The Impact of Health Programs on Political Opinion: Evidence from Malaria Control in Tanzania

Kevin Croke
contact: kcroke@hsph.harvard.edu
Harvard T. H. Chan School of Public Health

May 22, 2020

Abstract:

For elections to produce accountable government, citizens must reward politicians who deliver benefits. Yet there is relatively limited causal evidence of changes in public opinion in direct response to specific government programs. This question is examined in Tanzania, which has implemented large health programs targeting diseases such as HIV/AIDS and malaria. Tanzania's 2010-11 anti-malaria campaign took place concurrently with a national household survey. Exploiting discontinuities based on interview dates to estimate the effect of these programs on the popularity of local politicians, this paper shows that a bed net distribution campaign resulted in large, statistically significant improvements in approval of political leaders, especially in malaria endemic areas. Effects were largest shortly after program implementation, but persisted for up to six months. These findings suggest that citizens update their evaluation of politicians in response to programs, especially those that address important problems, and that the effects decay over time, but not completely.

Keywords: public opinion, health policy, malaria, bed nets, political economy, Tanzania

I. Introduction

Do well-delivered government programs change the way citizens evaluate their political leaders? Despite the centrality of this question to the theory and practice of accountable government, there is still relatively limited causal identification of links between government programs and citizen evaluation of politicians. A large literature in rich countries seeks to demonstrate that voters reward politicians for delivering economic growth (Fiorina, 1981; Key, 1966), and a burgeoning literature in Africa highlights similar links between performance in office, public opinion, and voting (Ellis, 2014). Yet much more common, especially in developing countries, is the assumption that voters support politicians *not* based on their ability to foster economic growth or deliver effective social programs, but based on shared ethnic identity or in exchange for material benefits that they receive via patronage networks. Much of this literature assumes that the distribution of public spending in developing countries is predominantly driven by clientelist logic, rather than according to programmatic criteria, because clientelist programs, while less effective at delivering goods and services to voters, are more likely to result in benefits to politicians.

According to standard political economy models, politicians make strategic choices about whether to pursue programmatic or clientelist strategies based on the net benefits that they expect to receive from these choices. But this calculus depends on the reaction of citizens. A critical, unresolved question in the literature is whether citizens in developing countries react to effective programs by increasing their support for politicians associated with these policies, or whether information deficits, attribution problems, or myopic evaluation of politicians prevent such reactions.

The literature from developed countries provides ambiguous predictions on this question: While many studies suggest that voters do seem to reward leaders for economic performance, others highlight that they do so in a way that is often inconsistent, myopic, or otherwise biased. These biases can be intensified by conditions which may be more present in developing countries, such as lack of accurate political information, lower levels of education, and unclear lines of political respon-

sibility for policy outcomes (Anderson, 2007). If effective programs are not rewarded even when delivered in developing countries, it could help explain perverse equilibria in which voters do not reward politicians who deliver public services, so politicians in turn see no incentive to deliver these services.[1]

I study the reaction of citizens to a programmatic and well-organized delivery of a socially-beneficial good in Tanzania; the mass distribution of insecticide-treated bed nets (ITNs) in 2010-2011. Tanzania is a challenging case for the study of voter responsiveness to policy; at the time of the ITN distribution, it had been a longstanding semi-competitive regime in which elections were held regularly and lower level politicians often lost their seats, but the ruling party's hold on executive power had never been seriously challenged since independence. While this ruling party dominance indicates that Tanzania might be a challenging setting in which to identify shifts in public opinion in response to specific programs, it also suggests that effects identified in Tanzania might be a lower bound on potential effects in more competitive polities.

Mass distribution of mosquito nets is an interesting policy to study because it involves the direct, visible and clearly attributable transfer of a good from the government to individuals for free. This is quite different from other government actions such as management of the economy or stewardship of a national health or education system, where the link from a given politician's effort to individual benefit is more diffuse (Harding and Stasavage, 2014). In addition, these are potentially life saving products: a meta-analysis of 6 RCTs estimates that distribution of ITNs results in an average reduction in under-5 mortality of 18% (Lengeler, 2004). Yet while these attributes make bed net distribution an intervention that citizens might plausibly respond to, the bed nets themselves are of modest monetary value, and several RCTs in comparable settings have shown that households place limited value on ITNs (Cohen and Dupas, 2010; Comfort and Krezanoski,

---

[1]An additional complication in highly aid-dependent countries is that important public services may be financed and at times delivered by actors other than the government. This further complicates the attribution problem that voters face. It could reduce the likelihood that voters credit political leaders for service delivery, while also introducing the possibility for politicians to claim credit for services that were financed by external actors.

2016). Citizen response to receiving such goods is therefore unpredictable ex ante.

Tanzania has conducted several mass distributions of insecticide-treated bet nets, including in 2008-2009 and 2010-2011. Fortuitously, the 2010-2011 bed net campaigns occurred at roughly the same time as the second round of the Tanzania National Panel Survey (NPS). The timing of National Panel Survey interviews was randomized into an early and a later survey group in order to accurately measure household consumption, while avoiding distorting seasonality effects. This paper exploits temporal discontinuities, by comparing households which were surveyed shortly before the ITN campaign to those surveyed shortly after the campaign. This provides a unique opportunity to study the reactions of citizens, in a nationally representative sample, to a large scale public health campaign that involved direct distribution of valuable items to individuals.

I find that citizens increase their approval of local political leaders significantly as a result of the net distribution campaign. Effects are stronger in districts with higher malaria prevalence, and the magnitude of effects fades sharply over time, but remains sizable as long as six months after the program. Voters do not appear to distinguish between officials formally responsible for program implementation and those who were not formally involved.

This study is among a small, although growing, group of papers to provide causally identified evidence that citizens in developing countries change their opinions about political leaders in response to specific government programs, and among the first to show that this effect can take place even when the program in question is of very low cost per beneficiary. Furthermore, while most other contributions to this literature focus on conditional cash transfer (CCT) programs in Latin America and Southeast Asia, causal evidence from sub-Saharan Africa is still relatively rare. Relatedly, while these relationships have been widely studied in consolidated democracies, this paper adds to an emerging literature which studies the responsiveness of public opinion to programmatic policies in partially democratic, partially authoritarian "hybrid regimes."

Furthermore, in contrast to other contributions, these findings isolate citizens' response to government actions themselves, rather than the economic benefits that government actions can pro-

duce. The emerging literature on public opinion responses to CCTs has an important limitation: because cash transfers are both a program delivered by government (which could elicit a rational decision by citizens to credit the government) and generate an immediate increase in income (which has been shown to increase approval of politicians even when they are not directly responsible for the gain), these studies cannot credibly isolate the mechanism at work. In other words, standard "pocketbook voting" cannot be separated from voter evaluation of a specific cash transfer program. Unlike CCTs, ITNs are worth just a few dollars.

Third, this analysis demonstrates that effects are larger when the problem addressed by the program is more severe, by leveraging variation in malaria prevalence across Tanzania to show that citizens reward politicians more in settings with high malaria prevalence.

Finally, I demonstrate a "decay" dimension to the effects: treatment effects are very large in the immediate aftermath of the program, before fading over a 3 to 6 month period. This suggests that Tanzanians react similarly to voters in other settings (such as the US) in overweighting the recent past in evaluating politicians (Achen and Bartels, 2016; Gerber et al., 2011; Healy and Lenz, 2014). This temporal variation provides a relatively unique opportunity to examine the dynamic path of public opinion in response to government actions, and provides evidence consistent with the literature on political budget cycles (Nordhaus, 1975).

II. Theory and Related Literature

Theoretical framework

For elections to translate into good governance, voters must judge leaders based on their performance. Unlike in autocracies where leaders face limited sanction for poor governance, in electoral regimes – including consolidated democracies as well as hybrid regimes like Tanzania – voters can observe the performance of political leaders and decide whether or not to re-elect them. Even

low-information voters who do not follow politics closely can use heuristics, such as their own economic circumstances or those of the country at large, to judge the performance of political leaders. If politicians understand that voters will evaluate them based on outcomes, then they will be incentivized to strive for good results. Many studies which show links between economic conditions and incumbent support purport to show that this is indeed how voters behave (Fiorina, 1981; Key, 1966). Yet these ideas have come under attack, both from theories which emphasize the centrality of social identity in determining public opinion, and by theories which stress that cognitive and emotional biases interfere with rational retrospective voting. Identity-focused theories suggests that voters form partisan attachments relatively early in life, based on their ethnicity, religion, or class (Achen and Bartels, 2016; Converse, 1964). Actual performance of politicians does not matter nearly as much as retrospective models assume, since loyalties are already largely fixed. A related critique comes from theories of "myopic" or even "blind" retrospection (Achen and Bartels, 2016), which suggest that voters try to evaluate politicians based on performance, but that cognitive and emotional biases create systematic inaccuracies in retrospective opinion formation and voting. While a large literature finds evidence of retrospective opinion formation and/or voting *in some form* by voters, these aggregate patterns are often consistent both with accurate retrospection, where politicians are justly rewarded, and myopic retrospection, where they are rewarded for strategic manipulations or luck. For some, these patterns largely invalidate the value of retrospection: Achen and Bartels (2016) argue that while voters attempt to incorporate information about performance into their judgments, the various forms of bias are so severe that "election outcomes turn out to be largely random events from the viewpoint of contemporary democratic theory."

In the African politics literature, there is also strong emphasis on voters' use of identity-based heuristics, which shape evaluations of candidate performance. However, an emerging literature has complicated this picture, highlighting voters who mix identity-based voting with evaluations of performance. Ferree (2006) argues that in South Africa, voting follows identity not because of fundamental affinity but because racial identity is a useful informational shortcut about the policy

views that candidates hold. Similarly Lindberg and Morrison (2008) and Ellis (2014) find evidence of retrospective voting across African countries.

Healy and Malhotra (2013) highlight three elements which can introduce bias into the retrospection process. First they note that voters seem to apply an "availability heuristic" (Tversky and Kahneman, 1974), by overweighting recent events in their evaluation of politicians. Second, retrospective evaluation is more difficult when responsibility is divided among branches or levels of government which may be controlled by different parties (Powell and Whitten, 1993). Finally they stress the role of local context: for example, voting on economic outcomes may be particularly likely in communities with higher poverty or unemployment rates.

All three of these factors which can improve or corrupt retrospective opinion formation and voting map directly onto empirical tests which can be conducted with the data from this study. The availability heuristic can be tested by examining the time path of treatment effects, to see whether effects fade over time, or whether they persist. To test the effect of the local context, the wide variation in malaria endemicity across Tanzania can be exploited to examine whether citizens respond more to bed nets in locations where malaria is more prevalent. And the divided responsibility theory can be tested by examining whether effects differ in settings where the same party controls central and local government versus settings where parties share power.

Related Literature

The literature is mixed on voter responsiveness to direct government provision of goods and benefits, and there is limited understanding of the drivers of this heterogeneity across countries, programs, target populations, and outcomes.

The advent of large scale conditional cash transfers (CCTs) has led to important opportunities for causal inference and learning about the political effects of these programs. However, there has been significant heterogeneity in findings. Imai, King and Velasco Rivera (N.d.) find no benefit to incumbents from the *Progresa* CCT program or Mexico's universal health insurance

8

program, *Seguro Popular*, and Blattman, Emeriau and Fiala (2018) show that an unconditional cash transfer in northern Uganda actually led to increased support for the opposition party. By contrast, Manacorda, Miguel and Vigorito (2011) find that recipients of Uruguay's unconditional transfer program increased their support for incumbents; Galiani et al. (2016) also find evidence of impact from a transfer program in Honduras. In Tanzania, Evans, Holtemeyer and Kosec (2019) find that a CCT in Tanzania increased trust in local leaders.

Moving away from cash transfers to distribution or subsidization of other goods, the evidence is similarly mixed. Dionne and Horowitz (2016) show that Malawi's agricultural input subsidies benefited the ruling party. In Bangladesh, Guiteras and Mobarak (2015) show that citizens reward leaders in response to a (randomly assigned) sanitation program, except when they were informed that local leaders were not responsible for the program, and Fried and Venkataramani (2017) find that Mexican voters rewarded politicians for a clean water program. By contrast, De Kadt and Lieberman (2017) show that provision of water, sanitation, and refuse collection services actually reduced government support in South Africa between 2000-2011. Larreguy, Marshall and Trucco (2015) find that urban land titles helped federal officials, who were credited with the program, but harmed local officials, who lost clientelistic opportunities. These heterogeneous results highlight that changes in public opinion as a result of government service provision are likely to vary by the type of service provided, the time elapsed between program implementation and opinion measurement, the political and institutional context, and the information available to citizens about the programs in question.

III. Politics in Tanzania

Tanzania is an excellent setting in which to study the relationship between service delivery and politician approval, as public service delivery is weak in ways that are common to many developing countries, yet it has also been one of the largest recipients of health sector aid in the world in recent

years, and it has been among the leading countries in sub-Saharan Africa in implementation of malaria control programs.

Since gaining independence in 1964, Tanzania has been ruled by a single party, *Chama Cha Mapinduzi* (CCM). After founding president Julius Nyerere's retirement in 1985, politics began to open up and in 1995, Tanzania had its first multi-party election. Yet despite having multiparty elections, CCM has never won less than 58% of the presidential vote or 70% of the seats in Parliament. Tanzania was in effect a single party state for much of the post-independence period. Yet as CCM's historical legitimacy as the party of independence and Julius Nyerere fades, party leaders have been eager to demonstrate that they can deliver services to justify their continued rule.

Tanzania has been consistently rated "partly free" by Freedom House, and political space has closed markedly in Tanzania since the election of President John Magufuli in 2015 (Freedom House, 2019). Yet despite these major limitations on competitive politics, shifts in public opinion about politicians (like the ones documented in this paper) are electorally meaningful, since lower-level politicians face competitive elections, especially within their own party. For example, in 2010 almost 40% of CCM MPs lost their seat in intra-party primary elections (Morse, 2018).

Tanzania has a centralized, executive-dominated political system. The President and MPs are both directly elected every 5 years. At the subnational level, regional and district commissioners are centrally appointed. Below the district, ward executive officers are civil servants, while ward councillors are elected politicians. At village level, there is an elected village chairman, and an appointed village executive officer (Evans, Holtemeyer and Kosec, 2019).

IV. Malaria Control Programs in Tanzania

Malaria control efforts have been progressively scaled up across Africa over the past 10 years, with particular focus on the distribution of insecticide treated bed nets (ITNs) for prevention of malaria. ITN distribution programs in Tanzania started out with small-scale pilots in the late 1990s

in several districts. In 2004, a national voucher scheme to provide subsidized access to bed nets was created, but comprehensive national coverage was not achieved until the mass free distribution campaigns of 2008-2011.

This paper focuses on one of these campaigns: the 2010-11 Universal Coverage Campaign (UCC). Tanzania first won funding from the Global Fund for AIDS, TB, and Malaria for a distribution campaign to all children under 5 in 2008-09. In a follow up campaign from July 2010 to October 2011, long-lasting insecticidal nets (LLINs) were distributed to cover all household members, by giving one net to households for every sleeping space not already covered with a net.

In this Universal Coverage Campaign, net distribution and transportation to communities was handled by the bed net manufacturer and NGOs. Then ward and village executives identified and supervised community volunteers in each village, who visited homes and registered each sleeping space. These volunteers issued coupons which were redeemable at a distribution point over a three day period. The Tanzanian Red Cross conducted a hang up encouragement campaign approximately one week after distribution. Over 17 million nets were distributed, a cost of \$96.4 million, funded primarily by the Global Fund for AIDS, Tuberculosis and Malaria (Renggli et al., 2013).

Detailed accounts of these net distribution campaigns suggest that they were implemented in an organized and well-monitored fashion (Bonner et al., 2011; Renggli et al., 2013). While there is evidence of political capture of other forms of aid in Tanzania, such as agricultural subsidies (Pan and Christiaensen, 2012), there is no evidence that the mass ITN distribution campaigns were used in this way.[2] The programmatic delivery of ITNs in Tanzania was likely linked to strong leadership of the National Malaria Control Program at the time, and close engagement between local and global malaria expert communities and implementers (Croke, 2012). Thus while there are no direct measures of whether the program was perceived as programmatic (rather than clientelist) by recipients, based on evidence about program implementation, this paper considers Tanzania's

---

[2]See appendix table 11 for evidence that ruling party support in 2008 does not predict receipt of bed nets in the Universal Coverage Campaign in 2010.

11

ITN distribution as an example of a programmatic policy.

V. Research Design

This section describes the data, the identification strategy, and estimation approaches that are used to identify the causal effects of the national ITN distribution campaign on citizens' views of political leaders in Tanzania.

Data

The main data source is the 2010-2011 round of Tanzania's National Panel Survey (NPS), a household survey conducted by the National Bureau of Statistics with support from the World Bank. This was the second round of the panel survey: 3,200 households were first interviewed in 2008-09, and these households, plus any new households that split off from the original sample, were re-interviewed in 2010-2011. The main focus of the survey was household consumption and agricultural production, but there was also a governance module, which was asked of one randomly selected adult household member. Helpfully for this paper's identification strategy, the timing of survey visits were randomized. The 2008-2009 survey documentation notes that "within each zone, each district and each region were visited at 3 separate (randomly assigned) points during the year, so as to account for seasonal fluctuations," and communication with LSMS survey staff confirms that this randomization into early or later survey dates was maintained as much as possible in the 2010/2011 round. This randomization of survey dates, discontinuities around survey dates, and staggered roll out of the ITN campaign, enables causal identification. Dates of the ITN distribution campaigns in each zone are obtained from Renggli et al. (2013).

Outcome variables are taken from the 2010-2011 survey, which asked voters for their level of approval of 8 individuals (scale 1-4): village chairman, village executive officer, ward executive

officer, ward councilor, headmaster, extension officer, police officer, and member of Parliament.[3] I create binary outcome variables for each public official, excluding the low level civil servants (extension officer, headmaster and policeman), and also create standardized versions of the continuous outcome variables. *Politician approval*, the main outcome, is measured for five different leaders: village chairman, village executive officer, ward executive officer, ward councillor, and member of parliament.[4] Between 70 and 80 percent of respondents reported either approving or strongly approving of these leaders in the 2010-2011 NPS.

Approval ratings for elected officials who were not formally tasked with program implementation are included for two reasons. First, for officials like the village chairman, their responsibilities include general coordination of development activities in their village, making it very likely that they were de facto involved in project implementation. Other officials, such as MPs, may have engaged in "credit claiming," i.e. appearing at project ribbon cuttings and distribution events even when they were not officially involved (Cruz and Schneider, 2017).[5] Citizens rarely have access to detailed information about which officials were formally responsible for programs, and might credit officials who attend program events in order to appear involved (Baldwin and Winters, 2018).

Variation in Access to ITNs

I exploit the variation in possession of a free bed net driven by whether the 2010-11 ITN distribution campaign happened before or after an individual was surveyed by the NPS. Thanks to the

---

[3]Publicly expressed support for candidates might be a preferable outcome variable. However, other literature has documented costs to opposing the ruling party publicly in Tanzania (Carlitz, 2017; Croke, 2012). Using anonymous survey responses avoids this issue with expressed political opinion.

[4]While questions about vote intention question were not included in the 2010 NPS, in the 2008-2009 survey the correlation between approval of local officials and vote intention was 0.78-0.81 for village chair, councilor, and MP.

[5]In the appendix, I examine effects on the headmaster, extension officer, and police officer. Sample sizes drop notably, since not all villages have these services. There are no significant effects for extension or police officers but there are positive effects on headmaster approval.

randomized roll out of the survey, in conjunction with the phased introduction of the ITN distribution campaign, I can compare citizens who were surveyed just prior to receiving a net with those who were surveyed just after receiving a net.

One data issue is that although the month and year of all survey interviews is reported, the exact *day* on which the survey was conducted is omitted to ensure anonymity. Therefore I impute a date of the 15th day of the month to all observations. I define respondents as treated if the survey team arrived within 3 months (90 days) after the mass bed net distribution campaign (such that the *post* variable = 1), omitting the 15 days before and 15 days after the survey date to account for uncertainty about the exact survey day of the month. Respondents who were surveyed within the 90 days before the ITN campaign arrived in their village are control (*post* = 0), again omitting the 15 days prior to the survey. Later I relax this assumption to test multiple definitions of the treatment variable (including with bandwidths of 30, 60, 90, 120, 150 and 180 days). A second data issue is that since the ITN campaign started in the southern portion of the country, taking the better part of a year to cover the whole country, there are, by construction, a higher percentage of observations where the "*post*" variable equals 1 in the southern zone and the southern highlands zone. Therefore the main estimates are presented both with and without zone fixed effects.

Figure 1 demonstrates that the 2010 universal coverage campaign dramatically increased ITN ownership. Individuals surveyed after the campaign occurred in their community have 37 percentage point higher rates of ITN ownership and are much likelier to report that a member of their household received a free net (or free ITN) than those interviewed before the campaign occurred. Table 1 shows that the effect is large and highly significant (p < 0.01) for any definition of bed net receipt or use.

The causal impact of the bed net distribution campaign can be identified under the assumption that respondents interviewed just before or just after the campaign are comparable in expectation. However, it is reasonable to think that individuals surveyed a long time before or long after the campaign might be different. To address such concerns, I compare treated cohorts surveyed shortly

14

before the campaign to control cohorts surveyed just after. The main analysis thus focuses on a "bandwidth" of 90 days on either side of the campaign period, but results are highly robust to windows of as little as 30 days on either side of the campaign.[6] Given the plausibly exogenous timing of the campaign's arrival in a given district combined with the survey's randomized timing, this enables the recovery of causal estimates.

Estimation Strategies

In this section, I provide estimates of the effect of bed net distribution on the main outcome variable of interest (approval ratings of local government officials and political leaders), first graphically, and then with reduced form regressions. Figure 2 shows the graphical representation of the impact of ITN distribution on approval ratings for five political leaders: village executive officer, village chairman, ward executive officer, ward chairman, and MP. In regression form, I estimate the effect of the bed net campaign on approval of local politicians by using the following OLS model:

$$Politician\ approval_{ic} = \delta post\ campaign_c + \xi_{ic} \tag{1}$$

Robust standard errors are clustered at the district level. For robustness, I later estimate models with zonal fixed effects, and with a linear time trend and the time trend interacted with the *post* variable. The estimation with time trends first limits analysis to the 90 day bandwidth, and then relaxes this restriction to include the full sample of respondents (Appendix Table 3).

---

[6]A bandwidth of 90 days is justified by the procedure outlined in Calonico et al. (2017), and implemented using the "rdbwselect" command in Stata. This command returns an optimal bandwidth of 94 days for village chair, which is the outcome variable with the largest number of observations. I round the bandwidth to 90 days for ease of interpretation.

VI. Results

In this section I present the main finding: that malaria control efforts in Tanzania have resulted in substantial public opinion gains for local politicians. Graphical evidence and regression estimates are provided for each outcome of interest. I then confirm the robustness of these estimates.

Main Estimates

In the main specifications, the village chairman, ward councilor, ward executive, and MP all see significant, substantive increases in their approval ratings. The approval increase they receive is on the order of 7 to 13 percentage points, from base approval rates of 70 to 80 percent (Table 2, Panel A). The effects are substantively large and highly significant: for village chairman, for example, I can reject that the coefficient equals zero with 99% confidence. With zonal fixed effects, results are of similar magnitude and are highly significant for village chair ($p < 0.05$) and councillor ($p < 0.01$), but are smaller and not significant for the village and ward executives, and the MP.

Table 2, Panel C shows results using a continuous measure of approval as the dependent variable (1-4, with 1 representing strong disapproval and 4 strong approval), for which I create a standardized measure of approval for ease of interpretation. Using this measure, there are large and highly significant increases in approval for all outcomes in the main specification (between 0.24 and 0.38 standard deviation increases). Panel D uses the panel dimension of the data and controls for the household respondent's approval of the same leadership position in the 2008 survey.

The positive estimates for village chairmen and ward councillor are the most robust results; they are significant at virtually all bandwidths, and in models which include zonal fixed effects. These positions are elected political leaders, unlike the village and ward executives, who are appointed.

16

Robustness Checks

This section tests the robustness of the findings presented above. Figure 3 shows balance graphically on pre-treatment variables (household consumption, age, gender, and urban residence), and Appendix table 2 presents regressions demonstrating that none of these variables show statistically significant differences at the discontinuity within the 90 day bandwidth.[7]

Next I present a series of placebo tests to ensure that the discontinuity does not reflect an artifact of survey timing. There is a natural placebo test which is generated by the structure of the distribution campaign. In each zone, there was a household registration process which took place between two and eight months before the actual ITN distribution. These registration household visits can be used as a "placebo" campaign to test whether the change in views represents the effect of contact with state officials, or a generic signal that government officials were taking some action (by organizing visits to households for the registration campaign), versus the actual effect of the bed net distribution. In contrast to the bed net distribution, there is no positive treatment effect of the registration campaign. In fact there is, if anything, a slightly negative effect of these visits (which did not result in any immediate tangible benefit), although this is not significant except for the ward executive officer (see Appendix Table 6). I also generate placebo campaigns 100 and 200 days before and after the real campaign. In 25 total placebo tests (5 outcomes x 5 placebos) only two coefficients are statistically significant at $p < 0.05$ (see Appendix Table 7).

Results are also robust to changing the bandwidth to 60 or 120 days (rather than 90), to controlling for pre-treatment characteristics, such as gender, age, consumption, and urban residence, and to incorporating the 15 days immediately before and after the distribution campaign (see Table 3). Finally, although Figure 2 shows no apparent trend on either side of the discontinuity, I also control for the value of the running variable and its interaction with the treatment for a range of

---

[7]Appendix table 4 shows that there is generally no differential pattern of missing response associated with the *post* variable; one exception is the ward councillor variable which is, with marginal significance, less likely to be missing in the "post" group for the main specification.

bandwidths and (see Appendix Figure 1 and Table 3).

A final threat to robustness is any influence of Tanzania's national election, which took place on October 31, 2010, on survey responses. However since the NPS also began in October 2010, there are no treated observations prior to the election; omitting pre-election observations does not affect results.[8] Moreover, while the campaign was planned to take place prior to the elections, administrative delays due to donor requirements delayed the campaign, such that the bulk of the campaign was pushed until after the election (Renggli et al., 2013). This delay would have disrupted any desire by political leaders to use the campaign to bolster incumbents prior to the election, and reduces concerns that election-related activities could bias results.

Heterogeneous Effects

In this section, I focus on heterogeneous effects according to factors identified by the theoretical and empirical literature as critical modifiers of retrospective opinion formation: local issue importance, partisan alignment and policy attributability, and the amount of time elapsed between program implementation and voting or survey follow up.

Heterogeneity by local conditions

There is notable variation in malaria prevalence in Tanzania, ranging from limited transmission in highland districts to year-round endemicity in other areas. Public opinion seems likely to be most responsive to malaria programs in areas where malaria is a major public health problem (Boas and Hidalgo, 2019). Using measures of malaria intensity (Chaki et al., 2013), districts can be divided into groups where the malaria prevalence measure is less than 10, between 10 and 20, between 20 and 30, between 30 and 40, and above 40 percent. A pattern of increasing treatment

---

[8]Respondents may have become aware of the ITN campaign before the campaign's arrival in their village. However, unless this awareness was systematically correlated with treatment status, this should only attenuate estimated effects.

effects as malaria prevalence increases is clearly visible in Figure 4. For all officials except the ward councillor, a sharp increase in treatment effects is visible for the 30-40% and above 40% prevalence districts, while treatment effects are zero or even negative in the 0-10% prevalence districts.

Heterogeneity by time of follow up

The durability of these opinion shifts is a key question. On one hand, if persistent gains result from programs such as this one, it raises the question of why systematic delivery of such items is not more common. On the other hand, if benefits fade completely over time, then one might expect instead a pattern of energetic service delivery in the immediate runup to elections, coupled with lackluster services in non-election periods. While all results in this paper are short run, it is still possible to leverage variation in the time elapsed between the ITN campaign and the survey interview to see if there is any fading of effects, or whether effects are roughly constant over time.

Examining effects starting at 30 days post-campaign and expanding the bandwidth in 15 day increments until reaching the main specification bandwidth of 90 days demonstrates that the effect fades over time. As figure 5 demonstrates, the effect sizes are quite large at 30 days, yet the magnitude decays notably by 90 days: the effect of the campaign on councillor approval, for example, has decreased from 31 percentage points at 30 days to 13 percentage points at 90 days. This pattern is even more striking with zonal fixed effects, where all officials see large, significant gains at 30 days which are attenuated over time. These responses show time inconsistency, with recently visited respondents overweighting the recent past.

Heterogeneity by partisan alignment of central and local government

Divided control of government can affect citizen response, because citizens misunderstand which party deserves credit, either because they have limited information, or because responsibility is

genuinely shared by multiple actors in the political system. In Tanzania, CCM has held power at the central level since independence, and most village governments are also controlled by CCM. ITN distribution was predominantly a central government and donor initiative (although local leaders participated in implementation), so if respondents are "correctly" attributing credit, there should be a reduced treatment effect in opposition villages (since the opposition had no power over the central government), and a larger effect in CCM villages.

The NPS collected information on the partisan affiliation of local political leaders, which enables an interaction of treatment with indicators for villages where a) all recorded village level officials are from the ruling party (43% of villages), and b) villages where more than 50 percent of village officials are from opposition parties (14% of villages). There is no evidence that citizens increase approval of local CCM officials more than the opposition, and similarly no evidence that they credit opposition leaders any less than CCM leaders, even though the opposition had no responsibility for the program at higher policy levels (Appendix Table 8). This could be because respondents observe policy implementation (by local leaders), but not policy formulation (by central government officials), and therefore credit local leaders of either party for net distribution.

VII. Discussion and Conclusion

The question of whether voters change their views of political leaders in response to government programs is a central issue in political science, and despite a growing literature, it remains unresolved. This paper demonstrates large effects to the delivery of a life-saving health intervention, and identifies patterns of differential responsiveness which speak to the nature of these effects.

Several factors might contribute to this large effect. Harding and Stasavage (2014) argue that the tangibility or visibility of a benefit is a key factor enabling citizens to give credit to politicians. Mosquito nets are both visible on a daily basis and tangible. A related factor may be the program's universality: Because it targeted every household in the country, this campaign provided a high

"treatment dose" compared to programs like CCTs, which by design only reach the poor.

Another finding of interest is the stronger treatment effect for elected officials compared to unelected ones. While elected officials such as village chairmen were not formally tasked with program implementation, they may have sought to involve themselves. However, to the extent that voters credited officials who were genuinely uninvolved, this is an example of how retrospective evaluation of leaders is shaped by heuristics (i.e. competent programs make respondents happier with all local officials without thinking carefully about who "deserves" credit). Some evidence for this interpretation comes from the fact that respondents increase their approval of the local headmaster, despite this official's lack of formal involvement in the program (Appendix Table 13).

Finally this paper documents a significant fading of the effect over time. This suggests that handouts to voters are not an all purpose strategy for politicians. Delivered too early, their effect could wear off completely by election time. This may help explain variation in the effects identified in this literature. For example, the unresponsiveness of South African voters to infrastructure improvements (De Kadt and Lieberman, 2017) could be because of the time dimension, since that analysis examined changes in service delivery over a 10 year period.

The welfare implications of these findings are complicated by the fact that the ITN campaign was aid-financed. Some have argued that aid, by allowing political leaders access to "unearned" resources, may further entrench poorly-performing leaders (Moss, Petterson and van de Walle, 2006). However, voters might also wish to credit leaders for attracting and cooperating with donors. Evaluating these difficult tradeoffs is beyond the scope of this paper.

Governments often fail to deliver services effectively because powerful political forces push leaders to use resources for personal gain, political survival, or both. Yet the apparent incentive compatibility between delivery of health programs and the political interests of local politicians offers hope that under certain conditions, other paths are possible. This paper points the way to a broader research agenda on the political returns to critical health interventions that are often underprovided in developing countries.

Table 1: impact of campaign on net ownership and use

	(1) any ITN	(2) slept w/ITN	(3) ITN pct	(4) any net	(5) free net	(6) free ITN	(7) any free net
post	0.370***	0.355***	0.361***	0.183***	0.396***	0.422***	0.422***
	(0.0496)	(0.0587)	(0.0461)	(0.0504)	(0.0621)	(0.0551)	(0.0498)
constant	0.423***	0.348***	0.315***	0.719***	0.240***	0.153***	0.346***
	(0.0313)	(0.0331)	(0.0309)	(0.0459)	(0.0282)	(0.0214)	(0.0228)
N	915	915	915	915	915	915	915

Robust standard errors clustered at district level

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 2: Impact of campaign on politician approval

	(1) village chair	(2) village exec	(3) councillor	(4) ward exec	(5) MP
Panel A: Binary approval (0-1)					
post	0.116***	0.0677*	0.132**	0.0827	0.132**
	(0.0308)	(0.0363)	(0.0566)	(0.0534)	(0.0559)
constant	0.760	0.797	0.740	0.749	0.677
	(0.0283)	(0.0310)	(0.0508)	(0.0502)	(0.0454)
N	757	569	553	418	551
Panel B: Zone fixed effects					
post	0.101**	0.020	0.0995***	0.00211	0.0149
	(0.0386)	(0.0513)	(0.0329)	(0.0476)	(0.0325)
constant	0.757	0.858	0.809	0.866	0.815
	(0.0488)	(0.0575)	(0.0347)	(0.0467)	(0.0372)
N	757	569	553	418	551
Panel C: Continuous approval (standardized)					
post	0.326***	0.240**	0.353**	0.378***	0.337**
	(0.079)	(0.096)	(0.141)	(0.127)	(0.162)
constant	0.000	0.000	-0.000	-0.000	0.000
	(0.065)	(0.078)	(0.115)	(0.118)	(0.113)
N	757	569	553	418	551
Panel D: Binary outcome, controlling for 2008 approval					
post	0.0943***	0.0575	0.0803	0.107**	0.115**
	(0.0287)	(0.0364)	(0.0495)	(0.0482)	(0.0473)
constant	0.663***	0.771***	0.742***	0.646***	0.605***
	(0.0426)	(0.0334)	(0.0629)	(0.0549)	(0.0547)
N	755	567	418	553	551

Robust standard errors clustered at district level

* $p < .1$, ** $p < .05$, ***$p < .01$

Table 3: Robustness checks

	(1) village chair	(2) village exec	(3) councillor	(4) ward exec	(5) MP
Panel A: Main specification with controls					
post	0.111**	0.0443	0.109**	0.0723	0.125**
	(0.0287)	(0.0320)	(0.0472)	(0.0473)	(0.0483)
constant	0.660	0.787	0.831	0.811	0.708
	(0.0451)	(0.0527)	(0.0598)	(0.0970)	(0.0625)
N	737	554	540	404	531
Panel B: Main specification with no omitted period					
post	0.104***	0.0793**	0.106**	0.0930**	0.120**
	(0.0283)	(0.0321)	(0.0509)	(0.0460)	(0.0494)
constant	0.761	0.797	0.754	0.742	0.694
	(0.0260)	(0.0282)	(0.0480)	(0.0446)	(0.0444)
N	972	755	719	534	698
Panel C: 60 day bandwidth					
post	0.107***	0.0121	0.153**	0.0739	0.0923
	(0.0390)	(0.0363)	(0.0569)	(0.0515)	(0.0567)
constant	0.767	0.832	0.760	0.767	0.711
	(0.0353)	(0.0298)	(0.0491)	(0.0406)	(0.0390)
N	497	363	347	258	355
Panel D: 120 day bandwidth					
post	0.105***	0.0503	0.133**	0.100*	0.123**
	(0.0312)	(0.0384)	(0.0557)	(0.0520)	(0.0508)
constant	0.770	0.787	0.739	0.737	0.680
	(0.0282)	(0.0334)	(0.0536)	(0.0499)	(0.0425)
N	1125	849	831	618	819

Notes: Controls in Panel A include age, gender, per capita consumption and urban residence. Robust standard errors are clustered at district level   * $p < .1$, ** $p < .05$, *** $p < .01$

Figure 1: ITN access by survey date
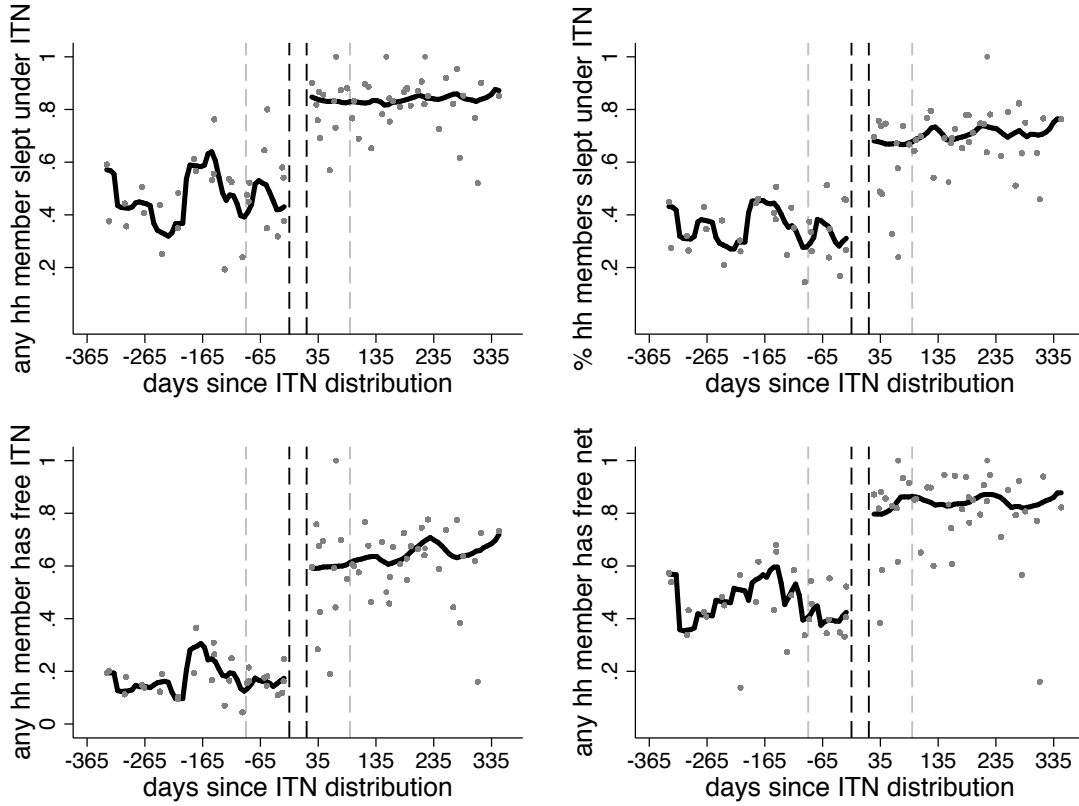
Notes: Each gray dot represents average ITN ownership or use for a given value of the "days since ITN distribution" variable (survey date minus campaign date). Black lines are local polynomials fitted either side of the survey date (indicated by the vertical dashed line). The vertical gray dashed lines indicate the bandwidth used for the main analysis. Variable definitions are provided in the appendix. The x-axis shows the number of days elapsed between respondent's interview date and the date of ITN campaign in the respondent's zone.

Figure 2: Politician approval by survey date

Figure 3: Covariate value by survey date
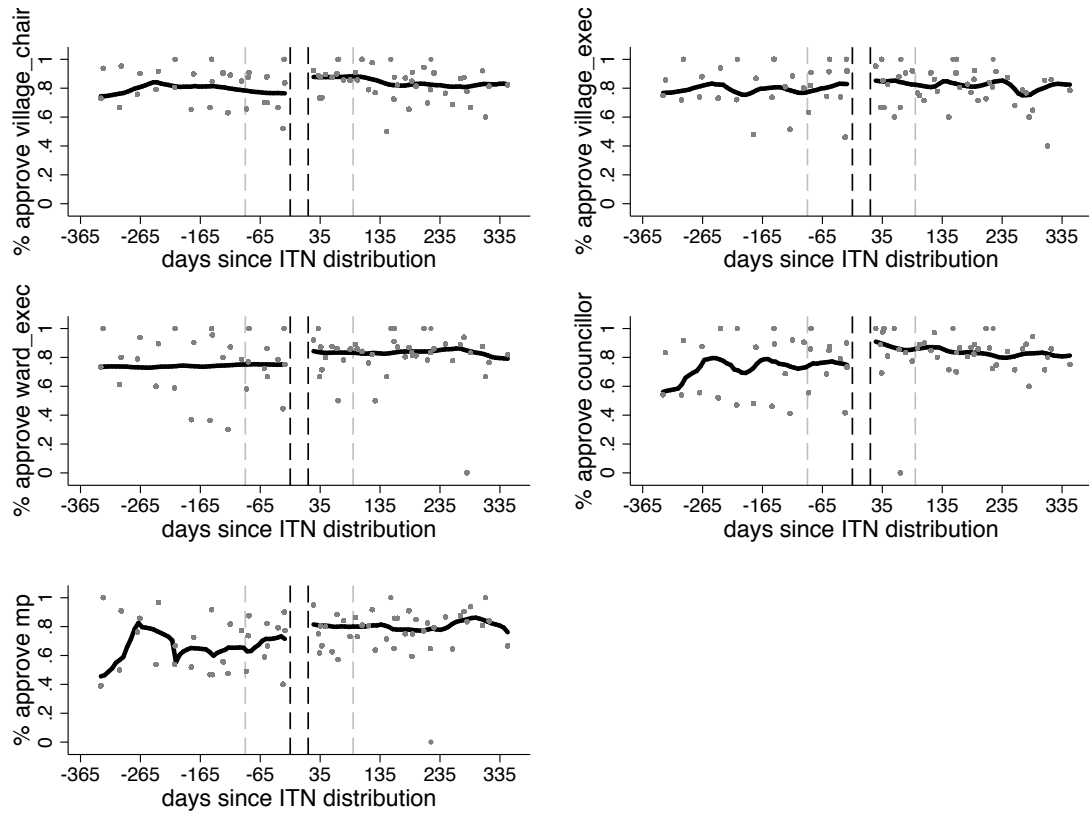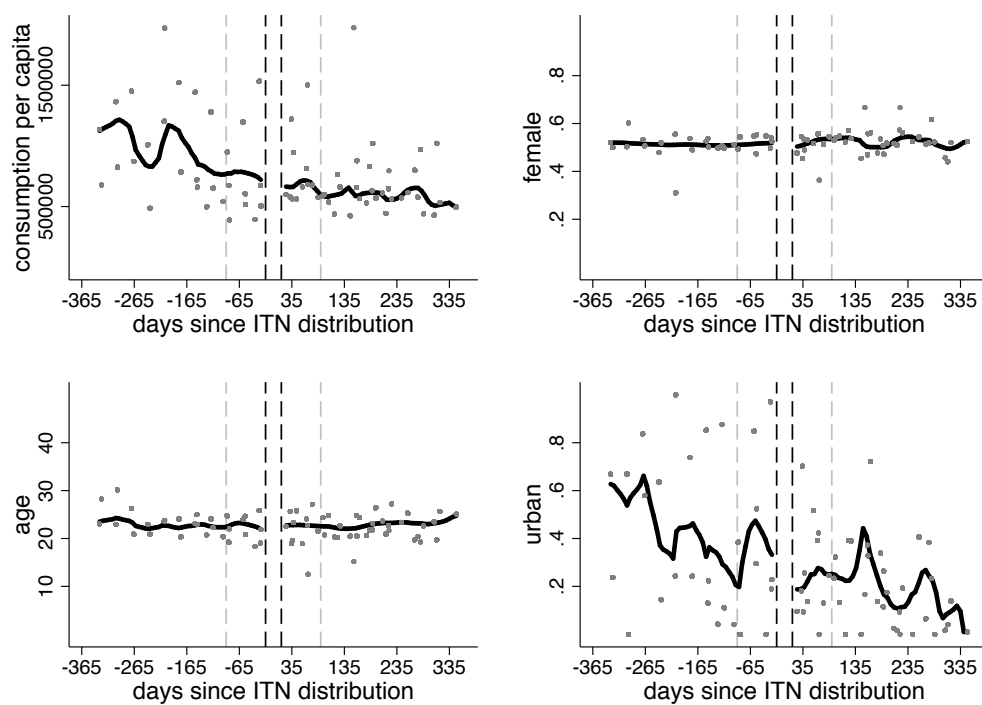
Notes: See Figure 1.

Figure 4: Treatment effects by malaria prevalence
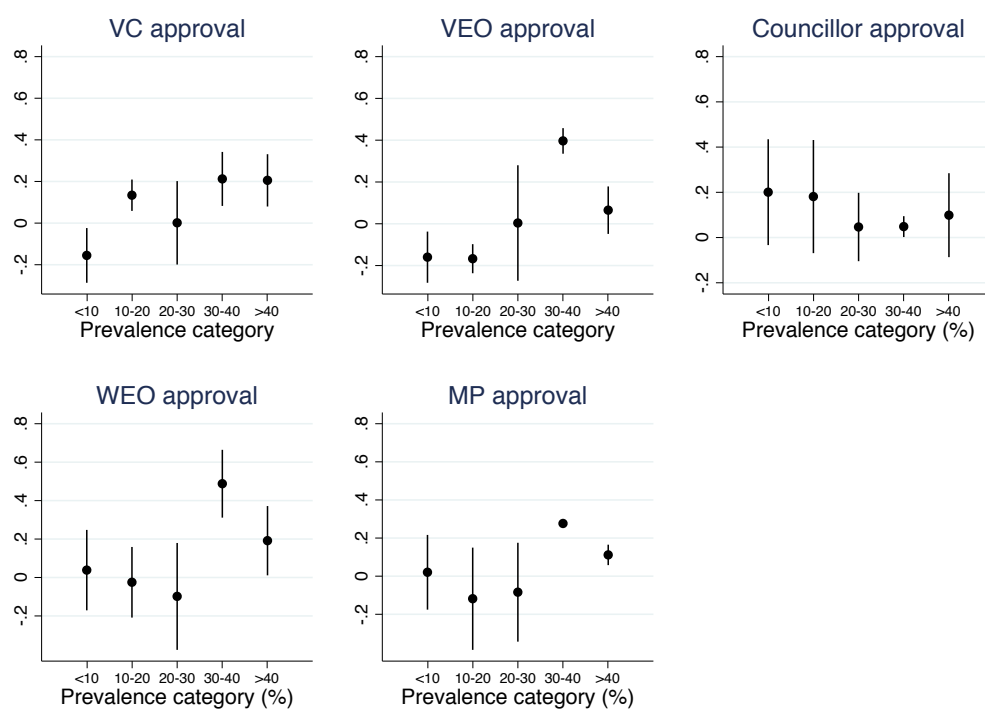
Figure 5: Politician approval by time since campaign date
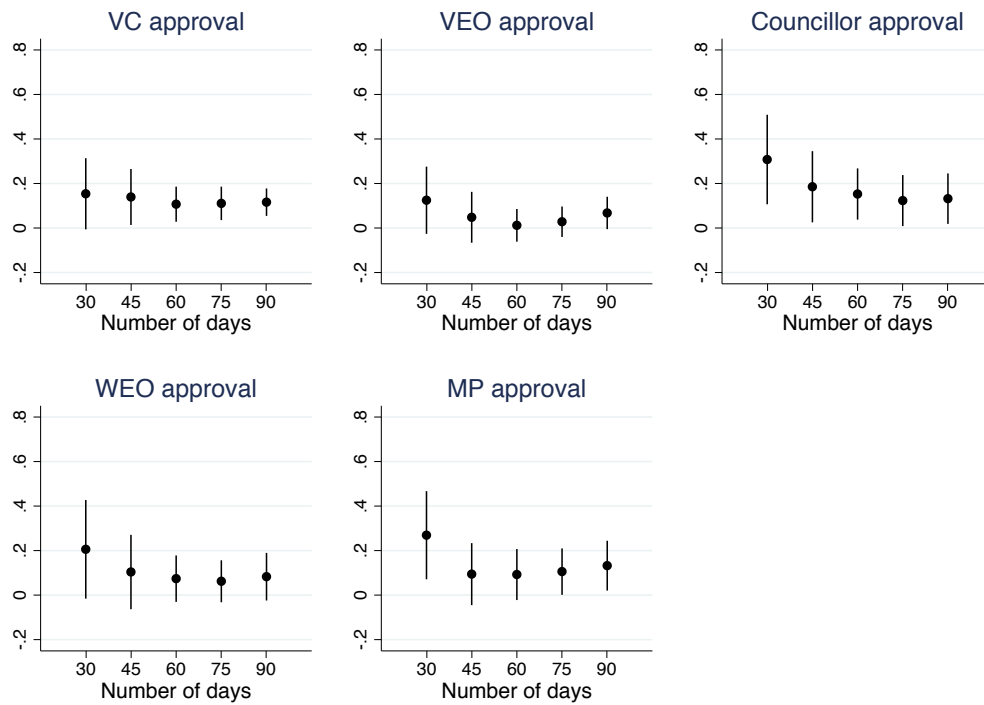
Notes: Unadjusted treatment effects. No time trends, controls or fixed effects included in regressions.

References

Achen, Christopher H. and Larry M. Bartels. 2016. *Democracy for Realists: Why Elections Do Not Produce Responsive Government*. Princeton: Princeton University Press.

Anderson, Christopher J. 2007. "The End of Economic Voting?: Contingency Dilemmas and the Limits of Democratic Accountability." *Annual Review of Political Science* 10(1):271–296.

Baldwin, Kate and Matthew S. Winters. 2018. "Bypass Aid and Perceptions of Local GOvernment Performance and Legitimacy.". AidData Working Paper 56.

Blattman, Christopher, Mathilde Emeriau and Nathan Fiala. 2018. "Do Anti-Poverty Programs Sway Voters? Experimental Evidence from Uganda." *The Review of Economics and Statistics* 100(5):891–905.

Boas, Taylor C. and F. Daniel Hidalgo. 2019. "Electoral incentives to combat mosquito-borne illnesses: Experimental evidence from Brazil." *World Development* 113:89–99.

Bonner, Kimberly, Alex Mwita, Peter McElroy, Susan Omari, Ally Mzava, Christian Lengeler, Naomi Kaspar, Rose Nathan, Joyce Ngegba, Romanus Mtung'e and Nick Brown. 2011. "Design, implementation and evaluation of a national campaign to distribute nine million free LLINs to children under five years of age in Tanzania." *Malaria Journal* 10(1):73.

Calonico, Sebastian, Matias D. Cattaneo, Max H Farrell and Rocio Titiunik. 2017. *Stata Journal* 17(2):372–404.

Carlitz, Ruth D. 2017. "Money Flows, Water Trickles: Understanding Patterns of Decentralized Water Provision in Tanzania." *World Development* 93:16 – 30.

Chaki, Prosper, Renata Mandika, Ally Mohammed, Fabrizio Molteni, Clara Mundia, Abdisalan Mohammed Noor, Ritha Njau, Fredros Okumu and Robert Snow. 2013. "An Epidemiological Profile of Malaria and its Control in Mainland Tanzania.".

Cohen, Jessica and Pascaline Dupas. 2010. "Free Distribution or Cost-Sharing? Evidence from a Randomized Malaria Prevention Experiment." *Quarterly Journal of Economics* 125(1):1–45.

Comfort, Alison B and Paul J Krezanoski. 2016. "The effect of price on demand for and use of bednets: evidence from a randomized experiment in Madagascar." *Health Policy and Planning* 32(2):178–193.

Converse, Philip. 1964. The Nature of Belief Systems in Mass Publics. In *Ideology and Discontent*, ed. David Apter. New York: The Free Press.

Croke, Kevin. 2012. "The Political Economy of Child Mortality Decline in Tanzania and Uganda, 1995 2007." *Studies in Comparative International Development* 47(4):441–463.

Cruz, Cesi and Christina J. Schneider. 2017. "Foreign Aid and Undeserved Credit Claiming." *American Journal of Political Science* 61(2):396–408.

De Kadt, Daniel and Evan Lieberman. 2017. "Nuanced Accountability? Voter Responses to Service Delivery in Southern Africa." *British Journal of Political Science* .

Dionne, Kim Yi and Jeremy Horowitz. 2016. "The Political Effects of Agricultural Subsidies in Africa: Evidence from Malawi." *World Development* 87:215 – 226.

Ellis, Erin. 2014. "A Vote of Confidence: Retrospective Voting in Africa." Afrobarometer Working Paper No. 147.

Evans, David K., Brian Holtemeyer and Katrina Kosec. 2019. "Cash transfers increase trust in local government." *World Development* 114:138 – 155.

Ferree, Karen E. 2006. "Explaining South Africa's Racial Census." *The Journal of Politics* 68(4):803–815.

Fiorina, Morris. 1981. *Retrospective Voting in American National Elections*. New Haven and London: Yale University Press.

Freedom House. 2019. "Freedom in the World 2019.".

Fried, Brian and Atheendar Venkataramani. 2017. "Does Saving Lives Win Votes? Evaluating the Electoral Consequences of Providing Clean Water in Mexico." Working paper.

Galiani, Sebastian, Nadya Hajj, Pablo Ibarraran, Nandita Krishnaswamy and Patrick J. McEwan. 2016. "Electoral reciprocity in programmatic redistribution: Experimental Evidence." NBER Working paper 22588.

Gerber, Alan S., James G. Gimpel, Donald P. Green and Daron R. Shaw. 2011. "How Large and Long-lasting Are the Persuasive Effects of Televised Campaign Ads? Results from a Randomized Field Experiment." *American Political Science Review* 105(1):135–150.

Guiteras, Raymond P. and Ahmed Mushfiq Mobarak. 2015. "Does Development Aid Undermine Political Accountability? Leader and Constituent Responses to a Large Intervention." BREAD Working Paper No. 489.

Harding, Robin and David Stasavage. 2014. "What Democracy Does (and Doesn't Do) for Basic Services: School Fees, School Inputs, and African Elections." *The Journal of Politics* 76(1):229–245.

Healy, Andrew and Gabriel S. Lenz. 2014. "Substituting the End for the Whole: Why Voters Respond Primarily to the Election-Year Economy." *American Journal of Political Science* 58(1):31–47.

Healy, Andrew and Neil Malhotra. 2013. "Retrospective Voting Reconsidered." *Annual Review of Political Science* 16(1):285–306.

Imai, Kosuke, Gary King and Carlos Velasco Rivera. N.d. "Do Nonpartisan Programmatic Policies Have Partisan Electoral Effects? Evidence from Two Large Scale Randomized Experiments." *Journal of Politics*. Forthcoming.

Key, V.O. 1966. *The Responsible Electorate: Rationality in Presidential Voting, 1936-1960*. Harvard University Press/Belknap.

Larreguy, Horacio, John Marshall and Laura Trucco. 2015. "Breaking Clientelism or Rewarding Incumbents? Evidence from an Urban Titling Program in Mexico." Working Paper.

Lengeler, Christian. 2004. "Insecticide-treated bed nets and curtains for preventing malaria." *Cochrane Database of Systematic Reviews* 2.

Lindberg, Staffan I. and Minion K.C. Morrison. 2008. "Are African Voters Really Ethnic or Clientelistic? Survey Evidence from Ghana." *Political Science Quarterly* 123(1):95–122.

Manacorda, Marco, Edward Miguel and Andrea Vigorito. 2011. "Government Transfers and Political Support." *American Economic Journal: Applied Economics* 3(3):1–28.

Morse, Yonatan L. 2018. "Electoral authoritarianism and weak states in Africa: The role of parties versus presidents in Tanzania and Cameroon." *International Political Science Review* 39(1):114–129.

Moss, Todd, Gunilla Petterson and Nicolas van de Walle. 2006. "An Aid-Institutions Paradox? A Review Essay on Aid Dependency and State Building in Sub-Saharan Africa.". Center for Global Development working paper no. 74.

Nordhaus, William D. 1975. "The Political Business Cycle." *Review of Economic Studies* 42(2):169.

Pan, Lei and Luc Christiaensen. 2012. "Who is Vouching for the Input Voucher? Decentralized Targeting and Elite Capture in Tanzania." *World Development* 40(8):1619 – 1633.

Powell, G. Bingham and Guy D. Whitten. 1993. "A Cross-National Analysis of Economic Voting: Taking Account of the Political Context." *American Journal of Political Science* 37(2):391–414.

Renggli, Sabine, Renata Mandike, Karen Kramer, Faith Patrick, Nick Brown, Peter McElroy, Wilhelmina Rimisho, Amina Msengwa, Ally Mnzava, Rose Nathan, Romanus Mtung'e, Rita Mgullo, Jane Lweikiza and Christian Lengeler. 2013. "Design, implementation and evaluation of a national campaign to deliver 18 million free long-lasting insecticidal nets to uncovered sleeping spaces in Tanzania." *Malaria Journal* 12(1):85.

Tversky, Amos and Daniel Kahneman. 1974. "Judgment under Uncertainty: Heuristics and Biases." *Science* 185(4157):1124–1131.

Biographical statement: Kevin Croke is an assistant professor of global health at the Harvard T.H. Chan School of Public Health, Boston MA, 02115.