The social construction of global health priorities: An empirical analysis of contagion in bilateral health aid

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Abstract

Donors of development assistance for health typically provide funding for a range of disease focus areas, such as maternal health and child health, malaria, HIV/AIDS, and other infectious diseases. But funding for each disease category does not match closely its contribution to the disability and loss of life it causes in low- and middle-income countries. We argue that peer influences in the social construction of global health priorities contribute to explaining this misalignment. Aid policy-makers are embedded in a social environment encompassing other donors, health experts, advocacy groups, and international officials. This social environment influences the conceptual and normative frameworks of decision-makers, which in turn affect their funding priorities. Aid policy-makers are especially likely to emulate decisions on funding priorities taken by peers with whom they are most closely involved in the context of expert and advocacy networks. We draw on novel data on donor connectivity through health IGOs and health INGOs and assess the argument by applying spatial regression models to health aid disbursed globally between 1995 and 2017. The analysis provides strong empirical support for our argument that the involvement in overlapping expert and advocacy networks shapes funding priorities regarding disease categories and recipient countries in health aid.

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Introduction

While access to healthcare has improved considerably around the world in recent decades, millions of deaths could still be prevented each year through low-cost medical interventions. For instance, child mortality rates continue to drop – from 183 children of every 1,000 dying before age five in 1960 to 39 in 2018. But an estimated half of the over 5 million children who still die each year could be saved by well-tested low-tech measures such as vaccines, antibiotics, micronutrient supplementation, and insecticide-treated bed nets (UNICEF 2019). Financial constraints often hinder these measures. In 2017, health expenditure per capita was $ 44.81 in the average low-income country, compared to $ 269.50 in middle-income countries and $ 5,284 in high-income countries (World Bank 2020a). The economic crisis triggered by the coronavirus causing COVID-19 is putting health budgets under further pressure: domestic health expenditure in low and middle-income countries is expected to fall substantially over 2020-2024, despite increasing need (Gheorghe et al. 2020).

Given these long-term resource gaps, governments have come to consider development aid as a key tool for improving access to health care worldwide (Lumsdaine 1993). Overall, Development Assistance for Health (DAH) increased globally from $7.2 billion in 1990 to $11.7 billion in 2000 and $36.4 billion in 2015 (2011 US dollars). In 2014, external resources for health accounted for a third of the total expenditure for health in low-income countries (Dieleman et al. 2016, 2540). Donors allocate health aid to a wide range of uses, from interventions targeted at specific diseases, such as HIV/AIDS, tuberculosis, malaria or poliomyelitis, to payments into the general health budget of recipient governments. Since the early 1990s, the World Health Organization (WHO), the World Bank and other organisations have promoted the "disability-adjusted life-years" (DALY) lost because of specific health conditions as a tool to help allocate scarce resources among health interventions (GBD 2017 DALYs and HALE Collaborators 2018). Health policy experts have used DALY information to criticise donors for the "misfinancing" and "misalignment" of DAH, i.e. for failing to align their funding with the relative contribution of health conditions to the global burden of disease (MacKellar 2005; Shiffman 2006; Sridhar and Batniji 2008; Stuckler et al. 2008; Esser and Bench 2011; Dieleman et al. 2014). Examples of misalignment are non-communicable diseases, such as diabetes, cancer and congenital heart disease. Non-communicable

diseases account for nearly 50 per cent of the total burden of disease in terms of DALY, but they receive only 1.5 per cent of all health aid (Dieleman et al. 2014, 884). Another example is acute respiratory infections, which accounted for more than a quarter of the burden attributable to communicable diseases but received less than three per cent of aid directed at that disease group (Shiffman 2006).

Theories of International Relations contribute to explaining mismatches between development needs and aid flows. Political economy approaches point at domestic interests and institutions in donor countries and the policy concessions that recipient governments make in exchange for aid, whereas security-oriented approaches point at the strategic interests of donor countries (Lancaster 2006; Bueno De Mesquita and Smith 2009; Milner and Tingley 2010; Baccini and Urpelainen 2012; Barthel et al. 2014; Vreeland and Dreher 2014; McLean 2015; Dietrich 2016; Bermeo 2017; Alexander and Rooney 2019; Lazell and Petrikova 2020; Dietrich et al. 2020). Such factors are likely to play a role also in the field of DAH. However, in this article, we draw on the constructivist tradition to argue that something else plays a role too. Development aid is a social environment, where policy-makers are exposed to a range of norms and behavioural expectations and sometimes to forms of peer pressure. To be sure, such normative expectations and pressures are often insufficient to override expectations and demands originating from powerful domestic actors, including economic and foreign affairs departments within the policy-makers' government. Nevertheless, such domestic pressures usually leave aid policy-makers with some room for manoeuvre, and this is where the social environment constituted by other actors, including donor officials from other countries, can make a difference.

This paper argues that health-aid objectives are constructed socially and specifically through communicative interactions between global health actors. We do not argue merely that donors act based on beliefs on the relative importance of health issues (as opposed to more "objective" indicators), but also that peer groups influence such beliefs. Health aid policy-makers are embedded in overlapping networks of experts on various aspects of global health – what have been called epistemic communities (Haas 1992). These epistemic communities are composed of health experts, advocacy groups, international officials, and donor officials themselves. This social environment influences the conceptual and normative frameworks of global health decision-makers, which in turn affect their funding priorities. Aid policy-makers are especially likely to emulate decisions on funding priorities taken by peers with whom they are most closely involved

in the context of epistemic communities. If our argument is correct, we should find that how a donor allocates its DAH among health purposes is influenced by how its social peers – i.e., other donors linked to it via overlapping epistemic communities – have distributed their health aid. While the measurement of influences between donors concerning the choice of *recipients* has received some attention already (Barthel et al. 2014; Steinwand 2015; Davies and Klasen 2019), to our knowledge, we provide the first quantitative assessment of social influences in relation to the choice between priority areas for intervention.[2]

We test our hypothesis using spatial econometric models. Our primary dependent variables are the proportion of health aid disbursed bilaterally by each donor to each recipient for a range of health focus areas. Our main independent variables are spatial lags capturing how health aid is distributed by other donors involved in (partly) the same health-focused epistemic communities. We multiply the lagged vector of donor's aid disbursements for each disease by dyadic memberships of donors in both intergovernmental and international non-governmental organisations (IGOs and INGOs) concerned with health issues, using an original dataset. Donor governments can be connected to other donors through joint memberships in health-IGOs and through health-INGOs that have members within their borders. We expect that a donor's allocation of DAH among health issues is influenced by the allocation of other donors, in proportion to the intensity of the donors' links through health-IGOs and through health-INGOs.

Our argument is meant to complement rather than replace accounts based on donor self-interest. In testing our hypothesis empirically, we control for a range of factors that strategic accounts would expect to determine the allocation of DAH across uses. Strategic accounts would expect donors to prioritise diseases that can spread and affect the health of the public of donor governments. Apart from that, strategic accounts would expect the selection of health issues to be a by-product of choices of recipient countries. In other words, donors first decide whether a country should receive DAH based on strategic and commercial considerations. Then they decide how to allocate health

[2] Swiss (2012, 2018) comes closest to our aims by examining how the adoption of "Women in Development" and "Gender and Development" policies by donors is influenced by the number of other donors that have already adopted them, amongst other factors.

aid between different uses within each country (possibly in line with disease burdens within the country).

The paper is organised as follows. The next section gauges the extent of the mismatch between the health burden attributable to various disease categories and the funding targeted at them. Then we provide an explanation of the mismatch based on constructivist theory. Subsequent sections present our data and our econometric strategy, and then our findings. We conclude the paper with some thoughts on the implications of our findings for International Relations research on foreign aid and possible directions for future research.

Gauging the mismatch

The allocation of scarce resources among alternative health interventions has always been influenced by a complex bundle of information relating to the causes of ill health. The information required includes mortality rates, aetiological and epidemiological knowledge, availability of treatments, and their cost. Since the early 1990s, policy-makers have access to systematically collected and standardised information on the contribution of a wide range of diseases and health conditions to the overall burden of disease, globally and at the level of each country. The metrics used for producing this information also form the basis for standardised information on the cost-effectiveness of a wide range of health interventions. A collaboration between the World Health Organization, the World Bank and academics generated the data underlying two seminal outputs: the Global Burden of Disease 1990 study and the World Bank's *World Development Report 1993: Investing in Health* (World Bank 1993; see also World Health Organization 1996; Tan-Torres Edejer et al. 2003). The approach developed for the Global Burden of Disease project is based on the concept of DALY. DALY is a measure of impact that combines the number of years of life lost due to premature mortality and the years lived with disability due to the disease. The first Global Burden of Disease (GBD) study captured DALY for 100 diseases in 1990, and estimates were updated in later years. The latest study, Global Burden of Disease 2017, gives DALY estimates for 359 diseases and injuries for 195 countries and territories between 1990 and 2017 (GBD 2017 DALYs and HALE Collaborators 2018).

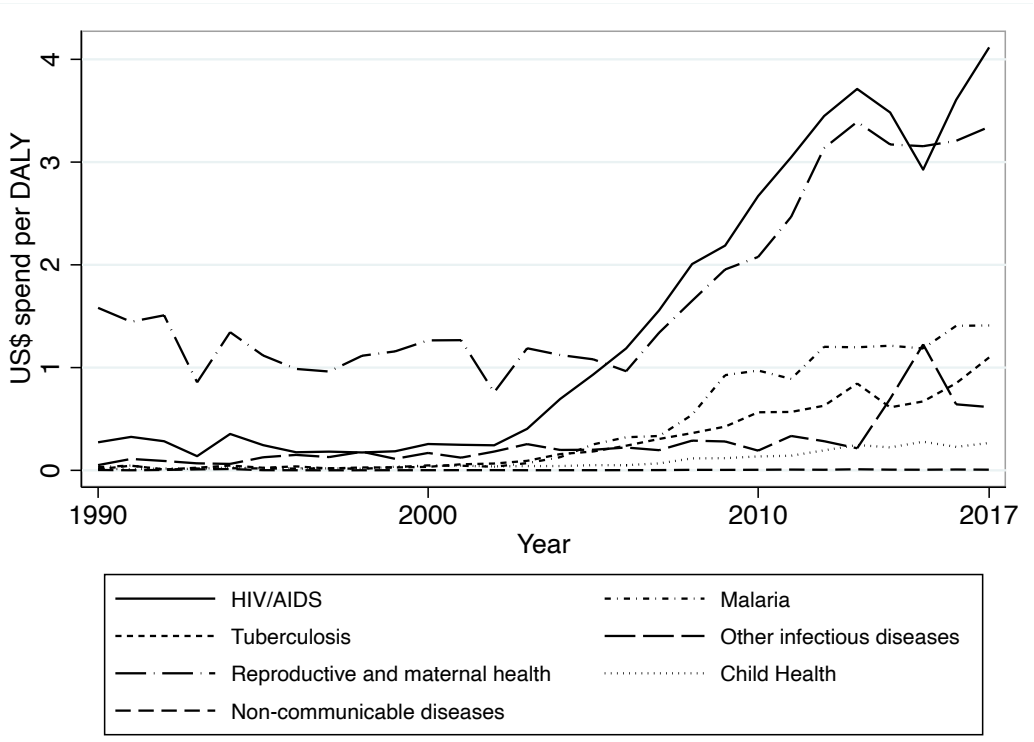
The GBD study was developed to help policy-makers make decisions about the allocation of scarce resources among health activities, and it has become a standard tool: 156 country governments

reference the GBD study (Murray and Lopez 2017). For instance, the aid agency of the United Kingdom government – the Department for International Development (DFID) - referenced it when stating that it "is allocating its country spend to those where the health impact is likely to be high, according to what might be an ideal allocation based on need and likely effectiveness of health expenditure in each country" (Department for International Development 2009, 5). DFID cites the GDB study to demonstrate that it is "targeting effort to need", by enabling it to state, for instance, that "Over 48% of the global burden of disease and more than 68% of the global burden of all communicable diseases are found in DFID focus countries" (Department for International Development 2013, 16).

However, health policy experts who criticise existing health aid allocations point at the mismatch between DALY and DAH (Sridhar and Batniji 2008; Stuckler et al. 2008). To gauge the extent of this mismatch and its trend since 1990, we analyse the latest available data on DALY and health aid over time.

We follow Ravishankar et al. (2009, 2114) in defining DAH as consisting of "[f]inancial and in-kind contributions from channels of assistance to improve health in low-income and middle-income countries. DAH aims to achieve either country-specific health improvements or to finance health-related global public goods such as research and development, disease surveillance, monitoring and evaluation, and data collection. DAH does not include support for allied fields such as humanitarian assistance, food aid, water and sanitation, education, and poverty alleviation that indirectly affect health." The Institute of Health Metrics and Evaluation (IHME) has systematically collected data on trends of DAH in general and for specific purposes between 1990 and 2017 (Institute for Health Metrics and Evaluation (IHME) 2020a). The IHME classifies health aid into broad "health focus areas" (plus a residual category): newborn and child health, reproductive and maternal health, HIV/AIDS, tuberculosis, malaria, other infectious diseases, non-communicable diseases (NCDs), and sector-wide approaches and health system strengthening.

Figure 1. Ratio of development assistance for health to Disability-Adjusted Life-Years, seven health focus areas, 1990-2017



Note: Funding amounts refer to all DAH recipients in the IHME database. Source: our calculations based on GBD 2017 DALYs and HALE Collaborators (2018) and Institute for Health Metrics and Evaluation (IHME) (2020a).

Mismatch between health focus areas

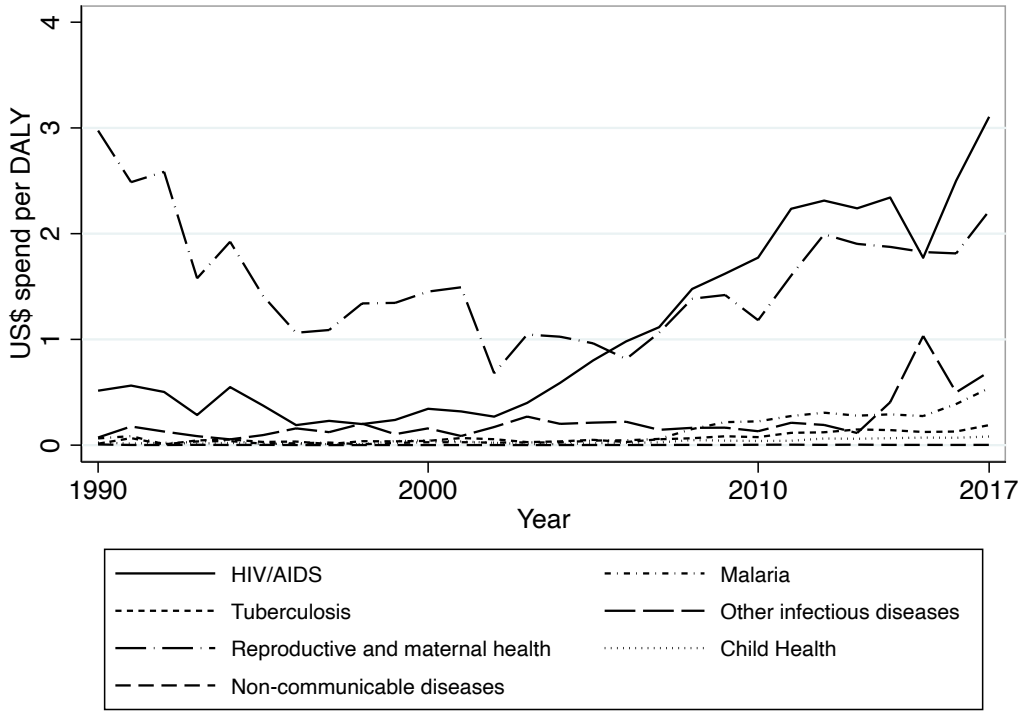
One way of gauging a mismatch between disease burdens and funding devoted to them is to compare the ratio of DAH to DALY lost across various health categories. Figure 1 shows how the ratio of DAH to DALY for seven disease categories has changed between 1990 and 2017. Table A3 in the online appendix displays how DALY data was coded to correspond to DAH data.

In this paper, the focus is on a sub-set of this funding: bilateral development assistance for health.[3] Figure 2 displays the same graph focusing only on the 23 donor countries included in our database. Information on donors and recipients are provided below.

If health aid was allocated among disease categories exactly in direct proportion to the DALY loss attributable to them, the lines corresponding to them would be coincident. Instead, the data presented in figure 2 shows that HIV/AIDS, "other infectious diseases", and reproductive and maternal health receive more funding per DALY than the other focus areas. The trend has increased in recent years. There are disparities also among the other causes of disease: malaria and tuberculosis received more funding per DALY than newborn and child health – a category that includes immunisations for several common diseases. Moreover, the child health category includes funding directed at polio eradication, which has received substantial amounts of funding in the past 20 years despite a relatively low contribution to global DALY. Finally, NCDs receive a minimal amount of DAH compared to their contribution to the global burden of disease.

[3] We do so for two reasons. First, it allows us to consider also the recipient and dyadic features that should play a major role according to the aid allocation literature. We could not do so if we included contributions to multilateral funds because decision-making in multilateral aid is subject to substantial bargaining among donors and agency slack of IGO bureaucracies (Schneider and Tobin 2013). Therefore, donor governments often cannot directly control who the recipients will be, and sometimes cannot control the specific health focus area either. Second, as we discuss below, the network data we use to operationalise involvement in epistemic communities is measured at the country level. While multilateral aid agencies interact with INGOs and other IGOs too, such interactions cannot be captured through the kind of systematic membership data that exists for countries.

Figure 2. Ratio of bilateral development assistance for health to Disability-Adjusted Life-Years, seven health focus areas, 1990-2017.

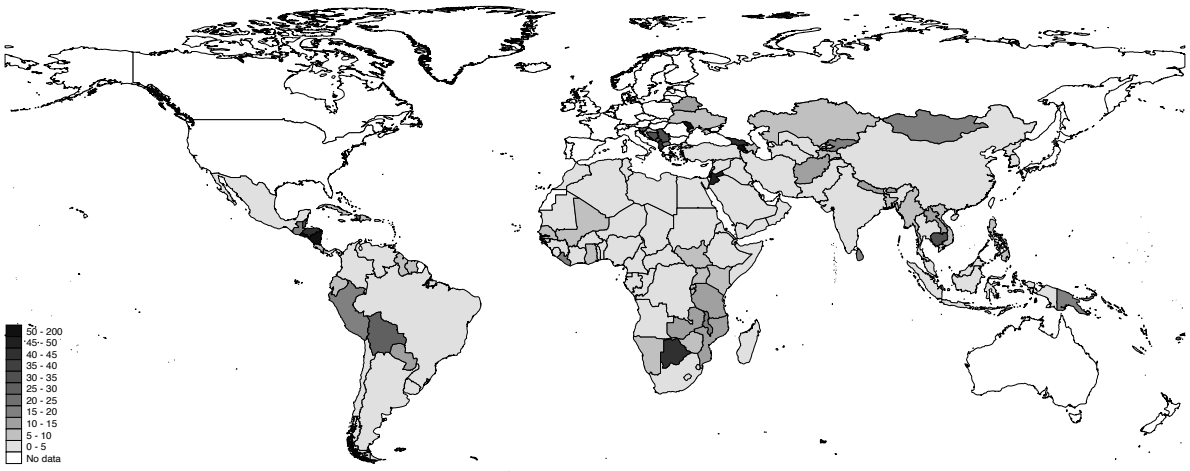


Note: Funding amounts refer to all DAH recipients in the IHME database. DALY refer to the sum of all DALY lost in each year for all recipients of bilateral DAH. Source: our calculations based on GBD 2017 DALYs and HALE Collaborators (2018) and Institute for Health Metrics and Evaluation (IHME) (2020a).

Mismatch between recipients

The mismatch is not only apparent for allocation between diseases but also between countries. Figure 3 displays the average aid per DALY allocated between 1990 and 2017 to recipient countries in DAH for child health (chosen as an example because diseases are less geographically clustered). There are wide disparities between countries in the allocation of child health aid. Some countries get a substantial degree of financing per DALY, while others attain very little. This often applies to geographical neighbours with similar levels of development and similar disease burdens. The picture is analogous when looking at the between-country distribution of other DAH disease categories.

Figure 3: Ratio of bilateral development assistance for health to Disability-Adjusted Life-Years, child health, 1990-2017



Note: Funding amounts refer to all DAH recipients in the IHME database. DALY refer to the sum of all DALY lost in each year. The values are calculated by summing DAH by dividing the sum of DAH in each recipient-year by the DALY lost in each recipient-year and then taking the average for all 27 years in the data. Source: our calculations based on GBD 2017 DALYs and HALE Collaborators (2018) and Institute for Health Metrics and Evaluation (IHME) (2020a).

It is essential to bear in mind that finding differences in DAH to DALY ratios are not sufficient to conclude that allocations do not reflect needs. First, the DAH category of reproductive and maternal health includes funding for family planning, whose health impact may not be limited to the DALY categories included in the denominator, maternal disorders and sexually transmitted diseases other than HIV/AIDS (Tsui et al. 2010). Second, some infectious diseases may spread very rapidly if left unchecked, and governments may decide to invest substantial amounts of resources in order to contain them (MacKellar 2005; Shiffman 2006; Stuckler et al. 2008). The SARS-CoV-2 coronavirus causing COVID-19 is such a rapidly spreading pathogen. However, a spike in mortality caused by a specific disease should not necessarily transform DALY-based funding priorities (Reddy 2020). Third, donors may consider not only how much a disease affects the health of a population but also the relative cost-effectiveness of interventions that target that disease. Focusing on a sample of 20 countries and 15 diseases between 2008 and 2011, Bendavid et al. (2015) show that, if differences in published cost-effectiveness are taken into account, the allocation of DAH among disease categories is less skewed than the comparison with DALY would suggest. However, the study confirms that a reallocation of DAH would have produced

higher health gains. As we show later in the empirical section, DALY and cost-effectiveness together cannot fully account for the allocation of DAH.

Despite these caveats, the fact that DAH is not fully aligned with DALY estimates provides a strong indication that DAH allocation is influenced by factors beyond the goals of improving the health of the populations in the countries that receive it. The remainder of this paper develops and tests a constructivist explanation for this.

The social construction of international health priorities

As noted in the introduction, International Relations scholars and political economists typically explain mismatches between development needs and aid flows by pointing at the economic and strategic interests of donor countries (Lancaster 2006; Bueno De Mesquita and Smith 2009; Milner and Tingley 2010; Baccini and Urpelainen 2012; Barthel et al. 2014; Vreeland and Dreher 2014; McLean 2015; Bermeo 2017; Lazell and Petrikova 2020). These factors certainly need to be considered in any analysis of the allocation of DAH (see the discussion below). But here we develop a complementary explanation based on the assumption that the global health "industry" is a social environment that exposes policy-makers to socialisation processes (Eyben 2006; Mosse 2011; Roth 2015; Kallman 2017). As Jeremy Shiffman noted in a seminal article on disease control priorities, "While recipient need or provider interest may shape initial donor choices, subsequent behaviour may be based less on deliberation than on precedent, resulting in simultaneous global shifts in priorities not always in accordance with developing world need" (Shiffman 2006, 403).

A constructivist explanation of DAH allocations needs to perform two tasks, which can be related to the norm life cycle theorized by Finnemore and Sikkink (1998). First, it needs to trace the origins of norms and ideas that have the potential of affecting funding decisions. Shiffman and other authors generated valuable insights into this aspect by presenting rich process-tracing evidence on the efforts by advocacy networks – i.e. coalitions of experts, officials and activists working on a health issue - to mobilise political support and funding for specific health areas, such as maternal health, infant survival and health system strengthening (Ogden et al. 2003; Shiffman and Smith 2007; Hafner and Shiffman 2013; Walt and Gilson 2014; Shiffman et al. 2016b; Quissell and Walt 2016; Gneiting 2016; Smith and Rodriguez 2016; Shiffman 2016; Schmitz 2016; Berlan 2016; Shiffman et al. 2016a; Storeng and Béhague 2016). Given the work that has been done on the

emergence, expansion and operations of such advocacy networks, we will not address this aspect here.

The second task is to examine whether and how such ideas exert a level of influence on aid decision-making that is sufficient to affect the aggregate allocation of DAH among health issues. This task relates to the concept of "norm cascade" (Finnemore and Sikkink 1998). Since systematic knowledge on this aspect of DAH is scarce, we focus our attention on it. In essence, we expect that a donor's allocation of DAH among health issues is influenced by how other donors have allocated their aid. This influence results from socialisation processes and typically leads to convergence in aid allocation. However, we do not expect donors to be influenced by all other donors equally. We hypothesise that influence is stronger between donors who participate in the same epistemic communities in the field of health. We discuss these two issues (influence and *unequal* influence) in turn.

The setting of priorities for global health interventions is a complex process that involves several epistemic and normative judgements. These judgements are based to some extent on policy paradigms, or possibly on compromises between policy paradigms that are held by different decision-makers within the same organisation. Existing research has shown that a variety of paradigms co-exist in the field of global health (Lee 2009; Davies 2010; Rushton and Williams 2012; Storeng 2014). The adoption, adaptation and replacement of policy paradigms are affected by several factors, which include learning from the experiences of other policy-makers and emulating the behavior of models and social peers. Emulation plays a role in shaping policy paradigms also because learning is hindered by noisy and incomplete information, and paradigms consist of conceptual categories and justice beliefs in addition to causal beliefs that can be updated by learning. Even decision-makers committed to maximising the health impact of DAH are subject to biases when seeking and interpreting evidence, including burden of disease and cost-effectiveness statistics (Parkhurst 2017).

Donor officials develop their intervention priorities in response to normative and cognitive shifts in their social environment (Finnemore and Sikkink 1998). While this environment includes a variety of actors (e.g. officials in other departments of the same government), our focus here is the role of epistemic communities, defined broadly as "a network of professionals with recognised expertise and competence in a particular domain and an authoritative claim to policy relevant

knowledge within that domain or issue-area" (Haas 1992, 3). By emphasizing social influences deriving from embeddedness in epistemic communities, our approach differs from recent work on how donors' choices of recipients affect the decisions of other donors, which focuses on rational-choice mechanisms of diffusion such as competition (Barthel et al. 2014; Steinwand 2015; Davies and Klasen 2019).

For our purposes, the relevant epistemic communities consist of experts who specialize in various aspects of global health. We focus on epistemic communities that span national borders, i.e. those that comprise individuals based in several countries. Some of these experts are primarily scientists and clinicians, while others are mainly engaged in policy advocacy and consultancy. As recent research on global health networks as shown, the boundaries between scientific, clinical and advocacy activities are fuzzy (Shiffman et al. 2016b; Quissell and Walt 2016; Gneiting 2016; Smith and Rodriguez 2016; Shiffman 2016; Schmitz 2016; Berlan 2016; Shiffman et al. 2016a; Herrick 2020). The foundational literature on epistemic communities posited a clear distinction between them and policy-makers (Haas 1992). However, in the field of global health, this distinction is often inappropriate, as donor agency officials are frequently specialists themselves and can credibly claim epistemic rather than just financial authority (e.g., Dalglish et al. 2015; Shawar and Crane 2017). For this reason, we depart from the conventional dichotomy and consider donor officials dealing with health aid as potential members of epistemic communities.

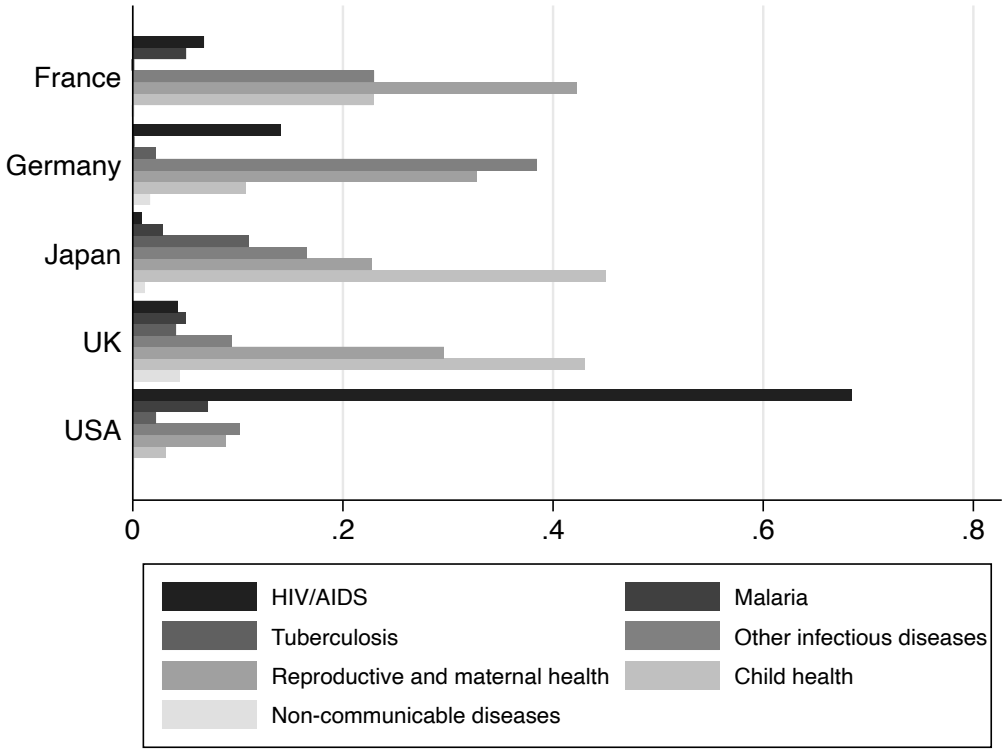
Complex patterns of reciprocal influence connect actors involved in epistemic communities. Officials of different donor agencies can be influenced by the same opinion leaders based in INGOs or IGOs such as the WHO. At the same time, they can influence each other, especially given that they constitute a peer group based on shared professional identities (Fejerskov 2015; Kallman 2017). The implications of this are that the behavior of donors can converge because of two mechanisms that are likely to operate simultaneously. First, convergence can result from common exposure to the same set of non-donor actors. Second, convergence can result from emulation among peers, where peer status is at least partly defined by joint involvement in overlapping epistemic communities. In the next section, we discuss the methodological implications of this double pathway to convergence.

Liam Swiss (2012, 2018) has provided one of the most in-depth studies on how officials in development agencies respond to the expectations and norms prevalent in their external

environment, by examining the adoption of policy models in the areas of gender and development and security and development. His primary aim is to explain "the apparent consensus or striking similarity of policy models and priorities among foreign aid donors" (Swiss 2018, 24). His explanation draws on the World Polity approach, which expects governments around the world to display increasing isomorphism in their structures and activities as a result of their desire to be seen in compliance with global standards of legitimacy. This approach identifies a world culture that shapes conceptions of appropriate social actors, collective goals, and policy models, and a world polity constituted by organisational linkages that transmit this world culture to all states (Boli and Thomas 1997; Meyer et al. 1997).

Our account shares key features of this approach, but it differs in an important way. Consistent with World Polity theorists who describe the world as "a unitary social system, increasingly integrated by networks" (Boli and Thomas 1997, 172). Swiss focuses on the question of "why donors march in lock-step with uniform policies and priorities" (Swiss 2018, 23). By contrast, our point of departure is not the observation of a general convergence among donors toward a single understanding of global health priorities. Even after decades of involvement in the health sector of low- and middle-income countries, differences in funding priorities remain substantial among donors. We illustrate this argument on a small number of donors in 2017. As shown in Figure 4, different donors seem to have varying priorities. France spent relatively more on reproductive and maternal health than the other donors, Germany focused more on infectious diseases, Japan and the UK prioritised child health, and the USA spent most of its DAH on the fight against HIV/AIDS.

Figure 4. Share of disbursement for seven health focus areas by five different donors, 2017.



Note: our calculations based on data from the Institute for Health Metrics and Evaluation (IHME) (2020a).

Such differences may be partly because, while epistemic communities influence donor officials, the members of such communities are not identical across all donors. This matters because, even when they are committed to improving population health, different groups carry different professional and cognitive biases (Parkhurst 2017). The issue is not just that some states have stronger connections to the world polity than other states, which fits with the view that they are merely at different stages of the same global trajectory. Rather, as Jason Beckfield points out in relation to IGOs in general, "while states are growing more even in the number of IGOs they belong to, they increasingly belong to different IGOs" (Beckfield 2010, 1041). He found that, since 1945, the network of IGOs has become more fragmented, more heterogeneous, less cohesive, and

less "small-worldly" in its structure. We do not aim to provide a similar structural mapping of intergovernmental and non-governmental organisations operating in the field of health. Nevertheless, Beckfield's findings are important for our purposes because they suggest that the study of policy contagion through involvement in epistemic communities needs a fine-grained analysis of *who is connected to whom*. This insight guides the empirical strategy that we present in the next section.

In sum, our theoretical approach to social contagion takes into account the possibility that health-aid policy-makers are susceptible to varying levels of influence stemming from interacting within the same epistemic communities. Our hypothesis is, therefore:

A donor's allocation of DAH among health issues is influenced by the allocation of other donors, in proportion to the intensity of the donors' links through health-focused epistemic communities.

Empirical strategy and data

We test our hypothesis using spatial econometric models. In this section, we describe dependent variables, main independent variables, controls, and the estimation strategy.

Dependent variables

Our main dependent variables are the amount of health aid disbursed for each one of eight health focus areas: newborn and child health, reproductive and maternal health, HIV/AIDS, tuberculosis, malaria, other infectious diseases, non-communicable diseases, and sector-wide approaches and health system strengthening. Specifically, we take the (log) total amount of health aid allocated donor i to recipient k in time t. The data are provided by the Institute for Health Metrics and Evaluation (IHME) (2020a) and have been described in the second section. IHME includes data for 23 donors (listed in Table A1). Data are available at the bilateral level and allow us to know the disbursement of aid from each donor to each recipient for every health focus area for each year between 1990 and 2015. Following common practice in the literature (Bueno De Mesquita and Smith 2007, 2009), we use the logarithm of the amount of aid disbursements to mitigate the impact of outliers. We label this variable *Aid Disbursements (health focus area)*.

The literature on aid allocation uses either disbursement or commitment data as dependent variables. We focus on disbursement because the health focus categories of the IMHE

disbursements dataset match the categories of causes of DALY of the Global Burden of Disease more closely than alternative sources of funding data such as the OECD Creditor Reporting System or AidData (Tierney et al. 2011; OECD 2020). Because it is desirable to include the DALY for each disease category as a control variable in our estimations, the IMHE allows us to match DAH and DALY more precisely.[4] While commitments may reflect the donors' intentions more accurately than disbursements, we consider disbursements as a reasonably accurate reflection of donor priorities. Contrary to other aid sectors, commitments of health aid are not only generally fulfilled, but they are also fulfilled quite rapidly, i.e. mostly within two years (Hudson 2013; see also Dietrich 2011).

Independent variables

Our main independent variables are spatial lags capturing connections through health-focused epistemic communities. More specifically, we multiply the lagged vector of donor's aid disbursements for each disease by a connectivity matrix capturing dyadic memberships of donors in both intergovernmental and non-governmental organisations concerned with health issues. Donor governments can be connected to other states through joint memberships in health-IGOs and through health-INGOs that have members within their borders. We use this measure because it captures both mechanisms discussed earlier: convergence resulting from common exposure to the same set of non-donor actors, and convergence resulting from emulation among peers, where peer status is at least partly defined by joint involvement in overlapping epistemic communities. Thus, our measure is well suited to reflect two important features of interpersonal interactions in the field of global health: on the other hand, health-INGOs and health-IGOs are not passive conduits between donors in the way that – say – transport links are, but actors that contribute to shaping beliefs and decisions; on the other hand, donor officials are not passive recipients of INGO-IGO advice and pressure, but exercise epistemic authority themselves and provide models for other donors. However, our approach has the limitation that it does not help us disentangle the

[4] See Global Burden of Disease Health Financing Collaborator Network (2019, 56-64) for details on the procedure for allocating funds to health focus areas. Sector-wide approaches and health sector strengthening does not have a corresponding DALY estimate and therefore we cannot control for them in the models. We do, however, report a robustness check focusing on them, in the online appendix.

relative importance of donor-donor and I(N)GO-donor influence in producing convergence of DAH allocation decisions. We point at a way to address this limitation in the concluding section.

As a first step, we include both intergovernmental and non-governmental organisations in the connectivity matrix, in line with the literature on epistemic communities, which does not draw a neat separation between public and private actors. In a robustness check, we consider dyadic memberships in health-IGO and dyadic memberships in health-INGO separately. We use an original dataset of memberships in health-IGOs and health-INGOs, based on information collected from the Yearbook of International Organizations (further details are in the appendix). Memberships are coded for the years 1988, 1992, 1996, 2000, 2004, 2008 and 2011. Since countries memberships in I(N)GOs does not fluctuate, with countries joining and leaving particular I(N)GOs rapidly and unpredictably, we use linear interpolation to fill in the years that were not coded.[5]

More formally, the spatial lag is built:

$$\text{Dyadic HIV Lag}_{ik,t} = (\text{IGO}_{ij,t-1} + \text{INGO}_{ij,t-1}) * \text{ HIV Aidshare}'_{jk,t-1} \quad (1)$$

where HIV Aidshare$_{ik,t}$ is the disbursement of HIV aid from donor *i* to recipient *k* in time *t-1* divided by the disbursement of all diseases from donor *i* to recipient *k* in time *t-1* and (IGO$_{ij,t-1}$ + INGO$_{ij,t-1}$) is the number of shared memberships in health-IGOs and health INGOs between donor *i* and donor *j* in time *t-1*. We build the spatial lag for the other disease categories in the same way. In short, we multiply dyadic memberships in health-IGO and health-INGO by a vector of donor's aid disbursement shares for each disease and each recipient. We use aid shares because we are interested in modelling the funding priorities of other donors. Using overall disbursements in the spatial lag would mean that some donors, who spend much more, contribute strongly to the spatial lag, even in disease categories where they spend comparatively little. Therefore, we account for

[5] In line with standard practice in quantitative research on INGO memberships (Belkin and Schofer 2003; Frank et al. 2000; Murdie and Bhasin 2011; Murdie and Hicks 2013; Hughes et al. 2015), we use linear interpolation to fill in the years that were not coded. Results using alternative imputation approaches (nearest neighbour and last available data) are very similar and can be provided upon request.

the relative importance of different disease categories in a donor's portfolio by using disbursement shares. In line with our conceptual framework, we only consider shared memberships between donors. We build the same lag for all the other six diseases. We use the log-transformed row value of these variables to mitigate the impact of outliers (Plümper and Neumayer 2010).[6]

Control variables

We incorporate several control variables to account for cofounding factors and alternative explanations. To begin with, we include variables measuring the burden of disease in each country (DALY). We have already discussed this measure and its source in the second section. We also use data on the cost-effectiveness of health intervention from the Disease Control Priorities project (Jamison et al. 1993; Jamison et al. 2006; Jamison et al. 2015-2018). The Disease Control Priorities project pools information on the cost-effectiveness of interventions from studies published in major academic journals. It lists the average price (per DALY saved) of a large number of interventions focusing on a range of diseases. The Disease Control Priorities (DCP) report was published in 1993, 2006 and 2015-18. The DCP report is as the standard reference book for practitioners in the area of cost-effectiveness of. It can be seen as the best available evidence policy-makers might have used at the time when comparing the cost-effectiveness of interventions during the design of health aid projects. We use GBD 1993 data for the years 1993-2005, GBD 2006 data for the years 2007-2015 and GDB 2015-18 data for subsequent years. When multiple interventions are listed per disease, we use the median costs per DALY of the listed interventions.

Moreover, the allocation of DAH across diseases may be partly a by-product of the decision to direct financial resources to countries that are important to the donor, notably for political, strategic and economic reasons. To account for this mechanism, we include variables capturing the commercial and strategic importance of recipient countries: the amount of trade between donors and recipients (World Bank 2020b), the distance of foreign policy ideal points based on United Nations General Assembly votes (Bailey et al. 2017), a dummy for UNSC members (Dreher et al. 2009), and a dummy for former colonies (Mayer and Zignago 2011). We also account for economic ties between donors and recipients by including a measure of bilateral trade (World Bank

[6] Following Plümper and Neumayer (2010), we do not use row-standardised connectivity matrices.

2020b). According to Bueno de Mesquita and Smith, it is more costly to buy policy concessions from democracies than for authoritarian countries, and therefore donors take into account the type of regime in allocating aid (Bueno De Mesquita and Smith 2007, 2009). To account for this, we include a measure of the type of regime, the Liberal Democracy score from the V-Dem project (Coppedge et al. 2020; Pemstein et al. 2020). In addition, donors might be concerned about the spreading of infectious diseases from recipient countries. We incorporate a measure of tourism outflows from the donor country (World Bank 2020a) and the geographical distance between donor and recipients (Mayer and Zignago 2011) to account for this argument. Finally, we control for recipient need more generally by including (log) population to control for variation in the size of the targeted population in different recipient countries and GDP per capita to account for different levels of economic development (United Nations 2019).

One might be concerned about potential confounders because networks of health IGO and INGO membership are likely correlated with other networks that countries are embedded in. A small but growing literature shows that donors are influenced by the choices of other donors when choosing between recipients (Barthel et al. 2014; Steinwand 2015; Davies and Klasen 2019). Therefore, we include several alternative spatial lags to test whether the findings on the association of the spatial lag focusing on epistemic communities in health with health aid are robust to including those networks. First, we considered the possibility that we are capturing networks of economic interest rather than epistemic communities for health (Barthel et al. 2014; Davies and Klasen 2019). Therefore, we include two economic spatial lags. We multiply aid disbursement shares with common membership in free trade agreements (Dür et al. 2014) and with donors' trade with each other (World Bank 2020b). Furthermore, we include alternative sources of social ties noted in the literature (Davies and Klasen 2019). We do so to make sure that results are not driven by general social ties alone but specifically by joint involvement in epistemic communities for health. We include spatial lags focusing on whether two donors have a common official language and on the geographical distance between two donors (Mayer and Zignago 2011). These models are plagued by substantial multicollinearity, so results should be interpreted cautiously. Table 1 reports the descriptive statistics of our main variables.

Table 1. Descriptive statistics

Variable	N	Mean	Std. Dev.	Min	Max
DAH disbursement (log)	534,416	0.73	1.84	0	13.19
DALY lost (in millions)	423,829	2.16	13.98	0.00	306.70
Median costs per DALY (log)	467,614	4.41	1.34	1.95	7.43
Spatial lag (health organ.)	484,376	3.94	2.69	0	9.04
Spatial lag (distance)	484,376	5.84	3.69	0	12.62
Spatial lag (language)	484,376	0.11	0.24	0	1.99
Spatial lag (FTA)	484,376	0.33	0.46	0	2.83
Spatial lag (trade)	484,376	9.85	7.19	0	20.35
GDP per capita	471,984	3,311.79	3,249.95	84.02	2,2395.59
UNGA ideal point distance	412,072	1.74	0.73	0	5.25
UNSC membership	460,760	0.05	0.22	0	1
Colony	526,640	0.05	0.21	0	1
Democracy	440,672	0.30	0.20	0.01	0.88
Imports	378,856	8.74	3.83	-6.91	19.99
Tourism arrivals	431,040	20,100,000	21,600,000	724,000	84,500,000

Empirical strategy

In our simplest regressions, we estimate the following model to probe the allocation among disease focus areas[7]:

$$\text{Aid Disbursements (HIV)}_{ik,t} = \alpha + \beta_1 \text{ HIV I(N)GO Lag}_{i,t} + X_{i,t-1}\,\beta_2' + W_{k,t-1}\,\beta_3' + Z_{ik,t-1}\,\beta_4' + \gamma_{ik} + \tau_t + \varepsilon_{ik,t}, \quad (2)$$

where aid disbursement and the spatial lag has been already described, X is a matrix of donor's characteristics, W is a matrix of recipient's characteristics, Z is a matrix of donor-recipient's characteristics. β_1, β_2' , β_3', and β_4' are the coefficients. In particular, the key coefficient of interest is β_1, which we expect to be positive. γ and τ are respectively donor-recipient fixed effects and year fixed effects, whereas α is the constant and ε is the error term. Since aid disbursements is a continuous variable, we can estimate the equation (3) using simple OLS regressions with robust standard error clustered at the donor-recipient level (Beck et al. 2006). When estimating allocation among recipients in a given disease focus area, we employ donor disease fixed effects rather than

[7] We use HIV in the formula as an example. We use the same equation for each health focus area.

donor recipient fixed effects. All independent variables and control variables are lagged by one year to ensure the correct ordering of events.

Findings

We discuss allocation among diseases and allocation among recipients in turn. Table 2 reports the results for five models focusing on allocation amongst disease focus area in a given recipient country. In Model 1, we use dyad fixed effects and year fixed effects as well as the country-level controls discussed above. Model 2 displays the results from an iteration of the model, employing dyad fixed effects in conjunction with recipient-year fixed effects and donor-year fixed effects. This specification allows for dropping all control variables measured at the dyad, donor-year and recipient-year because fixed effects absorb these factors. In Model 3, we employ fixed effects at the dyad-year, which allows us to hold everything constant that does not vary between diseases in one specific recipient in a given year. Finally, Models 4 and 5 further include the social and economic spatial lags discussed above to ensure that the spatial effects we observe capture epistemic communities for health and not alternative sources of connectivity.

We find very strong evidence that donors health focus area portfolios in a specific recipient country are related and influenced by epistemic communities for health. The coefficients are significant ($p<0.001$) and positive in all five models. Additionally, we find that median costs per DALY are significant in the models and are negatively associated with DAH. DALYs lost do not predict health aid at any conventional threshold of statistical significance.

Table 2: Epistemic communities and disbursement (log) of development assistance for health across disease categories

	(1)	(2)	(3)	(4)	(5)
Spatial lag (health organizations)	0.1572***	0.1506***	0.1531***	0.0790***	0.1443***
	(0.0050)	(0.0042)	(0.0042)	(0.0059)	(0.0071)
DALY lost (in millions)	-0.0001	-0.0006	-0.0006	-0.0005	-0.0004
	(0.0009)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Median costs per DALY (log)	-0.0182***	-0.0168***	-0.0169***	-0.0156***	-0.0157***
	(0.0038)	(0.0031)	(0.0031)	(0.0031)	(0.0030)
Spatial lag (economic ties)	No	No	No	Yes	No
Spatial lag (social ties)	No	No	No	No	Yes
Country-level controls	Yes	No	No	No	No
Dyad fixed effects	Yes	Yes	No	No	No
Year fixed effects	Yes	No	No	No	No
Donor-year fixed effects	No	Yes	No	No	No
Recipient-year fixed effects	No	Yes	No	No	No
Dyad-year fixed effects	No	No	Yes	Yes	Yes
Constant	-19.4696***	0.2230***	0.2146***	0.2977***	0.2729***
	(2.5952)	(0.0167)	(0.0167)	(0.0162)	(0.0159)
N	244958	423829	423829	423829	423829
R^2	0.389	0.397	0.482	0.491	0.492

Note: OLS regressions with clustered Standard errors at the dyad-level in parentheses; $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In a second step, we focus on the allocation of DAH among recipients. Table 3 displays the results from the corresponding five models. They mimic the specification choices used in the models focusing on allocation among health focus areas but shift the focus to allocation among recipients. Model 6 includes donor-disease fixed effects in conjunction with year fixed effects. In Model 7, we employ donor-disease fixed effects, donor-year fixed effects as well as disease-year fixed effects. To control for everything constant in a particular donor-disease-year and focus entirely on differences between recipients, we employ corresponding fixed effects in Model 8. Finally, we also include spatial lags based on economic and social sources of contagion in Models 9 and 10.

Again, the evidence supports the importance of joint involvement in epistemic communities for health in DAH allocation. Peers shape allocation among recipients in specific disease categories. The coefficients are significant ($p<0.001$) in all five models. Furthermore, increases in DALYs lost are associated with increased DAH at the country-level. This implies that disease severity does seem to play a role in the considerations of donors when choosing between recipient countries. Furthermore, there is strong evidence that cost-effectiveness is associated with DAH allocation decisions among recipients as well. The coefficients are significant in all five models ($p<0.001$). Donors seem to seek value for money when deciding on their DAH portfolio.

Table 3: Epistemic communities and disbursement (log) of development assistance for health across recipients

	(6)	(7)	(8)	(9)	(10)
Spatial lag (health organizations)	0.1106***	0.1060***	0.1088***	0.0447***	0.1205***
	(0.0042)	(0.0043)	(0.0044)	(0.0091)	(0.0110)
DALY lost (in millions)	0.0024+	0.0027*	0.0028*	0.0023+	0.0025+
	(0.0014)	(0.0014)	(0.0014)	(0.0014)	(0.0014)
Median costs per DALY (log)	-0.0137***	-0.6284***	-0.6305***	-0.5255***	-0.5474***
	(0.0041)	(0.0414)	(0.0416)	(0.0398)	(0.0398)
Spatial lags (economic ties)	No	No	No	Yes	No
Spatial lags (social ties)	No	No	No	No	Yes
Country-level controls	Yes	Yes	Yes	Yes	Yes
Donor- disease fixed effects	Yes	Yes	No	No	No
Year fixed effects	Yes	No	No	No	No
Donor-year fixed effects	No	Yes	No	No	No
Disease-year fixed effects	No	Yes	No	No	No
Donor- disease-year fixed effects	No	No	Yes	Yes	Yes
Constant	-2.1221***	1.2829***	1.2937***	0.8098**	0.9291***
	(0.2215)	(0.2568)	(0.2561)	(0.2505)	(0.2537)
N	244958	244958	244916	244916	244916
R^2	0.321	0.359	0.400	0.409	0.411

Note: OLS regressions with clustered Standard errors at the dyad-level in parentheses; $^{+}\ p < 0.10$, $^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$.

Considering our large sample size, the size of the coefficient seems a more appropriate choice to assess the importance of the variables than significance levels. Therefore, we now turn to the substantive importance of the three explanations for DAH allocations. Because we log-transform and do not row-standardise the spatial lags, it is not straightforward to grasp the magnitude of the effects. A way to gauge the relative strength of the coefficients is presented in Table 4. We display the simulated (log) disbursement, holding all variables at their mean and our variables of interest

one standard deviations below and above the mean for all eight models. We only perform this exercise for those variables that obtained statistically significant results in Models 3 and 8. The results illustrate the importance of joint involvement in epistemic communities for DAH disbursements. A two standard deviation change in the spatial lag leads to substantively higher DAH disbursements both across diseases and across recipients. In the model focusing on allocation among diseases in the same recipient, two-standard deviations increase DAH disbursements by 282.3%[8]. When holding donor-disease-years constant to focus on the allocation of aid in a specific disease category across recipients, the results are similarly substantial. A two-standard deviation increase in the spatial lag increases DAH disbursements by 118%.

Table 4: Substantive importance of epistemic communities, DALY lost and median costs

	At Mean - Std. dev.	**At Mean + Std dev.**	**Percentage change**
Across diseases (Model 3)			
Spatial lag (health organizations)	0.287	1.102	284.0%
	(0.280; 0.293)	(1.096; 1.109)	
Median costs per DALY (log)	0.717	0.672	-6.3%
	(0.711; 0.724)	(0.665; 0.678)	
Across recipients (Model 8)			
Spatial lag (health organizations)	0.481	1.048	117.9%
	(0.471; 0.490)	(1.039; 1.058)	
DALY lost **(in million)**	0.732	0.797	8.9%
	(0.724; 0.740)	(0.789; 0.805)	
Median costs per DALY (log)	1.623	-0.094	-105.8%
	(1.569; 1.677)	(-0.148; -0.040)	

These coefficients are substantially larger than those for DALY or cost-effectiveness for the disease model. DALY has only a very moderate association with DAH allocation. A two standard-deviations increase in DALYs lost increases DAH disbursements across recipients by only 8.9%.

[8] Percentage changes are calculated by subtracting the +Std. dev. value from the -Std. dev. value. The result is then divided by the -Std. dev value and multiplied by 100 to get the percentage change in predicted DAH allocation with a two standard deviation change in each of the independent variables.

The finding is in line with research that demonstrates that foreign aid does not always go where it is most needed (Briggs 2017). Cost-effectiveness has a small impact for allocations across diseases but predicts large changes in DAH allocations across recipients. A two standard-deviations increase in median costs per DALY (log) decreases DAH disbursement by roughly 6.3%. Cost-effectiveness is much more substantial when looking at allocation among recipients in one disease category. A two standard-deviations increase in median costs decreases DAH allocation by more than 100%.[9] Overall, the findings illustrate the substantive importance of joint involvement in epistemic communities for DAH disbursements both across diseases in a given recipient and across recipients in a given disease category.

Robustness Checks

In estimating these simple models, we face several econometric challenges that we account for through robustness checks reported in the appendix. First, our dataset has a hierarchical structure in which the unit of analysis is donor-recipient-disease-year. However, some of our key spatial lags do not vary across recipients, but only across donor-disease-year (*Global IGO and Global INGO lags*). Similarly, some covariates do not vary across diseases, e.g. donor's and recipient's characteristics. To account for the complexity of our data structure, we implement different model specifications. To begin with, we run separate regression for each health focus area using donor-year fixed effects (Table A4). Then, we run pooled-analyses using multilevel regressions with recipient random effects, donor and year fixed effects. To check the robustness of our results, we also run pooled-analyses, including health focus area fixed effects in addition to donor fixed effects and recipient random effects (Table A5). Additionally, we aggregate all variables to the donor level and re-estimate the models focusing only on donor spending priorities (Table A6).

Second, we use alternative ways of calculating our independent and dependent variables. The amount of aid allocated in time *t* is likely to (also) be a function of the amount of aid allocated in time *t-1*. To address the potential problem of serial correlation, we re-estimate the model using the

[9] The magnitude of the coefficient median costs per DALY (log) can be explained by the fact that the donor-disease-year fixed effects absorb all variation between cost-effectiveness of diseases and over time. Therefore, the coefficient reflects differences in costs of intervention between middle-income countries and low-income countries at one point in time, which can be substantial.

first difference of disbursement as the dependent variable. Additionally, we use the share of disbursement in each disease category rather than the overall disbursement as the dependent variable. Moreover, we calculate our spatial lags using the overall disbursement rather than shares. Finally, we re-estimate the model using NGO and INGO lags separately. We test the robustness of our findings regarding both allocations among diseases (Table A7) and allocation among recipients (Table A8) to these alternative specification choices.

Third, we include additional control variables. While the fixed effects we employed throughput the article account for most factors that vary by recipient or by disease focus area, we need to ensure that our spatial lag is not simply picking up some common factor to all aid portfolios. Therefore, we control for total aid (health and non-health) of bilateral donors and total DAH of multilateral donors in each disease focus area to consider the possibility that aid allocation is a function of aid volume (Table A9).

Fourth, an important category of health aid is health sector support (Peters et al. 2013; more generally on budget support Swedlund 2017). We did not include it as a separate category because it is not a disease area and, therefore, does not have corresponding DALY or cost-effectiveness values. However, it is very relevant to the debate on DAH. Thus we re-estimate the pooled model, including health sector support and estimate a separate model focusing on the spending category (Table A10). While there are some changes in coefficients and significance levels, the results regarding the importance of peer effects in DAH allocation are robust to all alternative specifications employed throughout.

Conclusions

Constructivist scholars argue that the foreign aid regime built since the 1940s resulted from the projection of norms on basic rights, poverty reduction and equity from the domestic to the international level (Lumsdaine 1993; Noël and Thérien 1995). But aid policies that appear to deviate from welfare maximisation principles are a puzzle for this perspective. Accounts based on the assumption that donors act out of self-interest seem to fare better. Political economy approaches point at commercial interests in donor countries and the policy concessions that recipient governments make in exchange for aid, whereas security-oriented approaches point at the strategic interests of donor countries. Without denying that such factors play a role in the field

of global health, we aimed to show how the analytical toolbox of constructivism, notably social influence in the context of epistemic communities, can help explain deviations from need-based allocations. Our findings indicate that its contribution is substantial.

Our starting point was a pattern noted by several observers of global health: there is a mismatch between aid spending priorities and the health needs of low- and middle-income countries, even accounting for cost-effectiveness considerations. But these observers stopped short of explaining the mismatch systematically. We build upon case study research that focuses on advocacy networks and epistemic communities in global health and demonstrate that such factors are systematically related to donor financing priorities. We found that joint involvement in epistemic communities explains a substantial part of the allocation of health aid across disease categories and recipients by 23 donors between 1990 and 2017 on two levels of analysis. First, donors are more likely to provide funding to a given disease category if other donors connected to them through many health IGOs and health INGOs have also invested in that disease category. Second, donors are more likely to allocate DAH for a specific disease category to a given recipient country if other donors connected to them through many health IGOs and health INGOs have also allocated to that country.

We can point at four promising directions for further research. First, our empirical analysis is conducted at the macro-level by focusing on the funding pattern created by numerous donors and recipients over several years. But socialisation and social influence ultimately operate at the level of the relationships among small groups and individual officials. It would be therefore useful to complement this macro-level analysis with a micro-level analysis of professional social interactions, possibly using ethnographic methods (Swiss 2018). As noted above, our approach to measuring joint involvement in epistemic communities does not allow us to determine the relative importance of donor-donor, and I(N)GO-donor influence in producing convergence of DAH allocation decisions, and qualitative research seems particularly suited to address this question.

Second, future research could establish whether the COVID-19 shock constitutes a "critical juncture" (Drezner 2020) in health aid allocation and whether it will magnify or mitigate the social influences that we highlighted here. In 2019, less than one per cent of total DAH was spent on preparing health systems for pandemics (Institute for Health Metrics and Evaluation (IHME) 2020b). For the foreseeable future, donors may have to decide between substantially increasing

funding for this area and pursuing the agenda of spreading "essential universal health coverage" in more countries (Sell 2019; Watkins et al. 2020): how will their decisions influence each other?

Third, further research could investigate whether the explanation we developed here also applies to aid sectors beyond DAH. The question of (mis)allocation is not exclusive to debates on health aid. Indeed, authors have long asked why aid does not reach those who might be most in need of assistance. Future research could consider epistemic communities in other development sectors and investigate whether and how they operate as social environments.

Finally, future research could study how the distorting effects of donor socialisation could be mitigated in practice. For instance, there is empirical support for the argument that the greater *diversity* of perspectives provided by interactions with a larger number of health aid donors can help officials in recipient governments to select more effective health policies (Han and Koenig-Archibugi 2015). This matches with micro-level research on health policy networks in a low-income country, which shows that networks with a greater diversity of members are more exposed to new ideas and evidence and result in more innovative policy decisions (Shearer et al. 2018; see also Shearer et al. 2014). This argument could be extended to donor officials: are donors who are exposed to a more diverse set of peers also more likely to align their funding with indicators of disease burdens and cost-effectiveness? There is scope for a research agenda aimed at establishing how communication and social influence can be turned from a potential liability to an asset in international aid for health.

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Appendix:

The social construction of global health priorities: An empirical analysis of contagion in bilateral health aid

Health IGO and INGO membership dataset

Our dataset of joint memberships in health-oriented IGOs and INGOs is based on the most comprehensive source of information on international organizations: the Yearbook on International Organizations published by the Union of International Associations (UIA). *Memberships are coded for the years 1984, 1988, 1992, 1996, 2000, 2004, 2008 and 2011.*

We collected membership data of organizations that have "health" or "health care" among their subject matter and that belong to one the main types of organizations. The four main types, for which the Yearbook aims to provide complete coverage, are the following. A: Federations of international organizations; B: Universal membership organizations; C: Intercontinental membership organizations; D: Regionally defined membership organizations. In addition, our dataset also includes IGOs classified as E: Organizations emanating from places, persons, proprietary products or other bodies ("emanations"); and F: Organizations having a special form, including foundations and funds. It is important to include emanations because some IGOs have addressed health issues by creating other IGOs rather than adding them to their competences. For instance, the West African Health Organization was created by ECOWAS member states as a specialized agency of ECOWAS. In some cases, membership of the emanation is not identical from that of the parent organization, as is the case with the East, Central and Southern African Health Organization, originally established under the auspices of the Commonwealth Secretariat, and the European Pharmacopoeia Commission, created under the aegis of the Council of Europe.

Organizations coded "inactive or dissolved international organizations" (H) are not included in the centrality dataset, unless the organization was coded as H in only one of the Yearbooks in the sample and ABCD(E) four years earlier *and* four years later; after consulting the Yearbook editors, we assumed that in such cases the H code resulted from insufficient information and included the organization with the membership information given in the previous Yearbook edition in our sample.

Table A1: List of donors included in the database

Donors	
Australia	Ireland
Austria	Italy
Belgium	Japan
Canada	South Korea
Switzerland	Luxemburg
Germany	Netherlands
Denmark	Norway
Spain	New Zealand
Finland	Portugal
France	Sweden
United Kingdom	United States
Greece	

Table A2: List of recipients included in the database

Recipients					
Afghanistan	Congo, DRC	Guatemala	Moldova	Philippines	Turkmenistan
Angola	Congo	Guyana	Madagascar	Papua New Guinea	Timor-Leste
Albania	Colombia	Honduras	Maldives	North Korea	Tonga
Argentina	Comoros	Croatia	Mexico	Paraguay	Trinidad & Tobago
Armenia	Cape Verde	Haiti	Marshall Is.	Palestine	Tunisia
Antigua & Barbuda	Costa Rica	Indonesia	Macedonia	Rwanda	Turkey
Azerbaijan	Cuba	India	Mali	Saudi Arabia	Tanzania
Burundi	Djibouti	Iran	Malta	Sudan	Uganda
Benin	Dominica	Iraq	Myanmar	Senegal	Ukraine
Burkina Faso	Dom. Republic	Jamaica	Montenegro	Solomon Is.	Uruguay
Bangladesh	Algeria	Jordan	Mongolia	Sierra Leone	Uzbekistan
Bahrain	Ecuador	Kazakhstan	Mozambique	El Salvador	St. Vincent & Grenadines
Bosnia & Herzegovina	Egypt	Kenya	Mauritania	Somalia	Venezuela
Belarus	Eritrea	Kyrgyzstan	Mauritius	Serbia	Vietnam
Belize	Ethiopia	Cambodia	Malawi	South Sudan	Vanuatu
Bolivia	Fiji	Kiribati	Malaysia	Sao Tome & Principe	Samoa
Brazil	Micronesia	Korea	Namibia	Suriname	Yemen
Barbados	Gabon	Laos	Niger	Slovenia	South Africa
Bhutan	Georgia	Lebanon	Nigeria	Swaziland	Zambia
Botswana	Ghana	Liberia	Nicaragua	Seychelles	Zimbabwe
Central African Rep.	Guinea	Libya	Nepal	Syria	
Chile	The Gambia	St. Lucia	Oman	Chad	
China	Guinea-Bissau	Sri Lanka	Pakistan	Togo	
Cote d'Ivoire	Equ-Guinea	Lesotho	Panama	Thailand	
Cameroon	Grenada	Morocco	Peru	Tajikistan	

Table A3: coding DAH and corresponding DALY

ID	Cause name	DAH disease focus area
302	Diarrheal diseases	**Newborn and child health**
322	Lower respiratory infections	
328	Upper respiratory infections	
329	Otitis media	
332	Meningitis	
337	Encephalitis	
338	Diphtheria	
339	Whooping cough	
340	Tetanus	
341	Measles	
380	Neonatal disorders	
386	Nutritional deficiencies	
366	Maternal disorders	**Reproductive and maternal health**
393	Sexually transmitted infections excluding HIV	
298	HIV/AIDS	**HIV/AIDS**
345	Malaria	**Malaria**
297	Tuberculosis	**Tuberculosis**
321	Other intestinal infectious diseases	**Other infectious diseases**
342	Varicella and herpes zoster	
346	Chagas disease	
347	Leishmaniasis	
350	African trypanosomiasis	
351	Schistosomiasis	
352	Cysticercosis	
353	Cystic echinococcosis	
354	Lymphatic filariasis	
355	Onchocerciasis	
356	Trachoma	
357	Dengue	
358	Yellow fever	
359	Rabies	
360	Intestinal nematode infections	
364	Food-borne trematodiases	
365	Other neglected tropical diseases	
400	Acute hepatitis	
405	Leprosy	
408	Other unspecified infectious diseases	
843	Ebola	
935	Zika virus	
936	Guinea worm disease	
958	Typhoid and paratyphoid	
959	Invasive Non-typhoidal Salmonella (iNTS)	
409	Non-communicable diseases	**Non-communicable diseases**

Table A4: Sub-samples by disease focus area

	(11) HIV/AIDS	(12) Malaria	(13) Tuber-culosis	(14) Maternal health	(15) Child health	(16) OID	(17) NCD
Spatial lag (health organ.)	0.2163***	0.1015***	0.0455***	0.1269***	0.0730***	0.1002***	0.0119**
	(0.0135)	(0.0065)	(0.0055)	(0.0124)	(0.0085)	(0.0062)	(0.0043)
DALY lost (in millions)	0.3175***	0.0528**	0.0214	0.0607	0.0027	0.0252	0.0013
	(0.0214)	(0.0162)	(0.0143)	(0.0587)	(0.0023)	(0.0178)	(0.0009)
Median costs per DALY (log)	-0.6177***	1.0761	-0.0377	-1.2944***	0.5360***	-0.7632***	-0.0286
	(0.0480)	(0.7375)	(0.0440)	(0.1069)	(0.1279)	(0.1070)	(0.0856)
Country-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Donor-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.2085***	-4.3908+	-0.8112***	2.5635***	-4.3033***	2.5954***	0.0990
	(0.4078)	(2.6016)	(0.2342)	(0.5210)	(0.6008)	(0.6306)	(0.5753)
N	34988	34988	34988	34988	34988	34988	34988
R^2	0.514	0.304	0.324	0.420	0.399	0.351	0.176

Note: OLS regressions with clustered Standard errors at the dyad-level in parentheses;
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In Table A4, we estimate separate models for each of the seven disease focus areas and test whether epistemic communities impact the allocation among recipients in these disease areas. We employ donor year fixed effects and country-level controls to isolate variation among recipients in one donor year. The spatial lag is statistically significant ($p<0.001$) and positive for Models 11-17. In Model 17, focusing on non-communicable diseases, it is statistically significant at a lower threshold ($p<0.01$) and also positive.

Table A5: Different fixed effects and Multilevel models

	(18)	(19)	(20)	(21)	(22)
Spatial lag (health organ.)	0.1776*** (0.0051)	0.1573*** (0.0050)	0.1076*** (0.0041)	0.1572*** (0.0014)	0.0626*** (0.0017)
DALY lost (in millions)	0.0009 (0.0012)	-0.0000 (0.0009)	0.0025+ (0.0013)	-0.0001 (0.0003)	0.0023*** (0.0003)
Median costs per DALY (log)	-0.0232*** (0.0039)	-0.0181*** (0.0038)	-0.0130*** (0.0038)	-0.0185*** (0.0027)	-0.0083* (0.0035)
Country-level controls	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Donor fixed effects	Yes	Yes	Yes	Yes	Yes
Disease fixed effects	No	No	Yes	No	Yes
Recipient fixed effects	No	Yes	No	No	No
Recipient random effects	No	No	No	Yes	Yes
Constant	-1.8530*** (0.2352)	-15.6371*** (2.4072)	-1.9121*** (0.2358)	-3.5901*** (0.4377)	-3.8276*** (0.4951)
N	244958	244958	244958	244958	244958
R^2	0.252	0.285	0.271		

Note: OLS regressions with clustered Standard errors at the dyad-level in parentheses;
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A5 tests robustness to different specification choices focusing on the multilevel structure of our pooled database: Model 18 includes only donor- and year fixed effects; Model 19 includes donor-, recipient- and year fixed effects; Model 20 includes donor-, disease- and year fixed effects.; Model 21 includes donor and year fixed effects as well as recipient random effects; Model 22 includes donor, disease and year fixed effects as well as recipient random effects. Our main variable of interest is robust to these alternative specification choices ($p<0.001$).

Table A6: donor models

	(23)	(24)
Spatial lag (health organ.)	0.0758***	0.0782***
	(0.0198)	(0.0195)
Mean of DALY lost (in millions)	-0.0053	-0.0062
	(0.0074)	(0.0073)
Mean of Median costs per DALY (log)	-0.0003	-0.0002
	(0.0002)	(0.0002)
Donor fixed effects	Yes	No
Year fixed effects	Yes	No
Donor-year fixed effects	No	Yes
Constant	0.2239*	0.2121*
	(0.0995)	(0.0976)
N	4046	4046
R^2	0.128	0.258

Note: OLS regressions with clustered Standard errors at the dyad-level in parentheses;
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In Table A6, we collapse the dataset to the donor level and estimate donor preferences across diseases without considering variation between recipients. In Model 23, we employ donor fixed effects and year fixed effects. In Model 24, we employ donor year fixed effects. The spatial lag is statistically significant ($p<0.001$) and positive in both models.

Table A7: Alternative IVs and DVs allocation across diseases

	(25)	(26)	(27)	(28)	(29)	(30)
Spatial lag (health organ.)	0.0019***	0.0218***				
	(0.0005)	(0.0004)				
Spatial lag (All donors)			0.0779***			
			(0.0022)			
Spatial lag (NGO)				0.1548***		-0.1729***
				(0.0042)		(0.0098)
Spatial lag (IO)					0.2912***	0.5666***
					(0.0076)	(0.0199)
DALY lost (in millions)	0.0001	-0.0001+	-0.0008	-0.0006	-0.0004	-0.0003
	(0.0001)	(0.0001)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Median costs per DALY (log)	0.0029***	0.0030***	-0.0126***	-0.0169***	-0.0141***	-0.0098**
	(0.0006)	(0.0004)	(0.0030)	(0.0031)	(0.0030)	(0.0030)
Dyad-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.0011	-0.0229***	0.1041***	0.2144***	0.2601***	0.3911***
	(0.0029)	(0.0025)	(0.0193)	(0.0167)	(0.0154)	(0.0155)
N	423829	423829	423829	423829	423829	423829
R^2	0.210	0.160	0.476	0.482	0.492	0.496

Note: OLS regressions with clustered Standard errors at the dyad-level in parentheses;
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In Table A7, we use a range of alternative dependent and independent variables for the models focusing on allocation across diseases in a given recipient. To do so, we employ dyad year fixed effects in all six Models presented in Table A7. Model 25 utilises the first difference of (log) disbursement as a dependent variable instead of its levels. In Model 26, we use the share allocated for each disease in each recipient as a dependent variable, rather than overall disbursement amounts. Furthermore, several alternative ways to calculate the spatial lag are presented in the table. First, in Model 27, the spatial lag is calculated using (log) disbursement rather than disbursement shares. Second, in Model 28, we only use the health NGO network to define connectivity between donors. Third, in Model 29, connectivity is exclusively based on networks of IOs. Finally, in Model 30 we employ both the IO and NGO networks together. The spatial lag is robust in all of these Models. When employing both IO and NGO lags together, the NGO lag is negative due to a high correlation between the IO and NGO lags.

Table A8: Alternative IVs and DVs allocation across recipients

	(31)	(32)	(33)	(34)	(35)	(36)
Spatial lag (health organ.)	0.0046*** (0.0008)	0.0119*** (0.0004)				
Spatial lag (total)			0.0636*** (0.0026)			
Spatial lag (NGO)				0.1101*** (0.0044)		-0.1443*** (0.0101)
Spatial lag (IO)					0.2311*** (0.0081)	0.4683*** (0.0188)
DALY lost (in millions)	0.0000 (0.0001)	0.0002* (0.0001)	0.0026+ (0.0014)	0.0028* (0.0014)	0.0025+ (0.0014)	0.0022 (0.0014)
Median costs per DALY (log)	0.0242* (0.0102)	-0.0663*** (0.0040)	-0.6286*** (0.0413)	-0.6300*** (0.0416)	-0.5850*** (0.0405)	-0.5531*** (0.0399)
Country-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Donor-disease-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.1365** (0.0493)	0.3173*** (0.0204)	1.5709*** (0.2531)	1.2920*** (0.2561)	1.1148*** (0.2550)	0.9948*** (0.2546)
N	244916	244916	244916	244916	244916	244916
R^2	0.153	0.297	0.404	0.400	0.406	0.408

Note: OLS regressions with clustered Standard errors at the dyad-level in parentheses;
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A8 displays the same six models as Table A7 but donor disease year fixed effects are employed to isolate the choice among recipients in each year and disease area. Again, the spatial lags are statistically significant (p<0.001) and positive (except for the NGO lag in Model 36).

Table A9: additional control variables (bilateral disbursements, multilateral disbursements, overall aid)

	(37)	(38)	(39)	(40)	(41)	(42)	(43)
Spatial lag (health organ.)	0.0316*** (0.0030)	0.1173*** (0.0032)	0.0209*** (0.0027)	0.0184*** (0.0040)	0.0604*** (0.0036)	0.0065+ (0.0037)	0.1251*** (0.0053)
DALY lost (in millions)	-0.0002 (0.0007)	-0.0009 (0.0007)	-0.0003 (0.0007)	0.0004 (0.0014)	0.0020 (0.0013)	0.0003 (0.0014)	0.0016 (0.0013)
Median costs per DALY (log)	-0.0031 (0.0029)	0.0031 (0.0029)	0.0047+ (0.0028)	-0.1569*** (0.0348)	-0.5910*** (0.0405)	-0.1652*** (0.0347)	-0.6930*** (0.0485)
Disbursement (bilateral)	0.0395*** (0.0011)		0.0382*** (0.0011)	0.0380*** (0.0013)		0.0363*** (0.0013)	
Disbursement (Multilateral)		0.0715*** (0.0028)	0.0296*** (0.0022)		0.0929*** (0.0039)	0.0308*** (0.0033)	
Disbursement (overall aid)							0.0008 (0.0005)
Country-level controls	No	No	No	Yes	Yes	Yes	Yes
Dyad-year fixed effects	Yes	Yes	Yes	No	No	No	No
Donor-disease fixed effects	No	No	No	Yes	Yes	Yes	Yes
Constant	0.0897*** (0.0165)	-0.0738** (0.0235)	-0.0235 (0.0203)	0.3639 (0.2541)	1.5418*** (0.2611)	0.5203* (0.2525)	1.5209*** (0.3301)
N	423829	423017	423017	244916	244867	244867	161280
R^2	0.529	0.489	0.530	0.459	0.412	0.461	0.415

Note: OLS regressions with clustered Standard errors at the dyad-level in parentheses;
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In Table A9, we introduce three additional control variables to demonstrate that the spatial lag does not just pick up overall patterns of DAH but rather links between donors through epistemic communities. Models 37-39 focus on allocation among diseases in a given recipient by employing dyad year fixed effects. In Model 37, we use the overall aid given by all other bilateral donors as a control variable. In Model 38, we control for the overall DAH given by all Multilateral donors. In Model 39, we employ both of these controls. The spatial lag remains significant ($p<0.001$) and positive.

In Models 40-43, we investigate allocation among recipients in a given disease area by employing donor disease year fixed effects. In Model 40, we further control for overall bilateral disbursements by all other donors. In Model 41, we also control for multilateral DAH disbursements. In Model 42, we employ both of these control variables together. Finally, in Model 43, we use data from the OECD creditor reporting system to control for allocation of all aid sectors (not just health) of each donor across recipients. The spatial lag is significant and positive in all four models, albeit at a lower threshold ($p<0.10$) in Model 42.

Table A10: Health sector support

	(44)	(45)	(46)
Spatial lag (health organ.)	0.1633***	0.1089***	0.1489***
	(0.0039)	(0.0045)	(0.0191)
Country-level controls	Yes	Yes	Yes
Donor-fixed effects	No	No	Yes
Dyad-year fixed effect	Yes	No	No
Donor-disease year fixed effects	No	Yes	No
Constant	0.1405***	-1.6954***	-2.3471***
	(0.0153)	(0.2219)	(0.4460)
N	484376	279904	34994
R^2	0.456	0.384	0.209

Note: OLS regressions with clustered Standard errors at the dyad-level in parentheses;
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Now, we show results including health sector in the pooled model as well as focusing on health sectors support separately. As discussed in the article, DALY and cost-effectiveness estimates are not available for health sector support. Therefore, we excluded it from the analysis. We employ dyad year fixed effects in Model 44, donor disease year fixed effects in Model 45 and estimate the regression on a sub-sample focusing only on HSS in Model 46 (including donor and year fixed effects). The spatial lag is significant and positive ($p<0.001$) in all three models.