How the content of digital complaints shapes bureaucratic responsiveness in Mumbai[1]

Tanu Kumar[2]

July 13, 2024

Forthcoming, Governance

When do unelected officials respond to citizen complaints, and what are the implications for service delivery? In the formal complaint system for Mumbai's water sector, bureaucrats addressed 44% of the 20,000 complaints lodged from 2016-2018. In line with literature on distributive politics, responsiveness to marginalized citizens is lower. Yet in interviews, officials emphasize that programmatic goals and capacity constraints lead to prioritization by what the complaint is about. In fact, once controlling for complaint content, the relationship between complainant identity and responsiveness disappears. Initial patterns of differential responsiveness by complainant identity arise from the fact that citizens from marginalized groups experience lower levels of service provision, which leads them to make complaints that are more difficult to address. The paper sheds light on the role of bureaucracy in e-governance and service delivery, showing administrative priorities in responding to complaints may perpetuate inequalities in service provision.

[1] Thank you to Isabel Arnade, Anna Glass, and Rahul Truter for your valuable assistance on this project. Thank you to Sam Asher, Christopher Carter, Alicia Cooperman, Justine Davis, Laura Jákli, Shelby Grossman, Jeremy Horowitz, Paul Novosad, Leah Rosenzweig, Alesha Porisky, Alison Post, Bhumi Purohit, Cesar Zucco Jr., and participants of the Southern Workshop in Empirical Political Science, the Program on Governance and Local Development workshop (University of Gothenberg) and the Inequality and Policy Research Center (Claremont Graduate University) Research Talks series for feedback and advice. Thank you also to three anonymous reviewers who provided constructive feedback

[2] Claremont Graduate University. tkumar08@gmail.com

Introduction

In low- and middle-income countries (LMICs) where resources are particularly scarce, politicians strategically allocate resources to different groups of citizens, with brokers or informal leaders serving as channels of communication and distribution (see Golden and Min, 2013, for a review). This process of distributive politics can create uneven access to public services such as water, electricity, or sanitation by certain ethnic, income, or voting blocs (Bates, 1974; Bardhan and Mookherjee, 2006; Besley et al., 2004; Burgess et al., 2015; Chandra, 2004; Franck and Rainer, 2012; Min, 2015; Nichter, 2008; Stokes, 2005).

Bureaucratic channels for collecting complaints, such as online grievance redressal systems or local bureaucracies with citizen-facing offices, can create an alternative path to demand improved services (eg. Bhattacharjee and Mysoor, 2016; Kosec and Wantchekon, 2020; Kruks-Wisner, 2021; Grossman et al., 2014; Ranganathan, 2007). Indeed, the World Bank has promoted the use of such institutions to strengthen the voice of the poor, marginalized, and minoritized (World Bank, 2004), and advocates the inclusion of mechanisms for grievance redressal in the projects it funds (Brown et al., 2014; Bank, 2021). Yet in most cases, officials will not be able to respond to every complaint and will therefore be forced to prioritize some over others. While existing work from the US considers the propensity of citizens to make complaints (Minkoff, 2016; White and Trump, 2018), less is known about which complaints will receive a response.

This paper seeks to shed light on patterns and predictors of responsiveness in formal complaint systems staffed by unelected officials, or bureaucrats. Existing research identifies at least two sets of variables that predict when an unelected official would be motivated to respond to citizens, to whom they are not formally accountable. On the one hand, if bureaucrats are politicians' agents and monitored based on electoral incentives, citizens belonging to politically important groups or constituencies may see greater responsiveness to their requests, and responsiveness may be particularly high prior to elections (eg. Bates, 1974; Besley et al., 2004; Bueno 2021; Chandra, 2004; Franck and Rainer, 2012; Min, 2015; Nichter, 2008). On the other hand, officials are part of hierarchical and constrained organizations, and an agency's programmatic goals and capacity constraints may make it easier or more attractive to respond based on what a complaint is about (Dasgupta and Kapur, 2020; Tendler, 1997). I also argue that the quality of service delivery, which is often determined through a political process, influences the types of complaints citizens make. This variation, along with officials' tendency to prioritize the simplest complaints, may result in overall patterns of responsiveness resembling the political patterns of service allocation.

I illustrate these possibilities in the context of Mumbai's water sector. While complaints here are frequently made through political networks and other informal means (Anand, 2011; Bjorkman, 2015), citizens can also make formal complaints with the city online, through an app, or on the phone. I collected the universe of complaints lodged from 2016-2018 through the website used for tracking these complaints and developed a dataset of 21,384 unique complaints about water. Rates of resolution initially appear high, with over 90% of complaints marked as "Closed" in the portal. Yet closure rates alone are an uninformative measure of responsiveness, as handlers are incentivized to complete the process for as many complaints as possible; one must look at the written response to a complaint to learn if any meaningful action was taken. Using supervised machine learning techniques to classify the categories of

complaints and text of responses reveals that just 44% of complaints receive what I call a "true response," suggesting that officials prioritize some complaints over others.

How do they make these decisions? I undertake a multi-method research design to find out. First, I geocode and classify the names of complainants and find that complaints issued in the runup to elections, those not from marginalized groups (in this case, Muslims), and from politically competitive electoral districts are more likely to receive a true response. These patterns are in line with the first set of expectations outlined above.

Yet qualitative interviews with handling officials indicate a different logic for resolution. They share that some types of complaints, like those about shortages or unauthorized use, are too costly to address. Others, like those about leaks, are prioritized because they are both less costly and align with the programmatic goals of their higher-ups and the bureaucracy as a whole. And indeed, when I classify the text of complaints, I see a distinct pattern of responsiveness that varies by complaint type.

In fact, when holding complaint type constant, responsiveness no longer varies with the identity and political constituency-related variables. I explain this empirical trend by suggesting that different groups of citizens tend to make different types of complaints, which in turn vary in their likelihood of receiving a response. In the Mumbai water sector, Muslims and those from non-competitive districts are more likely to make complaints about shortages and unauthorized use. Complaints about shortages in particular tend to come from places with the lowest mean daily supply hours. Yet these complaints are among the least likely to gain a response. The patterns suggest that complaint platforms address quality issues for services that may have already been allocated through a political process, and that incentives for differential responsiveness by type can reinforce existing inequities.

The theory and empirics make multiple contributions to research on service delivery, bureaucratic constraints, and e-governance interventions. This is, to my knowledge, one of the first studies of the *content* of complaints in either a formal or informal setting, and adds new explanations for responsiveness based on capacity and programmatic goals to the existing literature. Third, the study illustrates the role of grievance redressal systems in the broader process of the distributive politics of service delivery. In the short term, these systems may ease the registration and resolution of certain complaints, particularly if resolving those complaints is aligned with broader organizational incentives. Yet bureaucratic handlers may only be able to focus on tackling minor complaints rather than addressing systemic issues of inadequate and inequitable resource allocation. Many of these insights are likely to apply to platform for complaints in Western contexts and in other applications, such as healthcare or e-commerce. More broadly, the study contributes to a broader literature on e-governance initiatives by considering the preferences, incentives, and constraints of the humans who use them.

Motivation: the proliferation of online complaint portals

In recent years, the growth of e-governance initiatives has led to the proliferation of online portals for citizens to make complaints about public services (eg. Dipoppa and Grossman, 2020; Distelhorst and Hou, 2017; Grossman et al., 2018, 2020). In the United States, these are

commonly known as 311 complaint hotlines (Minkoff, 2016; White and Trump, 2018). Public-private partnerships, such as Colab in Brazil and FixMyStreet in the United Kingdom (Dipoppa and Grossman, 2020), are common as well. In India, these portals, commonly known as "grievance redressal systems," have been implemented at the central, state, and municipal levels.

These institutions can allow ordinary citizens to access government in contexts where demands are typically mediated through political networks. Grossman et al. (2014), for example, find that when citizens in Uganda are presented with the opportunity to send text messages to their representatives, marginalized groups are more likely to do so than to use existing political communication channels. More generally, studies of participatory governance structures suggest that formal institutions for citizen participation increase the accountability and responsiveness of government by addressing problems of elite capture and the clientelistic distribution of public goods (e.g. Blair, 2000; Kosec and Wantchekon, 2020; Mansuri and Rao, 2012; Grossman et al., 2014; Olken, 2010; Wampler, 2010; Speer, 2012).

Yet far from fully automating service delivery, these initiatives are often managed by bureaucrats, or unelected officials, who choose how and whether to respond to the complaints they receive. Their theorized effect on equity can occur only if handlers acknowledge, process, and respond to the citizens' input. Under what conditions will bureaucrats be responsive?

Theories about responsiveness

The main assumption I make is that officials cannot respond to all requests. Dasgupta and Kapur (2020) illustrate how block-level officials in rural India lack sufficient time and resources to complete all of their tasks. If officials are capacity constrained, then they must prioritize. Depending on whether the bureaucracy is politicized or whether officials are beholden to programmatic goals and capacity constraints, they will make their decisions differently. I outline two sets of expectations motivated by existing literature below.

Theory 1: a politicized bureaucracy focused on electoral incentives

Substantial existing research attempts to understand whether bureaucratic actors are politicized, or act in alignment with politicians. The key insight here is that officials are not formally accountable to citizens. Instead, a broad, cross-context literature assumes that bureaucrats are agents who are responsive to their principals, politicians (e.g. Gailmard and Patty 2012; Grossman and Slough 2022; Miller 2005; Waterman and Meier 1998).

To ensure that bureaucrats are serving citizens well, politicians must monitor their behavior. One body of literature suggests that they will undertake this costly monitoring action when it is most electorally beneficial to do so. Gulzar and Pasquale (2017), for example, argue that politicians will tend to monitor bureaucrats and generate high levels of service delivery when they can claim credit for their actions. In other words, politicians will ensure bureaucrats are responsive to citizens when it part of their strategy to win elections.

As such, we should expect bureaucratic responsiveness to follow similar patterns to those seen in the broad literature on distributive politics wherein politicians are strategic in allocating resources (Dixit and Londregan, 1996; Golden and Min, 2013). Here, researchers have found that the delivery of important public services such as water or electricity favors certain ethnic/religious groups (eg. Bates, 1974; Besley et al., 2004; Burgess et al., 2015; Chandra, 2004; Franck and Rainer, 2012) socioeconomic classes (Bardhan and Mookherjee, 2006; Kumar et al., 2022; Min, 2015) competitive districts (Golden and Min, 2013), and areas with core (or swing) voters (Nichter, 2008; Stokes, 2005). Officials are also likely to expend the most effort and resources at the times when it will help them win votes, namely prior to elections (Bueno 2021).

If the handling bureaucrats act in complete alignment with politicians motivated by distributive concerns, they should be more responsive to certain complaints. In particular, we would expect them to prioritize the complaints of politically influential citizens (either those from powerful social groups or pivotal constituencies) and to be particularly responsive to complaints that come in during the runup to an election.

Theory 2: a bureaucracy guided by programmatic goals and capacity constraints

At the same time, there are reasons to believe that officials might make decisions on the basis of programmatic goals and capacity constraints. Even if bureaucratic preferences mirror those of politicians, politicians often have not just distributive preferences, but programmatic ones as well. Veron et al. (2006), for example, highlight how the Communist Party of India-Marxist had a broad agenda aimed at development and poverty alleviation and therefore aimed to improve implementation of an employment guarantee. Tendler (1997, p. 1-27) further describes how a state-level government in a poor region in Brazil motivated local-level bureaucrats to prioritize work on a preventative health program. Beyond politicians, other higher-ups in a bureaucracy-- often bureaucrats themselves-- may have strong programmatic preferences as well.

Capacity constraints may also lead to shape prioritization. Certain *types* of requests might require less time or fewer resources to address. Officials are particularly incentivized to prioritize low-cost complaints where the number of complaints or average time to resolution is monitored. To maximize the number of complaints addressed or minimize the time to resolution, they will have an incentive to address many easy-to-resolve complaints over expending resources on few difficult-to-resolve complaints.

Due to these capacity constraints, officials may also avoid prioritizing complaints that are likely to affect other citizens. Examples here would involve the removal of street vendors, squatters, or those illegally tapping a water source. These might lead to complaints about the bureaucrat to higher-ups, or could also lead to more complaints from another set of citizens, which would increase the bureaucrat's workload in the short term. Handlers are likely to proceed in such cases with caution, as resolution may be seen as overtly political. Indeed, Holland (2016) describes a bureaucratic process to detect land invasions in Bogota but reveals that it is eventually *mayors* who decide whether or not to sign the orders for eviction.

These observations suggest that programmatic concerns and capacity constraints might lead officials to prioritize complaints based on what a complaint is about, rather than by whom or when it is made. Officials may prioritize the complaints that are aligned with an agency's programmatic goals, require minimal effort, and have few negative spillovers for other citizens. In other words, there are complaints that may be relatively "easy" to address in that they require few resources and do not generate backlash from other citizens, while others are more "difficult" to address.

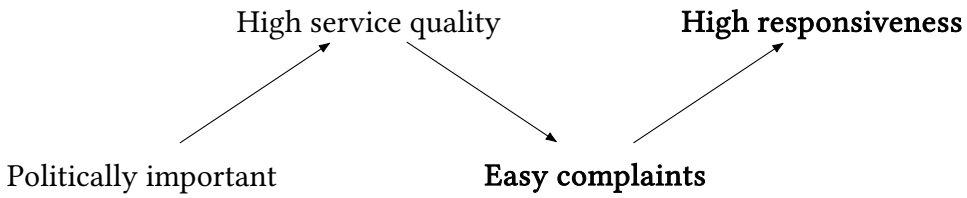
The role of underlying service quality and variation in complaint-making

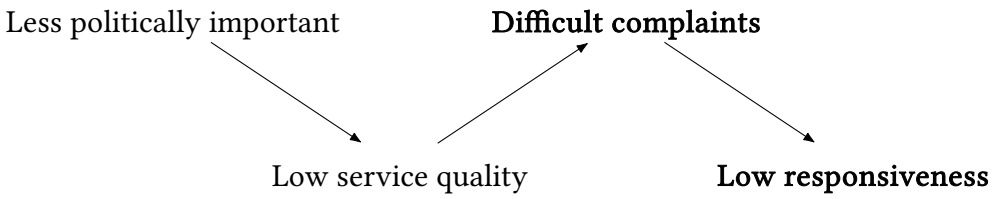
If officials do prioritize certain types of complaints over others, this will have broader implications for patterns of service delivery if there is systematic variation in the types of complaints citizens make. Unexplored in the literature on citizen demands is the fact that complaint-making occurs in the context of existing levels of service quality. As a result, there is likely to be variation in the types of complaints different sets of citizens make; if officials respond at different rates to different types of complaints, then responsiveness would be correlated with underlying levels of service quality.

Figure 1 illustrates how this might work. First, higher levels of service quality are allocated by existing policy-making processes to the most politically important citizens. This allocation then gives rise to different types of complaints, which is where bureaucratic grievance redressal plays a role.

While the way in which service quality shapes complaint-making would surely vary by context, in some sectors, complaints from areas with low levels of service quality might be more difficult to address. For example, an area with infrequent bus service is likely to make complaints for more frequent service, which may require additional buses or decreased service on another route; a place that already receives many buses a day is more likely to make complaints about bus repair or operator behavior, which *might* be easier to address. The scope of problems shrinks as service delivery improves. Officials are likely to prioritize the easier complaints and therefore have higher rates of responsiveness to areas with better service quality. The differential rates of responsiveness combined with differential rates of complaint-making leads patterns of responsiveness to mirror the initial politicized patterns of service delivery.

Figure 1. Hypothesized relationship between political influence and eventual responsiveness to complaints.





The role of grievance redressal is highlighted in bold

To date, these dynamics have difficult to explore given a dearth of comprehensive data on the universe of complaints made and whether each one gets a response in any given setting. Data on complaints and responsiveness in a grievance redressal portal in Mumbai provides useful leverage here.

Complaints and redressal in Mumbai's water sector

I study the predictors of bureaucratic responsiveness in Mumbai. The city is India's financial, commercial, and entertainment capital, and an estimated 12-13 million residents live under the direct purview of the Municipal Corporation of Greater Mumbai (MCGM), the city's governing body. Like other major cities in urbanizing countries, the city constantly faces insufficiency and inequity in the provision of many public services, such as water, electricity, and sanitation. Because patterns of responsiveness and distributive politics likely vary by sector (Kramon and Posner, 2013) I focus on one, namely water.

The water supply and infrastructure face a great deal of pressure. While the city technically sources sufficient water from nearby lakes and dams to provide its citizens with adequate daily supply, different authorities estimate that anywhere between 7-25% of this supply is lost through leaks and pipe bursts between the points of origin and supply (Varshney, 2021b).[3] Supply is also unequal: as is typical in cities with insufficient water, it is rationed out to different areas in rotation for several hours at a time. Despite the launch of a 24x7 water supply project in 2014, the mean duration of supply across the city was only six hours in 2018, with 180 out of 273 zones receiving four or fewer hours of supply a day (PRAJA, 2020). The level of supply also varies with communities' socio-demographic characteristics. In 2019, the MCGM found that non-slum areas received more than three times the daily volume of water as slum areas, where over 50% of the city's population lived at the time.

Complaints about water form a central component of political life in the city. Anand (2011) illustrates through careful ethnographic work how insufficient water shapes the lives of Mumbai citizens (particularly women, see p 97-126) and the intermediaries -- including engineers, informal fixers, and social workers -- they approach to access more of it. Bjorkman (2015, 198-227) further illustrates how citizens' demands and politicians' promises for water have become a routine “spectacle” of Mumbai politics.

[3] This figure is lower than usual estimates for non-revenue water in cities in LMICs because it does not include unbilled supply. With the inclusion of unbilled supply, estimates for non-revenue water for cities in India can reach 50-90% (Bandari and Sadhukhan, 2021).

Citizens can also approach officials with their complaints directly through a formal process. They can lodge a complaint with MCGM through its online portal, a smartphone app, or through the phone (see Varshney (2021a) and Figure SI.1).[4] These complaints are then given a number with which citizens' can subsequently track the progress of the complaint. According to PRAJA, an NGO aiming to improve transparency and accountability in Indian cities, complaints about water are frequent; "Water supply" has been in the top 5 complaint categories every year since 2010, the first year in which PRAJA makes its reports available.

Data

I collected data on complaints concerning water supply made to the MCGM from the online citizen complaint portal which collects and tracks formal complaints. I inputted every possible permutation of the details requested (eg. municipal ward, complaint-type, and date Figure SI.1, bottom panel) to collect individual-level data for every complaint lodged from 2016-2018. This process generated information on 21,384 complaints in the "Water supply" complaint-type.

Each observation contains information on its status, with the majority (93%) marked as "Closed," and others marked as "Registered," "In process," "Re-assigned," "Incomplete information," or with no status information. Figure 2 shows the number of complaints and rate of ticket closure by month from 2016-2018. Overall, the total ticket closure rate is high, at 93.4%. The high rate of closure likely reflects an office's incentives to resolve as many cases as possible, as the rate of complaint closure is part of officials' performance reviews.

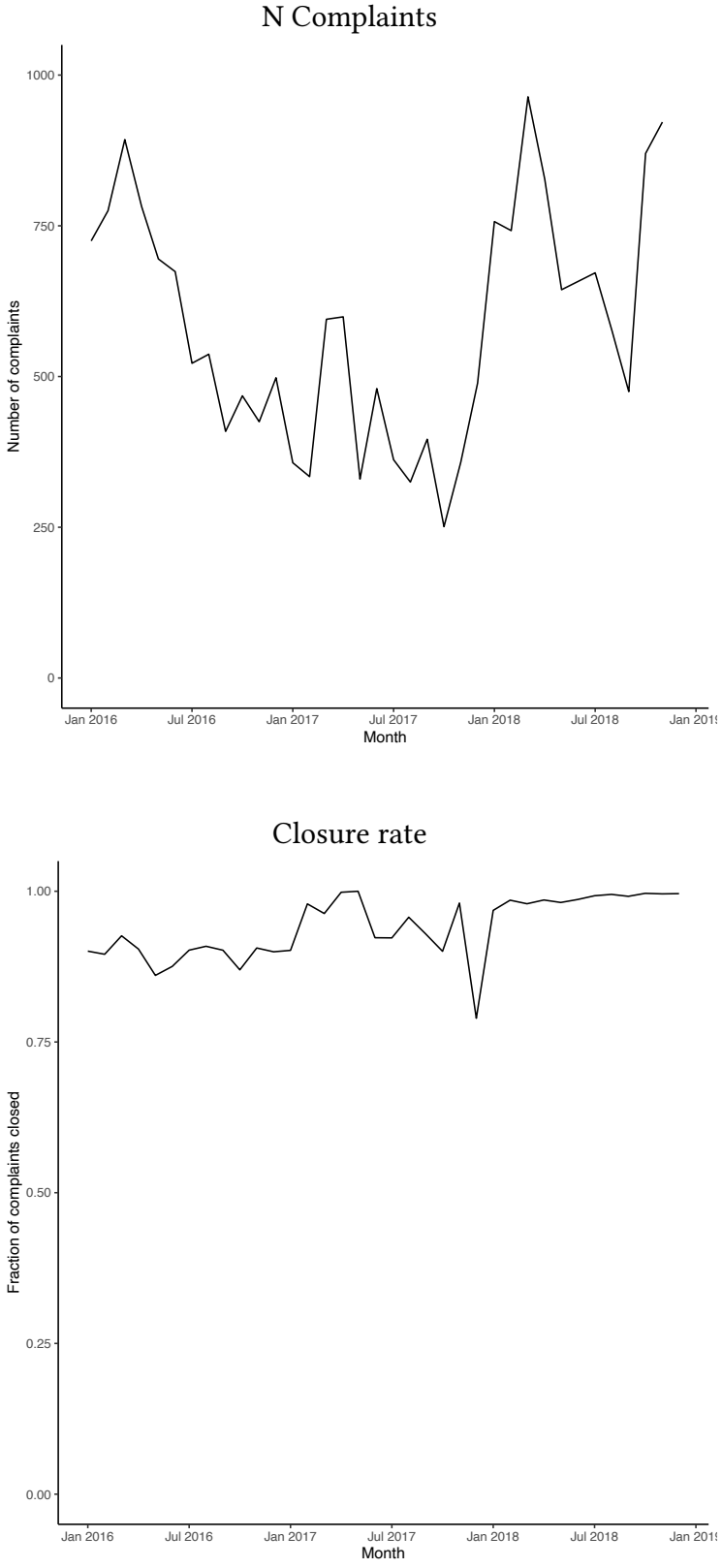
Methods for detecting rates of true responsiveness

Yet not all observations that are marked as "Closed" are accompanied by meaningful action or resolution. Each "Closed" observation includes response text from the final handling officer in Hindi, Marathi, or English. This response text reveals that several "Closed" complaints are not actually resolved. For example, many complaints receive "False complaint" as a response, and several complaints about water shortages receive "Water in reservoir is low" as a response. I used this text to develop my dependent variable of interest, true responsiveness, which is whether a complaint appears to be met with some meaningful action. The process for classification using LASSO and random forests is described in the Appendix. The final model predicted response categories in the test dataset with 92.5% accuracy, and the words used as predictors can be seen in Table SI.1.

The overall rate of true responsiveness is much lower than the rate of complaint closure, at 44%. The rates of true responsiveness over time are shown in Figure 3. Complaints marked as "Action taken" are usually (99.6%) marked as "Closed," but the reverse is not true, as just 47% of complaints marked as "Closed" are classified as "Action taken." Categorization as "Action taken" is my main measure for responsiveness throughout the paper.

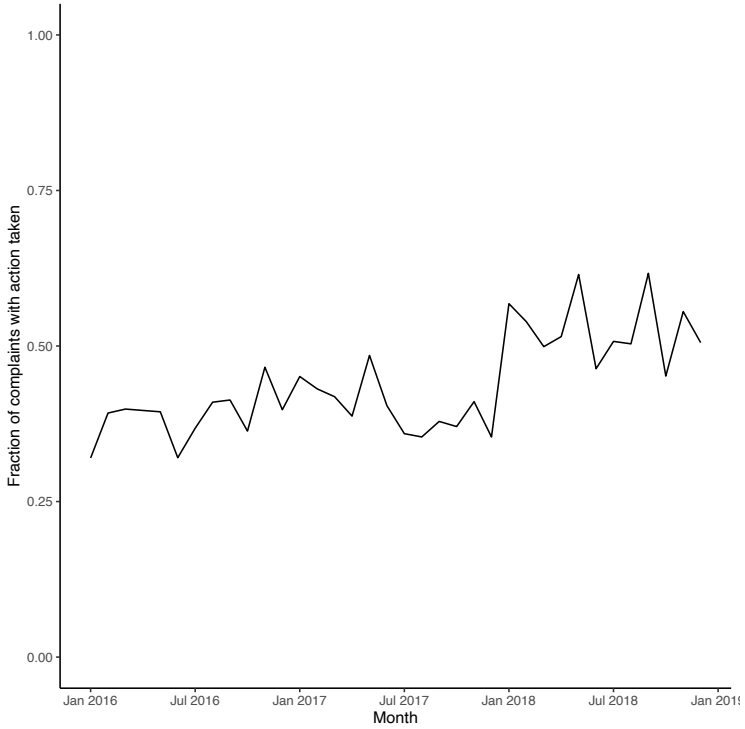
[4] The website can be accessed at http://www.mcgm.gov.in/

Figure 2. Overall complaint (top) and closure rate (bottom) in Mumbai's water sector, 2016-2018.



Before analyzing predictors of responsiveness, a few notes about how complaints are typically resolved are relevant. First, the complaints are handled at the administrative ward, which is a grouping of 6-14 adjacent electoral wards, or political constituencies that democratically elect representatives to Mumbai' municipal legislature. These 227 electoral wards are grouped into administrative wards that share infrastructure, funding, and bureaucratic personnel. The individual who handles complaints from the digital system varies by the sector in which it is made. In the case of complaints about water, the relevant office is that of the Assistant Engineer for Water Works, which is responsible for both maintaining a given municipal ward's water infrastructure and addressing citizen complaints.

Figure 3. Percentage of complaints with true responsiveness in Mumbai's water sector, 2016-2018.



"True responsiveness" is an indicator for whether the text filed in response to a complaint is classified as denoting some action was taken.

Politics, identity, and election timing as predictors of responsiveness

I first examine whether local electoral politics shape true responsiveness. Alongside the citizen-provided description of the content itself, complaints provide information on the submitter's name and address. Handlers can use these fields to learn about the complainant's identity and neighborhood, after which they can make decisions about prioritizing certain

complaints. Such decision-making could reflect bureaucratic responsiveness to the demands of appointing politicians to prioritize certain citizens or groups.

I use the same complaint characteristics that handlers see to develop variables about political characteristics that are salient in the Mumbai case. Regarding individual identity, the name that one provides can convey important information about religion, caste, and region of origin. In Mumbai, as in much of the country, religion and region are particularly salient markers of political power. Here, divisions between Hindus (67% of the population) and Muslims (19% of the population) are deep and long-standing, and Muslims face widespread discrimination on the basis of their identity every day, often with endorsement by political actors (Gaikwad and Nellis, 2017; Jaffrelot, 2010).

An individual's region of origin also sheds light on the likelihood of her being a migrant, another politically salient individual characteristic in this city that has experienced rapid population growth due to migration (Gaikwad and Nellis, 2017). In fact, Maharashtra's Shiv Sena party was founded in 1966 to protect the interests of native citizens (Joshi, 1970). As documented by Gaikwad and Nellis (2017), nativist politicians have a variety of policy platforms in service of the goal of "protecting" certain citizens, including the use of Marathi (the regional language spoken throughout the state) in the public sector, limiting the availability of public funds and programs for non-native citizens, and even the intimidation of migrants. These political platforms ostensibly represent the views of voters, but the behavior of elites may also be purely instrumental: Gaikwad and Nellis (2021) show that politicians are less responsive to non-native citizens because they believe they will be less likely to vote.

Given these patterns, a key predictor of responsiveness is an individual's religion or migrant status as revealed through a name. I use the NamSor API to classify a complainant's name as Muslim or native to the state of Maharashtra.[5] I do not assume that classifications are necessarily correct, particularly if individuals change their names through marriage or for some other reason. I simply aim to mirror mental shortcuts that handling officers might use when seeing a name. Also, not all complainants supply their names. If certain identities are given preferential treatment, withholding a name could even be strategic. I therefore also include an indicator for whether a name is provided at all. Across the full sample of water-related complaints, 9% have a name categorized as Muslim, 18% are categorized as Maharashtrian, 17% are blank, and the remaining 55% fall into some other category.

In addition to characteristics of a complainant's identity, I also examine features of the address from which a complaint originates. After all, many of the complaints are about public or club goods that serve not just an individual, but neighborhoods as a whole. For such goods, politicians might pressure bureaucrats to be most responsive in locations where their actions have the greatest likelihood of changing electoral outcomes. As such, a large literature on the distributive politics of public goods provision finds that service delivery is targeted at the electoral constituencies that are most competitive (Besley, 2006; Min, 2015; Weingast, 1995; Kumar et al., 2022). Even while the administrative handlers here respond to multiple politicians or principals, it is likely that politicians who face the greatest chance of losing their seats in the

[5] The NamSor API assigns a likelihood of being a certain identity. I classify a name as being Muslim or from Maharashtra when its likelihood of being so is greater than 50%.

next election will be the most motivated to pressure handlers to prioritize complaints from their neighborhoods.

Alternatively, others have found that central governments will allocate resources to their supporters, or the constituencies that voter in members of the party in the majority (e.g. Arulampalam et al., 2009; Carlitz, 2017; Jensenius and Chhibber, 2023). The city legislature here, which has been controlled by the Shiv Sena party for decades, might place pressure on Assistant Engineers to be most responsive to the constituencies that elect Shiv Sena councillors.

I create constituency-level variables measuring political competitiveness and alignment using the complainant-provided addresses. First, I used the Google geocode API to collect GPS coordinates for each address. I then placed the coordinates into electoral wards, after which I could attach data on the ward's margin of victory and party representation.[6] Mumbai held municipal elections in 2017, in the middle of the three-year period for which I have data. The margin of victory variable refers to this election, and the Shiv Sena representation variable refers to the relevant value for party control for the date on which a complaint was received. In the 2017 election, the mean margin of victory across the 227 electoral wards was about 14 percentage points, with a standard deviation of 12 percentage points. Prior to 2017, the Shiv Sena held 75 seats, and won 84 seats in the election.

Finally, I examine whether officials are more responsive to the complaints that arrive during the runup to an election. As the relevant election here occurred near the end of February 2017, I categorize complaints occurring in the six months prior, from November 2016 through February 2017, as being in the election runup.

I investigate the extent to which these political complaint features predict true responsiveness through a series of linear regressions (Table 1). In each model, the dependent variable is my measure of true responsiveness, or whether the response to a complaint suggests action was taken in response. Standard errors are heteroskedasticity-robust (HC2) unless any independent variable is coded at the electoral ward level, in which case they are clustered there.

I include controls for each month-year to hold time-related trends constant. I also control for the administrative ward, which is the level at which decision-making happens. Importantly, this holds constant the office or individual making a decision.

Table 1. Complaint-level predictors of true responsiveness

	Information	Identity	Constituency	Identity+Constituency	Identity+Constituency+ Elections
Intercept	−0.080***	0.023	−0.037	−0.053*	−0.071**
	(0.026)	(0.028)	(0.025)	(0.031)	(0.033)
Location provided	0.042***				
	(0.007)				
Name provided	0.101***				

[6] Ward maps were provided by the Urban Design Research Institute (http://www.udri.org).

	Information	Identity	Constituency	Identity+Constituency	Identity+Constituency+ Elections
	(0.009)				
Maharashtrian[1]		−0.001		−0.012	−0.014
		(0.009)		(0.011)	(0.012)
Muslim[1]		−0.065***		−0.072***	−0.073***
		(0.012)		(0.013)	(0.014)
Margin of victory[2]			−0.086***	−0.099***	−0.093***
			(0.033)	(0.033)	(0.034)
Shiv Sena ward			−0.001	−0.001	−0.006
			(0.009)	(0.010)	(0.011)
Election runup[3]					0.266***
					(0.046)
Num.Obs.	19869	16394	11794	9841	9841
R2	0.083	0.079	0.089	0.100	0.100
R2 Adj.	0.080	0.076	0.085	0.094	0.094
Std.Errors	HC2	HC2	Clustered by ward	Clustered by ward	Clustered by ward

*p<0.1; **p<0.05; ***p<0.01

All regressions include month-year and administrative ward dummies.

[1]The reference category is name classification as a non-Muslim or non-Maharashtrian name.

[2]Refers to the 2017 municipal election.
[3]October 2016- February 2016

The first model (Information), shows providing information about one's name and address is correlated with true responsiveness, suggesting that these features provide useful information to handlers. In line with expectations about discrimination against Muslims, the second model (Identity) shows that conditional on a name being provided, a complaint with a Muslim background is 6.5 percentage points less likely to receive a true response. In line with swing voter theories of public goods provision, the third model (Constituency) shows that conditional on the provision of an address that can be geolocated, the constituency's electoral competitiveness predicts responsiveness. The fourth model (Identity+Constituency) includes both sets of predictors and finds that the patterns remain the same. The final model assesses whether patterns differ prior to an election, and finds that officials are more responsive during this time.

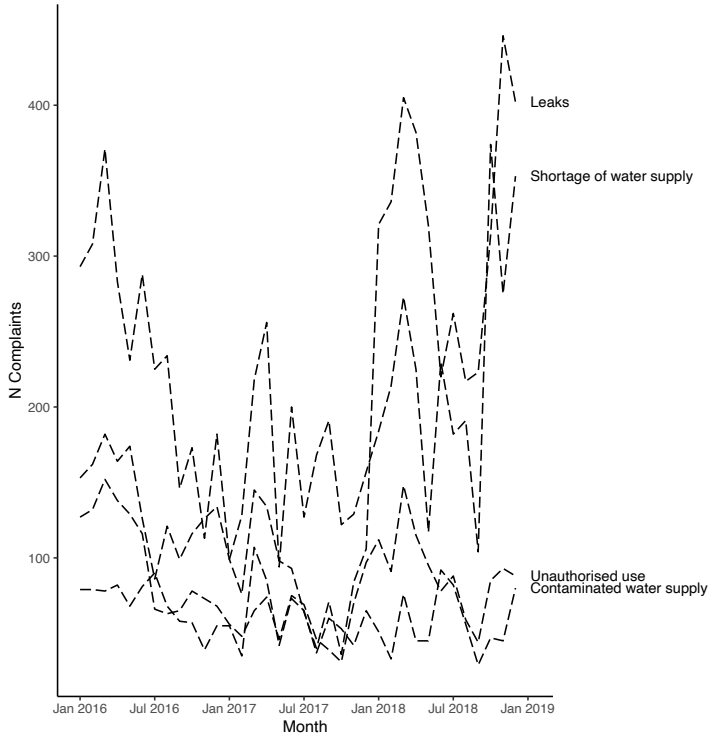
Overall, the results suggest that political characteristics commonly associated with public service delivery, namely a citizen's identity, the competitiveness of the constituency in which they live, and the proximity of an upcoming election are predictive of true responsiveness. The results therefore support the theory that handling bureaucrats are politicized and make decisions in line with the electoral strategies of local politicians.

Complaint type as a predictor of responsiveness

The second theory outlined above suggests that officials acting in line with programmatic and administrative priorities will be more responsive to complaint of certain *types*. To determine whether responsiveness varies with complaint type, I classify the complaints. Each complaint ticket includes the original complaint text in Hindi, Marathi, or English. I used the same basic text-analysis methods described in the Appendix to first prepare this content for classification. About 68% of these complaints had been classified into categories by the handling officer, and I used this sample as a training set to classify the remaining observations using LASSO and random forests, as above. This approach predicted complaint categories in the remaining test dataset with 86% accuracy. The words used in the final model can be seen in Table SI.1.

The overall incidence of the most frequently occurring categories in each month for which I collected data can be seen Figure 4. These categories comprise 91% of all complaints made. Complaints about leaks and shortages make up most topics covered. The rate of complaint closure over time and by category can be seen in Figure 5, with minimal variation across complaint type.

Figure 4: N complaints for most common complaint categories in Mumbai's water sector, 2016-2018.



Examining true responsiveness, however, reveals a distinct pattern that varies by complaint type. Figure 6 shows that action is taken for almost 83% of complaints about leaks, and 49% of complaints about contaminated water, 21% of complaints about shortages, and only 12% of complaints about unauthorized use.

Figure 5. Complaint closure rate for most common complaint categories in Mumbai's water sector, 2016-2018.

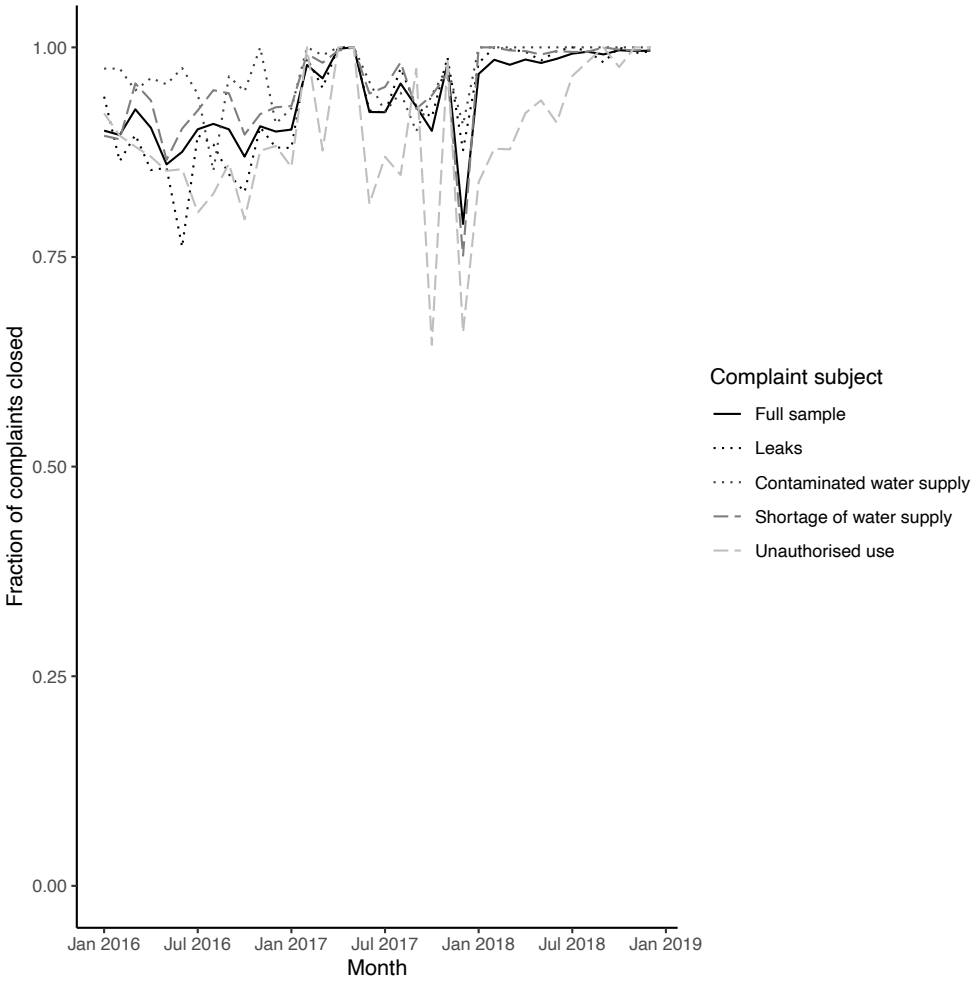
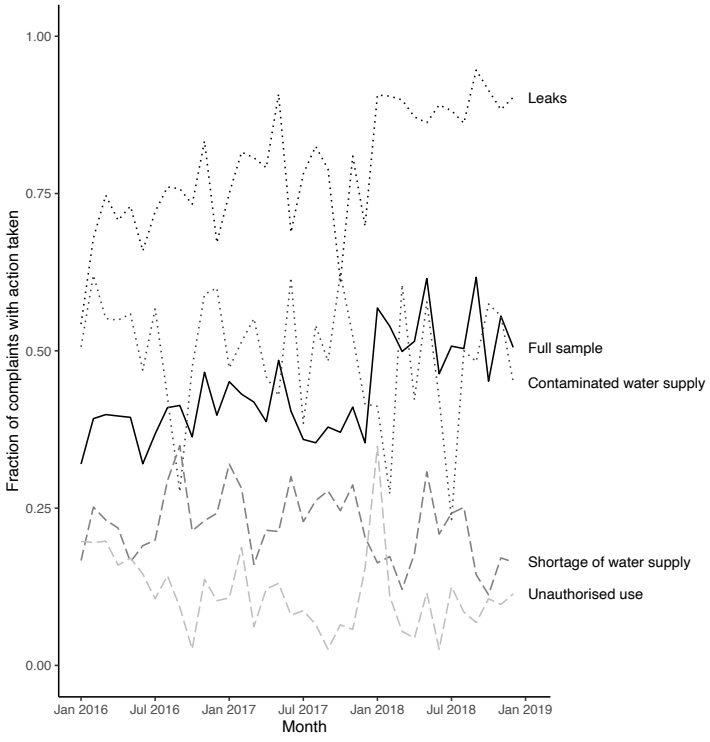


Figure 6. Rate of meaningful action taken by complaint type for most common complaint categories in Mumbai's water sector, 2016-2018.



Explanations from qualitative interviews: easy vs. difficult complaints

What accounts for this clear variation in responsiveness to different types of demands in the water sector? I explore these dynamics through five unstructured interviews (conducted in January 2018) with the Assistant Engineer for Water Works in randomly sampled wards.[7] The interviews illustrate the reasons for patterns of responsiveness in handlers' own words.

Complaints about unauthorized use, such as instances in which a pipe is being tapped by an individual or settlement, are low priority. These complaints are very clearly about other citizens, and the engineers hesitate to address them. "I don't know what the arrangement is with the leader or people there. It is best that the corporators [ward-level representatives], police, or courts deal with such issues," one engineer (all ward names omitted for anonymity) replied when I brought up the issue. These complaints therefore receive the lowest levels of responsiveness.

Similarly, engineers worry that resolving complaints about shortages will affect other citizens. "We can sometimes reshuffle the timings of the water supply to give one area more water and another one a little less. We can only do this sometimes and if the need is very great, though, otherwise people get upset." Handling engineers often do not choose this option, as it simply

[7] More information is available in the Appendix.

“generates more complaints from other citizens.” As reported by the Assistant Engineer, “this makes no sense. Why would I do something that makes other people complain? In some cases, the MCGM can send a tanker, but not for every problem.”

Next, consider complaints about contamination. According to an Assistant Engineer, the department may work to see whether there is a sewage leak or some debris in the reservoir, but this is rarely the case, he says. “People will have a bad smell in the neighborhood and blame it on the water. There's usually nothing wrong,” he explains. Whether or not this is true, the attitude indicates that such complaints are rarely prioritized or taken seriously. This is partly because, as another engineer explains, households can boil or filter the water to clean it. Their priority is ensuring that households actually have the water. Within the MCGM's set of constraints, complaints about contamination are deprioritized.

Most important are complaints about leaks. The MCGM has been operating under a steady campaign to resolve leaks and decrease non-revenue water, or water that is generated in the system but does not reach the end user. In 2011, after a 15-day effort, city engineers found 653 leaks in the pipe system (Purohit, 2011). Citizens' complaints are key to supporting such initiatives to map, maintain, and upgrade leaky pipes, and resolving leaks is therefore central to the engineers' job description. As such, the local context incentivizes prioritizing these complaints, even if they incur monetary costs. In fact, there is a sanctioned budget that is easily accessible to address problems of leaks. As reported by the Assistant Engineer, “sometimes fixing a leak can take time, but the office has the support to do it and it doesn't affect other people [who don't live in the area].”

These observations and interviews suggest that within the context of Mumbai, complaints about shortages or the unauthorized use of water are low priority because their resolution explicitly entails removing or redirecting another citizen's water supply. In other words, they are *difficult* to resolve.

Complaints about contamination and leaks, on the other hand, do not require denying other citizens water. They are, therefore, relatively *easy* to resolve. Within these, those about leaks are most relevant to the handlers' broader mission to reduce non-revenue water. These explanations are reflected in the differential rates of true responsiveness across complaint types seen in Figure 5. Complaints about shortages and unauthorized use receive lower rates of responsiveness than those about leaks and contamination.

To determine whether these patterns hold even when controlling for administrative capacity and time trends, I first explore whether complaint type predicts responsiveness when controlling for month-year and administrative wards. Table 2 shows patterns that align with those seen in Figure 6 and the remarks from the engineers. In the Type-only model, the intercept refers to complaints about contamination and suggests that Leaks at are resolved at a much higher rate than these. Shortages are resolved less often, and unauthorized use issues are resolved the least of all.

These patterns, however, could be driven by patterns of political selection. Officials might believe, for example, that complaints about shortages are more likely to be made by Muslims or those in uncompetitive districts and therefore de-prioritize them. These dynamics, moreover,

may hold in non-election times, but also during the runup to elections. I therefore limit the analysis to the subset in which political constituency information is provided and control for complaint-level electoral, identity, and political constituency-related variables. As shown in the Constituency+Identity+Election model, when holding constituency variables constant, the complaint-type variables remain statistically significant and of comparable magnitude.[8]

Table 2. Complaint-level predictors of true responsiveness including complaint type.

	Type only	Type+Constituency+Identity+Election
Intercept	0.232***	0.171***
	(0.025)	(0.038)
Leaks (easy)[1]	0.321***	0.254***
	(0.012)	(0.017)
Shortages (difficult) [1]	−0.288***	−0.336***
	(0.011)	(0.017)
Unauthorized use (difficult) [1]	−0.358***	−0.389***
	(0.012)	(0.021)
Maharashtrian[2]		0.001
		(0.010)
Muslim[2]		−0.012
		(0.012)
Margin of victory[3]		−0.007
		(0.028)
Shiv Sena ward		−0.004
		(0.009)
Election runup[4]		0.203***
		(0.041)
Num.Obs.	19869	9841
R2	0.370	0.369
R2 Adj.	0.368	0.365
Std.Errors	HC2	Clustered by ward

*p<0.1; **p<0.05; ***p<0.01

All regressions include month-year and administrative ward dummies.

[1]The reference category is complaints about contamination.

[2]The reference category is name classification as a non-Muslim or non-Maharahstrian name.

[3]Refers to the 2017 municipal election.

[4]October 2016- February 2016

[8] It is possible that officials believe that complaints of certain types are made by citizens with particular identities; as a result, including the identity variables here would lead to post-treatment bias for the complaint-type variables. Reassuringly, the coefficients remain the same direction and of comparable magnitude.

Discussion: complaint type as a mediator

Even while officials are more responsive to competitive districts and non-Muslims in the dataset as a whole (Table 1), they exhibit no different responsiveness based on complainant identity when holding complaint type constant (Table 2). What explains this divergence in patterns in the full dataset and its subgroups?

One possibility, examined in Table 3, is that Muslims and uncompetitive districts are more heavily represented in the complaints that are less likely to get a response. Complaints to which officials are least responsive (unauthorized use and shortages) tend to be made by Muslims and those living in unresponsive wards, while complaints that are more likely to get a response (those about contaminated water and leaks) are more less likely to be made by Muslims and more likely to be made by those living in competitive wards.

One reason that complaint type may vary with citizens' identity and political influence is that different citizens are responding to different types of problems. Some citizens and constituencies are more likely to experience problems with shortages and unauthorized use, while others are more likely to experience problems with leaks and contamination. In other words, the incidence of complaints can be seen as a measure of levels of service delivery.

Table 3. Political and identity-related predictors of complaint-type.

	Difficult		Easy	
	Unauthorized use	Shortages	Contamination	Leaks
Intercept	0.144***	0.615***	0.144**	0.069
	(0.055)	(0.058)	(0.062)	(0.042)
Maharashtrian[1]	−0.002	0.030***	−0.001	−0.019*
	(0.006)	(0.011)	(0.007)	(0.010)
Muslim[1]	0.075***	0.033**	−0.021**	−0.076***
	(0.012)	(0.016)	(0.010)	(0.013)
Margin of victory[2]	0.048*	0.122**	−0.068***	−0.102***
	(0.027)	(0.051)	(0.025)	(0.036)
Shiv Sena ward	−0.006	0.006	0.007	−0.008
	(0.006)	(0.010)	(0.007)	(0.010)
Election runup[3]	0.027	−0.167***	0.073**	0.072*
	(0.032)	(0.042)	(0.037)	(0.042)
Num.Obs.	9841	9841	9841	9841
R2	0.056	0.120	0.057	0.142
R2 Adj.	0.050	0.115	0.051	0.136

*p<0.1; **p<0.05; ***p<0.01

All regressions include month-year and administrative ward dummies. Standard errors clustered at the electoral ward level.

[1]The reference category is name classification as a non-Muslim or non-Maharahstrian name.

[2]Refers to the 2017 municipal election.

[3]October 2016- February 2016

And indeed, the incidence of different types of complaints varies with existing levels of service provision. Consider leaks and shortages, which are by far the most placed complaints. I test whether the administrative ward-level daily complaint rate varies with fixed ward-level service provision levels.[9] Here, I use the mean daily hours of water supply as the indicator of service provision levels because supply hours best approximate the total volume of water households receive from the public utility.[10]

The results can be seen in Table 4. First, there is no measurable relationship between the ward-level daily complaint rate per capita for all water-related and the mean daily supply hours. This suggests that areas with different levels of service delivery are unlikely to exhibit variation in complaint-making *in general*. This null relationship masks two correlations going in opposite directions. Wards that experience one more hour of service generate 0.001 more complaints about leaks per person and 0.00003 fewer complaints about shortages per person per day. I therefore see a divergence in the types of complaints that are made as levels of service provision increases.

Table 4. Correlation between number of complaints per capita and mean daily supply hours (2018).

	All water complaints[1]	Leaks	Shortages
Mean daily supply hours	0.0002	0.001***	− 0.0003***
	(0.0003)	(0.0001)	(0.0001)
Constant	0.008*	− 0.0004	0.003**
	(0.004)	(0.002)	(0.001)
	8,760	8,760	8,760
R2	0.070	0.086	0.072
Adjusted R2	0.030	0.046	0.032

*p<0.1; **p<0.05; ***p<0.01

Observations are at the day-ward level for 2018. All regressions include a dummy for each day, and standard errors clustered at the ward level.
[1]Number of complaints per day divided by the number of individuals in the ward.

These patterns suggest that bureaucratic responsiveness occupies the role outlined in Figure 1, where distributive politics generates differences in patterns of service allocation. These

[9] The ward-level service provision data is available at the administrative ward only.
[10] This data is from PRAJA (2020) and covers the year 2018, and I include observations from 2018 only. All models include day fixed-effects to account for any events or trends affecting complaint levels over time. Table SI.2 shows summary statistics for the outcomes of interest at the ward-day level for the three years that the dataset covers.

differences yield complaints that are easier or more difficult to respond; officials' prioritization of the easiest complaints yield overall patterns of responsiveness that mirror political patterns of service allocation.

Nevertheless, handling officials are not completely immune from political concerns. While Table 3 does show that easier complaints are certainly more likely and difficult complaints less likely to come in during this time period, election timing remains a significant predictor of responsiveness, even when controlling for complaint type (Table 2). This suggests that politicians, either those motivated by distributive or programmatic concerns, might still place pressure on officials to be responsive when it is most strategic.

Conclusion and implications

There is a growing recognition that politicians and bureaucrats "co-produce" public services (Slough, 2024). Politicians are typically theorized as initiating the allocation of public services, and in this view, bureaucrats implement the decisions of politicians.

Yet the proliferation of grievance redressal systems creates a direct channel for citizens to access bureaucrats. An optimistic view of these institutions would be that they provide access to marginalized citizens who do not have the requisite connections or political leverage to work through politicians. A pessimistic view would be that even here, bureaucrats follow the wishes of politicians when choosing which requests to prioritize. Using original data on complaints, responsiveness, and characteristics of both the complaints and the complainants themselves, I shed new light on patterns of responsiveness and examine which view has greater empirical support.

This study suggests that the truth lies somewhere between the optimistic and pessimistic views. Officials may be more responsive during an election period. Yet in addition to the directives of politicians, handlers face capacity constraints and broader organization goals (e.g. fixing Mumbai's leaks) when deciding which complaints to prioritize. At least in the case of Mumbai's water sector, these constraints seem to be more important than political considerations, leading to prioritization by complaint type rather than complainant characteristics. Highlighting the importance of the *content* of a complaint and how complaint type interacts with a handler's professional and personal constraints are among the main contributions of the paper.

At the same time, the capacity constraints limit responsiveness to those with the worst services, which may themselves have been allocated through a political process. As such, this study further underscores the limits of bureaucratic grievance redressal systems in shifting entrenched patterns of service delivery. In the short term, these institutions serve the primary (and important) functions of making it easier for citizens to register complaints and crowd-sourcing information about service problems for local officials. In the long-term, formal institutions for complaint-making might increase equity in service delivery if information about the distribution and incidence of demands reaches those with the power and incentives to redistribute or increase capacity. In short, these institutions may complement, but are not substitutes for, accountable politicians.

Another major contribution of this paper is to highlight variation in the types of complaints citizens make. Whether politicians or bureaucrats are addressing citizen' concerns, the citizen demand-side of service delivery is certain to play a role in overall patterns of allocation. I argue that the types of complaints that will be most prevalent are a function of past patterns of service allocation; it follows that future complaints may be a function of present complaint resolution, either by shaping citizens' needs or expectations. Existing research has found that citizens will make complaints when and where they believe the will get a response (Trucco, 2017). Understanding the role of grievance redressal platforms in shaping citizens' expectations, their perceptions of responsiveness, and longer-term patterns of complaint-making remains an important area for future research.

Ultimately, this study opens new avenues for the study of grievance redressal across sectors and contexts. While I focus on digital complaints and service delivery in the LMICs, they are frequently found in Western local government (e.g. Minkoff 2016), and organizations solicit complaints in applications as diverse as healthcare (e.g. Dael et al. 2020; Thi Thu Ha et al. 2015) and e-commerce (Stevens et al. 2018). Across contexts, there is likely to be important variation in the types of complaints made by different groups and simultaneously, variation in handlers' ability to respond to different types. Exactly what shapes this variation will be context-dependent and worth of future research. The major point I aim to make, however, is that studying grievance redressal platforms and, indeed, e-governance initiatives more broadly, requires understanding the preferences and incentives of the humans who use and operate them.

References

Anand, N. (2011). Pressure: The PoliTechnics of Water Supply in Mumbai. *Cultural Anthropology*, 26(4):542–564.

Arulampalam, W., Dasgupta, S., Dhillon, A., and Dutta, B. (2009). Electoral goals and center-state transfers: A theoretical model and empirical evidence from India. *Journal of Development Economics*, 88(1):103–119.

Bandari, A. and Sadhukhan, S. (2021). Determinants of per capita water supply in Indian cities with low surface water availability. *Cleaner Environmental Systems*, 3:100062.

Bank, W. (2021). *Fostering the Inclusion of Disadvantaged and Vulnerable Individuals or Groups in Project-Level Grievance Mechanisms*. World Bank Group.

Bardhan, P. and Mookherjee, D. (2006). Decentralisation and accountability in infrastructure delivery in developing countries. *The Economic Journal*, 116(508):101–127.

Bates, R. H. (1974). Ethnic competition and modernization in contemporary Africa. *Comparative Political Studies*, 6(4):457–484.

Besley, T. (2006). *Principled agents?: The political economy of good government*. Oxford University Press, USA.

Besley, T., Pande, R., Rahman, L., and Rao, V. (2004). The politics of public good provision: Evidence from Indian local governments. *Journal of the European Economic Association*, 2(2-3):416–426.

Bhattacharjee, M. and Mysoor, D. (2016). Unredressed grievances under RTE: navigating the state labyrinth. *Governance*, 29(1):31–45.

Bjorkman, L. (2015). *Pipe Politics, Contested Waters: Embedded Infrastructures of Millennial Mumbai*. Duke University Press.

Blair, H. (2000). Participation and accountability at the periphery: Democratic local governance in six countries. *World Development*, 28(1):21–39.

Brown, M., Jenkins, B., Leon, P., Seyedian, A., Inamdar, A., et al. (2014). *Global review of grievance redress mechanisms in World Bank projects*. World Bank Group.

Bueno, N. S. (2023). The timing of public policies: Political budget cycles and credit claiming. *American Journal of Political Science*, *67*(4), 996-1011.

Burgess, R., Jedwab, R., Miguel, E., Morjaria, A., and Padro i Miquel, G. (2015). The value of democracy: evidence from road building in kenya. *American Economic Review*, 105(6):1817–51.

Carlitz, R. D. (2017). Money flows, water trickles: Understanding patterns of decentralized water provision in tanzania. *World Development*, 93:16–30.

Chandra, K. (2004). *Why ethnic parties succeed*. Cambridge: Cambridge University Press.

Van Dael, J., Reader, T. W., Gillespie, A., Neves, A. L., Darzi, A., & Mayer, E. K. (2020). Learning from complaints in healthcare: a realist review of academic literature, policy evidence and front-line insights. *BMJ quality & safety*, *29*(8), 684-695.

Dasgupta, A. and Kapur, D. (2020). The political economy of bureaucratic overload: Evidence from rural development officials in India. *American Political Science Review*, 114(4):1316–1334.

Dipoppa, G. and Grossman, G. (2020). The effect of election proximity on government responsiveness and citizens participation: Evidence from English local elections. *Comparative Political Studies*, 53(14):2183–2212.

Distelhorst, G. and Hou, Y. (2017). Constituency Service under Nondemocratic Rule: Evidence from China. *The Journal of Politics*, 79(3):1024–1040.

Dixit, A. and Londregan, J. (1996). The determinants of success of special interests in redistributive politics. *The Journal of Politics*, 58(4):1132–1155.

Franck, R. and Rainer, I. (2012). Does the leader's ethnicity matter? ethnic favoritism, education, and health in sub-Saharan Africa. *American Political Science Review*, 106(2):294–325.

Gaikwad, N. and Nellis, G. (2017). The Majority-Minority Divide in Attitudes toward Internal Migration: Evidence from Mumbai. *American Journal of Political Science*, 61(2):456–472.

Gaikwad, N. and Nellis, G. (2021). Do politicians discriminate against internal migrants? evidence from nationwide field experiments in india. *American Journal of Political Science*, 65(4):790–806.

Gailmard, S., & Patty, J. W. (2012). Formal models of bureaucracy. *Annual Review of Political Science*, *15*, 353-377.

Golden, M. and Min, B. (2013). Distributive Politics Around the World. *Annual Review of Political Science*, 16(1):73–99.

Grossman, G., Humphreys, M., and Sacramone-Lutz, G. (2014). I wld like u WMP to extend electricity 2 our village: On Information Technology and Interest Articulation. *American Political Science Review*, 108(3):688–705.

Grossman, G., Humphreys, M., and Sacramone-Lutz, G. (2020). Information technology and political engagement: Mixed evidence from Uganda. *The Journal of Politics*, 82(4):1321–1336.

Grossman, G., Platas, M. R., and Rodden, J. (2018). Crowdsourcing accountability: ICT for service delivery. *World Development*, 112:74–87.

Grossman, G., & Slough, T. (2022). Government responsiveness in developing countries. *Annual Review of Political Science*, *25*, 131-153.

Gulzar, S. and Pasquale, B. J. (2017). Politicians, Bureaucrats, and Development: Evidence from India. *American Political Science Review*, 111(1):162–183.

Holland, A. C. (2016). Forbearance. *American Political Science Review*, 110(2):232– 246.

Jaffrelot, C. (2010). *Religion, caste, and politics in India*. Primus Books.

Jensenius, F. R. and Chhibber, P. (2023). Privileging ones own? voting patterns and politicized spending in india. *Comparative Political Studies*, 56(4):503–529.

Joshi, R. (1970). The shiv sena: A movement in search of legitimacy. *Asian Survey*, 10(11):967–978.

Kosec, K. and Wantchekon, L. (2020). Can information improve rural governance and service delivery? *World Development*, 125:104376.

Kramon, E. and Posner, D. N. (2013). Who benefits from distributive politics? How the outcome one studies affects the answer one gets. *Perspectives on Politics*, pages 461–474.

Kruks-Wisner, G. (2021). Great expectations, great grievances: the politics of citizens' complaints in India. *Comparative Politics*, 54(1):27–49.

Mansuri, G. and Rao, V. (2012). Localizing development: Does participation work? *World Bank Policy Research Report*.

Miller, G. J. (2005). The political evolution of principal-agent models. *Annu. Rev. Polit. Sci.*, *8*, 203-225.

Min, B. (2015). *Power and the vote: Elections and electricity in the developing world*. Cambridge University Press.

Minkoff, S. L. (2016). Nyc 311: A tract-level analysis of citizen–government contacting in New York City. *Urban Affairs Review*, 52(2):211–246.

Nichter, S. (2008). Vote Buying or Turnout Buying? Machine Politics and the Secret Ballot. *American Political Science Review*, 102(1):19–31.

Olken, B. A. (2010). Direct democracy and local public goods: Evidence from a field experiment in Indonesia. *American Political Science Review*, 104(2):243–267.

PRAJA (2020). Report on status of civic issues in mumbai. Technical report, PRAJA.

Purohit, K. (2011). BMC plugs 605 pipe leaks. *Hindustan Times*.

Ranganathan, M. (2007). *Grievance redressal processes in urban service delivery: How effective are they*. Asian Development Bank.

Slough, T. (2024). Bureaucratic quality and electoral accountability. *American Political Science Review*.

Speer, J. (2012). Participatory Governance Reform: A Good Strategy for Increasing Government Responsiveness and Improving Public Services? *World Development*, 40(12):2379–2398.

Stevens, J. L., Spaid, B. I., Breazeale, M., & Jones, C. L. E. (2018). Timeliness, transparency, and trust: A framework for managing online customer complaints. *Business Horizons*, *61*(3), 375-384.

Stokes, S. C. (2005). Perverse Accountability: A Formal Model of Machine Politics with Evidence from Argentina. *American Political Science Review*, 99(3):315–325.

Tendler, J. (1997). *Good government in the tropics.* Johns Hopkins University Press.

Thi Thu Ha, B., Mirzoev, T., & Morgan, R. (2015). Patient complaints in healthcare services in Vietnam's health system. *SAGE Open Medicine*, *3*, 2050312115610127.

Trucco, L. (2017). Broken cities: The effect of government responsiveness on citizens' participation. < https://www.nyudri.org/research-index/2017/1/11/broken-cities-the-effect-of-government-responsiveness-on-citizens-participation >

Varshney, A. (2021a). Accountability: how to raise complaints with the BMC. *Citizen Matters, Mumbai*.

Varshney, A. (2021b). A leak here, a leak there. No way to quantify water wastage in Mumbai. *Citizen Matters, Mumbai*.

Veron, R., Williams, G., Corbridge, S., and Srivastava, M. (2006). Decentralized corruption or corrupt decentralization? community monitoring of poverty-alleviation schemes in eastern India. *World Development*, 34(11):1922–1941.

Wampler, B. (2010). *Participatory budgeting in Brazil: Contestation, cooperation, and accountability*. Penn State Press.

Waterman, R. W., & Meier, K. J. (1998). Principal-agent models: an expansion?. *Journal of public administration research and theory*, *8*(2), 173-202.

Weingast, B. R. (1995). The economic role of political institutions: Market-preserving federalism and economic development. *The Journal of Law, Economics, and Organization*, 11(1):1–31.

White, A. and Trump, K.-S. (2018). The promises and pitfalls of 311 data. *Urban affairs review*, 54(4):794–823.

World Bank (2004). *World Development Report 2004: Making services work for poor people*. The World Bank Group.

Appendix

Text Classification Process

For the responses, I first translated the text using Google Translate, after which a team coded 3% of the responses as "Action taken," "False complaint," "Incorrect or missing information," "Referred to other department," or "No action taken" for some other reason.[1] Each observation was coded twice by independent coders, and I made the final judgement on any discrepancies. As discussed in the text, 68% of the complaints were pre-coded by handling officers.

For both the responses and complaints, I used the coded observations to build a random forests model to predict the categories of the remaining sample. To do this, I first tokenized the sentences and phrases of the original text into words, removed special characters, removed stopwords, and stemmed any remaining words. Using a "bag of words" approach, I fit least absolute shrinkage and selection operator (LASSO) models to a 70% training sample of the already categorized sample to select the words or features most predictive of each complaint topic as defined by the handler.[2] I selected the words with non-zero coefficients from each of the LASSO models to fit a random forests model on the training sample of the classified data.[3] The remaining 30% of the sample was used as a test dataset.

Procedure for qualitative interviews with officials

In January 2018, I conducted 5 unstructured interviews with five different Assistant Engineers (AEs) for Water Works. I sampled 10 of Mumbai's 24 administrative wards and first emailed and called their offices to set up appointments with the AEs. I received responses and scheduled appointments with 2; for the remaining 8, I approached the offices in person and waited until somebody was available to see me. I was able to conduct an interview with 3 of these 8, for a full sample of 5 interviews.

The interview were conducted in the presence of a Research Assistant in a combination of Hindi, English and Marathi. They were semi-structured, and drew on the following questions:

1. How would you describe your responsibilities?
2. Which of your responsibilities are the most important?
3. Which of your responsibilities take the most time?
4. How do you use the BMC's online portal for digital complaints? How has it affected your job?

---

[1] I validated the translations by manually examining 100 randomly selected rows.
[2] I selected lambda for each model using k-fold cross validation.
[3] Random forests provided a higher accuracy rate than k-nearest neighbors, gradient boosting, and naive Bayes, other popular algorithms for multi-class classification. The number of trees and number of variables available for splitting at each node (eg. "mtry") were determined using holdout cross validation.

5. Do you find the online portal useful?
6. How much of your time does managing the complaint portal take?
7. Which are the most important complaints that come through the portal?
8. Which are the least important complaints that come through the portal?
9. When your time is limited, how do you decide which complaints to focus on?
10. Does anyone give you guidance on which complaints are more important than others?

Interviews lasted 30 minutes to 1 hour. They were not recorded, as public officials tend to avoid being recorded. The Research Assistant and I both took detailed notes and combined them. The observations presented in the paper represent the trends that we felt were in common across the interviews.

Tables and Figures

Figure SI.1: MCGM's website and complaint-tracking portal.

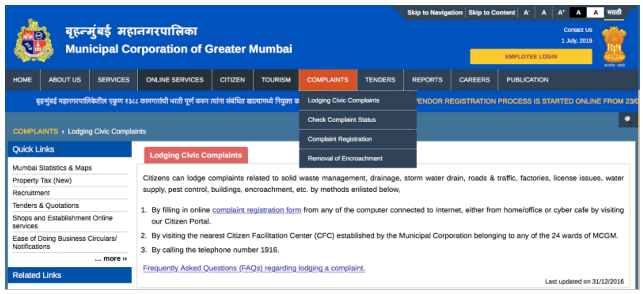


Table SI.1: Words used in predictive models for response and complaint categories.

Outcome	*Predictive words (stemmed)*
Complaints	booster, pump, use, day, suppli, leakag, shortag, complaint, connect, get, road, unauthor, tap, illeg, taken, leak, kurla, start, contamin, last, water, line, low, pressur, sinc, bill, overflow, tank, broken, wast, instal, meter, not, bad, provid, near, even, problem, smell, two, come, short, main, receiv, issu, less, past, burst, dirti, tanker, pipelin, pipe, flow
Responses	pleas, mobil, bill, provid, address, suppli, due, found, inspect, unauthor, repair, contact, joint, aqueduct, consent, inner, site, leakag, fals, henc, must, fact, contamin, cut, regular, action, connect, damag, entir, not, offic, smooth, complaint, disconnect, detect, water, declar, short, meter, request, done, hous, servic, check, low, email, usual

Table SI.2: Summary statistics for complaints and responsiveness by the ward-day, Mumbai 2016-2018.

Variable	*Min.*	*Max.*	*Mean*	*SD*
Complaints (all types)	0	23	0.81	1.38
Complaints (unauthorized use)	0	9	0.11	0.41
Complaints (contamination)	0	10	0.08	0.36
Complaints (shortages)	0	22	0.28	0.81
Complaints (leaks)	0	12	0.25	0.63
Closure rate (all types)	0	1	0.95	0.20
Closure rate (unauthorized use)	0	1	0.91	0.28
Closure rate (contamination)	0	1	0.97	0.18
Closure rate (shortages)	0	1	0.96	0.20
Closure rate (leaks)	0	1	0.96	0.20
Action taken rate (all types)	0	1	0.45	0.44
Action taken rate (unauthorized use)	0	1	0.12	0.32
Action taken rate (contamination)	0	1	0.50	0.49
Action taken rate (shortages)	0	1	0.22	0.39

Variable	*Min.*	*Max.*	*Mean*	*SD*
Action taken rate (leaks)	0	1	0.82	0.64