviors. It is theorized that under RAM, prioritization in GHG is based on the aggregation of individual explicit and implicit objectives.

Second, the Lancet-University of Oslo Commission on Global Governance for Health (2014) argues that "power asymmetry and global social norms limit the range of choice and constrain action on health inequity."[6] The actions of powerful global health actors in pursuit of their own interests "are not designed to harm health but can have negative side-effects" that may have contributed to the persistence of inequities.[6] The lack of power of global health beneficiaries and smaller health actors, and the outsized wielded power of large global health funders may also have contributed to the slow rate of reduction in global health inequities.

The argument that GHG operates under the RAM and the Commission on Global Governance for Health's argument about power asymmetry are mainly theoretical ideas about the behaviors of global health actors founded on a collection of studies within specific nations, regions, or institutions. What is necessary is empirical evidence at the global level that can confirm, deny or recharacterize these characterizations of how global health currently operates. Empirical evidence at the global level eliminates doubts of how decisions are currently made in global health and can guide GHG towards addressing the world's inequities in health.

We aim to empirically test the following research questions at the global level: (1) does GHG operate under the RAM? and (2) how can we characterize power dynamics in GHG?

We hypothesize that GHG operates under RAM and that there are power asymmetries in GHG that limit the range of health priorities. We analyzed empirical evidence from Twitter, funding data, and policy documents at the global level to test whether GHG operates under RAM and to characterize the power dynamics in GHG.

METHODS

We test if GHG operates under the RAM and characterize the power dynamics in GHG through the lens of global health priority-setting. All global health actors have certain preferences for health issues and act in alignment with these priorities.

Priorities can either be stated or revealed. Stated priorities are those preferences explicitly stated in a health actor's founding documents, websites, and annual reports. The mission statements and the health areas each actor explicitly mention in their official documents and websites are stated priorities. Revealed priorities are preferences that are gleaned from records of past behaviors and choices. Past health funding allocations and accounts of implemented programs and policies are revealed priorities. Revealed priorities may or may not be aligned with stated priorities.

We use evidence for both stated and revealed priorities from 2016 to 2020 to test our research questions.

Study Sample

We identified 20 key global health actors based on a consensus among three past studies that mapped the global health network using quantitative and qualitative methodologies.[4,14,15] As shown in Table 1, the key global health actors were categorized based on their nature of work in global health. Global health actors were either funding organizations, channels of developmental assistance for health (DAH) or implementing institutions. While most actors fall into multiple categories in practice, for the integrity of this analysis, organizations were limited to only one category based on the nature of work.

Nature of Work in Global Health	Organizational Category	Twitter Username	Global Health Actor	Number of Twitter Followers (as of October 2021)
	Global health initiative	gavi	Gavi, the Vaccine Alliance	153,000
		UNITAID	Unitaid	17,200
		GlobalFund	Global Fund to Fight AIDS,	240,100
			Tuberculosis and Malaria	
	Multilateral	WorldBank	World Bank	3,500,000
Channels of	Development Bank			
Developmental	United Nations System	WHO	World Health Organization	10,000,000
Assistance for Health		UNAIDS	Joint United Nations	286,800
			Programme on HIV/AIDS	
			(UNAIDS)	
		UNFPA	United Nations Population	260,800
			Fund (UNFPA)	
		UNICEF	United Nations Children's	8,900,000
			Fund (UNICEF)	

 Table 1. Summary of Global Health Actors. Characteristics of the 20 global health actors analyzed in this study.

	National Government	USAID	United States Agency for International Development (USAID)	843,200
Funding Organizations		DFID_UK*	United Kingdom Department for International Development (UK DFID)*	1,000,000
	Philanthropic Organization	gatesfoundation	Bill and Melinda Gates Foundation	2,100,000
	Global CSO/NGO	MSF	Doctors Without Borders (MSF)	165,100
		PATHtweets	PATH	59,500
		SavetheChildren	Save the Children	2,700,000
		Oxfam	Oxfam International	836,300
	United Nations System	FAO	Food and Agriculture Organization (FAO)	469,600
Implementing Institutions		UNDP	United Nations Development Programme (UNDP)	1,600,000
	National Government	CDCgov	Centers for Disease Control and Prevention (CDC)	4,300,000
		ECDC_EU	European Centre for Disease Prevention and Control (ECDC)	90,600
		NIH	National Institutes of Health (NIH)	1,400,000

* UK DFID is now the Foreign, Commonwealth, and Development Office. During the time of the analysis, the UK's agency for aid was known as DFID.

Patient and public involvement

Patients and the public were not involved in the development of the research questions and outcome measures.

Data Sources

We analyze stated and revealed priorities of 20 key global health actors from three data sources – policy documents, DAH funding data, and tweets. Table 2 summarizes each data source, how they were collected, how they were analyzed, and what types of priorities can be derived.

 Table 2. Summary of Data Source, Collection, and Analysis. Description of how data is collected and analyzed in the study.

Data Source	Data Collection	Analysis	Type of Priorities Derived from Source
Policy Documents	Manual collection of annual reports, policy documents, and official communications from official websites of each global health actor	Manual content analysis	Stated
DAH Funding Data	Queried funding allocation data of each global health actor from the International Health Metrics and Evaluation (IHME) DAH Database	Descriptive statistics; network analysis	Revealed
Twitter Data	Collected all the tweets of each global health actor from November 2016 to May 2020 in three month intervals using the Twitter API	Natural language processing (topic modeling); network analysis	Revealed

Drawing stated priorities from policy documents

Stated priorities are obtained from a manual content analysis of policy documents, annual reports, and official websites of global health actors.

Available policy documents, annual reports, and relevant official communications from the websites of each global health actor between 2016 and 2020 were collected. Manual content analysis was conducted to evaluate the available policy documents for each global health actor and identify their respective stated priorities.

The stated priorities drawn from these documents were commonly obtained from official statements that fall under the following headings: "strategic priorities," "program priorities," "strategic objectives," "focus areas," "strategic work areas," "program focus," "Strategy 20XX-20XX," "strategic goals," "priority areas," among others. Supplementary Table 1 contains the stated priorities obtained from each actor.

Deriving revealed priorities from funding data

The first of two ways we derive revealed priorities is by using a network analysis and descriptive statistics of financial flows in DAH funding data.

Data from the Institute for Health Metrics and Evaluation's (IHME) Developmental Assistance for Health Database was collected for 2019.[16] The database includes approximately 800,000 transactions of health financing from funding organizations to channels of DAH and to implementing countries.

Descriptive statistics were conducted to determine the allocations of funding for each health area and geographic region for the 20 global health actors in 2019.

Network analysis is an analytic method that has proved to be useful in understanding relational dynamics across actors in global and public health.[17,18] Network analysis was conducted to observe the funding relationships between global health actors. Gephi 0.9.2 was used in constructing and analyzing the network map. The network modelled in the study allows for a visualization of the flows of global health funding in 2019. In the network map, nodes represent global health actors and lines or "edges" indicate a flow of funding in global health. The Fruchterman-Reingold algorithm was used in modelling the network map. The algorithm "calculates the optimal layout so that nodes with less strength and less connections are placed further apart, and those with more and/or stronger connections are placed closer to each other."[19] The thickness of edges represents the amount of funding transferred between actors. The modelled network is discussed in the findings section.

Twitter data

The second way we derive revealed priorities is by using topic modeling in natural language processing (NLP) and conducting a network analysis of the global health actors' tweets.

Using the Twitter API, we collected all the tweets of each global health actor by username from November 2016 to May 2020 in three-month intervals. This means that all the tweets of each global health actor were collected for each day in the months of February, May, August, and November for each year. An interval of three months was decided for two reasons. First, a variation in the issues, topics, and themes that global health actors' tweet can be observed in three-month intervals. Initial small sample testing indicates that collecting all the tweets of every month for each actor yields redundancy in issues and topics observed. Redundancy is eliminated in three-month intervals. Second, it also allows for efficient usage of the data request limits of the Twitter API. As Twitter limits the number of tweets one can collect from the Twitter API, this interval is an efficient way of collecting data for the timeframe. A total of 74,241 tweets were collected from 2016 to 2020 for the 20 global health actors. Supplementary Tables 2 and 3 describe the tweets collected.

Using Twitter as a data source plays an important role in analyzing GHG. In the academic area of communications studies, researchers suggest that there are two forms of utility that motivate actors to post content on Twitter. First, intrinsic utility assumes that a user receives inherent satisfaction from posting content on Twitter.[20] While global health actors do not necessarily receive the same "inherent satisfaction" as individual Twitter users, global health actors acquire more intrinsic utility as their communications reach a greater number of users. Second, image-related utility assumes that the perceptions of others,[21,22] and seeking status are strong motivators for posting content.[23,24] As global health actors operate best with high public approval, posting content on Twitter can improve public perception. Twitter is the ideal platform for global health actors to simultaneously share their work to a greater number of individuals and to improve their public perception.

Because Twitter limits each post to 280 characters, the platform promotes short, frequent, and straightforward manners of communication. The tweets of global health actors are regular ways of communicating their work, preferences, and priorities to the public.[25–28] The tweets of global health actors act as an archive, a record of historical preferences, priorities, goals, and implemented programs.[29]

We consider tweets equally to funding data as they both reveal priorities through documentation of past decisions, preferences, and goals. Funding data is a record of priorities in the form of financial flows and transactions towards certain global health issues. Twitter is a record of priorities in the form of programs, policies, and opinions deemed important and necessary to communicate with the world. Because of their archival nature, both funding data and tweets reveal priorities through complementing records of decisions.

While tweets can represent both stated and revealed priorities, for this study, we use tweets to represent revealed priorities. Since this study analyzes tweets in aggregation, our findings reveal the top themes discussed by each actor from 2016-2020. Because we do not analyze each tweet at an individual level, tweets are considered revealed priorities and not stated priorities.

Obtaining revealed priorities from Twitter data

NLP is a subfield in artificial intelligence, computer science, and linguistics at the intersection of the human language and computers. NLP utilizes computers to process and analyze large quantities of human language data. We use NLP to analyze the tweets of the global health actors for two reasons. First, NLP allows for the efficient analysis of tens of thousands of rows of text data that could not be done manually.[30–32] Second, NLP allows for topic modeling, an algorithm that generates lists of words frequently used together.[33–35] These lists of words correspond to themes, topics, or issues that can be used to identify the top 10 priorities of each global health actor. The results are then used in a network analysis that visualizes where actors converge or diverge in global health priorities.

As seen in Table 3, ten topics were generated using the Latent Dirichlet Allocation (LDA) topic model for each global health actor's tweets to reveal their priorities from 2016 to 2020. LDA is a generative probabilistic modeling method where words in a corpus of text that are frequently used together are categorized into topics.[36] This follows the assumption that documents, or in this case Twitter profiles, can be broken down into multiple topics that are identified by certain combinations of words.

Table 3. Revealed Priorities from Twitter Topic Modeling. Ten revealed priorities of each of the 20 global health actors based on their tweets from 2016 to 2020. Priorities are alphabetically arranged. Red indicates Funding Organizations. Blue indicates Channels of DAH. Gray indicates Implementing Institution.

United States	United Kingdom	Gates Foundation	WHO	World Bank	UNAIDS	UNFPA	UNICEF	UNITAID	GAVI
Africa	Africa	Africa	Africa	Africa	Access	Africa	Africa	Access	Africa
Children	Agriculture	Breastfeeding	Breastfeeding	Agriculture	Africa	Child Marriage	Breastfeeding	Cancer	Cancer
Education	Children	Children	Children	Children	Discrimination	Children	Children	Children	Children
Food Security	Development	Education	Ebola	Climate Change	HIV/AIDS	Family Planning	Climate Change	Hepatitis	Cholera
HIV/AIDS	Ebola	HIV/AIDS	HIV/AIDS	Food Security	Human Rights	FGM	Ebola	HIV/AIDS	Ebola
Humanitarian Aid	Education	Malaria	Malaria	Humanitarian Aid	Innovation	Human Rights	Education	Malaria	Measles
Mothers	Food Security	Mothers	Measles	Poverty	Prevention	Humanitarian Aid	Human Rights	Testing	Pneumonia
South America	HIV/AIDS	Polio	Mothers	Sanitation	Testing	Nutrition	Online	Treatment	Polio
Water	Humanitarian Aid	Sanitation	Polio	Water	Treatment	Violence	Violence	Tuberculosis	Poverty
Women	Water	Women	Women	Women	Women	Women	Water	Vaccines	Vaccines
			1	1			1		1
Global Fund	CDC	EU CDC	NIH	FAO	UNDP	MSF	PATH	Save the Children	Oxfam
Global Fund Africa	CDC Children	EU CDC Ebola	NIH Africa	FAO Africa	UNDP Africa	MSF Africa	PATH Access	Save the Children Africa	Oxfam Africa
Global Fund Africa Children	CDC Children Diarrhea	EU CDC Ebola Hepatitis	NIH Africa Cancer	FAO Africa Agriculture	UNDP Africa Children	MSF Africa Children	PATH Access Africa	Save the Children Africa Children	Oxfam Africa Climate Change
Global Fund Africa Children Cholera	CDC Children Diarrhea E. Coli	EU CDC Ebola Hepatitis HIV/AIDS	NIH Africa Cancer Funding	FAO Africa Agriculture Biodiversity	UNDP Africa Children Climate Change	MSF Africa Children Cholera	PATH Access Africa Breastfeeding	Save the Children Africa Children Donations	Oxfam Africa Climate Change Ebola
Global Fund Africa Children Cholera Ebola	CDC Children Diarrhea E. Coli Influenza	EU CDC Ebola Hepatitis HIV/AIDS Influenza	NIH Africa Cancer Funding Heart Disease	FAO Africa Agriculture Biodiversity Climate Change	UNDP Africa Children Climate Change Education	MSF Africa Children Cholera Ebola	PATH Access Africa Breastfeeding Cancer	Save the Children Africa Children Donations Education	Oxfam Africa Climate Change Ebola Food Security
Global Fund Africa Children Cholera Ebola HIV/AIDS	CDC Children Diarrhea E. Coli Influenza Measles	EU CDC Ebola Hepatitis HIV/AIDS Influenza Measles	NIH Africa Cancer Funding Heart Disease HIV/AIDS	FAO Africa Agriculture Biodiversity Climate Change Families	UNDP Africa Children Climate Change Education FGM	MSF Africa Children Cholera Ebola HIV/AIDS	PATH Access Africa Breastfeeding Cancer Children	Save the Children Africa Children Donations Education Food Security	Oxfam Africa Climate Change Ebola Food Security Humanitarian Aid
Global Fund Africa Children Cholera Ebola HIV/AIDS Malaria	CDC Children Diarrhea E. Coli Influenza Measles Prevention	EU CDC Ebola Hepatitis HIV/AIDS Influenza Measles Outbreaks	NIH Africa Cancer Funding Heart Disease HIV/AIDS News	FAO Africa Agriculture Biodiversity Climate Change Families Fammers	UNDP Africa Children Climate Change Education FGM Food Security	MSF Africa Children Cholera Ebola HIV/AIDS Humanitarian Aid	PATH Access Africa Breastfeeding Cancer Children Ebola	Save the Children Africa Children Donations Education Food Security Humanitarian Aid	Oxfam Africa Climate Change Ebola Food Security Humanitarian Aid Malaria
Global Fund Africa Children Cholera Ebola HIV/AIDS Malaria Pneumonia	CDC Children Diarrhea E. Coli Influenza Measles Prevention Vaccines	EU CDC Ebola Hepatitis HIV/AIDS Influenza Measles Outbreaks Report	NIH Africa Cancer Funding Heart Disease HIV/AIDS News Rare Disease	FAO Africa Agriculture Biodiversity Climate Change Families Farmers Fisheries	UNDP Africa Children Climate Change Education FGM Food Security HIV/AIDS	MSF Africa Children Cholera Ebola HIV/AIDS Humanitarian Aid Refugees	PATH Access Africa Breastfeeding Cancer Children Ebola Innovation	Save the Children Africa Children Donations Education Food Security Humanitarian Aid Pneumonia	Oxfam Africa Climate Change Ebola Food Security Humanitarian Aid Malaria Pneumonia
Global Fund Africa Children Cholera Ebola HIV/AIDS Malaria Pneumonia Polio	CDC Children Diarrhea E. Coli Influenza Measles Prevention Vaccines Water	EU CDC Ebola Hepatitis HIV/AIDS Influenza Measles Outbreaks Report Surveillance	NIH Africa Cancer Funding Heart Disease HIV/AIDS News Rare Disease Research	FAO Africa Agriculture Biodiversity Climate Change Families Families Farmers Fisheries Food Security	UNDP Africa Children Climate Change Education FGM Food Security HIV/AIDS Malaria	MSF Africa Children Cholera Ebola HIV/AIDS Humanitarian Aid Refugees Treatment	PATH Access Africa Breastfeeding Cancer Children Ebola Innovation Malaria	Save the Children Africa Children Donations Education Food Security Humanitarian Aid Pneumonia Refugees	Oxfam Africa Climate Change Ebola Food Security Humanitarian Aid Malaria Pneumonia Refugees
Global Fund Africa Children Cholera Ebola HIV/AIDS Malaria Pneumonia Polio Tuberculosis	CDC Children Diarrhea E. Coli Influenza Measles Prevention Vaccines Water Women	EU CDC Ebola Hepatitis HIV/AIDS Influenza Measles Outbreaks Report Surveillance Tuberculosis	NIH Africa Cancer Funding Heart Disease HIV/AIDS News Rare Disease Research Stress	FAO Africa Agriculture Biodiversity Climate Change Families Farmers Fisheries Food Security Forests	UNDP Africa Children Climate Change Education FGM Food Security HIV/AIDS Malaria Water	MSF Africa Children Cholera Ebola HIV/AIDS Humanitarian Aid Refugees Treatment Tuberculosis	PATH Access Africa Breastfeeding Cancer Children Ebola Innovation Malaria Pneumonia	Save the Children Africa Children Donations Education Food Security Humanitarian Aid Pneumonia Refugees Schools	Oxfam Africa Climate Change Ebola Food Security Humanitarian Aid Malaria Pneumonia Refugees Water

Additionally, we model a network map from the priorities generated using the LDA topic model also using the Fruchterman-Reingold algorithm. This network map visualizes the similarities in priorities between the 20 actors. Data used for this network map can be found in Supplementary Table 4. This network map is compared with the network map generated using financial data from IHME in the findings section. This comparison between network maps can illustrate if priorities from tweets and from financial data are aligned. Further details on LDA and network maps can be found in Supplemental Methods.

Testing if GHG operates under the RAM

By combining evidence for stated and revealed priorities of 20 key global health actors, we can determine if GHG operates under the RAM.

The rational actor model (RAM) in international cooperation is categorized as the "linchpin of foreign policy decision making."[37] This approach is rooted in expected utility theory in microeconomics introduced by von Neumann and Morgenstern in the 1940s and subsequent theories of rationality.[38]

RAM is most useful in explanations of economic behavior if the three conditions of the rationality assumption are fulfilled.[37] First, it is assumed that an actor's goal is predetermined before intentionally acting to achieve it.[37] Second, actors are assumed to "display consistent preferences as manifested in the ability to rank the preferences in transitive order."[37] Third, actors are assumed to maximize utility while choosing an alternative that provides the highest amount of net personal benefit.[37]

"Rational" in this case does not simply mean a dispassionate calculation of costs and benefits. In the case of global health actors, acting rationally means weighing both economic and political factors, and acting according to the three assumptions of RAM.

"To maximize utility" in this study refers to maximizing the net personal benefits however defined by the health actor. It can be defined as financial benefits, ethical benefits such as equity, or however else the health actor defines their utility.

GHG operates under RAM if each of the 20 global health actors and the global health system collectively fulfill the three assumptions of pre-determined goal, rank order preferences, and benefit maximization.

To test the first assumption of pre-determined goal, we determine the stated priorities of each global health actor from policy documents. We test whether there exist explicit statements on goals and priorities and note what health areas or issues are the stated priorities of each global health actor.

To test the second assumption of consistent rank order preferences, we compare revealed priorities from DAH funding data and revealed priorities from tweets. From the funding data, we can determine rank order preferences based on which health issues are allocated the most funding in 2019. From tweets, we can determine rank order preferences based on the top 10 topics each global health actor tweeted about from 2016 to 2020. If there is consistency in rank order preferences between the revealed priorities from funding data and revealed priorities from tweets, then the second assumption is fulfilled.

To test the third assumption of benefit maximization, we compare the stated and revealed priorities from all three data sources. The priorities that are consistent across stated priorities from policy documents and revealed priorities from funding data and from tweets are revealed to be the priority that the global health actor determines to be benefit maximizing. An alignment of a preference across the three different sources can lead us to believe with some certainty that it is the actor's benefit-maximizing preference. While indirect, we believe this method of determining benefit-maximizing preference is the best method given the available data.

We also test the three assumptions at the global health system level. Pre-determined goals are obtained from stated priorities from collective stated commitments to global health based on Sustainable Development Goal 3 (SDG3) of "good health and well-being" as all 20 of the actors in this study have stated commitments to this goal.

Consistent rank order preferences are derived from the alignment between aggregated DAH funding allocations of all global health actors and the most common topics generated from tweets across all global health actors. The consistent preferences across stated and revealed priorities are inferred to be the global health systems' benefit-maximizing preference.

If each global health actor and the global health system collectively fulfill the three assumptions, then GHG operates under the RAM.

Characterizing power dynamics in GHG

We use the following typology of power when characterizing power dynamics in GHG. "Power is exercised everywhere in global health although its presence may be more apparent in some instances than others,"[39] one global health researcher notes. The power concept in global health does not stray far from Robert Dahl's (1957) definition in his seminal study where he describes "A has power over B to the extent that he can get B to do something B would not otherwise do."[40] One way to categorize power is through the four types introduced by Barnett and Duvall (2005), each manifesting in different manners in global health.[41] Supplementary Table 5 summarizes Barnett and Duvall's four types of power. First, compulsory power is defined as "direct control of one actor over the conditions of existence or the actions of another."[41] In global health, compulsory power can be seen in how donor countries dictate the conditions in low and middle-income countries (LMICs) through development aid. [42] Second, institutional power is "the control actors exercise indirectly over others through diffuse relations of interactions."[41] High-income countries control funding allocations for LMICs through institutional power via their contributions to multilateral organizations. Third, structural power refers to the "constitution of subjects' capacities in direct structural relation to one another."[41] The structural and historical disempowerment of indigenous populations have resulted in their disproportionate outcomes in health.[43,44] Fourth, "productive power works through diffuse constitutive relations to produce the situated social capacities of actors." [40] Research institutions funded by high-income countries direct what health issues are studied and addressed.[45]

To characterize the power dynamics in GHG, we analyze the interplay of stated and revealed priorities between funding organizations, channels of DAH, and implementing organizations. Particularly, we identify which global health actors have the most influence in setting global health priorities. The global health actors which have the most priorities aligned with the stated and revealed priorities of the global health system are determined to have the most influence and power in priority-setting.

DISCUSSION

GHG operates under RAM

As seen in Supplementary Table 1, we find that each of the 20 key global health actors fulfills the three assumptions of the RAM. Each actor has a pre-determined goal stated in policy documents, annual reports, and official websites. Each actor has consistent rank order preferences as observed in the alignment of order of preferences in DAH

funding data and top identified topics from tweets. Consistent, top-ranking preferences across policy documents, funding data, and tweets are the alternatives that maximize benefits for each global health actor based on their pre-determined goal.

As an example, USAID's pre-determined goal is "advancing American security and prosperity" through providing aid in the health areas of child and maternal health, HIV/AIDS, malaria, and tuberculosis as found on their official website.[46] In 2019, 49% of aid from USAID support HIV/AIDS, 22% supported child and maternal health, and 7% to malaria.[47] The topic modelling for USAID's tweets shows that HIV/ADIS, child and maternal health, and maternal health, and maternal health, and maternal health, and malaria are the top themes tweeted about by the organization from 2016-2020 (See Supplementary Table 1). USAID behaves under the RAM since their revealed priorities from past funding behavior and from tweets align with their predetermined goal.

As shown in the last row of Supplementary Table 1, we find that the global health system collectively fulfills the three assumptions of the RAM. The pre-determined goal of the global health system can be found in the WHO constitution and the 9 target areas for SDG3 on good health and well-being. All 20 global health actors have stated commitments to the WHO mission and the SDGs. The alignment of DAH funding allocations and most common health issues from Twitter reveal that in terms of rank order, HIV/AIDS, child health, and maternal health are the top 3 priorities of the global health for all" and "SDG3: good health and well-being", the global health system prioritizes HIV/AIDS, child health, and maternal health. Among all 9 stated targets in SDG3, only these three issues are prioritized. Effectively, the 6 other stated targets in SDG3 are deprioritized and underfunded by the global health system.

Since each global health actor and the global health system collectively fulfills the three assumptions, we find that GHG operates under the RAM. This finding demonstrates that each global health actor operates based on their rational self-interest and that the global health system pursues only some pre-determined health priorities. Who determines which priorities are pursued by the global health system? The findings on power dynamics in GHG reveal the actors who determine global priorities.

Compulsory and institutional power asymmetries in GHG

As demonstrated in the following network maps, we find that there is compulsory and institutional power asymmetry in GHG.

Compulsory power asymmetry can be found in how funding organizations strongly influence channels of DAH and implementing institutions based on their relationship. Channels of DAH and implementing institutions rely on funding organizations for resources to continue operating. We find that the top priorities of the 3 funding organizations in this study are also the priorities of channels of DAH and implementing institutions.

[INSERT FIGURE 1 HERE]

As seen in Figure 1, HIV/AIDS is 1st priority of United States Agency for International Development (USAID), 2nd priority of United Kingdom Department for International Development (UK-DFID), and 2nd priority of the Bill and Melinda Gates Foundation

(BMGF) based on the alignment of stated and revealed priorities. HIV/AIDS is a priority of 4 of 8 channels of DAH and 4 of 9 implementing institutions based on its presence in policy documents, DAH funding, and tweets of each actor.

Figure 1 also demonstrates that maternal and child health is 2nd priority of USAID, 1st priority of UK-DFID, and 1st priority of BMGF based on the alignment stated and revealed priorities. Maternal and child health is a priority of 6 of 8 channels of DAH and 7 of 9 implementing institutions based on its presence in policy documents, DAH funding, and tweets of each actor.

[INSERT FIGURE 2 HERE]

Following the flow of the funding in Figure 2 and the similarities in tweets in Figure 1, we can see that institutional power asymmetry can be found in how funding organizations strongly influence implementing institutions through outsized influence of channels of DAH that allocate funding to these implementing institutions. As some implementing institutions do not get direct funding from funding organizations, but through channels of DAH, their funding is controlled by channels of DAH. Because wealthy funding organizations influence the priorities of channels of DAH, transitively, funders have power over implementing institutions. Implementing institutions in turn align their priorities with the priorities of channels of DAH, and transitively with the priorities of funding organizations.

Both network analyses of revealed priorities from DAH funding data and from tweets show how there is asymmetric levels of power held by the United States, United Kingdom, and the Gates Foundation. Figure 2 reveals how these three funding organizations are the largest funders of the Global Fund, WHO, World Bank, US Foundations, UN organizations, and Gavi. The IHME DAH database reveals that 24% of all DAH funding was allocated to HIV/AIDS, 21% to child health, and 12% to maternal health – the three top priorities of funding organizations.[16] Only 14% was allocated to health system strengthening and 2% to non-communicable diseases.[16]

Figure 1 reveals how the most common topics generated across all global health actors include Africa, HIV/AIDS, child health, women health, and infectious diseases. These are the same health issues highly prioritized by the United States, United Kingdom, and Gates Foundation. Comparing figures 1 and 2, we find that these three funding organizations have outsized influence in priority-setting because of how much DAH funding these three organizations have provided relative to other funders. We find that the priorities from 2016 to 2020 documented through the tweets of actors align with these funders' priorities of HIV/AIDS, child health, maternal health, infectious disease, and Africa. This outsized influence of global health funders limits the range of funded programs and policies, especially making it difficult for smaller implementers to fund local programs and policies that do not neatly align with the priorities of large funders.

Limitations

It is necessary to acknowledge the limitations of this study. First, we assume stated priorities match what is specified in organizational documents. It may be the case that some organizations communicate priorities differently from what is written in their foundational documents. Moreover, what is fundable may not necessarily be what is

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deemed important. Second, we assume that health funding is indeed spent on what it is ostensibly spent on when deriving revealed preferences from funding data, which may not always be true. Third, our scope is limited to examining 20 global health actors from 2016 to 2020. There are non-health actors and processes that likely influence health outcomes. Studying the stated and revealed priorities of non-health actors and processes such as foreign relations between nations and the influence of the private sector on health can improve the characterization of current GHG. Fourth, tweets may only reveal priorities that the actor wants to communicate. As organizations have teams that plan communications, priorities derived from Twitter may be limited and not reveal all priorities. While what happens behind closed doors in GHG is unknowable, tweets can reveal some of the implicit priorities of actors. Fifth, we derived benefit-maximizing preferences by identifying consistently top-ranking preferences across stated priorities from policy documents and revealed preferences from tweets and funding data. This manner of identifying benefit-maximizing preferences is indirect and does not necessitate that it is indeed what the actor believes is a benefit-maximizing preference. To be certain about what is benefit-maximizing can only be done by directly asking health actors. However, even within organizations, there are inconsistencies about what members think are benefit-maximizing. We acknowledge this indirect manner of deriving benefit-maximizing priorities is a limitation.

CONCLUSION

We find empirical evidence at the global level showing that GHG operates under the RAM. Additionally, we find that at the global level, there is asymmetric compulsory and institutional power held by funding organizations, allowing global health priorities to be largely influenced by large funders. In the past years, these funders have been the United States, United Kingdom, and the Gates Foundation.

We find that there is a correlation between the priorities of large funders and the priorities of channels of DAH and implementing institutions. This correlation in conjunction with GHG operating under the RAM and the asymmetric power held by funders raises issues. What is worrying is that GHG under the RAM grants large funders majority of the power to determine where GHG resources go, and ultimately influencing outcomes. Effectively, this limits the range of health issues that are adequately funded. Additionally, if outcomes are unfavorable, funding organizations do not have full accountability even if they have outsized influence in GHG priority-setting. It is an issue that implementing organizations, especially smaller local organizations, who have the closest relationship with target populations, have little to no say in how resources are distributed in GHG under the RAM. GHG under the RAM can only lead to equitable health outcomes if and only if major funding organizations have a joint commitment towards the same goals of health equity and justice. If funders set priorities that is grounded on equity and justice, then it would be good for all actors to adhere to the RAM and seek funding by aligning their priorities with funder priorities. In this situation, all actors' individual goals will be aligned with the funding organizations' goals of equity and justice. These findings are aligned with current literature discussing how "philantrocapitalists" and large funders have an outsized influence on global health agenda-setting even without having an ethical framework for decision-making.[48,49]

Our paper complements the current research on agenda-setting in global health, which discusses of how agenda-setting is not purely a rational deliberation of evidence but the convergence of problems, solutions, and political developments.[50] This study attempts to deepen the understanding power's manifestation and influence in agenda-setting through the lens of stated and revealed priorities.

The priorities of funders of HIV/AIDS, child health, and maternal health have been prioritized from 2016-2020. While we have seen improvements in these three areas, the existence of significant and severe preventable health inequalities demonstrates that this prioritization architecture does not necessarily promote equity and justice in global health. Additionally, other core health issues such as horizontal health system improvements were not found to be prioritized which may have affected the persistence of health inequities. We have empirical evidence supporting the arguments that current GHG operates under the RAM, and existing power asymmetries limit the range of choice for health policies and programs that aim to reduce inequities.

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Ethics approval: The study did not have any human or animal participants. Additionally, the study did not require ethical approval as the Twitter data used were already in the public domain.

Data and materials availability: Under the "Content Redistribution" section of Twitter's Developer Agreement and Policy, "We restrict the redistribution of Twitter Content to third parties. If you provide Twitter Content to third parties, including downloadable datasets or via an API, you may only distribute Tweet IDs, Direct Message IDs, and/or User IDs." Because the data collected using the Twitter API does not allow for redistribution under the Twitter Developer Agreement and Policy, tweets cannot be made publicly available. Only Tweet ID's and User ID's are allowed to be redistributed according to the Twitter policy. Please email jenpr@upenn.edu if you wish to receive a copy of the Tweet ID's and User ID's of the data and/or the code used in the study. The IHME DAH Database can be found at http://ghdx.healthdata.org/record/ihme-data/development-assistance-health-database-1990-2019

FIGURE LEGENDS

Figure 1. Network Analysis of Revealed Priorities from Tweets. Line thickness represents how many similar priorities one global health actor has with another. Font size of global health priorities represent the number of organizations have it as a priority. Data used found in Supplementary Table 4.

Figure 2. Network Analysis of Revealed Priorities from Funding for DAH (2019). Line thickness represents the amount of funding for health that was transferred between two actors. Font size represents the total amount of funding for health donated or received in 2019.

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7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 9 40 41 42 43 43 44 45 46 47 47 48 49 40 41 40 40 40 40 40 40 40 40 40 40	49 50	the Setting(s) of the International/Global Health Agenda. <i>Hypothesis</i> 2014; 12 . McGoey L. Philanthrocapitalism and its critics. <i>Poetics</i> 2012; 40 . doi:10.1016/j.poetic.2012.02.006 Shiffman J. Agenda Setting in Public Health Policy. In: <i>International Encyclopedia of Public Health</i> . 2016. doi:10.1016/B978-0-12-803678-5.00007-2
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Figure 1. Network Analysis of Revealed Priorities from Tweets. Line thickness represents how many similar priorities one global health actor has with another. Font size of global health priorities represent the number of organizations have it as a priority. Data used found in Supplementary Table 4.

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27	Figure 2. Network Analysis of Revealed Priorities from Funding for DAH (2019). Line thickness represents
28	the amount of funding for health that was transferred between two actors. Font size represents the total
29	amount of funding for health donated or received in 2019.
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Supplemental Material

Supplementary Table 1. Evidence and Testing RAM by Actor. Evidence for stated and revealed priorities and testing of RAM for each actor and the global health system as a whole. Light red indicates funding organization, blue indicates channel of DAH, yellow indicates implementing institution, and dark red indicates global health system as a whole.

		Evidence		Testing	Assumptions of R	AM	
	Stated Priorities from Policy Documents	Revealed Priorities from DAH Data	Revealed Priorities from Tweets	Pre-determined goal?	Consistent preferences?	Utility maximizing?	Operates under RAM?
USAID	Documents "On behalf of the American people, we promote and demonstrate democratic values abroad, and advance a free, peaceful, and prosperous world. In support of America's foreign policy, the U.S. Agency for International development leads the U.S. Government's international development and disaster assistance through partnerships and investments that save lives, reduce poverty, strengthen democratic governance, and help people emerge from humanitarian crises and progress beyond assistance." "For over 50 years, USAID's global health programs have saved lives, protected people most vulnerable to disease, and promoted the stability of communities and nations, while advancing American security and prosperity. America is safer and stronger when people can live healthy and productive lives and when nations around the world are self-reliant and resilient." (USAID Website) Health Focus Area (USAID Website) • Child and maternal death • HIV/AIDS • Malaria • Tuberculosis	trom DAH Data Health Focus Area 49.0% of 2019 US DAH (\$6.0 billion) supported HIV/AIDS; 7.0% (\$862.5 million) supported malaria; 11.4% (\$1.4 billion) was disbursed for child health, and 10.8% (\$1.3 billion) went to maternal health. Region In 2017, the most recent year for which regional DAH estimates are available, the US directed much of its resources to sub- Saharan Africa, sending 50.5%, or \$6.9 billion, of 2017 DAH. Channel The US provided 59.2% of its funding in 2019 through its own bilateral agencies, including the United States Agency for International Development (USAID), the President's Malaria Initiative (PMI), and PEPFAR. UN agencies received 6.2% of US DAH in 2019, or \$761.4 million, up 9.0% from 2018, and the Global Fund received \$636.5 million, down 25.8%. NGOS received 26.8% of US DAH in 2019, or \$3.3 billion.	Trom Tweets Topics from 2016-2020 Tweets (no order) Africa Children Education Food Security HIV/AIDS Humanitarian Aid Mothers South America Water Women	goal? National security National interests Global health focus: Child and maternal health, HIV/AIDS, malaria, tuberculosis	Preferences? HIV/AIDS, child and maternal health, and Africa are consistent across DAH data and tweets	maximizing? HIV/AIDS, child and maternal health are consistent across stated and revealed priorities. To maximize benefits for national security and interests, USAID prioritizes HIV/AIDS and child and maternal health in Africa.	Yes
UK DFID	"We pursue our national interests and project the UK as a force for good in the world. We promote the interests of British citizens, safeguard the UK's security, defend our values, reduce poverty and tackle global challenges with our international partners." (UK FCDO, formerly DFID website) "We are responsible for: 1. honouring the UK's international commitments and taking	Health Focus Area Reproductive, maternal, newborn, and child health was the focus of \$1.4 billion (38.5%) of the UK's DAH in 2019, followed by HIV/AIDS with \$553.9 million (15.8%). Region By GBD super- regions, the UK contributed \$1.3 billion, or 37.3% of tis 2017 DAH, to sub-	I opics from 2016-2020 tweets (no order) Africa Agriculture Children Development Ebola Education Food Security HIV/AIDS Humanitarian Aid Water	National interests National security Global peace, security, and governance; Crisis response and resilience; Global prosperity; Extreme poverty and helping most vulnerable; Value for money	Child and maternal health, HIV/AIDS, and Africa are consistent across DAH data and tweets.	Child and maternal health, HIV/AIDS, and Africa are consistent across stated and revealed priorities. To maximize benefits for national security and interests, UK DFID prioritizes child and maternal	Yes

	 action to achieve the United Nations' Global Goals making British aid more effective by improving transparency, openness and value for money targeting British international development policy on economic growth and wealth creation improving the coherence and performance of British international development policy in fragile and conflict- affected countries improving the coherence and performance of British international development policy in fragile and conflict- affected countries improving the lives of girls and women through better education and a greater choice on family planning preventing violence against girls and women in the developing world helping to prevent climate change and encouraging adaptation and low-carbon growth in developing countries strengthening resilience and response to crisis promoting global peace, security and governance strengthening resilience and response to crisis promoting global prosperity tackling extreme poverty and helping the world's most vulnerable delivering value for money" 	Saharan Africa; §301.0 million (8.7%) to South Asia; §163.9 million (4.7%) to Southeast Asia, East Asia, and Oceania; §237.9 million (6.9%) to North Africa and the Middle East; and §41.0 million (1.2%) to Central Europe, Eastern Europe, and Central Asia. Channel Of the UK's 2019 DAH, §990.3 million (28.2%) was Channeled to UK bilateral agencies; §524.6 million (14.9%) to UN agencies; §306.4 million (23.3%) to the Global Fund.				health and HIV/AIDS in Africa.	
BMGE	delivering value for money" (UK DFID About Page) "Strategic Investments, We	Health Focus Area	Topics from 2016-2020	Strategic	Child and	Child and	Yes
	artner with entrepreneurs, companies, and other organizations to create incentives that harness the power of private enterprise to create change for those who need it most." (BMGF: how we work) Global development. "Our Global Development Division focuses on improving the delivery of high-impact health	In 2019, the Gates Foundation directed \$1.5 billion, or 38.3%, of its DAH to reproductive, maternal, newborn, and child health; \$709.3 million, or 18.1%, to HIV/AIDS; \$303.9 million, or 7.8% to malaria; \$237.6 million, or 6.1%, to	Africa Breastfeeding Children Education HIV/AIDS Malaria Mothers Polio Sanitation Women	investments private enterprise solutions for most disadvantaged; High-impact health products and services to world's poorest Stated global development areas: Emergency	maternal health, HIV/AIDS, malaria, and Africa are consistent across DAH data and tweets.	maternal health, HIV/AIDS, malaria, and Africa are consistent across stated and revealed priorities. To maximize returns of their strategic	

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	 products and services to the world's poorest communities and helps countries expand access to health coverage. Areas: Emergency Response, Family Planning ,Global Delivery Programs, Global Libraries, Maternal, Newborn & Child Health, Nutrition, Polio" (BMGF: our work) Global health. "Our Global Health Division aims to reduce inequities in health by developing new tools and strategies to reduce the burden of infectious disease and the leading causes of child mortality in developing countries. Areas: Discovery & Translational Sciences, Enteric and Diarrheal Diseases. HIV, Innovative Technology Solutions, Institute for Disease Modeling, Integrated Development, Malaria, Maternal, Newborn & Child Health, Discovery & Tools, Neglected Tropical Diseases, Pneumonia Tuberculosis, Vaccine Development and Surveillance" (BMGF: our work) 	tuberculosis; \$266.5 million, or 6.8%, to health systems strengthening; and \$72.4 million, or 1.9%, to non- communicable diseases. Region In 2017, the Foundation provided 41% of its DAH to global recipients and programs and 18% to sub- Saharan Africa. Channel The Gates Foundation's 2019 DAH total of \$3.9 billion was an increase of 9.9% from 2018. Of this, \$2.5 billion or 64.0% was channeled through the Gates Foundation directly to implementing institutions. In 2019, \$266.8 million (7%) in Gates Foundation DAH went to UN agencies, \$256.9 million (7%) went to the Global Fund, and \$406.1 million (10%)		Response, Family Planning, Global Delivery Programs, Global Libraries, Maternal, Newborn & Child Health, Nutrition, Polio Stated global health areas: Discovery & Translational Sciences, Enteric and Diarrheal Diseases. HIV, Innovative Technology Solutions, Institute for Diseases Modeling, Integrated Development, Malaria, Maternal, Newborn & Child Health, Discovery & Tools, Neglected Tropical Diseases, Pneumonia Tuberculosis, Vaccine Development and Surveillance		investments, BMGF prioritizes child and maternal health, HIV/AIDS, and malaria in Africa.	
WHO	 "Health for all. Ensuring universal health coverage without impoverishment is the foundation for achieving the health objectives of the Sustainable Development Goals – because when people are healthy, their families, communities and countries benefit. Our top priority must be to support national health authorities' efforts to strengthen all the building blocks of health systems and to enact policies aimed at ensuring health care is equitable and alfordable for all. Health emergencies. In today's interconnected world, public health emergencies can affect anyone, anywhere – and the Ebola crisis in West Africa showed us the dangers of being unprepared. The development of resilient and robust global and local health systems capable of preventing, monitoring, detecting and responding to public health emergencies must therefore be a key priority, closely linked to our efforts to achieve universal health coverage. Women, children and adolescents. We cannot achieve the ambitious health and development targets in the Sustainable Development Goals unless we secure the health, dignity and rights of women, children and adolescents. Yet, in too many places, gender gaps, harmful cultural and social practices and gender-based violence are negatively impacting these individuals. Because of that, 	Health Focus Area WHO provided \$2.5 billion of DAH in 2019, down 1.2% from 2018. Of this, \$630.7 million or 24.9% was disbursed to other infectious diseases and \$1.0 billion or 39.8% to health systems strengthening. Region DAH data for the WHO in 2019 have unallocated or unspecified regions.	Topics from 2016-2020 tweets (no order) Africa Breastfeeding Children Ebola HIVA/AIDS Malaria Measles Mothers Polio Women	Universal health coverage, health systems strengthening, health equity, health equity, health equity, climate and environmental impacts on health, improved WHO governance	Infectious diseases (ebola, HIV/AIDS, malaria, measles, polio) are consistent across DAH data and tweets.	Infectious diseases (ebola, HIV/AIDS, malaria, measles, polio) are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of health for all, WHO prioritizes on infectious diseases like Ebola, HIV/AIDS, malaria, measles, and polio.	Yes

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3		we must put the well-being of						
4		women, children and						
r		adolescents at the centre of global bealth and						
2		development.						
6		The health impacts of climate						
7		and environmental change.						
8		change impact many aspects						
0		of life that are inextricably						
9		linked to health – food						
10		air safety and water and						
11		sanitation systems – and WHO						
12		estimates that 12.6 million						
12		result of living or working in						
13		an unhealthy environment. To						
14		address this, WHO has a key role to play advancing both						
15		mitigation and adaptation						
16		strategies for climate and						
17		environmental change,						
17		with other UN agencies and						
IŎ		stakeholders.						
19		A transformed WHO. Building	~~					
20		transparent and accountable	· · ·					
21		agency will require striking a						
 วว		balance between bold reform						
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23		evolving needs and challenges						
24		game-changing, sustainable						
25		results, WHO will need to						
26		focus its work where it has the						
27		intensify its engagement						
27		across stakeholders, attract						
28		more predictable, flexible						
29		and retain the best global						
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30		talent." (WHO Priorities)						
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30 31 32 33 34 35 36	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face.	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed 51.1 billion of DAH in		ien	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of	Yes
30 31 32 33 34 35 36 37	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face.	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018 The		ien	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined	Yes
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30 31 32 33 34 35 36 37 38 20	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction		ien	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and	Yes
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30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Finance Human Development and Gender.	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$1.1 billion of DAH un	Topics from 2016-2020	End poverty and boost prosperity through sustainable economic growth, investing in	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Finance Human Development and Gender Private Sector	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$11.1 billion of DAH, up 25.4% from 2018.	Topics from 2016-2020 tweets	End poverty and boost prosperity through sustainable economic growth, investing in people, and	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Human Development Development Evelopment	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$11.1 billion of DAH, up 25.4% from 2018. Funds were targeted	Topics from 2016-2020 tweets (no order)	End poverty and boost prosperity through sustainable economic growth, investing in people, and building resilience	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Human Development Development Private Sector Development Public Sector Management	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$11.1 billion of DAH, up 25.4% from 2018. Funds were targeted at reproductive, maternal. newhorn	Topics from 2016-2020 tweets (no order) Africa	End poverty and boost prosperity through sustainable economic growth, investing in people, and building resilience to shocks and threats:	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending poverty and boosting prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
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30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56	World Bank	talent." (WHO Priorities) "The World Bank Group works in every major area of development. We provide a wide array of financial products and technical assistance, and we help countries share and apply innovative knowledge and solutions to the challenges they face. Three priorities guide our work with countries to end poverty and boost prosperity for the poorest people. Helping create sustainable economic growth, investing in people and building resilience to shocks and threats that can roll back decades of progress. Themes Economic Policy Environment and Resource Development Finance Human Development Private Sector Development Social Development Social Development Nerdetiona Rural Development (World Bank Annual Report	Health Focus Area Focused on ending poverty in the world's poorest countries, the World Bank's International Development Association (IDA) disbursed \$1.1 billion of DAH in 2019, down 33.9% from 2018. The International Bank for Reconstruction and Development (IBRD) is a global development cooperative owned by 189 countries. As "the world's largest development bank," the IBRD helps countries reduce poverty and extend the benefits of sustainable growth to all people. In 2019, the IBRD disbursed \$11.1 billion of DAH, up 25.4% from 2018. Funds were targeted at reproductive, maternal, newborn, and child health; vaccination programs; infectious diseases; and NCDs. Region 27.6% of DAH disbursed by	Topics from 2016-2020 tweets (no order) Africa Agriculture Children Climate change Food security Humanitarian aid Poverty Sanitation Water	End poverty and boost prosperity through sustainable economic growth, investing in people, and building resilience to shocks and threats; Maternal and child health, health emergencies, nutrition, infectious diseases, tobacco control, mental	Child and maternal health and Africa are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize the benefits of their pre- determined goal of ending prosperity for the poorest people, the World Bank prioritizes on child and maternal health issues in Africa.	Yes
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	"World Bank Health Focus Areas: 1. Women and children's health 2. Health emergencies 3. Nutrition 4. Infectious diseases 5. Tobacco control 6. Mental health" (World Bank Health Focus Areas)	as group went to sub-Saharan Africa and 20.5% to North Africa and the Middle East.					
UNAIDS	 "Strategic leadership agenda In the light of the need for change, this Strategy seeks to achieve a set of far-reaching and people-centred goals and targets that must be met by 2020 if we are to reach our 2030 ambition of ending the AIDS epidemic. The goals correspond to each of the three strategic directions, and include achieving by 2020: Fewer than 500 000 people newly infected with HIV Fewer than 500 000 people dying from AIDS-related causes Elimination of HIV-related discrimination" (UNAIDS 2016- 2021 Strategy) 	Health Focus Area UNAIDS is leading the global effort to end AIDS as a public health threat by 2030. In addition, the agency is working toward its 2020 90-90-90 targets: for 90% of people living with HIV/AIDS to know their status; for 90% of those diagnosed with infections to receive antiretroviral treatments; and for 90% of patients receiving antiretroviral therapy to have viral suppression. In 2019, the agency disbursed \$207.3 million, up 1.7% from 2018. The top five contributors to UNAIDS in 2019 were the US, Sweden, the Netherlands, the UK, and Norway. Region DAH data for UNAIDS in 2019 have unallocated or	Topics from 2016-2020 tweets (no order) Access Africa Discrimination HIV/AIDS Human Rights Innovation Prevention Testing Treatment Women	Ending the AIDS epidemic by 2030.	HIV/AIDS prevention, testing, and treatment is consistent across DAH data and tweets.	HIV/AIDS prevention, testing, and treatment are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of ending the AIDS epidemic by 2030, UNAIDS focuses on HIV/AIDS prevention, testing, and treatment.	Yes
UNFPA	"Our goal is to achieve universal access to sexual and reproductive health, realize reproductive rights, and reduce maternal mortality to accelerate progress on the agenda of the Programme of Action of the International Conference on Population and Development (ICPD), to improve the lives of women, adolescents and youth, enabled by population dynamics, human rights and gender equality. Priority Areas • Sexual and reproductive health services and reproductive rights • Adolescent and youth empowerment • Gender equality and women's empowerment • Population data for development" (UNFPA Strategic Plan)	Health Focus Area The United Nations Population Fund (UNFPA) is the United Nations' sexual and reproductive health agency. UNFPA's programs include the Maternal and Newborn Health Thematic Fund, focused on preventing maternal deaths through strategic interventions. Training midwives and ending fistula, a childbirth injury caused by prolonged obstructed labor, are also part of the Maternal and Newborn Health Thematic Fund. In 2019, UNFPA disbursed \$1.1 billion in DAH, down 1.7% from 2018. Of this, UNFPA received \$466.8 million, or 43.8%, from	Topics from 2016-2020 tweets (no order) Africa Child Marriage Children Family planning FGM Human Rights Humanitarian Aid Nutrition Violence Women	Universal access to sexual and reproductive health, reproductive rights, maternal mortality, child health	Sexual and reproductive health, and maternal and child health are consistent across DAH data and tweets.	HIV/AIDS prevention, testing, and treatment are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of ending the AIDS epidemic by 2030, UNAIDS focuses on HIV/AIDS prevention, testing, and treatment.	Yes

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		2018, the US withheld funding from UNFPA for the third year in a row under the Kemp- Kasten amendment. <u>Region</u> DAH data for UNFPA in 2019 have unallocated or unspecified regions.					
UNICEF	 "Vision: Realizing the rights of every child, especially the most disadvantaged. Goal areas: Every child survives and thrives Every child learns Every child is protected from violence and exploitation Every child lives in a safe and clean environment Every child has an equitable chance in life" (UNICEF Strategic Plan 2018-2021) 	Health Focus Area UNICEF provides long-term humanitarian and development assistance to children and mothers, with a specific focus on nutrition, immunization, and HIV/AIDS, as well as emergency (i.e., pandemic) assistance. UNICEF disbursed \$2.6 billion in DAH in 2019, up 12.5% from 2018. Private philanthropies provided UNICEF with \$519.3 million, or 19.8% of its funding in 2019, and the US contributed \$316.9 million, or 12.1%. <u>Region</u> DAH data for UNICEF in 2019 have unallocated or	Topics from 2016-2020 tweets (no order) Africa Breastfeeding Children Climate Change Ebola Education Human Rights Online Violence Water	Realizing the rights of every child, especially the most disadvantaged. Health related: child health, child mortality	Child and maternal health are consistent across DAH data and tweets.	Child and maternal health are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of realizing the rights of every child, UNICEF focuses on child and maternal health.	Yes
UNITAID	 "Unitaid's Strategy for 2017- 2021 is firmly grounded in its Constitution, which states that Unitaid aims to 'contribute to scale up access to treatment for HIV/AIDS, malaria and tuberculosis for the people in developing countries by leveraging price reductions of quality drugs and diagnostics, which currently are unaffordable for most developing countries, and to accelerate the pace at which they are made available.' Innovation, access, and scalability. They guide the design of unitaid's interventions, which Promote innovation. Unitaid connects those who are developing innovations with people who need them the most. Innovation means both using existing commodities in new ways and developing new products and approaches. Catalyze equitable access to better health products. Unitaid leverages its market expertise and its relationships with partners to design a portfolio of projects that will overcome barriers to access to 	unspecified regions. Health Focus Area In 2019, Unitaid disbursed \$154.1 million in DAH, up 35.2% from 2018. Projects Unitaid has been working on include a net program to combat malaria and a program to distribute and promote HIV self- testing kits in Africa. US contributed \$316.9 million, or 12.1%. Region DAH data for UNITAID in 2019 have unallocated or unspecified regions.	Topics from 2016-2020 tweets (no order) Access Cancer Children Hepatitis HIV/AIDS Malaria Testing Treatment Tuberculosis Vaccines	Access to treatment of, affordability of drugs, and innovation in addressing HIV/AIDS, malaria, tuberculosis	Increasing access, testing, and treatment of HIV/AIDS, malaria, and tuberculosis are consistent across DAH data and tweets.	HIV/AIDS, malaria, and tuberculosis are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of scaling up treatment for HIV/AIDS, malaria, and tuberculosis in developing countries, UNITAID prioritizes HIV/AIDS, malaria, and tuberculosis.	Yes

	innovative boalth	1	1	1	1	I	ı
	products						
	Create the right						
	conditions for scale						
	up, so better health						
	products reach all						
	them. From						
	conception through						
	implementation,						
	Unitaid works with						
	that projects						
	transition to scale."						
	(Unitaid Strategy						
<u> </u>	<u>2017-2021</u>)			-			
Gavi	"Our 2016–2020 mission, to				Child health,		Ye
	protect people's health by				infectious		
	increasing equitable use of				diseases, and		
	vaccines in lower-income				Africa are		
	countries, is guided by four				consistent		
	1 Accelerate equitable				data and		
	uptake and				tweets.		
	coverage of						
	vaccines.						1
	 increase effectiveness and 						1
	efficiency of						
	immunisation						
	delivery as an						
	integrated part of strengthened health						
	systems.						
	3. Improve						
	sustainability of	Health Focus Area					
	national	In 2019, Gavi				Child hoalth	
	programmes	billion in				vaccination	
	4. Shape markets for	development				infectious	
	vaccines and other	assistance for health				diseases, and	
	immunisation	to child health				Africa are	
	products.	(94.4% of Gavi				consistent	
	was approved by the Board in	communicable				and revealed	
	June 2014 – the full	disease-related				priorities.	
	implementation of the	programs. Top					
	strategy will see developing	sources of funding	•			To maximize	
	million children saving 5–6	were the Bill &				their pre-	
	million lives in the long term.	Melinda Gates				determined	
	Coverage and equity are at	Foundation, the	Topics from 2016-2020			goal of "saving	
	the core of our current	United States, and	tweets			children's lives	
	strategy. While we continue to	the United Kingdom.	(no order)			by increasing	
	new vaccines, our focus is	Region	Africa			of vaccines in	
	expanding to reach every child	In 2017, 52.6% of	Cancer			lower-income	1
	with these vaccines. With as	DAH disbursed by	Children			countries",	
	many as 20 countries	Gavi went to sub-	Cholera Ebola	Increasing guarall		Gavi prioritizes	1
	financial support in this	25.5% to South Asia	Measles	coverage and		and	1
	period, ensuring that	DAH data for Gavi in	Pneumonia	equity in		vaccination of	
	programmes are sustainable	2019 have	Polio	vaccinating		infectious	1
	in the long term is essential. "	unallocated or	Poverty	children in lower-		diseases in	1
Global	"The Global Fund Strategy	Health Focus Area	Topics from 2016-2020	To end HIV/AIDS	HIV/AIDS	HIV/AIDS	٧e
Fund	2017-2022: Investing to End	In 2019, the Global	tweets	malaria, and	malaria,	malaria,	
	Epidemics outlines our	Fund channeled a	(no order)	tuberculosis	tuberculosis,	tuberculosis,	1
	partnership's bold agenda for	total of \$3.5 billion	A.6.1	epidemics	and Africa are	and Africa are	1
	2017-2022 based on an	to programs	Africa Children		consistent	consistent	1
	epidemics. These four	sources of Global	Cholera		data and	and revealed	1
	strategic objectives are at the	Fund contributions	Ebola		tweets.	priorities.	
	core of the strategy:	were the United	HIV/AIDS				1
	Maximize impact	States, the United	Malaria			To maximize	1
	against HIV, TB, and Malaria	The LIK provided	Prieumonia Polio			benefits of their pre-	1
	Promote and	\$817.1 million or	Tuberculosis			determined	1
	protect human	23.3% to the Global	Women			goal of	1
	rights and gender	Fund in 2019, more				"ending the	1
	equality	than any other				epidemics",	1
	 Mobilize increased 	contributor. The US				the Global Fund	1
	Build resilient and	million or 18.1%				prioritizes	1
	sustainable systems	Japan contributed				child health	1
	for health" (<u>Global</u>	\$442.4 million or				and	1
		12.6% and Germany	1	1	1	vaccination of	1

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	Fund Strategy 2017-	contributed \$396.7				infectious	
	<u>2022</u>)	million or 11.3%.				diseases in Africa.	
		50.4% of funding were allocated to					
		address HIV/AIDS, 31.7% to Malaria					
		and 17.8% to					
		Tuberculosis.					
		<u>Region</u> In 2019, 72,7% of					
		DAH disbursed by					
		went to sub-Saharan					
		Africa and 10.5% to Southeast Asia. East					
		Asia, and Oceania.					
		Global Fund in 2019					
		have unallocated or unspecified regions.					
CDC	"CDC's Strategic Framework	Health Focus Area	Topics from 2016-2020	National security	Protecting	HIV/AIDS,	Yes
	capabilities that enable the	Americans from	(no order)	diseases	infectious	tuberculosis,	
	agency's three strategic priorities, all united behind	Infectious Diseases at Home and Abroad	Children	Securing global	diseases is consistent	and Africa are consistent	
	one mission: protect	(\$3.0 billion)	Diarrhea	health and	across DAH	across stated	
	security. Our work is	Leading Causes of	L. COII Influenza	preparedness	tweets.	priorities.	
	underscored by the agency's Pledge to the American	Disease, Disability, & Death (\$2.0 billion)	Measles Prevention			To maximize	
	People.	Protecting	Vaccines			benefits of	
	Securing global health	Natural Disasters,	Women			determined	
	and America's preparedness	Terrorist Threats, Environmental &	Zika			goal of "protecting	
	By stopping the spread of	Occupational				America's	
	pandemic	Monitoring Health &				and security",	
	contagions, addressing	Ensuring Laboratory Excellence (\$496				the CDC prioritizes	
	public health terror	million) Cross-cutting				infectious disease	
	threats, and	Support & PHHS				protection in	
	protecting people from	Block Grant & Buildings & Facilities	6			the US and globally.	
	vector-borne diseases.	(\$357 million)					
	Eliminating disease	Region					
	controlling	global					
	vaccine- preventable						
	disease,						
	Hepatitis C,						
	and reducing the maternal						
	mortality						
	Ending epidemics						
	 Such as HIV, decreasing 						
	opioid overdoses.						
	improving						
	and						
	interventions to stem						
	seasonal						
	developing						
	and deploying						
	new answers						
	resistance,						
	and reducing new						
	incidents of diabetes						
	Core Capabilities						
	 World-class data and analytics 						
	 State-of-the-art laboratory capacity 						
	aboratory capacity	1	1	1	1	1	

	 Elite public health expertise Responding to outbreaks at their source Global capacity and domestic preparedness" (CDC Strategic Framework) 						
EU CDC	 ""ECDC is an EU agency aimed at strengthening Europe's defences against infectious diseases. The core functions cover a wide spectrum of activities: surveillance, epidemic intelligence, response, scientific advice, microbiology, preparedness, public health training, international relations, health communication, and the scientific journal Eurosurveillance. Strategic Work Areas Providing evidence for effective and efficient decision-making: We support efficient public health decisionmaking by providing timely, accurate and relevant information. Support the strengthening of public health systems: We strengthen European capacities and capabilities effectively prevent and control communicable diseases. Support ing response to threats: We support effective health threats detection, assessment 	Health Focus Area All funding is spent on expenses for staff, buildings and equipment, and operations for surveillance, research, and response to infectious disease epidemics. <u>Region</u> European Union and global	Topics from 2016-2020 tweets (no order) Ebola Hepatitis HIV/AIDS Influenza Measles Outbreaks Report Surveillance Tuberculosis West Nile	European security from infectious disease	Infectious disease surveillance, reporting, and research are consistent data and tweets.	Infectious disease surveillance, reporting, and research are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of "strengthening Europe's defences against infectious diseases", the EU CC prioritizes infectious disease surveillance, reporting, and research.	Yes
NIH	 (ECDC Annual Report 2019) "NIH's mission is to seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability. The goals of the agency are: to foster fundamental creative discoveries, innovative research strategies, and their applications as a basis for ultimately protecting and improving health; to develop, maintain, and renew scientific human and physical resources that will ensure the Nation's capability to prevent disease; to expand the knowledge base in medical and associated sciences in order to enhance the Nation's economic well-being and ensure a continued high 	Health Focus Area In 2019, NIH had a \$39.28 discretionary budget. 1. NCI (14.7%) – cancer 2. NIAID (14.1%) – allergy and infectious disease 3. NHLBI (8.9%) – heart, lung, and blood 4. NIA (7.9%) – instate on aging 5. NIGMS (7.3%) – general medical sciences <u>Region</u> United States (with some global research)	Topics from 2016-2020 tweets (no order) Africa Cancer Funding Heart Disease HIV/AIDS News Rare Disease Research Stress Veterans	National security through developing new knowledge in enhancing health and lengthening life.	Research on cancer, HIV/AIDS, heart disease, and rare diseases are consistent across DAH data and tweets.	Research on cancer, HIV/AIDS, heart disease, and rare diseases are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of seeking knowledge to enhance life and ensure the US's capability to prevent disease, the NIH prioritizes research on cancer, HIV/AIDS, heart disease, and rare diseases.	Yes

FAO	 b) to be the highest level of scientific integrity, public accountability, and social responsibility in the conduct of science. In realizing these goals, the NIH provides leadership and direction to programs designed to improve the health of the Nation by conducting and supporting research: in the causes, diagnosis, prevention, and cure of human diseases; in the processes of human growth and development; in the biological effects of environmental contaminants; in the understanding of mental, addictive and physical disorders; and in the understanding of mental, addictive and physical disorders; and in directing programs for the collection, dissemination, and exchange of information in medicine and health, including the development and support of medical libraries and the training of medical libraries and other health information is specialists. "Today, member states face an increasing number of demands and challenges in agricultural development. To support them, FAO has identified five key priorities on which it is best placed to intervene. These priorities, or Strategic Objectives, represent our main areas of work to achieve our vision of a world free from hunger and malnutrition, where food and agriculture help to improve the living standards of all, especially the poorest, in an economically, socially and environmentally sustainable manner – contributing to the implementation of the 2030 Agenda for Sustainable Development. Help eliminate hunger, food insecurity, and fisheries more productive and sustainable Reduce rural poverty Enable inclusive and efficient agricultural food systems Increase the resilience of livelihoods to threats and crises" (FAO Strategic Objectives 2019) 	Health Focus Area All received funding is spent on staffing addressing hunger, food insecurity, malnutrition, and improving resiliency of food systems. Region Funding data for Funding data for FAO in 2019 have unallocated or unspecified regions.	Topics from 2016-2020 tweets (no order) Africa Agriculture Biodiversity Climate Change Families Farmers Fisheries Food Security Forests Water Water	Addressing hunger, food insecurity, and mainutrition through improving food and agricultural systems.	Food insecurity, malnutrition, and food systems are consistent across DAH data and tweets.	Food insecurity, malnutrition, and food systems are consistent across stated and revealed priorities. To maximize benefits of their pre- determined goal of a world free from hunger and malnutrition, the FAO prioritizes eliminating hunger, food insecurity, and malnutrition	Yes
UNDP	"UNDP's Strategic Plan (2018- 2021) has been designed to be	Tot/al budget	Topics from 2016-2020	Poverty	HIV/AIDS,	HIV/AIDS,	Yes

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	responsive to the wide diversity of the countries we serve. The diversity is reflected in three broad development contexts: • Eradicate poverty in all its forms and dimensions • Accelerate structural transformations • Build resilience to shocks and crises To respond to these issues, and better focus its resources and expertise to deliver on the 2030 Agenda, UNDP has identified a set of approaches that we call our Sinostrea	\$5.7 billion budget in 2019 By UNDP focus Eradicating poverty (43%), accelerate structural transformations (32%), build resilience to shocks and crises (11.5%), others (13.2%) By health focus area SDG3 was allotted \$504M (9%) of total budget in 2019 – 55% to HIV/ODS	(no order) Africa Children Climate Change Education FGM Food Security HIV/AIDS Malaria Water Women	accelerate structural transformations, build resilience to shocks and crises SDG 3: Ensure healthy lives and promote well- being for all at all ages (includes: maternal mortality, child mortality, child mortality, HIV/AIDS, tuberculosis, malaria, infectious	child and maternal health are consistent across DAH data and tweets.	child and maternal health are consistent across stated and revealed preferences. To maximize benefits of their pre- determined global health goal of ensuring healthy lives and promoting well heair for
	 that we can our signature Solutions: Keeping people out of POVERTY GOVERNANCE for peaceful, just, and inclusive societies Crisis prevention and increased RESILIENCE ENVIRONMENT: nature-based solutions for development Clean, affordable ENERGY Women's empowerment and GENDER equality In all our activities, we encourage the protection of human rights and the empowerment of women, minorities and the poorest and most vulnerable." (UNDP About us) UNDP is the lead development 	to HIV/AIDS, and malaria (target 3.3), 26% to universal health coverage (target 3.8), 9% to child mortality (target 3.2) <u>Region</u> 23% of 2019 budget was allocated to Africa, 19% to Asia and the Pacific, 18% to Latin America and the Caribbean.		diseases, mental health, substance abuse, road traffic accidents, sexual and reproductive health, universal health coverage, deaths from environmental pollution)		wein-being for all, the UNDP prioritizes HIV/AIDS, malaria, and child and maternal health.
	agency in helping the achievement of the Sustainable Development Goals. SDG 3: Ensure healthy lives and promote well-being for all at all ages. (UNDP: SDGs)		2	R		
MSF	 "Médecins Sans Frontières brings medical humanitarian assistance to victims of conflict, natural disasters, epidemics or healthcare exclusion" (MSF About Us) "Program Priorities Outpatient consultations Birth assistance (including C-section) Cholera treatment Inpatient care Vaccinations against measles Malaria treatment Sexual violence Meningitis treatment Inpatient feeding programs for malnourished children TB treatment HIV ART treatment Mental health services Distribution of relief goods" (International Activity Report 2019) 	Health Focus Area "81% of our financial resources are allocated to fulfilling our social mission: 65% to our humanitarian programmes, 12% to support our projects and programmes, 12% to support our projects and 4% to awareness-raising, the Access Campaign, and the Drugs for Neglected Diseases initiative (DNDi). The rest is spent on general management and fundraising costs. We also maintain reserves that allow us to respond immediately to a crisis without having to wait for an appeal." Funding is allocated mostly to outpatient consultations, malaria treatment, and birth assistance	Topics from 2016-2020 tweets (no order) Africa Children Cholera Ebola HIV/AIDS Humanitarian Aid Refugees Treatment Tuberculosis Violence	Medical humanitarian assistance to victims of conflict, natural disasters, epidemics, or healthcare exclusion.	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across DAH data and tweets.	Humanitarian aid, HIV/AIDS, infectious diseases, and child health are consistent across stated and revealed preferences. To maximize benefits of their pre- determined goal of bringing medical humanitarian assistance to victims of crises, MSF prioritizes humanitarian aid, HIV/AIDS, infectious diseases, and child health.

		Funding data for MSF in 2019 have unallocated or unspecified regions.					
PATH	"At PATH, we are a global team of innovators working to accelerate health equity so all people and communities can thrive. We advise and partner with public institutions, businesses, grassroots groups, and investors to solve the world's most pressing health challenges." (PATH About US) "2019 Achievements Controlling and eliminating malaria Differentiating services for HIV patients Reimagining primary health care Creating innovative devices and diagnostics Maximizing impact through policy Advancing essential medicines Reducing the cost of sanitation and cleaning Expanding access to contraception"	Health Focus Area Of the \$303 million 2019 budget, 48% was allocated to global health programs, 37% to essential medicines, 11% to technology and innovation, 3.5% to other. Region Funding data for PATH in 2019 have unallocated or unspecified regions.	Topics from 2016-2020 tweets (no order) Access Africa Breastfeeding Cancer Children Ebola Innovation Malaria Pneumonia Vaccines	Accelerating health equity Areas: Malaria, HIV/AIDS, primary health care, health innovations, health policy, essential medicines, sanitation, contraceptives	Malaria, vaccines, and innovations are consistent across DAH data and tweets.	Malaria, vaccines, and innovations are consistent across stated and revealed preferences. To maximize benefits of their pre- determined goal of "accelerating health equity", PATH prioritizes malaria, vaccines, and health innovations.	Yes
Save the Children	 (For 100 years, we've been giving children in the U.S. and around the world a healthy start in life, the opportunity to learn and protection from harm. When crisis strikes, we are always among the first to respond and the last to leave. We do whatever it takes to save children, transforming their lives and the future we share." (Save the Children About Us) Focus Areas Health and Nutrition Education Hunger and Livelihoods Public Policy and Advocacy HIV/AIDS Child Protection and Rights Governance (Save the Children Annual Report 2019) 	Health Focus Area In 2019, Save the Children had a budget of \$836 million. • Health & Nutrition (38%) • Education (19%) • Hunger & Livelihoods (13%) • Public Policy & Advocacy (11%) • HIV/AIDS (7%) • Child Protection & Rights Governance (4%) • Other (8%) <u>Region</u> Funding data for Save the Children in 2019 have unallocated or	Topics from 2016-2020 tweets (no order) Africa Children Donations Education Food Security Humanitarian Aid Pneumonia Refugees Schools Water	Health related: "giving children a healthy start", "protection from harm"	Child health, nutrition, and food security are consistent across DAH data and tweets.	Child health, nutrition, and food security are consistent across stated and revealed priorities. To maximize benefits of their pre- determined global health goals of "giving children a healthy start and protection from harm", Save the Children prioritizes child health, nutrition, and food security.	Yes
Oxfam	"Oxfam is a global organization working to end the injustice of poverty. We help people build better futures for themselves, hold the powerful accountable, and save lives in disasters." (About Oxfam) "Across Yemen, Puerto Rico, Bangladesh, Syria, Central America, and Mozambique, among many other places, our work is delivering tangible, measurable impact: providing lifesaving aid, partnering with local organizations to achieve long-term solutions, and using	Health Focus Area Of the \$88 million 2019 budget, 36% was allocated to emergency response and preparedness, 28% to overcoming poverty, 28% to social justice campaigns, 8% to public education. <u>Region</u> Of the budget spent on emergency response and preparedness, 40% was allocated to Africa, 24% to Latin	Topics from 2016-2020 tweets (no order) Africa Climate Change Ebola Food Security Humanitarian Aid Malaria Pneumonia Refugees Water Women	Health related: "help people build better futures for themselves," "save lives in disasters"	Emergency response (humanitarian aid, Ebola, food security, and infectious disease) is consistent across DAH data and tweets.	Emergency response (humanitarian aid, Ebola, food security, and infectious disease) is consistent across stated and revealed preferences. To maximize benefits of their pre- determined global health goals of "helping	Yes

our strong policy voice to advocate for change. Program Services • Saving Lives: Emergency Response and Preparedness • Programs to overcome poverty • Campaigning for social justice • Public education" (Oxfam Annual Report 2019)	America and the Caribbean, and 13% to Asia and the Pacific				people build better futures for themselves" and "saving lives in disasters", Oxfam prioritizes emergency response, humanitarian aid, Ebola, food security, and infectious	
Global health system WHO constitution (1948): "Health for All" and the right to the highest attainable standard of health. Declaration of Alma-Ata (1978): universal access to primary health care. MDGs (2000): reduce child mortality (4), improve maternal health (5), combat HIV/AIDS and other diseases (6) SDGS (2015) [Relevant to study's time period]: good health and well-being (3) By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births (3.1) By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births (3.2) By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and other communicable diseases (3.3) By 2030, reduce by one third premature mortality, to at least as low as 25 per 1,000 live births (3.2) By 2030, reduce by one third premature mortality form non- communicable diseases (3.3) By 2030, reduce by one third premature mortality form non- communicable diseases through prevention and treatment and promote mental health and well-being (3.4) By 2020, halve the number of global deaths and injuries from road traffic acidents (3.6) By 2020, nesure universal access to	Health Focus Areas Of the \$41 billion DAH transferred across all global health actors in 2019, 24% was allocated to HIV/AIDS, 21% to newborn and child health, 14% to health system strengthening, 12% to reproductive and maternal health, 6% to other infectious diseases, 6% to malaria, 4% to tuberculosis, and 2% to non- communicable diseases. <u>Region</u> Funding data in 2019 have unallocated or unspecified regions. In 2017, 33% of all DAH funding was allocated to sub- Saharan Africa, 5% to South Asia, 4% to North Africa and the Middle East, 3% to Latin America and the Caribbean, 2% to Europe and Central Asia, 15% globally, and 32% unallocated.	Most common topics from 2016-2020 across20 key actors(number in parenthesis indicates count of actors that had the topic as a priority from 2016-2020 tweets)1.Africa (17), 2.2.Children (15), 3.3.HIV/AIDS (11), 4.4.Women (10), 5.5.Ebola (9), 6.6.Water (9), 7.7.Food security (7), 8.8.Humanitarian aid (7), 9.9.Malaria (7), 10.10.Education (6), 11.11.Climate change (5), 13.13.Breastfeeding (4), 14.14.Cancer (4), 15.15.Measies (4), 16.16.Polio (4), 17.17.Tuberculosis (4), 18.18.Vaccines (4), 19.20.Agriculture (3), 20.21.Cholera (3), 22.22.Human Rights (3), 23.23.Mothers (3), 24.24.Refugees (3), 25.25.Treatment (3), 26.26.Violence (3), 27.27.FGM (2), 28.28.Hepatitis (2), 29.29.Influenza (2), 30.30.Innovation (2), 31.31.Poverty (2), 32.32.Prevention (2), 33.33.Sanitation (2), 34.34.Testing (2)	Health for all and the right to highest attainable standard of health. 9 important target areas under SDG 3.	HIV/AIDS, child and maternal health, and infectious diseases are consistent across DAH data and tweets.	HIV/AIDS, child and maternal health, and infectious diseases are consistent across stated and revealed priorities. To maximize benefits of the pre- determined goal of "health for all" and "SDG3: good health and well-being", the global health system prioritizes 3 of the 9 target areas of SDG 3: HIV/AIDS, child and maternal health, and infectious diseases. Note: These benefit- maximizing priorities of the stare funding organizations.	Yes

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5	for family planni	icluding		
5	information and			
0	education, and t integration of	the		
/	reproductive he	alth		
8	into national str and programme	ategies (3.7)		
9	Achieve univers	al		
10	health coverage	e, ial risk		
11	protection, acce	ess to		
12	quality essential health-care serv	l		
13	and access to sa	fe,		
14	effective, quality affordable esser	y and ntial		
15	medicines and v	vaccines		
16	• By 2030, substa	ntially		
17	reduce the num	ber of		
18	deaths and illne from hazardous	esses		
10	chemicals and a	ir,		
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Supplementary Table 2. Breakdown of Collected Tweets by Actor and Month. Total tweets and average tweets per month for each of the 20 global health actors.

Global Health Actor	Total Tweets	Average Tweets per Month
World Health Organization	10,827	722
Oxfam International	5,694	380
Doctors Without Borders (MSF)	5,553	370
UN Children's Fund (UNICEF)	5,395	360
World Bank	5,365	358
UN Development Programme (UNDP)	4,912	327
UN Population Fund (UNFPA)	3,908	261
UK Department of International Development	3,823	255
Centers for Disease Control and Prevention (CDC)	3,701	247
United States Agency for International Development (USAID)	3,604	240
Food and Agriculture Organization (FAO)	3,263	218
Save the Children	3,121	208
Gavi, the Vaccine Alliance	2,739	183
National Institutes of Health (NIH)	2,664	178
Joint UN Programme on HIV/AIDS (UNAIDS)	2,214	148
PATH	1,954	130
Global Fund	1,727	115
European Centre for Disease Prevention and Control (ECDC)	1,311	87
Gates Foundation	1,249	83
Unitaid	1,217	81
Total	74,241	4,949

1,217 81 74,241 4,949

	Tweets per Month	Tweets per Year
2016		5,973
November	5,973	
2017		21,193
February	4,474	
May	5,582	
August	5,103	
November	6,034	
2018		18,562
February	4,145	
May	4,965	
August	4,205	
November	5,247	
2019		17,884
February	4,500	
May	4,886	
August	3,987	
November	4,511	
2020		10,629
February	4,446	
May	6,183	
Total	74,241	74,241

Supplementary Table 3. Breakdown of Collected Tweets by Year and Month Tweets per month and per year for all the tweets collected.

	USA	UK	BMGF	WHO	World Bank	UNAIDS	UNFPA	UNICEF	UNITAID	GAVI	Oxfam	Global Fund	CDC	EU CDC	NIH	FAO	UNDP	MSF	PATH	the Children
USA	7	7	6 4	5	6	3	4	4	2	2	5	4	3	1	2	3	7	4	2	6
BMGF	6	4	- -	8	4	3	3	4	3	3	3	6	2	1	2	1	6	3	4	3
Who World Bank	6	6	4	3	5	2	4	4	1	3	6	3	3	0	1	5	6	3	2	5
UNAIDS UNFPA	3	2	3 3	3 3	2	3	3	2 4	4	1	2	3 3	2	1 0	2	1	3 4	3 4	3 2	1 3
	4	5	4	4	4	2	4	1	1	3	4	3 4	2	1	1	3	5 3	4	4	4
GAVI	2	3	3	5	3	1	2	3	3	2	3	6	3	2	2	1	2	4	5	2
Global Fund	3 4	5 4	6	4	3	2	3	4	4	3 6	5	Э	2	3	2	4	5	4	3	5 2
CDC EU CDC	3 1	2	2	3	3	2	2	2	2	3 2	2	2	2	2	0 1	1 0	3 1	1 3	2	2
NIH	2	2	2	2	1	2	1	1	2	2	1	2	0	1	1	1	2	2	2	1
UNDP	7	6	6	5	6	3	4	5	3	2	6	5	3	1	2	4	Ŧ	3	3	5
MSF PATH	4	5 3	3 4	4 5	3	3	4	4	4 5	4 5	4 3	6 4	1	3	2	1	3	3	3	4

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Supplementary Table 5. Types of Power. A summary of the four types of power as presented by Barnett and Duvall (2005) with examples in global health.

Power Type	Relational specificity	Power works through…	Definition according to Barnett & Duvall (2005)	Global Health Example
Compulsory Power	Direct	Interactions of specific actors	"Direct control of one actor over the conditions of existence or the actions of another." (p. 48)	Donor countries dictate the conditions in low and middle-income countries (LMICs) through dictating requirements in development aid.
Institutional Power	Diffuse	Interactions of specific actors	"Control actors exercise indirectly over others through diffuse relations of interactions." (p. 43)	High-income countries control funding allocations for LMICs through institutional power via their contributions to the WHO and other multilateral organizations.
Structural Power	Direct	Social relations of constitution	"Constitution of subjects' capacities in direct structural relation to one another." (p. 43)	The structural and historical disempowerment of indigenous populations have resulted in their disproportionate outcomes in health.
Productive Power	Diffuse	Social relations of constitution	"Power [that] works through diffuse constitutive relations to produce the situated social capacities of actors." (p. 48)	High-income countries direct what research institutions prioritize and study, and ultimately determine what health issues are addressed.

_____ actors." (p. 48)

SUPPLEMENTARY MATERIALS

Materials and Methods

Rationale for choosing the 20 global health actors

- 1. Hoffman & Cole (2018), Frenk & Moon (2013), and Szlezak et al. (2010) were the basis for the 20 global health actors in this study.[4, 15, 16]
 - a. Hoffman & Cole (2018) used the related search function in Google in order to systematically map global health actors 20 global health actors were identified as most important based on their methodology and was validated by 9 identified global health experts.
 - b. Frenk & Moon (2013) identifies 9 primary types of actors in global health with 24 examples in their study on pluralism and other challenges in global health.
 - c. Zlezak et al. (2010) describes their 8 identified types of actors in global health as a partnership in their article that argues for the norms and roles of each actor in the transition of global health.
- 2. The identified global health actors across the 3 studies were compared, and the 20 actors that were identified most important by all 3 studies were chosen.

Collection of tweets

- 1. Twitter is one of the social media platforms where global health actors actively and consistently share their work, research, and news to the general global public.
- 2. Using the <u>Twitter Application Programming Interface (API)</u>, tweets from of the 20 global health actors were collected from November 2016 to May 2020 in three month intervals.
 - a. All the tweets of each of the 20 global health actors were collected for the following 15 months:
 - i. 2016: November
 - ii. 2017: February, May, August, November
 - iii. 2018: February, May, August, November
 - iv. 2019: February, May, August, November
 - v. 2020: February, May
 - b. November 2019 is the identified beginning of the COVID-19 outbreak.
 - c. This scope allows an analysis of tweets of global health actors 3 years leading up to the COVID-19 outbreak and 6-months into the pandemic.
- 3. Three month intervals were chosen with the assumption that a variance in the issues, topics, and themes that global health actors tweet can be seen in three month intervals while allowing for efficient usage of the request limit from the Twitter API.

Topic modelling

1. Topic Modeling was conducted to identify the 10 most tweeted global health issues/topics by each actor in each of the 15 months in the study.

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3	2. The 10 most tweeted global health issues/topics were used to describe the set of
4	issues/problems a specific global health actor prioritizes in a given month.
5	3. Latent Dirichlet Allocation (LDA) was used in topic modeling.
6	1 Topic modeling answers the guestions:
/	Topic modeling answers the questions.
8	a. What are the most phontized issues among the identified global health
9	actors from 2016 to 2020?
10	b. "When did global health actors have pandemic preparedness as a priority
11	in the three years leading up to the COVID-19 pandemic?"
12	c. "What are the trends in prioritization of global health issues between and
13	among different types of global health actors?
14	among amoroni ()poo or grobal noallir actoror
15	EAOs shout how I DA was used in this study
10	PAGS about now LDA was used in this study
17	 What did the authors do with tweets that mentioned both "breastfeeding" and
10	"mothers"? Do the authors believe that the revealed priorities of an organization
19	that references both breastfeeding and mothers are substantively different than
20	those of an organization that just references breastfeeding, and so on?
21	 For context I DA topic modeling is a form of "unsupervised machine
<u>∠∠</u> 23	learning" where the data used is "unlabeled." This means that when we
23	rep the algorithm we did not define what statements will be estagorized
25	ran the algorithm, we did not define what statements will be categorized
25	as "breastreeding" and what will be categorized as "mothers." We also did
20	not define what words would fall under any other topics that were
28	generated by the model. The only input from us is was how many topics
20	we want the LDA algorithm to categorize the corpus of text. In our
30	analysis, we generated 10 topics for each of the 20 actors. The LDA
31	algorithm generates topics based on a generative probabilistic model that
32	assumes each topic is a mixture over an underlying set of words, and
33	assumes each topic is a mixture over an underlying set of words, and
34	each corpus of text is a mixture of sets of topic probabilities. In a nuisneil,
35	the algorithm analyzes all the words in all the tweets of a specific actor. It
36	then generates probabilities of each unique word appearing with other
37	words in a certain tweet or sentence. Topics are then generated by the
38	model based on these sets of probabilities.
39	• Some topics are quite general (e.g., "Poverty", "Treatment", "News"), while others
40	are more specific ("Fisheries" "Henatitis" "Veterans") In cases where one tonic
41	could be subsumed by another (e.g. "Schools" could be subsumed by
42	"Education") how did the outhors disaggregate these?
43	Education), now did the authors disaggregate these?
44	 vve did not nave any input in categorizing any of the topics generated. The
45	topics generated are based on the words and language used by each
46	respective actor in their tweets. The algorithm uses the words/language
47	used by the actor in their tweets to generate topics. We did not make any
48	other edits to the topics after they were generated.
49	
50	Code for collecting tweets
51	
52	# CREDENTIALS
53	import yamı
54	<pre>config = dict(</pre>
55	<pre>searcn_tweets_ap1 = dict(account type = 'premium',</pre>
56	endpoint = 'https://api.twitter.com/1.1/tweets/search/fullarchive/datacollection.json',
57	
58	
59	For neer review only - http://hmionen.hmi.com/sita/about/auidalinas.yhtml
60	r or peer review only " http://binjopen.binj.com/site/about/guidennes.xhtml

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)

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)
with open('twitter_keys_fullarchive.yaml', 'w') as config_file:
   yaml.dump(config, config_file, default_flow_style=False)
# LOAD CREDENTIALS
from searchtweets import load_credentials
premium_search_args = load_credentials("twitter_keys_fullarchive.yaml",
                                     yaml_key="search_tweets_api",
                                     env_overwrite=False)
print(premium_search_args)
# OUERY RULE SET UP
from searchtweets import gen_rule_payload
rule = gen_rule_payload("from:username"
                       results_per_call=500,
                      from_date="2020-02-01",
                      to date="2020-03-01"
                      )
# WRITE TO JSONL config_file
import json
with open('tweets_feb_2020.jsonl', 'a', encoding='utf-8') as f:
   n = 0
    for tweet in rs.stream():
       n += 1
       if n % 10 == 0:
           print('{0}: {1}'.format(str(n), tweet['created_at']))
                                                a
       json.dump(tweet, f)
       f.write('\n')
print('done')
# REPEAT FOR OTHER USERS AND MONTHS
Code for topic modelling
# Importing modules
import pandas as pd
# Read data into tweets df
tweets_df = pd.read_csv('tweets_nov2016-may2020.csv')
# Print head
tweets.head()
# Remove the columns
tweets_df = tweets_df[["username","user_id","created_at","tweet"]]
# Print out the first rows of tweets_df
tweets_df.head()
# Create dataframe for each month in analysis
tweets_feb = tweets.loc[tweets.created_at.str.contains("Feb")]
tweets_feb_17 = tweets_feb.loc[tweets_feb.created_at.str.contains("2017")]
tweets_feb_18 = tweets_feb.loc[tweets_feb.created_at.str.contains("2018")]
tweets_feb_19 = tweets_feb.loc[tweets_feb.created_at.str.contains("2019")]
tweets_feb_20 = tweets_feb.loc[tweets_feb.created_at.str.contains("2020")]
tweets_may = tweets.loc[tweets.created_at.str.contains("May")]
tweets_may_17 = tweets_may.loc[tweets_may.created_at.str.contains("2017")]
tweets_may_18 = tweets_may.loc[tweets_may.created_at.str.contains("2018")]
tweets_may_19 = tweets_may.loc[tweets_may.created_at.str.contains("2019")]
tweets_may_20 = tweets_may.loc[tweets_may.created_at.str.contains("2020")]
tweets_aug = tweets.loc[tweets.created_at.str.contains("Aug")]
tweets_aug_17 = tweets_aug.loc[tweets_aug.created_at.str.contains("2017")]
tweets_aug_18 = tweets_aug.loc[tweets_aug.created_at.str.contains("2018")]
tweets_aug_19 = tweets_aug.loc[tweets_aug.created_at.str.contains("2019")]
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3
                 tweets_nov = tweets.loc[tweets.created_at.str.contains("Nov")]
                 tweets_nov_16 = tweets_nov.loc[tweets_nov.created_at.str.contains("2016")]
4
                 tweets_nov_17 = tweets_nov.loc[tweets_nov.created_at.str.contains("2017")]
5
                 tweets_nov_18 = tweets_nov.loc[tweets_nov.created_at.str.contains("2018")]
                 tweets_nov_19 = tweets_nov.loc[tweets_nov.created_at.str.contains("2019")]
6
7
                 # Helper function
                 def plot_10_most_common_words(count_data, count_vectorizer):
8
                     import matplotlib.pyplot as plt
9
                     words = count_vectorizer.get_feature_names()
                     total_counts = np.zeros(len(words))
10
                     for t in count_data:
11
                         total_counts+=t.toarray()[0]
12
                     count_dict = (zip(words, total_counts))
count_dict = sorted(count_dict, key=lambda x:x[1], reverse=True)[1:23]
13
14
                     words = [w[0] for w in count_dict]
                     counts = [w[1] for w in count_dict]
15
                     x_pos = np.arange(len(words))
16
                     plt.figure(2, figsize=(15, 2))
17
                     plt.subplot(title=f'10 Most Common Words')
18
                     sns.set_context("notebook", font_scale=1.25, rc={"lines.linewidth": 2.5})
                     sns.barplot(x_pos, counts, palette='husl')
19
                     plt.xticks(x_pos, words, rotation=90)
20
                     plt.xlabel('words')
                     plt.ylabel('counts')
21
                     plt.show()
22
                 # Import Libraries
23
                 from sklearn.feature_extraction.text import CountVectorizer
24
                 import numpy as np
25
                 import matplotlib.pyplot as plt
26
                 import seaborn as sns
27
                 import re
28
                 import string
29
                 # Identify top 10 keywords, issues, topics of each actor for a given month
30
                 tweets = tweets nov 16[tweets nov 16["username"] == username]
31
                 tweets = tweets_df[tweets_df['username'].isin(username)]
                 printable = set(string.printable)
32
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                                 1
                 exclusions = '|'.join(exclusionList)
38
                tweets['paper_text_processed'] = tweets['tweet'].map(lambda x: re.sub(exclusions, '', x))
tweets['paper_text_processed'] = tweets['paper_text_processed'].map(lambda x: x.lower())
39
40
                 tweets['paper_text_processed'].head()
                 sns.set_style('whitegrid')
41
                 %matplotlib inline
42
                 count_vectorizer = CountVectorizer(stop_words='english')
                 count_data = count_vectorizer.fit_transform(tweets['paper_text_processed'])
43
                 import warnings
44
                 warnings.simplefilter("ignore")
                 plot_10_most_common_words(count_data, count_vectorizer)
45
46
                 # LDA Topic Modeling
                 import warnings
47
                 warnings.simplefilter("ignore", DeprecationWarning)
48
                 # Load the LDA model from sk-learn
                 from sklearn.decomposition import LatentDirichletAllocation as LDA
49
50
                 # Helper function
                 def print_topics(model, count_vectorizer, n_top_words):
51
                     words = count_vectorizer.get_feature_names()
52
                     for topic_idx, topic in enumerate(model.components_):
    print("\nTopic #%d:" % topic_idx)
53
                         print(" ".join([words[i]
54
                                          for i in topic.argsort()[:-n_top_words - 1:-1]]))
55
                 # Tweak the two parameters below
56
                 number_topics = 5
57
58
59
```

number_words = 10
Create and fit the LDA model
lda = LDA(n_components=number_topics, n_jobs=-1)
lda.fit(count_data)
Print the topics found by the LDA model
print("Topics found via LDA:")
print_topics(lda, count_vectorizer, number_words)

How network maps were analyzed

- What is network analysis? Network analysis is an analytic method that has proved to be useful in understanding relational dynamics across actors in global and public health. (Lopreite et al. 2021 and Quisell et al. 2018).
- Why use network analysis for the study? Network analysis was conducted to observe the funding relationships between global health actors.
- What tool was used? Gephi 0.9.2 was used in constructing and analyzing the network map.

• How was the network map designed?

- The network modelled in the study allows for a graphical visualization of the flows of global health funding in 2019.
- The network map was designed such that each global health actor is represented by a node and lines or "edges" indicate a flow of funding in global health.

• The Fruchterman-Reingold algorithm was used in modelling the network map.

- The algorithm "calculates the optimal layout so that nodes with less strength and less connections are placed further apart, and those with more and/or stronger connections are placed closer to each other."[18]
- The thickness of edges represents the amount of funding transferred between actors.
- The modelled network map can be found and will be discussed in the findings section.

DAH funding data network analysis summary statistics

Network Overview			
Average Degree	25.403	Run	(?)
Avg. Weighted Degree	254.124	Run	0
Network Diameter	4	Run	0
Graph Density	0.113	Run	0
HITS		Run	(?)
Modularity	0.093	Run	3
PageRank		Run	3
Connected Components	1	Run	0

Twitter data network analysis summary statistics

Network Overview			
Average Degree	2.181	Run	3
Avg. Weighted Degree	4.614	Run	3
Network Diameter	3	Run	(?)
Graph Density	0.027	Run	0
HITS		Run	3
Modularity	0.172	Run	3
PageRank		Run	(?)
Connected Components	14	Run	0

DAH funding data network analysis statistics report

	Label	indegree	outdegree	Degree	weighted indegree	weighted outdegree	Weighted Degree	Eccentricity	closnesscentrality	harmonicclosnesscentrality	between esscentrality	modularity_class	strongcompnum
African Development Bank		25	57	82	1149	1149	2298	1	1.00	1.00	54.18	1	57
Asian Development Bank		26	48	74	723	723	1446	3	0.42	0.53	52.20	0	160
United Arab Emirates		1	79	80	79	79	158	1	1.00	1.00	7.28	2	161
Australia		1	151	152	137	1021	1158	2	0.85	0.91	0.00	2	175
Austria		1	128	129	112	1083	1195	2	0.76	0.85	0.00	0	179
Belgium		1	140	141	123	1278	1401	2	0.80	0.87	0.00	0	181
Canada		1	163	164	146	1564	1710	2	0.89	0.94	0.00	2	183
Switzerland		1	138	139	124	866	990	2	0.82	0.89	0.00	2	184
China		39	12	51	251	380	631	2	0.52	0.53	661.00	1	160
Germany		1	165	166	147	1476	1623	2	0.90	0.94	0.00	0	185
Denmark		1	131	132	115	1229	1344	2	0.77	0.85	0.00	0	186
Spain		1	152	153	134	1498	1632	2	0.84	0.91	0.00	0	188
Finland		1	160	161	144	1210	1354	2	0.88	0.93	0.00	0	189
France		1	172	173	154	1466	1620	2	0.92	0.96	0.00	0	192
United Kingdom		1	168	169	150	1552	1702	2	0.91	0.95	0.00	0	193
Greece		1	148	149	133	1031	1164	2	0.83	0.90	0.00	0	194
Ireland		1	120	121	104	1081	1185	2	0.74	0.82	0.00	2	195
Italy		1	160	161	143	1433	1576	2	0.88	0.93	0.00	0	196
Japan		1	169	170	155	1111	1266	2	0.94	0.97	0.00	2	198
Korea		1	138	139	125	876	1001	2	0.82	0.89	0.00	2	199
Luxembourg		1	130	131	114	1124	1238	2	0.77	0.85	0.00	2	200

Netherlands	1	158	159	142	1380	1522	2	0.87	0.93	0.00	0	201
Norway	1	157	158	138	1221	1359	2	0.86	0.92	0.00	2	203
New Zealand	1	129	130	118	633	751	2	0.78	0.86	0.00	3	204
Portugal	1	73	74	57	885	942	3	0.62	0.69	0.00	0	205
Sweden	1	155	156	139	1464	1603	2	0.86	0.92	0.00	0	206
United States	1	165	166	150	1390	1540	2	0.92	0.96	0.00	2	207
Bill & Melinda Gates Foundation	1	162	163	146	1280	1426	2	0.89	0.94	0.00	1	208
Coalition for Epidemic Preparedness Innovations	10	1	11	10	10	20	1	1.00	1.00	0.23	1	163
European Commission	15	148	163	2184	2184	4368	3	0.83	0.92	53.93	0	178
European Economic Area	3	7	10	17	17	34	1	1.00	1.00	8.85	2	202
Gavi	28	118	146	2024	2024	4048	3	0.65	0.81	110.05	1	160
Global Fund	29	155	184	4119	4119	8238	3	0.91	0.96	336.01	2	160
Inter-American Development Bank	15	34	49	269	269	538	1	1.00	1.00	49.50	2	119
International NGOs	27	151	178	2323	2323	4646	3	0.86	0.94	198.03	2	171
US NGOs	27	158	185	442	442	884	3	0.90	0.95	306.65	1	174
Pan American Health Organization	23	44	67	318	318	636	3	0.41	0.52	28.46	2	162
UNAIDS	30	133	163	612	612	1224	3	0.73	0.87	198.05	1	160
UNFPA	30	141	171	1630	1630	3260	3	0.79	0.90	226.79	0	160
UNICEF	30	146	176	1913	1913	3826	3	0.83	0.92	250.51	1	160
UNITAID	9	2	11	14	14	28	1	1.00	1.00	0.28	1	187
US Foundations	1	164	165	164	164	328	3	0.92	0.96	23.90	1	210
World Bank	21	129	150	1134	1134	2268	3	0.71	0.85	32.25	0	176
WB_IBRD	20	153	173	1369	1369	2738	3	0.84	0.93	247.82	0	169
WB_IDA	27	117	144	2596	2596	5192	3	0.64	0.81	163.51	3	160
WHO	29	154	183	2476	2476	4952	3	0.90	0.95	314.53	0	160
Corporate Donations	0	2	2	0	2	2	4	0.48	0.49	0.00	1	211
Debt Repayments	0	2	2	0	173	173	4	0.47	0.48	0.00	3	212
Non-OECD DAC Countries	0	17	17	0	710	710	2	0.52	0.55	0.00	2	213
Other	0	11	11	0	285	285	3	0.52	0.53	0.00	2	214
Other OECD DAC Countries	0	8	8	0	220	220	3	0.51	0.52	0.00	2	215
Private Other	0	14	14	0	941	941	3	0.52	0.54	0.00	1	216
Unallocable	0	4	4	0	4	4	4	0.46	0.49	0.00	1	217
Afghanistan	40	0	40	275	0	275	0	0.00	0.00	0.00	0	134
Albania	34	0	34	190	0	190	0	0.00	0.00	0.00	3	122
Algeria	36	0	36	138	0	138	0	0.00	0.00	0.00	2	3
Angola	39	0	39	279	0	279	0	0.00	0.00	0.00	1	21
Anguilla	3	0	3	3	0	3	0	0.00	0.00	0.00	2	170
Antigua and Barbuda	19	0	19	65	0	65	0	0.00	0.00	0.00	2	87
Argentina	34	0	34	118	0	118	0	0.00	0.00	0.00	2	113
Armenia	36	0	36	218	0	218	0	0.00	0.00	0.00	3	75
Azerbaijan	36	0	36	199	0	199	0	0.00	0.00	0.00	3	74
Bahrain	1	0	1	1	0	1	0	0.00	0.00	0.00	0	190
Bangladesh	39	0	39	271	0	271	0	0.00	0.00	0.00	0	135
Barbados	6	0	6	47	0	47	0	0.00	0.00	0.00	2	107

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2													
3	Belarus	30	0	30	119	0	119	0	0.00	0.00	0.00	2	144
4	Belize	33	0	33	119	0	119	0	0.00	0.00	0.00	2	94
5	Benin	30	0	30	273	0	273	0	0.00	0.00	0.00	1	/3
7	Deuton	24	0	24	162	0	160	0	0.00	0.00	0.00	2	70
8	Brutan	54	0	54	103	0	103	0	0.00	0.00	0.00	3	70
9	Bolivia	38	0	38	180	0	180	0	0.00	0.00	0.00	2	108
10	Bosnia and Herzegovina	35	0	35	182	0	182	0	0.00	0.00	0.00	3	121
11	Botswana	39	0	39	210	0	210	0	0.00	0.00	0.00	0	18
12	Brazil	37	0	37	131	0	131	0	0.00	0.00	0.00	2	117
13	Bulgaria	5	0	5	34	0	34	0	0.00	0.00	0.00	2	156
14 15	Burkina Faso	39	0	39	280	0	280	0	0.00	0.00	0.00	1	50
16	Burundi	39	0	39	264	0	264	0	0.00	0.00	0.00	1	19
17	Cambodia	37	0	37	266	0	266	0	0.00	0.00	0.00	0	130
18	Cameroon	39	0	39	277	0	277	0	0.00	0.00	0.00	1	37
19	Cape Verde	24	0	24	117	0	117	0	0.00	0.00	0.00	3	12
20	Central African Republic	39	0	39	259	0	259	0	0.00	0.00	0.00	1	14
21	Chad	39	0	39	266	0	266	0	0.00	0.00	0.00	1	29
22	Chile	34	0	34	112	0	112	0	0.00	0.00	0.00	2	102
25 74	Christmas Island	J	0	1	1	0	1	0	0.00	0.00	0.00	1	200
25			0	1	1	0	1	0	0.00	0.00	0.00	1	209
26	Colombia	36	0	36	126	0	126	0	0.00	0.00	0.00	2	118
27	Comoros	39	0	39	223	0	223	0	0.00	0.00	0.00	3	5
28	Congo	39	0	39	249	0	249	0	0.00	0.00	0.00	1	7
29	Cook Islands	9	0	9	49	0	49	0	0.00	0.00	0.00	2	149
30	Costa Rica	35	0	35	131	0	131	0	0.00	0.00	0.00	2	97
31 20	Cote d'Ivoire	39	0	39	276	0	276	0	0.00	0.00	0.00	1	20
33	Croatia	22	0	22	61	0	61	0	0.00	0.00	0.00	2	153
34	Cuba	36	0	36	166	0	166	0	0.00	0.00	0.00	2	92
35	Czech Republic	2	0	2	2	0	2	0	0.00	0.00	0.00	1	173
36	Democratic Republic of the Congo	37	0	37	199	0	199	0	0.00	0.00	0.00	1	46
37	Djibouti	39	0	39	247	0	247	0	0.00	0.00	0.00	1	25
38	Dominica	26	0	26	83	0	83	0	0.00	0.00	0.00	2	89
39	Dominican Republic	37	0	37	159	0	159	0	0.00	0.00	0.00	2	112
40	Ecuador	37	0	37	128	0	128	0	0.00	0.00	0.00	2	106
42	Favot	30	0	30	254	0	254	0	0.00	0.00	0.00	1	35
43		27	0	27	161	0	161	0	0.00	0.00	0.00	2	100
44		20	0	57	101	0	101	0	0.00	0.00	0.00	2	100
45	Equatorial Guinea	38	0	38	197	0	197	0	0.00	0.00	0.00	3	51
46	Eritrea	39	0	39	255	0	255	0	0.00	0.00	0.00	1	16
4/	Estonia	5	0	5	31	0	31	0	0.00	0.00	0.00	2	154
40 49	Ethiopia	39	0	39	288	0	288	0	0.00	0.00	0.00	1	41
50	Federated States of Micronesia	24	0	24	64	0	64	0	0.00	0.00	0.00	2	64
51	Fiji	26	0	26	81	0	81	0	0.00	0.00	0.00	2	139
52	Gabon	38	0	38	210	0	210	0	0.00	0.00	0.00	0	47
53	Georgia	36	0	36	245	0	245	0	0.00	0.00	0.00	3	81
54	Ghana	39	0	39	284	0	284	0	0.00	0.00	0.00	1	40
55	Global	43	0	43	260	0	260	0	0.00	0.00	0.00	1	6
50 57													

2													
3	Grenada	30	0	30	85	0	85	0	0.00	0.00	0.00	2	90
4		30	0	50	170	0	170	0	0.00	0.00	0.00	2	50
5	Guatemala	37	0	37	170	0	170	0	0.00	0.00	0.00	2	115
6	Guinea	39	0	39	270	0	270	0	0.00	0.00	0.00	1	31
/	Guinea-Bissau	39	0	39	259	0	259	0	0.00	0.00	0.00	1	30
8	Guyana	34	0	34	156	0	156	0	0.00	0.00	0.00	2	98
9 10	Haiti	38	0	38	234	0	234	0	0.00	0.00	0.00	2	111
10	Honduras	38	0	38	186	0	186	0	0.00	0.00	0.00	2	109
12	Hungary	3	0	3	3	0	3	0	0.00	0.00	0.00	1	166
13	India	30	0	30	27/	0	274	0	0.00	0.00	0.00	0	136
14	Indenesia	20	0	20	2/4	0	2/4	0	0.00	0.00	0.00	0	122
15	Indonesia	39	U	39	265	0	265	0	0.00	0.00	0.00	0	132
16	Iran	36	0	36	142	0	142	0	0.00	0.00	0.00	2	73
17	Iraq	37	0	37	195	0	195	0	0.00	0.00	0.00	0	76
18	Jamaica	36	0	36	143	0	143	0	0.00	0.00	0.00	2	103
19	Jordan	37	0	37	198	0	198	0	0.00	0.00	0.00	0	80
20	Kazakhstan	37	0	37	212	0	212	0	0.00	0.00	0.00	3	78
21	Kenva	39	0	39	285	0	285	0	0.00	0.00	0.00	1	48
22	Kirihati	28	0	28	98	0	98	0	0.00	0.00	0.00	2	58
25 24	Kasava	20	ů	20	142	0	140	0	0.00	0.00	0.00	2	142
25	KOSOVO	32		32	142	0	142	0	0.00	0.00	0.00	3	145
26	Kyrgyzstan	36	0	36	225	0	225	0	0.00	0.00	0.00	3	77
27	Laos	37	0	37	258	0	258	0	0.00	0.00	0.00	0	127
28	Latvia	5	0	5	7	0	7	0	0.00	0.00	0.00	1	157
29	Lebanon	38	0	38	162	0	162	0	0.00	0.00	0.00	0	68
30	Lesotho	39	0	39	253	0	253	0	0.00	0.00	0.00	1	22
31	Liberia	39	0	39	269	0	269	0	0.00	0.00	0.00	1	33
32	Libva	33	0	33	123	0	123	0	0.00	0.00	0.00	0	2
33	Lithuania	5	0	5	7	0	7	0	0.00	0.00	0.00	1	158
34 25		3	0	20	121	ů	121	0	0.00	0.00	0.00	-	1.45
35	Macedonia	30	0	30	131	0	151	0	0.00	0.00	0.00	Z	145
37	Madagascar	39	0	39	276	0	276	0	0.00	0.00	0.00	1	38
38	Malawi	39	0	39	277	0	277	0	0.00	0.00	0.00	1	44
39	Malaysia	31	0	31	132	0	132	0	0.00	0.00	0.00	0	140
40	Maldives	32	0	32	110	0	110	0	0.00	0.00	0.00	3	66
41	Mali	40	0	40	282	0	282	0	0.00	0.00	0.00	1	45
42	Malta	1	0	1	1	0	1	0	0.00	0.00	0.00	0	180
43	Marshall Islands	21	0	21	76	0	76	0	0.00	0.00	0.00	0	138
44	Mauritania	39	0	39	259	0	259	0	0.00	0.00	0.00	1	34
45	Mauritius	22	0	22	112	0	112	0	0.00	0.00	0.00	2	0
46		55	0	55	112	0	112	0	0.00	0.00	0.00	2	0
47	Mayotte	1	0	1	1	0	1	0	0.00	0.00	0.00	0	191
40	Mexico	37	0	37	161	0	161	0	0.00	0.00	0.00	2	114
50	Moldova	33	0	33	185	0	185	0	0.00	0.00	0.00	3	125
51	Mongolia	37	0	37	213	0	213	0	0.00	0.00	0.00	0	124
52	Montenegro	31	0	31	137	0	137	0	0.00	0.00	0.00	3	142
53	Montserrat	25	0	25	72	0	72	0	0.00	0.00	0.00	2	91
54	Morocco	39	0	39	218	0	218	0	0.00	0.00	0.00	1	55
55	Mozambique	30	n	39	288	0	288	n	0.00	0.00	0.00	1	36
56		39	U	55	200	0	200	0	0.00	5.00	0.00	1	50
57													

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1													
2													
3	Myanmar	37	0	37	258	0	258	0	0.00	0.00	0.00	0	131
4	Namibia	39	0	39	222	0	222	0	0.00	0.00	0.00	1	17
6	Nauru	19	0	19	52	0	52	0	0.00	0.00	0.00	2	59
7	Nepal	39	0	39	265	0	265	0	0.00	0.00	0.00	0	86
8	Netherlands Antilles	2	0	2	12	0	12	0	0.00	0.00	0.00	0	177
9	Nicaragua	37	0	37	201	0	201	0	0.00	0.00	0.00	2	110
10	Nigor	20	0	20	201	0	201	0	0.00	0.00	0.00	1	42
11	Niger	39	0	39	270	0	270	0	0.00	0.00	0.00	1	42
12	Nigeria	39	0	39	287	0	287	0	0.00	0.00	0.00	1	52
14	Niue	18	0	18	64	0	64	0	0.00	0.00	0.00	2	63
15	North Korea	32	0	32	127	0	127	0	0.00	0.00	0.00	2	72
16	Northern Mariana Islands	2	0	2	2	0	2	0	0.00	0.00	0.00	2	197
17	Oman	5	0	5	5	0	5	0	0.00	0.00	0.00	1	164
18	Pakistan	39	0	39	273	0	273	0	0.00	0.00	0.00	0	137
19	Palau	18	0	18	50	0	50	0	0.00	0.00	0.00	2	62
20	Palestine	34	0	34	125	0	125	0	0.00	0.00	0.00	2	151
22	Panama	35	0	35	142	0	142	0	0.00	0.00	0.00	2	105
23	Papua New Guinea	32	0	32	138	0	138	0	0.00	0.00	0.00	0	128
24	Paraguay	36	0	36	116	0	116	0	0.00	0.00	0.00	2	95
25	Peru	37	0	37	131	0	131	0	0.00	0.00	0.00	2	104
26	Philippines	39	0	39	248	0	248	0	0.00	0.00	0.00	0	120
2/	Poland	4	0	4	6	0	6	0	0.00	0.00	0.00	1	168
20	Romania	5	0	5	34	0	34	0	0.00	0.00	0.00	2	155
30	Russia	8	0	8	36	0	36	0	0.00	0.00	0.00	2	147
31	Rwanda	39	0	39	276	0	276	0	0.00	0.00	0.00	1	27
32	Saint Holona	22	0	22	120	Ű	120	0	0.00	0.00	0.00	-	10
33	Saint Relena	55	0	55	150	0	150	0	0.00	0.00	0.00	0	150
34		0	0	0	47	0	47	0	0.00	0.00	0.00	2	152
35	Saint Lucia	33	0	33	107	0	107	0	0.00	0.00	0.00	2	93
37	Saint Vincent and the Grenadines	32	0	32	95	0	95	0	0.00	0.00	0.00	2	88
38	Samoa	26	0	26	106	0	106	0	0.00	0.00	0.00	3	65
39	Sao Tome and Principe	38	0	38	230	0	230	0	0.00	0.00	0.00	3	4
40	Saudi Arabia	5	0	5	5	0	5	0	0.00	0.00	0.00	1	172
41	Senegal	39	0	39	283	0	283	0	0.00	0.00	0.00	1	39
42	Serbia	35	0	35	167	0	167	0	0.00	0.00	0.00	2	146
43 <i>AA</i>	Seychelles	33	0	33	97	0	97	0	0.00	0.00	0.00	2	1
45	Sierra Leone	39	0	39	270	0	270	0	0.00	0.00	0.00	1	49
46	Slovakia	2	0	2	2	0	2	0	0.00	0.00	0.00	1	165
47	Slovenia	8	0	8	8	0	8	0	0.00	0.00	0.00	0	159
48	Solomon Islands	26	0	26	128	0	128	0	0.00	0.00	0.00	3	82
49	Somalia	39	0	39	252	0	252	0	0.00	0.00	0.00	1	15
50 51	South Africa	39	0	39	260	0	260	0	0.00	0.00	0.00	0	24
51 52	South Korea	7	0	7	7	0	7	0	0.00	0.00	0.00	0	167
53	South Sudan	39	0	39	245	n N	245	n	0.00	0.00	0.00	1	13
54	Sri Lanka	27	0	27	2-13	0	273	0	0.00	0.00	0.00	•	176
55	Sudan	20	0	20	231	0	231	0	0.00	0.00	0.00	1	120
56	Suuan	39	U	39	212	U	272	U	0.00	0.00	0.00	1	26
57													

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Suriname	34	0	34	107	0	107	0	0.00	0.00	0.00	2	96
Swaziland	38	0	38	201	0	201	0	0.00	0.00	0.00	0	11
Syria	38	0	38	195	0	195	0	0.00	0.00	0.00	0	67
Tajikistan	37	0	37	248	0	248	0	0.00	0.00	0.00	0	83
Tanzania	39	0	39	285	0	285	0	0.00	0.00	0.00	1	53
Thailand	38	0	38	193	0	193	0	0.00	0.00	0.00	0	85
The Gambia	39	0	39	248	0	248	0	0.00	0.00	0.00	1	28
Timor-Leste	37	0	37	231	0	231	0	0.00	0.00	0.00	0	79
Тодо	39	0	39	255	0	255	0	0.00	0.00	0.00	1	9
Tokelau	13	0	13	18	0	18	0	0.00	0.00	0.00	2	148
Tonga	23	0	23	99	0	99	0	0.00	0.00	0.00	3	60
Trinidad and Tobago	11	0	11	52	0	52	0	0.00	0.00	0.00	2	116
Tunisia	37	0	37	172	0	172	0	0.00	0.00	0.00	2	8
Turkey	29	0	29	142	0	142	0	0.00	0.00	0.00	0	141
Turkmenistan	36	0	36	158	0	158	0	0.00	0.00	0.00	3	69
Turks and Caicos Islands	2	0	2	2	0	2	0	0.00	0.00	0.00	2	182
Tuvalu	21	0	21	93	0	93	0	0.00	0.00	0.00	3	61
Uganda	39	0	39	286	0	286	0	0.00	0.00	0.00	1	54
Ukraine	32	0	32	181	0	181	0	0.00	0.00	0.00	0	123
Unallocated/Unspecified	45	0	45	357	0	357	0	0.00	0.00	0.00	1	56
Uruguay	31	0	31	78	0	78	0	0.00	0.00	0.00	2	101
Uzbekistan	35	0	35	253	0	253	0	0.00	0.00	0.00	0	129
Vanuatu	25	0	25	76	0	76	0	0.00	0.00	0.00	2	71
Venezuela	34	0	34	106	0	106	0	0.00	0.00	0.00	2	99
Vietnam	39	0	39	270	0	270	0	0.00	0.00	0.00	0	133
Wallis and Futuna Islands	18	0	18	27	0	27	0	0.00	0.00	0.00	0	150
Yemen	37	0	37	249	0	249	0	0.00	0.00	0.00	3	84
Zambia	39	0	39	283	0	283	0	0.00	0.00	0.00	1	32
Zimbabwe	39	0	39	275	0	275	0	0.00	0.00	0.00	1	23

Twitter network analysis statistics report

Label	indegree	outdegree	Degree	weighted indegree	weighted outdegree	Weighted Degree	Eccentricity	closnesscentrality	harmonicclosnesscentrality	between esscentrality	modularity_class	strongcompnum
United States	0	8	8	0	30	30	3	0.38	0.44	0.00	0	67
Kingdom	0	8	8	0	29	29	3	0.38	0.44	0.00	1	68
BMGF	0	8	8	0	35	35	3	0.38	0.44	0.00	0	69
WHO	3	9	12	17	29	46	2	0.54	0.58	23.50	0	66
World Bank	3	8	11	16	31	47	2	0.54	0.58	19.65	1	65
UNAIDS	3	9	12	8	18	26	2	0.54	0.58	23.50	0	64

BMJ Open

1														
2														
3		2	0	11	10	20	20	2	0.54	0 5 9	10.65	1	62	
4	UNFFA	5	0	11	10	20	50	2	0.54	0.56	19.05	1	05	
5	UNICEF	3	9	12	13	28	41	2	0.54	0.58	23.50	1	62	
6	UNITAID	3	8	11	7	21	28	2	0.54	0.58	20.21	4	61	
7	GAVI	3	9	12	9	24	33	2	0.54	0.58	23.50	4	60	
8	GFATM	3	9	12	14	30	44	2	0.54	0.58	23.50	3	59	
9	Oxfam	8	10	18	28	10	38	1	1 00	1 00	40 64	1	58	
10	CDC		10	10	10	10	20	-	1.00	1.00	72.46	2	56	
11	CDC	8	10	18	19	10	29	1	1.00	1.00	72.46	2	50	
12	EU CDC	6	10	16	13	10	23	1	1.00	1.00	62.06	3	51	
13	NIH	8	10	18	13	10	23	1	1.00	1.00	87.07	4	43	
14	FAO	7	9	16	13	9	22	1	1.00	1.00	67.06	1	35	
15	UNDP	8	10	18	33	10	43	1	1.00	1.00	41.00	1	28	
10	MSE	8	10	18	32	10	42	1	1 00	1 00	56 78	з	23	
17	DATU	0	10	10	32	10	-12	-	1.00	1.00	50.70		47	
10	Save the	8	10	18	30	10	40	1	1.00	1.00	59.94	4	17	
20	Children	8	9	17	20	9	29	1	1.00	1.00	46.99	1	9	
20	Access	1	0	1	1	0	1	0	0.00	0.00	0.00	4	16	
21	Africa	7	0	7	7	0	7	0	0.00	0.00	0.00	1	8	
22	Agriculture	1	0	1	1	0	1	0	0.00	0.00	0.00	1	24	
23	Agriculture	1	0	1		0		U	0.00	0.00	0.00	1	54	
25	Biodiversity	1	0	1	1	0	1	0	0.00	0.00	0.00	1	33	
26	Breastfeeding	1	0	1	1	0	1	0	0.00	0.00	0.00	4	15	
27	Cancer	2	0	2	2	0	2	0	0.00	0.00	0.00	4	14	
28	Child Marriage	0	0	0	0	0	0	0	0.00	0.00	0.00	5	70	
29	Children	5	0	5	5	0	5	0	0.00	0.00	0.00	1	7	
30	Chalana	1	0	1	1	0	1	0	0.00	0.00	0.00	-	,	
31	Climate	T	0	T	T	0	1	0	0.00	0.00	0.00	- 3	22	
32	Change	3	0	3	3	0	3	0	0.00	0.00	0.00	1	27	
33	Development	0	0	0	0	0	0	0	0.00	0.00	0.00	6	71	
34	Diarrhea	1	0	1	1	0	1	0	0.00	0.00	0.00	2	55	
35	Discrimination	0	0	0	0	0	0	0	0.00	0.00	0.00	7	72	
36			0	0	0	0	0	0	0.00	0.00	0.00	10	12	
37	Donations	1	0	1	1	0	1	0	0.00	0.00	0.00	1	6	
38	E. Coli	1	0	1	1	0	1	0	0.00	0.00	0.00	2	54	
39	Ebola	4	0	4	4	0	4	0	0.00	0.00	0.00	3	13	
40	Education	2	0	2	2	0	2	0	0.00	0.00	0.00	1	5	
41	FGM	1	0	1	1	0	1	0	0.00	0.00	0.00	1	26	
42	Families	1	0	1	1	0	1	0	0.00	0.00	0.00	1	32	
43	Family	1	0	1	1	0	1	0	0.00	0.00	0.00	1	52	
44	Planning	0	0	0	0	0	0	0	0.00	0.00	0.00	8	73	
45	Farmers	1	0	1	1	0	1	0	0.00	0.00	0.00	1	31	
46	Fisheries	1	0	1	1	0	1	0	0.00	0.00	0.00	1	30	
47	Food Security	4	0	4	4	0	4	0	0.00	0.00	0.00	1	4	
48	Forests	1	0	1	1	0	1	0	0.00	0.00	0.00	1	20	
49	Forests	T	0	1	1	0	1	0	0.00	0.00	0.00	1	29	
50 51	Funding	1	0	1	1	0	1	0	0.00	0.00	0.00	4	42	
50 50	HIV/AIDS	4	0	4	4	0	4	0	0.00	0.00	0.00	1	21	
52 53	Heart Disease	1	0	1	1	0	1	0	0.00	0.00	0.00	4	41	
55	Hepatitis	1	0	1	1	0	1	0	0.00	0.00	0.00	3	50	
55	Human Rights	0	n	0	n	0	0	0	0.00	0.00	0.00	9	74	
56		5	Ũ	U	Ū	Ū	Ū	Ũ	0.00	0.00	0.00	5		
57														

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Testing00000000.000.000.001782Treatment10110100.000.000.00320Tubercolosis20220200.000.000.00319Vaccines20220200.000.000.00210Veterans10110100.000.000.00318Water30330300.000.000.00225West Nile10110100.000.000.00224Zika10110100.000.000.00225	Testing00000000.000.000.001782Treatment10110100.000.000.00320Tubercolosis20220200.000.000.00319Vaccines20220200.000.000.00210Veterans10110100.000.000.00318Water30330300.000.000.00225West Nile10110100.000.000.00224Zika10110100.000.000.00224	Testing 0 0 0 0 0 0 0.00 1.00 1.00 3.2 Treatment 1 0 1 0 1 0 0.00 0.00 0.00 3.2 20 Tubercolosis 2 0 2 0 2 0 0.00 0.00 0.00 3 20 Vaccines 2 0 2 0 2 0 0.00 0.00 0.00 3 10 Vaccines 1 0 1 0 1 0 0.00 0.00 0.00 4 36 Violence 1 0 1 0 1 0 0.00 1.00 0.00 0.00 3.3 18 Water 3 0 3 0 1 0 0.00 0.00 0.00 3.3 44 Women 3 0 1 0 1 0 0.00 0.00 0.00 2 52 Ika 1 0 1 0	Surveillance	1	0	1	1	0	1	0	0.00	0.00	0.00	3	45	
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Tubercolosis20220200.000.000.00319Vaccines20220200.000.000.00210Veterans10110100.000.000.00436Violence10110100.000.000.00318Water30330300.000.000.00225West Nile10110100.000.000.00344Women30330300.000.000.00224Zika10110100.000.000.00252	Tubercolosis20220200.000.000.00319Vaccines20220200.000.000.00210Veterans10110100.000.000.00436Violence10110100.000.000.00318Water30330300.000.000.00225West Nile10110100.000.000.00344Women30330300.000.000.00225Zika1010100.000.000.00224	Tubercolosis20220200.000.000.00319Vaccines20220200.000.000.00210Veterans10110100.000.000.00436Violence10110100.000.000.00318Water30330300.000.000.00225West Nile10110100.000.000.00344Women30330300.000.000.00224Zika10110100.000.000.00224	Treatment	1	0	1	1	0	1	0	0.00	0.00	0.00	3	20	
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West Nile 1 0 1 0 1.0 0.00 0.00 0.00 3 44 Women 3 0 3 0 3 0 0.00 0.00 0.00 2 24 Zika 1 0 1 1 0 1 0 0.00 0.00 2 52	West Nile 1 0 1 0 0.00 0.00 0.00 3 44 Women 3 0 3 0 3 0 3 0 0.00 0.00 0.00 2 24 Zika 1 0 1 0 1 0 0.00 0.00 0.00 2 52	West Nile 1 0 1 1 0 0 0.00 0.00 0.00 3 44 Women 3 0 3 0 3 0 3 0 0.00 0.00 0.00 2 24 Zika 1 0 1 1 0 1 0 0.00 0.00 0.00 2 24	Water	3	0	3	3	0	3	0	0.00	0.00	0.00	2	25	
Women 3 0 3 0 3 0 0.00 0.00 0.00 2 24 Zika 1 0 1 0 0.00 0.00 0.00 2 52	Women 3 0 3 0 3 0 0.00 0.00 0.00 2 24 Zika 1 0 1 0 1 0 0.00 0.00 0.00 2 24	Women 3 0 3 0 3 0 0.00 0.00 0.00 2 24 Zika 1 0 1 1 0 1 0 0.00 0.00 0.00 2 52	West Nile	1	0	1	1	0	1	0	0.00	0.00	0.00	3	44	
Zika 1 0 1 1 0 1 0 0.00 0.00 2 52	Zika 1 0 1 1 0 1 0 0.00 0.00 2 52	Zika 1 0 1 1 0 1 0 0.00 0.00 2 52	Women	3	0	3	3	0	3	0	0.00	0.00	0.00	2	24	
			vomen Zika	3	0	3	3	0	1	0	0.00	0.00	0.00	2	24 52	