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RESEARCH NOTE

The diplomatic burden of pandemics: lessons from malaria

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Abstract

This note seeks to understand the extent of the disruptions to international relations caused by pandemics, focusing on one globally-endemic disease: malaria. We posit that longstanding diseases such as malaria have the potential to undermine the political ties of nation states, as well as the many benefits of these connections. Our argument is tested empirically using both directed-dyadic and monadic data, while incorporating methods that account for endogeneity and other relevant concerns. We find that the geographic malaria rates of a country not only serve to historically discourage foreign governments from establishing diplomatic outposts on a country's soil, but also lead to an aggregate decrease in the total diplomatic missions that a country receives. We then discuss the current implications of these findings.

Pandemics—outbreaks of disease that affect wide geographic areas and impact the lives of hundreds of thousands if not millions of individuals (Hatchett *et al.*, 2007; WHO, 2015)—can have long-term global political implications. The last Ebola outbreak in western Africa, for instance, "had a devastating impact on the economies of Guinea, Liberia and Sierra Leone...the economy has deflated by 30 percent."[1] A particularly interesting, and extreme, case of how pandemics significantly shape socioeconomic and political environments is that of malaria. Throughout history, malaria has adversely impacted household behaviors ranging from schooling, through demography and migration, to financial savings—generating broader social costs, which still affect many developing states. Indeed, the evidence that malarial countries experience consistently higher levels of poverty and lower levels of economic development compared to non-malarial states is formidable (e.g., Gallup and Sachs, 2001; Sachs and Malaney, 2002).

Interestingly, despite the attention given to the socioeconomic effects of pandemics, relatively little attention has been given to their *international political* implications. Focusing on malaria, a global pandemic that affected approximately 228 million individuals in 2018 (WHO, 2020), we analyze the deep and long-lasting impacts of pandemics on diplomatic relations. Malaria provides an interesting case for developing a theory on how pandemics may—in extreme cases—impact international relations for at least four reasons. First, malaria's recorded effects on international relations in modern times can be traced back to settlement patterns and colonial policy choices amongst colonizing powers over 100 years ago (Acemoglu *et al.*, 2001; Kim, 2016; Gratien, 2017). Second, unlike pandemics characterized by outbreak followed by remission—as is the case for

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[1]ThisIsSierraLeone, "Ebola Crisis: The Economic Impact," accessed 10/23/2019. http://www.thisissierraleone.com/Ebola-crisis-the-economic-impact/.

some influenza strains and Ebola—malaria is *endemic* (Sachs and Malaney, 2002; WHO, 2015). Third, malaria is *extremely deadly*, killing a staggering 405,000 people in 2018 alone. Finally, malaria's *global effects* are far-reaching, impacting more individuals than most pathogens with comparably deadly impacts. For instance, the WHO (2015, 4) estimates that 198 million malaria cases occurred in 2013, compared to approximately 8.6 million tuberculosis cases. Hence, malaria is an important test for the extent to which pandemics broadly affect diplomatic missions.

In the Supplemental Appendix, we develop an explanation as to why malaria has had a lasting impact on international diplomacy, emphasizing the role of foreign service members' perceptions and fears. We summarize the key features of this argument below. We then evaluate (i) whether countries are less likely to establish diplomatic missions with other countries when the latter's malaria rates are high and (ii) whether individual countries receive fewer total diplomatic missions as their malaria rates increase. These evaluations employ dyadic and monadic datasets measuring diplomatic missions and malaria prevalence over the 1950–2005 period. We find that higher malaria rates reduce both the likelihood of diplomatic ties and the total diplomatic missions received, and that malaria's effects are larger or comparable to those of many other commonly identified determinants of diplomatic linkages. These results are robust to the inclusion of numerous controls for economic development, democracy, geography, and political instability, as well as to endogeneity and serial correlation concerns. Building on these findings, we conclude by discussing several downstream implications of malaria's adverse impacts on international diplomacy.

1. Diplomacy and malaria

As discussed in detail in the Supplemental Appendix, the practice of establishing diplomatic relations with foreign polities predates the inception of the modern nation-state. Historically, such missions served as central means for governments to conduct their international relations, promote their economic interests, and maintain their power and prestige abroad.[2] Post-World War II, these traditional roles of diplomatic missions have expanded further to aid states in directing their foreign security policy when foreign intra and interstate wars arise and communicating with and aiding citizens abroad during natural disasters and related emergencies. In the current era of state-to-state relations, diplomatic missions continue to function as an essential policy instrument in these regards (Bagozzi and Landis, 2015, 18).

Though politically and economically beneficial, governments' use of diplomatic missions and envoys costs scarce resources, which can pose a strong constraint on developing or smaller states. Accordingly, scholars note a high degree of variance in the number (and extent) of diplomatic ties across countries and time (Neumayer, 2008). States (and diplomats) must make choices in where to send their limited diplomatic resources. In this endeavor, one typically sees governments weighing cost-benefit calculations when choosing diplomatic destinations (Neumayer, 2008; Kinne, 2014). In particular, factors such as proximity, power, and ideological affinity weigh heavily on governments' perceptions of a potential diplomatic mission's *benefits*, as these criteria, when present, ensure that the perks of diplomatic missions, including those related to trade promotion, cultural exchange, economic cooperation, and direct lines of access to allies and major powers, will be maximized (Rose, 2007; Neumayer, 2008).

Pandemics exert similar, but negative, pressures by reducing standards-of-living and directly endangering the diplomatic staff's and their families' health. The additional costs of preventing and mitigating such pandemics can be high due to a variety of factors, ranging from vaccinations and treatments, through hospitalization, to the number of workdays lost due to indisposed staff and sick family members (Sachs and Malaney, 2002; WHO, 2015). Although these costs can be

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[2]In this vein, historical accounts argue that diplomacy directly allows states to avoid war with one another, and accordingly attribute the outbreak of war to failures of diplomacy (e.g., Dorman and Kennedy, 2008, 183).

absorbed relatively easily by wealthier states, they can be prohibitive to many poorer and smaller states. Facing opportunity costs of where to invest their more limited pool of resources, such countries will steer diplomatic relations away from highly-pandemic—and toward more inviting—locales.

Historically—by influencing the well-being of those directly exposed—malaria has shaped political decisions, settlement patterns, and colonial policy choices amongst colonizers, impacting—for instance—the design of political institutions in colonies settled by Europeans (Acemoglu et al., 2001), the location of settlements in the Ottoman Empire (Gratien, 2017), and patterns of urbanization in Japanese-ruled Korea (Kim, 2016). Building on these insights, we posit that a potential diplomatic host-country's levels of malaria prevalence will lead governments to be less likely to establish diplomatic relations there. Specifically, concerns about the disease's prevalence "trickle up" to influence whether an embassy/consulate is established in these affected countries (Rose, 2007; Neumayer, 2008). We test these expectations empirically in the next section, and discuss the implications of these effects in the Discussion section.

2. Empirical analysis

To capture malaria's impact on international diplomacy, we examine *both* the likelihood that a pair of states will establish a diplomatic relationship *and* the number of diplomatic missions over time. For the first case, we create a dataset where the cross-sectional unit of analysis is the directed dyad for all directed pairs of countries (i and j) in the world (1950–2005). For the second case, we collapse this (1950–2005) directed dyad dataset to the monadic level for $country_j$. Due to data availability and the slow-moving nature of diplomatic ties, each dataset is only measured at five-year intervals. Hence, our temporal unit of analysis corresponds to half-decade periods.[3]

We operationalize our first dependent variable (DV), $Diplomacy_{i \ at \ j}$, as a dichotomous indicator of whether $country_i$ has established formal diplomatic representation—e.g., a chargè d'affaires, minister, or ambassador—within $country_j$'s territory during a given time period. Information for creating this variable was obtained from the Correlates of War's (COW) Diplomatic Exchange dataset (Bayer, 2006). We then create our second DV, $\sum Diplomacy_{at \ j}$, as a five-year period sum that measures the total number of diplomatic missions in host-country j.

To operationalize our main independent variable, we utilize the average malaria prevalence at the host-country, $Malaria \ Prevelance_j$, similarly measured at five-year intervals. First, data on the percentage of host-country, $country_j$'s land area with malaria exposure in the years 1946, 1966, 1982, and 1994 were obtained from the Center for International Development (CID) Malaria data set (Gallup et al., 2001), and interpolated to the five-year level.[4] This specific CID measure utilizes the proportion of a country's land area with malaria over 1950–2005 via WHO reports, which best reflects the real-time Malaria information available to diplomats. Finally, to ensure temporal precedence on malaria prevalence, we lag this variable by one period. Our analyses also employ a large number of controls, which we discuss in detail in the Supplemental Appendix due to space constraints.

Given that our first DV, $Diplomacy_{i \ at \ j}$, is binary, we first employ logistic regression. As $\sum Diplomacy_{at \ j}$ is a count variable and initial tests indicate a presence of overdispersion in our observed count values (see the Supplemental Appendix), we employ a negative binomial (NB) model for our second DV.[5] Each model specification includes fixed effects for directed

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[3]Using a five-year period as our unit allowed us to employ GMM models, which we could not estimate on much larger samples due to computational limitations.

[4]For example, country-years prior to 1957 were assigned a country's recorded malaria rate in 1946, whereas country years between 1957 and 1966 were assigned that country's 1966 malaria rate, and so on.

[5]This drops cases without temporal variation on our DVs (we relax this in the Supplemental Appendix), yielding lower model N's than our GMM models.

dyad (in the case of our logit model) or receiver country (in the case of our NB models). Each full specification also includes year fixed effects.

Finally, diplomatic missions in our data may exhibit serial correlations over time and/or endogeneity with malaria prevalence due to endogenous policy responses, omitted variable effects, or persistent policies resulting from endemic malaria prevalence. We thus also employ a series of robust system generalized method of moments (GMM) *dynamic* models where the necessary instruments are "internal" and rely on lagged values of the instrumented—i.e., the dependent—and endogenous independent variables (Blundell and Bond, 1998). The model is specified as a system of (per period) equations, where the instruments applicable to each equation differ because additional lagged values of the instruments exist in later time periods. For these instruments, we include two-to-five-period lags of the DV and *Malaria Prevelance$_j$*, capturing variations in these variables at time t based on changes from past periods. Since we are considering panel models with two-way effects, unit and period fixed effects are canceled-out, providing a straightforward instrumental variable estimator.

3. Results

Table 1 provides strong evidence in support of our expectations. The coefficient estimate for *Malaria Prevelance$_j$* is negative and significant (to at least $p < 0.05$) across all models and specifications. Columns 1–2 in Table 1 suggest that increases in host-country j's malaria prevalence reduce its likelihood of receiving a diplomatic mission from a sending country. Columns 3–4 demonstrate that high malaria rates also reduce countries' total received diplomatic contacts. Finally, in reestimating these four specifications using GMM models, we find that *Malaria Prevelance$_j$*'s significant effects remain, meaning that our findings are not the result of either endogeneity or serial correlations in the establishment of diplomatic missions, and are indeed specific to pandemic—i.e., malaria—prevalence, even though the reliance on a linear model for binary and count DVs suggests a greater risk of falsely rejecting our hypothesis (a type II error). Sargan tests are statistically significant in the dyadic and baseline monadic GMM models, suggesting that the models are robust but weakened by the many instruments. An absence of statistically significant Sargan test estimates in the monadic full GMM model suggests that this model is robust and effectively specified. Thus, these eight specifications offer strong support to the argument that (malaria) pandemics noticeably and adversely affect international relations.

While we do not discuss the effects of other variables in our models in the interest of space, each is largely consistent with findings reported in similar research (Rose, 2007; Neumayer, 2008). Our Supplemental Appendix demonstrates the robustness of these models to an extensive array of alternative specifications.

We assess malaria's substantive effects by calculating our full fixed effects models' estimated effects of *Malaria Prevelance$_j$*, along with 95 percent confidence intervals. These effects were estimated for *Malaria Prevelance$_j$* $(0 \Rightarrow 1)$, while holding all other variables at their medians. In response to this change, the predicted probability that sending state i will establish a diplomatic mission in host-country j decreases by 6.24 percent (−8.98 percent $\Leftrightarrow$ −3.50 percent), while the predicted counts of $\sum Diplomacy_{at\,j}$ decreases by 3.69 hosted diplomatic missions (−7.23 percent $\Leftrightarrow$ −0.16 percent). This is comparable to the coefficients from the GMM models, which suggest a decrease of ∼7 percent in the likelihood of $Diplomacy_{i\,at\,j} = 1$ (full dyadic GMM) and ∼15 diplomatic missions for $\sum Diplomacy_{at\,j}$ (monadic GMM) over a five-year period. These effects are relatively sizable considering (low) variation in diplomatic activity over time. For comparison, a standard deviation increase in $GDPpc_j$—a commonly considered baseline country-level predictor of diplomatic ties (Rose, 2007; Neumayer, 2008)—has smaller and less reliable predicted effects on the likelihood of dyadic $Diplomacy_{i\,at\,j} = 1$ (+4.8 percent) and the predicted count of $\sum Diplomacy_{at\,j}$ (−1.48 missions).

Table 1. Determinants of directed diplomatic representation, 1950–2005

	FE Logit Dyadic		FE NB Monadic		GMM			
					Dyadic		Monadic	
	Baseline	Full	Baseline	Full	Baseline	Full	Baseline	Full
Malaria prevalence$_j$	−1.598***	−0.414***	−0.468***	−0.097*	−0.504***	−0.065***	−54.497***	−15.272*
	(0.052)	(0.093)	(0.059)	(0.047)	(0.012)	(0.012)	(6.988)	(7.456)
Trade$_j^a$	.	0.222***	.	0.001***	.	0.031***	.	0.048***
		(0.014)		(0.0001)		(0.001)		(0.006)
Diplomacy$_{j\,at\,i}^a$	.	1.261***	.	.	.	0.488***	.	.
		(0.040)				(0.005)		
GDPpc$_i^a$	.	−0.138*	.	.	.	−0.001	.	.
		(0.061)				(0.002)		
GDPpc$_j^a$	.	0.322***	.	−0.039	.	−0.014***	.	−3.241
		(0.062)		(0.035)		(0.004)		(2.684)
Ideology$_{ij}$	.	1.209***	.	.	.	0.024***	.	.
		(0.091)				(0.006)		
CINC$_i^a$	.	0.752***	.	.	.	0.032***	.	.
		(0.064)				(0.001)		
CINC$_j^a$	.	0.092	.	0.064*	.	0.013***	.	3.963**
		(0.065)		(0.031)		(0.001)		(1.222)
Dem$_i$*Dem$_j$	.	−0.445***	.	.	.	0.051***	.	.
		(0.092)				(0.006)		
Dem$_i$	.	0.266***	.	.	.	0.015**	.	.
		(0.075)				(0.005)		
Dem$_j$	.	−0.063	.	−0.047	.	−0.055***	.	−4.588
		(0.077)		(0.031)		(0.005)		(2.668)
N	64,542	36,955	1,301	1,066	173,708	105,039	1,319	1,085
Sargan χ^2	.	.	.	.	11,495.86*** (DF=87)	6,838.118*** DF=(97)	139.694*** (DF=87)	78.14 DF=(91)

Note: Coefficients are reported with standard errors in parentheses. All independent variables lagged by one period. Fixed effects not reported.
[a]In natural log form.
***p < 0.001; **p < 0.01; *p < 0.05.

4. Discussion

What are the implications of our findings for international relations scholars and policymakers? As we mentioned above, diplomatic connections are one of the most important and effective tools for the conduct of interstate relations, and as such fulfill many routine—but essential—tasks. In this context, our findings suggest pandemics may heavily constrain the level of support that states can provide to citizens and visa seekers abroad. States where malarial rates limit the number of foreign embassies and consulates will find it harder to attract foreign assistance (e.g., NGOs). They will also face challenges in sending their own citizens abroad as students and attachés, thus preventing their economies from gaining key skills that can help promote economic and political development, reinforcing their position within the "poverty trap" (Bonds *et al.*, 2010).

A second important socioeconomic impact of our findings relates to affected states' ability to maintain stable trade flows. As mentioned above, "investors from non-malarious regions tend to shun malarious regions for fear of contracting the disease" (Gallup and Sachs, 2001, 95). But more than these direct impacts, by reducing diplomatic activity in these host states, malaria raises the risk to those investors that do choose to invest in the local economy. For instance, a key tool to protect the investment is in the form of investment treaties (Gertz *et al.*, 2018). Monitoring and ensuring effective protection of foreign investors based on these treaties is the responsibility of the local embassy or consulate, which is the first to check investor complaints and report any such disputes to its home government. Accordingly, as malaria rates reduce the number of diplomatic missions locally, the level of protection available to foreign investors is also reduced, providing additional incentives for such investors to avoid the affected state.

Our findings also have implications for peace, conflict, and human rights. Diplomatic missions play a crucial role in monitoring, identifying, and bringing to light human rights violations, through their contribution to, e.g., the U.S. State Department's Country Reports on Human Rights Practices (Bagozzi and Berliner, 2018). Accordingly, in countries where diplomatic activity is low, reporting biases and missing information will thus potentially impact the effectiveness of human rights monitoring and reporting. Diplomatic missions also play a key role in conflict prevention and mediation, by allowing third parties to help resolve local bargaining disagreements between two or more warring parties (Ruhe, 2020). Embassies and consulates are likewise important in helping to identify and prevent terrorism, promoting security and stability not only in their sending country, but also—by allowing local and international authorities to target terrorist groups—locally in the host state (de Orellana, 2017). By reducing diplomatic activities, malaria may therefore subject some nation-states to a higher risk of military, political, and human insecurity (Cervellati *et al.*, 2017).

Another implication of our findings relates to our ability to identify in advance new emerging diseases and pathogens that might spread both locally and throughout the globe (Bonds *et al.*, 2010). Health organizations such as Médecins Sans Frontiéres depend on the diplomatic services of their sending countries for support and—if necessary—evacuation, especially when deployed to regions in conflict or those facing natural disasters. Additionally, countries can at times first learn of the emergence of new pathogens abroad via their (or their allies') diplomatic agents. Hence, by reducing diplomatic activity, malaria increases the possibility that unknown deadly pathogens emerge and spread before international responses can be mustered (Abu-Raddad *et al.*, 2006).

Our findings suggest that scholars should be more aware of the effect of pandemics on diplomacy and international relations more broadly. Although we focus on malaria as an "extreme case," considering its endemic nature and tropical prevalence, it is likely that other pandemics —e.g., tuberculosis, Ebola, and possibly even influenza, in addition to COVID-19[6] —also

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[6]For example, Colum Lynch and Robbie Grammer, "Global Diplomacy Grinds to a Halt on Infection Fears," *Foreign Policy*, March 12, 2020, https://foreignpolicy.com/2020/03/12/global-diplomacy-halt-coronavirus-covid-infection-fears/;

shape diplomatic interactions and international relations. Future research would benefit not only from incorporating the role of these different pathogens into similar analyses, but also from giving such factors a more central role in theories of (international) politics. Investigations into how pandemics affect other types of international exchanges such as norms diffusion, electoral and human rights monitoring, and broader INGO activities may likewise provide important insights. Considering that the future prevalence of pandemics—caused by both known and emerging pathogens—is predicted to increase due to climate change (GPMB, 2019), this research direction is both important and timely.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/psrm.2021.28.

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