Bureaucratic Representation and State Responsiveness during Times of Crisis: The 1918 Pandemic in India

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Abstract

I combine personnel records with vital statistics for 1910-1925 to study how bureaucratic representation affects mortality in 1,271 Indian towns during the 1918 Influenza pandemic. Exploiting the rotation of senior colonial officers across districts and a cross-border comparison, towns headed by Indian (as opposed to British) district officers experienced 15 percentage points lower deaths. The lower mortality effects extend beyond the urban areas and coincide with greater responsiveness in relief provision. Bureaucratic representation can thus be a powerful way to increase state responsiveness during times of crisis.

JEL codes: I18, M5, N45, F54

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1 Introduction

States play a central role in the process of economic development by providing public goods. The role of the state is even more important in times of crisis, where large shocks require a coordinated response to solve market failures. Understanding how to build an effective bureaucracy is critical for development and growth (Besley and Persson, 2013).

There are two political economy traditions in thinking about how to build an effective public organization: one view – the Weberian view – stresses the importance of building a rational organization (Weber, 1922; Evans and Rauch, 1999; Rauch and Evans, 2000). Guided by process and impartiality, individual traits of its personnel are deemed to play no role. The second, contrasting view follows the premise that public organizations are more effective if their composition reflects the population served (Kingsley, 1944; Meier, 2018). Greater representation helps align preferences, provides social incentives and reduces information frictions (Bardhan, 2002; Ashraf and Bandiera, 2018; Alsan et al., 2019). Research on the effects of bureaucratic representation, however, remains limited.

This papers studies the impact of bureaucratic representation on state responsiveness in a unique setting:[1] the administrators of the British Raj during the 1918 pandemic in India. The 1918 influenza pandemic caused over 50 million deaths worldwide.(CDC, 2018) India suffered the greatest death toll with 10-20 million deaths (Chandra and Kassens-Noor, 2014). While the aggregate mortality is staggering, there was substantial variation in mortality across different towns and areas of India (Donaldson and Keniston, 2017). I study whether part of that variation can be explained by increased bureaucratic representation by asking if areas

[1]The definition of bureaucratic representation in this paper follows the standard definition in public administration: "the degree to which the social characteristics of the bureaucracy represent the social characteristics of the clients in the population" (Farazmand, 2018).

under Indian (vs. British) district administrators fared differently during this crisis.

The district administration was and remains the backbone of the administrative structure in India and most former colonies of the British Empire. The district officer (DO), as the local executive of the Empire, enjoyed substantial discretion on the ground (Potter, 1996; Gupta, 2019). My empirical strategy exploits variation in the spatial distribution of officers across districts in 1918 to compare towns under an Indian vs. British district officer around the pandemic. Underpinning this empirical strategy are two important institutional features. First, the fact that India was the first colony to allow locals to enter the civil service through open examinations, providing variation in Indian civil servants across cohorts. Second, that – once selected – officers are promoted and assigned to districts based on seniority. By the onset of the pandemic, a sufficiently large number of Indians had risen through the ranks to head up entire districts. Combining the exogenous timing of the pandemic with the cross-sectional pattern of Indian vs. British district officers allocated *just before* the pandemic struck allows me to implement a difference-in-differences (DiD).

To implement the empirical strategy, I digitize the Provincial Civil Lists – a previously untapped data source – to construct an officer-level panel covering the allocation of 978 officers across 205 districts of India between 1910-1925. The Provincial Civil Lists also provide individual-level characteristics that allow me to shed light on differences in education and experience between Indian vs. British officers in the colonial administration. I combine this dataset with newly digitized town-level vital statistics covering 1,271 towns over the same time period. I complement the mortality data with sub-district-level census data, as well as newly digitized data on hospitals and famine relief measures to explore mechanisms.

The main result is that towns under Indian DOs in 1918 experience a lower number of deaths during the 1918-19 pandemic. While deaths increase by 30% on average, the increase is 15 percentage points (pp) lower in towns under Indian DOs. This result is unlikely to be driven by differences in district characteristics that may interact during the pandemic (e.g. that Indian DOs are more likely to be allocated to more remote areas less exposed to the pandemic). The allocation pattern of Indian DOs in 1918 does not deviate significantly from the allocation pattern observed during "normal" times. Importantly, the allocation pattern of Indian DOs before and after the pandemic does not exhibit the same effect, suggesting that it is indeed the allocation of officers in 1918 that drives the observed effects.

The disaggregated town-level data not only provides more statistical power but also enables me to complement the DiD with a refined cross-district border design where I compare mortality differences between towns along the borders of Indian vs. British districts. The results also hold when comparing only among the 512 towns along narrow 25km border segments, suggesting that the observed effects are not driven by differences in geography or environmental conditions. The results also hold when restricting the analysis to districts ever headed by an Indian DO; and when using a coarsely-exact matched town-level sample (Iacus et al., 2012). Finally, I validate the results using sub-district-level census data as an alternative outcome to document smaller declines in population in Indian administered areas.

I complement my main results with evidence that help shed light on the mechanisms. The lower mortality effects are not driven by differences in the qualifications or experience of Indian officers. Instead, the mortality gap appears largest for officers who were newly appointed to the district, consistent with reduced information frictions that initially benefited the Indian DOs. Finally, I draw upon newly digitized hospital-level and famine data to study

intermediate outcomes. I find no differential effect in hospital admissions, capacity, treatment success and expenditures during the pandemic years, suggesting that greater provision of health-related public goods is unlikely to be the main driver of the effects. Instead, I document a significantly stronger response in public relief measures during the pandemic: using district-month-level data, areas headed by Indian district officers expand public works employment and relief measures quicker and by a larger margin. These results are consistent with the historical literature that ascribes a critical role of public relief in lowering the mortality effects of the pandemic – a policy district officers had substantial leeway over.[2]

The results connect to different strands of the literature. The question what makes governments responsive to citizens is a key question in political economy. While existing work has focused on the role of political representation (Besley and Burgess, 2002; Pande, 2003; Chattopadhyay and Duflo, 2004), there is limited work on the role of bureaucratic representation. Existing work has studied the role of identity in the quality of implementation and take-up of public services among front-line providers (Neggers, 2018; Alsan et al., 2019). I complement this work by showing the role of bureaucratic representation among administrative leaders in charge of districts with a population of over 1 million during a critical time of crisis. Focusing on mortality as an outcome, this paper also contributes to the literature that documents heterogeneity in health outcomes during major pandemics (Christensen et al., 2020; Durante et al., 2020; Donaldson and Keniston, 2017). To the best of my knowledge, this is the first paper that links such heterogeneity to characteristics of the local bureaucracy.

[2]See, for example, the 1918-19 Famine Report of the Central Provinces.

2 Historical background

2.1 Organizational structure and the personnel of the state

Britain formally took control of India in 1858 (Government of India Act 1858). Throughout the colonial period, India would remain the largest and most populous colony ("the Jewel in the Crown"). Due to its importance to the Crown, India was administered separately from the other colonies by the India Office. The India Office was based in London and headed by the Secretary of State for India, a cabinet-level position appointed by the British Prime Minister. In India, the central government rested under the Governor-General (also referred to as the Viceroy of India) in Calcutta. Subordinate to the Governor-General were the Governors, who were appointed to head the 11 provinces. The remaining parts of India – about 40% – were under indirect rule by the Princely States (Iyer, 2010).[3] For the study period 1910-1925, political representation was virtually absent and only limited to the appointment of Indian council members with advisory roles for the governors.

The basic unit of administration was the district. These districts were headed by the district officer.[4] As the "man on the spot", the district officer personified the powers of the colonial state. The district officer oversaw the entire local administration, wielding wide-ranging powers to collect land revenue, assess land, supervise the local police and justice system, appoint local civil servants and oversee public works and relief measures. With their superiors far away in the provincial capitals and London, the district officer enjoyed substantial discretion. It is the district officer "upon [whose] energy and personal character depend ultimately

[3] The lack of comparable data and large institutional differences (both among the numerous Princely States and compared to British administered areas) complicate a direct comparison.

[4] The exact title differed across provinces. I use district officer (DO) as a shorthand for the equivalent positions of district magistrate, collector and deputy commissioner.

the efficiency of Indian government. [...] He is not a mere subordinate of a central bureau. [He] is a strongly individualized worker in every department of rural well-being, with a large measure of local independence and personal initiative" (Hunter, 2013).

District officers were drawn from the India Civil Service (ICS). The ICS is the elite civil service of the Raj, with its officers staffing the senior-level positions across provincial departments and districts of India. It is the precursor of the modern Indian Administrative Service, sharing many of its institutional features (Iyer and Mani, 2012; Bertrand et al., 2019). It was the first colonial service to introduce competitive examinations that were open for all "natural-born subjects." While the de-jure open nature of the ICS paved way for bureaucratic representation, entry was heavily biased in favor of British candidates. Until 1922, the exam had to be taken in London. The exam itself focused on testing Western content such as English history, Latin and Greek. The share of Indian officers remained low during the 19th century.

Progression and remuneration in the ICS were strictly seniority-based: officers were ranked based on their entry year and exam score on the "gradation list" and were allocated positions depending on their rank. The typical career was to serve as an assistant district officer, progress to district officer before moving on to a divisional commissioner and finally taking on responsibilities in the provincial administration or at the Government of India. While promotions were seniority-based, horizontal transfers are more idiosyncratic, depending on the interaction of the availability of vacancies and term limits. Rotation decisions often appeared opaque and random even to the ICS officers: "[The ICS officer] will be sent just wherever a man happens to be wanted at the time, so that it is a mere chance whether he goes to a large and favourite station like Meerut, or a small and lonely one such as Basti." (Tupp, 1876)

While lower-tier public officers were exclusively Indian, bureaucratic representation at the higher echelons remained low. It is only by the early 20th century that Indian officers had risen through the ranks of the ICS to occupy senior positions in the district administration.

2.2 The Influenza pandemic of 1918-19

Throughout the British Raj, weather shocks and epidemics placed administrative burdens on the districts (Burgess and Donaldson, 2010). The largest shock in terms of mortality was the influenza outbreak of 1918. With a global death toll of over 50 million, 10-20 million of the deaths are estimated to have occurred in India (Chandra and Kassens-Noor, 2014). The consensus narrative attributes the spread of influenza to the importation of the virus via the port of Bombay due to returning troops from the First World War. The first wave of the disease occured in mid-1918; the second and by far more deadly wave swept through the subcontinent in the winter of 1918-19. Epidemiologists have documented substantial variation in mortality rates across India. Variation in mortality has typically been attributed to two factors. The first is the variation in climatic conditions conducive to the flu (Donaldson and Keniston, 2017). The second factor is the interaction of the influenza with the failure of the monsoon in 1918 which increased food shortages and the risk of famines well into 1919.[5]

State responsiveness had been relatively muted (Arnold, 2019). The reach of the colonial authorities was mostly limited to the urban areas. By 1918, the medical and sanitary services had been depleted by the war. Backlash in the local population following the aggressive containment interventions during the 1897 plague also induced the colonial authority to follow a more hands-off approach (Peckham, 2015). Local authorities distributed leaflets recom-

[5] Report of the Committee of the Bombay Presidency Famine Relief Fund 1918-19.

mending the ill to stay at home but fell short of imposing lockdowns (Phipson, 1923). While temporary hospitals and dispensaries were set up, the numbers were limited, leaving authorities to rely on assistance from local charitable institutions.[6] The only meaningful policy available to DOs was the provision of famine relief. With the lack of a centralized response, district officers had a critical role in coordinating the local crisis response (Potter, 1996).

3 Data and descriptive statistics

3.1 Data sources

I conducted archival work to photograph and collect data from multiple colonial government publications at the British Library. In this subsection, I discuss the main sources of data. For this study, I focus on the 9 major provinces of British India, covering 205 districts.

Civil lists. To document the allocation pattern of officers across districts, I digitized the full set of provincial civil lists between 1910-1925, and selective portions before and after. Published annually for each province of British India, the civil lists contain the full record of the senior-level civil servants serving in a given province. The cut-off date for the listing is January or July,[7] predating the onset of the pandemic in 1918. The provincial lists include details about the job title, the remuneration, the years served, and individual characteristics such as the educational background. Two sections of these volumes are of particular interest: the first section is the "gradation list", which ranks all serving ICS officers by seniority. The second section is the "distribution list", which provides a breakdown of the senior-level positions in each district. I use the latter section to identify the district officers. I classify civil servants

[6] Annual Report of the Sanitary Commissioner 1918.
[7] Cut-off dates listed vary by province. This does not affect the results since I exploit within-province variation.

into Indian and British administrators based on their names.

During the sample period, 51% of the district officers served in a single district and only 22.5% served in more than two districts. On average, officers spend 3.5 years as a DO. Overall, bureaucratic representation among district officers is low during the study period. While the share of Indian district officers increased from 10% in 1910 to 25% in 1925, only 15% (or 32) districts were administered by an Indian civil servant at the onset of the pandemic. Appendix Figure A1 shows the share of Indian DOs from 1880 until independence. Appendix Figure A2, Panel A shows the spatial distribution of Indian DOs in 1918.

Vital statistics. To link the district officers to outcomes, I use vital statistics from the Sanitary Reports 1910-1925. Published annually for each province, these reports provide information about births and deaths. Previous work that championed the use of this data has relied on district-level measures (Donaldson and Keniston, 2017). I digitize novel town-level data reported in "Statement VI – Deaths registered from different causes in the districts and towns" to construct a town-level panel covering 1,271 towns in the study period of 1910-1925. The disaggregated data allows me to increase statistical power and implement a comparison of towns along district borders of Indian vs. British administered districts.

Figure 1 shows the percentage deviation in deaths between 1918-19 against the benchmark period (1910-17), broken down by whether a town is under the jurisdiction of an Indian or British DO at the onset of the pandemic.[8] The distribution of deaths among towns under Indian and British DOs is remarkably similar before the pandemic. On average, there is no

[8]The district-specific deviations in deaths are computed by regressing (log) town-level deaths on district-specific bi-annual time dummies and town fixed effects. The figure then shows the cdfs of the estimated district-specific time effects (which, after partialing out town fixed effects, capture deviations from the district mean) for the pre-pandemic period and 1918-19, separately for districts administered by Indian vs. British DOs.

deviation from the district-level average between 1910-17. With the onset of the pandemic in 1918, however, there is an abrupt rightward shift in the cumulative density functions, indicating a stark increase in deaths across the entire distribution. Interestingly, the distributions now reveal a significant difference, with towns in districts under Indian DOs exhibiting lower increases in deaths than those under British DOs during 1918-19.

Census Data. Finally, I collected census data between 1901-1941 to obtain baseline characteristics and an additional measure of population change for robustness. The census is collected on a decadal basis and provides rich details about the demographic and socioeconomic characteristics. Importantly, I draw upon the "Provincial Table II" to obtain sub-district level population counts, which are at the tehsil-level.[9]

3.2 Allocation patterns – descriptive evidence

Table 1 reports the difference between districts assigned to Indian vs. British district officers at the onset of the pandemic in 1918.[10] The total number of districts is 205, but the actual number varies slightly due to missing data and district splits.

Overall, districts administered by Indian officers are comparable to those run by their British counterparts (columns 1-2). They are comparable in size (both population and area) and mortality, have comparable access to railroads, exhibit similar socioeconomic characteristics and climatic conditions. The only statistically significant differences appear in the share of population aged 20-40, the latitude of the district headquarter and the distance to the closest major port. The magnitudes of these differences, however, are small. The difference in the population share aged 20-40, for example, is only 3% when compared to the mean share in

[9] This sub-district-level geographical unit is also referred to as the taluk, thana or mandal.
[10] Appendix B provides a summary of each data source.

British districts. Similarly, the difference in the latitude amounts to an average difference of 220km – modest given India's size (Appendix Figure A2, Panel A).

While Table 1 suggests balance on a large set of observables, districts assigned to Indian officers may differ in unobservable ways. Column 3 thus restricts the sample to only districts that were ever administered by an Indian officer during the pre-period 1910-1917 (Appendix Figure A2, Panel B). While districts that are always administered by British officers are likely to be very different, districts that were run by Indian officers in the past – "switchers" – are likely to provide a tighter comparison group. Reassuringly, I achieve comparable balance.

4 Bureaucratic representation and pandemic mortality

4.1 Empirical strategy

To identify the impact of bureaucratic representation on town-level mortality during the 1918 pandemic, I now estimate a difference-in-differences. For town i in district $j = J(i)$ and year t, I estimate the following regression model:

$$\log(\text{deaths}_{it}) = \beta \times \text{Indian}_{J(i)} \times \text{Pandemic}_t + \theta_i + \tau_t + \varepsilon_{it} \tag{1}$$

Equation 1 relates the (log) total number of deaths in a town and year to the presence of an Indian DO.[11] $\text{Indian}_{J(i)}$ is a dummy that is 1 if the town's DO is Indian (as opposed to British) in 1918,[12] where $j = J(i)$ denotes the district the town i is located in. Pandemic_t is a dummy that is 1 during 1918-19, the years of the pandemic. θ_i are town fixed effects, and τ_t are year

[11] The results also hold when using the 1911 census population to compute mortality rates (Appendix Table A1).

[12] The assignment status remains throughout the year. Since the paper's focus lies on the effect of bureaucratic representation during the pandemic, assignment is based on the cross-sectional variation in 1918.

fixed effects. The standard errors are clustered at the district-level $J(i)$, corresponding to the DO's administrative unit of assignment (and thus the treatment level).

The key parameter of interest is β, the differential mortality effect of the pandemic on towns under Indian (as opposed to British) DOs. The key threat to causally identifying this parameter is that officers are not randomly allocated across districts. Ex-ante, the sign of the resulting bias is ambiguous. If Indian officers, for example, are more likely to be allocated to districts with lower pandemic incidence (e.g. more remote districts less exposed to Bombay, the influenza hotspot), the resulting estimate is likely to be downward biased. In contrast, if Indian officers are more likely to be allocated to less developed districts that are more vulnerable to the pandemic shock, the resulting estimate of β is likely to be upward biased. To causally interpret the estimate, the key assumption is that the interaction between the timing of the pandemic and the spatial distribution of Indian officers across districts in 1918 is as good as random. More precisely, the assumption is:

Identification assumption: *The interaction between the timing of the pandemic and the spatial distribution of Indian DOs in 1918 is (conditionally) unrelated to the pandemic shock:* $E[India_{J(i)} \times Pandemic_t | \varepsilon_{it}, \theta_i, \tau_t] = 0$. *There may be systematic differences between districts with Indian vs. British DOs, but these district differences do not interact differentially during the pandemic.*

There are both empirical and institutional reasons for why the assumption is likely to be met in this setting. First, as shown in subsection 3.2, there are no marked differences in the allocation patterns between Indian and British DOs in 1918. When restricted to districts that were ever led by an Indian DO between 1910-1917, I obtain balance on all observables. Second, institutionally, DOs are assigned to serve regular terms that average 1.1 years in the study

period.[13] Among the officers serving at the onset of the pandemic, 79% of the officers were *already* allocated and serving in the district before 1918. Among those appointed in 1918, I use the assignments pre-dating the onset of the pandemic. Finally, I do not find evidence for strategic reallocations in 1918: there is no statistically significant difference in the allocation pattern between Indian vs. British DOs in 1918 when compared to all other years of the study period 1910-1925 (Appendix Table A2).

4.2 Main result and robustness

Table 2 reports the results. I first report the full sample estimates. On average, the pandemic increased the total deaths by 0.27 log points (30%, column 1). While towns under Indian DOs exhibit a comparable number of deaths outside the pandemic years, the increase in deaths is significantly lower during the years of the pandemic 1918-19 (column 2). Towns in districts under Indian DOs experience 15 pp lower deaths during the pandemic. This is a sizeable effect, reducing the overall increase in deaths during the pandemic years by half. The effect size remains stable when fully partialling out year and town fixed effects (column 3).

Figure 2 provides visual evidence. The figure flexibly estimates the Indian vs. British mortality gap for different years throughout the sample period 1910-1925. The estimates are binned in two year periods to reduce noise. As Figure 2 shows, there is no statistically significant difference in reported deaths before the outbreak of the pandemic, confirming the absence of pre-trends. The lower deaths in Indian administered towns appear exactly in the years of the pandemic 1918-19, disappearing shortly thereafter.

Although there is limited evidence that Indian DOs are systematically allocated to different

[13] This number is in line with historical accounts for the colonial era (Potter, 1996; Gilmour, 2007).

districts during the pandemic, I use several additional refinements to alleviate remaining concerns over endogenous assignment. First, I restrict the comparison to only districts in the same state by partialling out state $\times$ year specific fixed effects (column 4). The resulting estimate remains virtually unchanged.[14]. Second, I restrict the British "control" districts to be only those that ever had Indian administrators. While locations that never received Indian administrators might differ significantly from those that *did* receive Indian officers, focusing on the set of 71 districts that exhibit switches in bureaucratic representation over time between 1910-1917 yields a natural control group (Figure A2, Panel B and Table 1). Once again, given the plausibly exogenous interaction between the timing of the pandemic and the distribution of Indian administrators in 1918, this refinement leaves the estimate nearly unchanged.

The rotation of ICS officers across districts allows for a placebo test. If the results are driven by Indian DOs serving in 1918, leads and lags in the distribution of Indian DOs should have no effect. Indeed, when controlling for the entire history of allocation patterns before and after the pandemic, it is only the spatial distribution of Indian vs. British officers in 1918 that drives the negative effects. All leads and lags are jointly insignificant (Appendix Table A3).

The availability of panel data on the presence of Indian DOs also allows us to assess whether the impact of bureaucratic representation during crisis times differs from "normal" times. Appendix Table A4 reports the results of a standard panel regression, where I allow the effect of having an Indian DO in a given year to vary during 1918-19. It is only during times of crisis where bureaucratic representation reduces mortality.

The results also hold up against a host of additional robustness checks. The results are not

[14]Indeed, the results also hold with even more stringent division fixed effects, which are able to account for region-specific shocks at an even finer level (Appendix Table A13).

driven by particular states and districts but hold when dropping one state or district at a time (Appendix Table A5 and Figure A3). The results also hold when controlling for the two unbalanced covariates (Table 1, column 2) or using coarse exact matching to flexibly balance the covariates at the town-level by matching on town-level population in 1911 and baseline death rates in 1911 (Appendix Table A6, see Iacus et al. (2012) for methodology). Finally, I complement the mortality results with an independent measure of population change from the census to ensure that the results are not only driven urban areas or the selective misreporting of vital statistics (Appendix C).

4.3 Comparison along district borders

The disaggregated town-level data allows me to construct even more restrictive control groups. A remaining concern is that the within-state comparison and balance on observables still does not sufficiently account for all unobservable cross-district differences between Indian vs. British administered districts. To further alleviate such concerns, I compare the subset of towns along the district border. Intuitively, proximate towns are likely to be much more comparable in terms of geography and socioeconomic characteristics, except that they fall under the jurisdiction of different district officers in the particular year of the pandemic.

To construct this border sample, I create individual control groups for each Indian border town. I identify for each town under an Indian DO all towns that lie within 25km and are under the administration of a British DO. This yields 70 border segments with one Indian border town each and a median number of two British comparison towns. For the border

segment b I then estimate,

$$\log(\text{deaths}_{ibt}) = \beta \times \text{Indian}_{bJ(i)} \times \text{Pandemic}_t + \theta_i \times \nu_b + \tau_t \times \nu_b + \varepsilon_{ibt} \quad (2)$$

Equation 2 provides a much more restrictive comparison. With the inclusion of fixed effects ν_b for each border segment, I am now comparing deaths in each Indian border town with the deaths observed in the set of neighboring towns under British administration. Since a town under a British DO can lie in the vicinity of multiple Indian border towns (and thus serve in multiple control groups), the fixed effects $\theta_i \times \nu_b$ ensure that the comparison is only made within a given border segment. Similarly, $\tau_t \times \nu_b$ restrict the temporal variation to only those within the same border segment. This partials out very localized shocks common to all towns in that particular border segment. This is substantially more restrictive than state-specific year fixed effects used in the previous analysis. The standard errors are clustered at the district $\times$ border segment-level $bJ(i)$ to avoid "double-counting" due to British towns serving in multiple control groups (de Chaisemartin and Ramirez-Cuellar, 2020).

Table 3 shows the results. Consistent with the standard difference-in-differences, towns in the Indian administered areas exhibit significantly lower mortality during the 1918-19 pandemic. Despite the different identification strategy, the point estimate is strikingly comparable to the panel results. When comparing towns along the border of Indian vs. British administered districts, the number of deaths is 15 pp lower on the Indian administered side (column 1-2). The results are similar when comparing only within each border segment (column 3).

A concern when comparing neighboring towns is the presence of spillovers. Such spillovers could be particularly important for influenza, which spreads more easily between neighbor-

ing towns, attenuating the results. To assess robustness, columns 4 and 5 drop the closest British comparison towns. As the results show, the coefficients remain stable when dropping British towns within 5km and 10km. The combined results thus provide strong evidence that bureaucratic representation reduced mortality during the pandemic.

4.4 Heterogeneity and intermediate outcomes

Differential selection of ICS officers. Although all ICS officers enter through the same competitive examinations, Indian candidates faced higher *de-facto* entry barriers (subsection 2.1). One explanation for the observed differential performance then is that Indian DOs – entering the service *despite* discrimination – are more qualified than their British counterparts. Based on the biographical information from the Civil Lists, I do not see significant differences on observable measures of education and experience: Indian DOs are equally likely to hold a BA or MA degree. At the onset of the pandemic, they had also served a comparable number of years (Appendix Table A7). Consequently, when fully interacting these proxies of human capital with the pandemic, the main effect remains almost unchanged (Appendix Table A8). While differential selection is a possible channel through which bureaucratic representation can affect performance, the results suggest that the effects are unlikely to be driven by the conventional, readily observable measures of differential ability.

Reduced information frictions. Reduced information frictions can both arise from better local information and trust.[15]Most British ICS recruits never saw India before their first deployment; many had limited command of the local languages. A channel through which bureaucratic representation can positively affect performance is thus through the superior

[15]Since the predictions of both mechanisms are observationally equivalent, I am unable to further distinguish between local information and trust.

local information of Indian DOs and the ability to gain the trust of the subordinates and local population more quickly.[16] To shed light on this mechanism, I exploit that DOs serving at the onset of the pandemic had been appointed at different times. There is thus variation in how much time DOs had to establish themselves in the district. In Appendix Table A9, I split officers into those who were *just appointed* before the pandemic struck and those who had already been serving before 1918. While towns in districts with newly-appointed British officers see larger increases in mortality, this is not the case for towns under the jurisdiction of Indian DOs. While suggestive given data limitations, the heterogeneity suggests that the benefits of bureaucratic representation are partly driven by reduced information frictions.

Hospitalization and relief work. A remaining question is *how* DOs reduced mortality. The literature points to several channels. As the executive head of a district, the key role of the DO was to coordinate response in tandem with town and village authorities and civil society (Potter, 1996). Given limited state capacity, relief measures crucially relied on the cooperation of the public sector with religious and charitable societies, which played an important role in raising local funds for disaster relief (Peckham, 2015). While data limitations prevent me to explore these channels more systematically, I was able to collect data on hospital utilization and relief measures. Although the provision of public goods was limited during the British rule, Indian DOs could have raised more local funds to allocate more resources to the local hospitals and dispensaries during the crisis.

To test this, I digitized hospital-level data from the "Reports on the working of civil hospitals and dispensaries." Previously untapped data, these reports contain detailed hospital-level

[16] Trust has been shown to be an important channel in related work on race representation (Alsan et al., 2019) and colonial health interventions in Africa (Lowes and Montero, 2020).

statistics on the number of patients admitted, capacity, and budget. Due to logistical limitations, I was only able to collect data for Bihar & Orissa and Madras. Since the main results also hold for this subsample (Appendix Table A12), the results will still be informative of the mechanism at hand. I find no marked increase in hospital admissions during the pandemic (Appendix Table A10, Panel A). There is also no differential effect by Indian vs. British district officers when looking at a wider range of outcomes such as capacity (the number of beds), the death-to-treated ratio, or the overall expenditures.

An alternative channel is the provision of relief, for which the DO was directly responsible. Historical accounts of the 1918 pandemic in India frequently emphasize the interaction between the pandemic and the failure of the late monsoon (September-November). The main way through which relief was provided was through famine relief in the form of public work and kitchens. Indian DOs could have been more effective in mobilizing resources, both from the colonial administration and civil society.[17]

I collected newly digitized data from the Famine Reports in Central Provinces and Bombay 1918-19.[18] These reports provide detailed information on the type and amount of relief provided at the district-month-level. I find that public works and the provision of relief increase after the onset of the second and strongest wave of the pandemic in November 1918. While there is no difference in the amount of public employment provided between Indian vs. British officers before November 1918, the increase is twice as large in districts with an Indian district officer (Appendix Table A10, Panel B and Figure A4). The results are consistent with bureaucratic representation increasing state responsiveness during the 1918 pandemic.

[17] The role of civil society has been frequently highlighted, see e.g. in Arnold (2019).
[18] These are provinces for which Famine Reports exist. The mortality results hold within the subsample.

5 Conclusion

A popular notion is that bureaucrats are passive: they serve politicians and implement policy choices as ordered. Using newly digitized data in colonial India, I show that bureaucratic representation among civil service leaders matters. Bureaucratic representation at the apex of the local administration increased the responsiveness of the state and reduced mortality during one of the deadliest pandemics in human history.

What is striking about these findings is that bureaucratic representation "worked" in the absence of meaningful political representation. For this to work requires substantial autonomy, which district officers in the colonial period – like many bureaucrats owing their expertise and insulation from politics – enjoyed. As such, the paper speaks to a longer tradition of political economy thinking that explores the tension between embeddedness and autonomy in explaining differences in state effectiveness (Evans, 1995).

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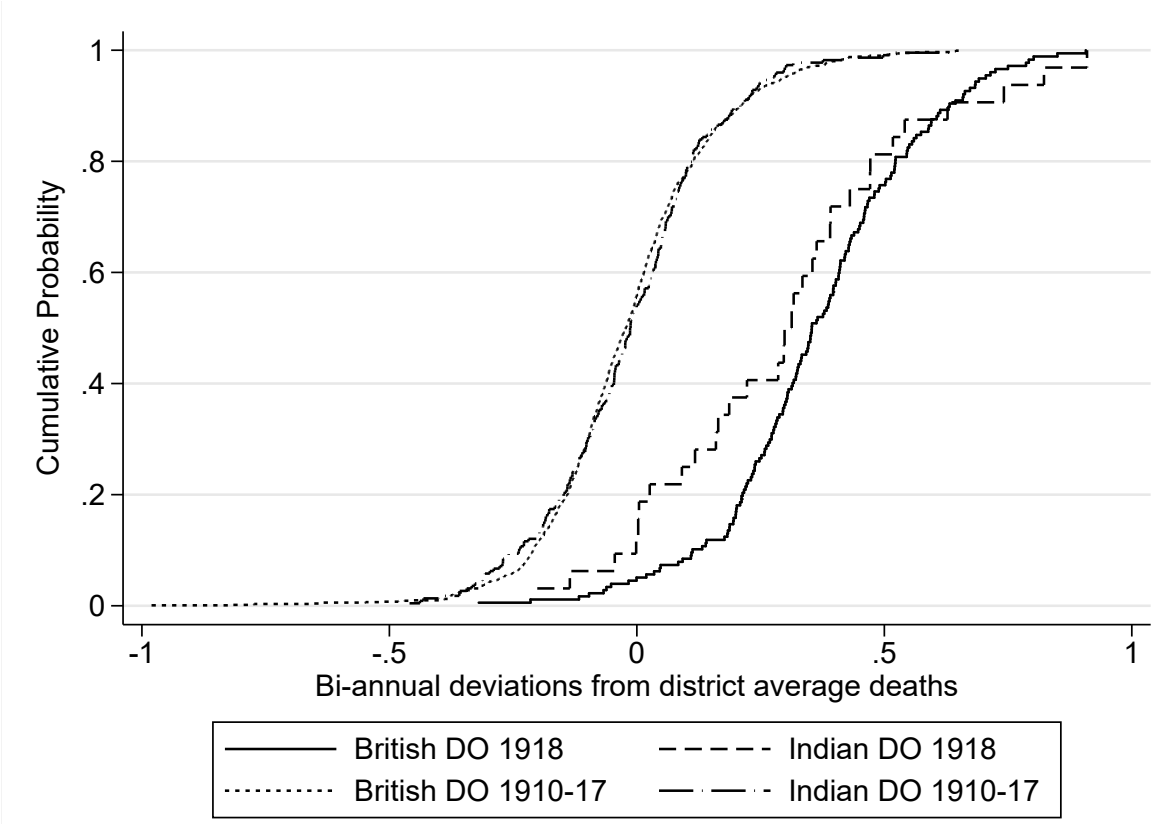
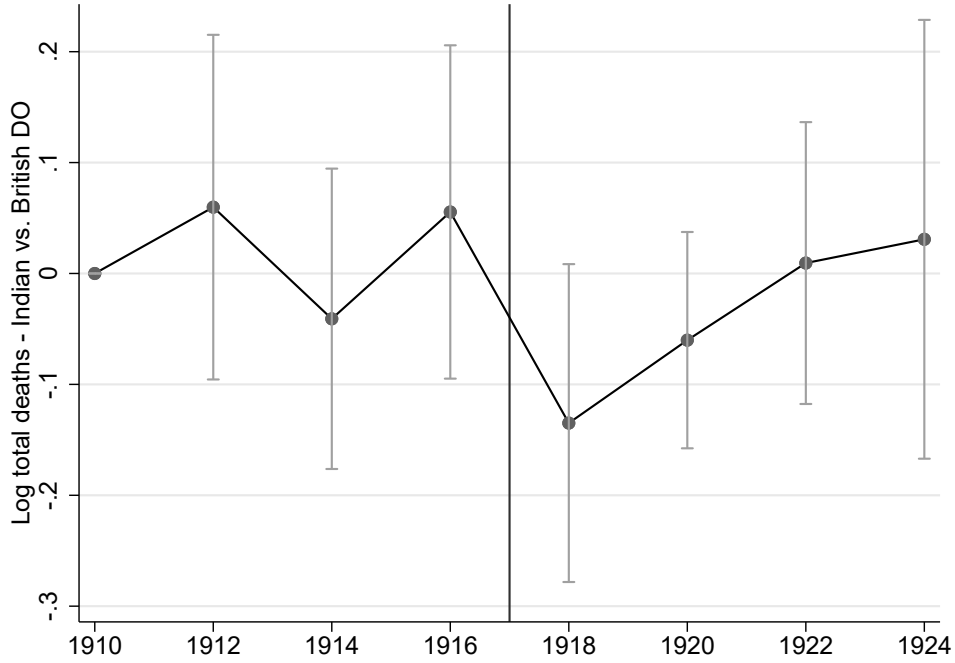
Figures and Tables

Figure 1: Changes in district-level deaths during the 1918 pandemic



Notes: Reporting the cumulative density function (cdf) of the district-specific changes in deaths during the 1918 pandemic vs. the pre-period 1910-17, broken down by districts run by Indian vs. British district officers in 1918. The district-specific changes are computed by regressing (log) town-level deaths on district-specific time dummies conditional on town fixed effects.

Figure 2: Town-level mortality by Indian vs. non-Indian district officer



Notes: Difference in (log) deaths in towns under the jurisdiction of an Indian vs. non-Indian district officer in 1918, before and after the 1918 pandemic (solid line). The coefficients are estimated using the specification of Table 2, column 3 where the Pandemic dummy is replaced with bi-annual year dummies. Standard errors clustered at the district-level. Reporting 95% confidence intervals.

Table 1: Comparison of districts led by Indian vs. British district officers in 1918

	(1)	(2)	(3)	(4)
	British	Diff: Indian-British		
	Mean	Full	Switcher	Obs.
Log(Census population 1911)	13.724	-0.027	0.120	204 (71)
		(0.102)	(0.116)	
Death rate pre-1910	34.800	-1.170	-0.438	202 (71)
		(2.090)	(2.408)	
Log(Real income 1910)	16.789	-0.390	-0.188	167 (61)
		(0.300)	(0.307)	
Log(District area km^2 1911)	8.041	-0.146	-0.214	204 (71)
		(0.184)	(0.196)	
White population 1911 (per 1,000)	1.784	-0.667	0.765	203 (71)
		(1.037)	(0.902)	
Number of towns	4.522	0.138	0.136	205 (72)
		(0.813)	(0.976)	
Share urban population 1911	0.103	-0.006	0.020	204 (71)
		(0.031)	(0.031)	
Share employed in industry 1911	0.010	-0.000	0.007	204 (71)
		(0.006)	(0.006)	
Share born in district 1911	0.891	0.013	0.011	204 (71)
		(0.014)	(0.019)	
Share aged 20-40 in district 1911	0.301	0.009*	-0.000	199 (71)
		(0.005)	(0.006)	
Born in Bombay (per 1,000)	0.914	0.930	-0.806	203 (71)
		(1.182)	(1.757)	
Log(Distance Bombay)	6.502	-0.152	0.111	204 (72)
		(0.143)	(0.184)	
Log(Distance to Madras)	6.667	-0.651	-0.557	204 (72)
		(0.428)	(0.435)	
Log(Distance to Calcutta)	6.271	-0.118	-0.082	204 (72)
		(0.174)	(0.204)	
Log(Distance to closest port)	5.830	-0.706*	-0.593	204 (72)
		(0.416)	(0.436)	
Number of railroad junction stations	0.947	-0.141	-0.022	204 (72)
		(0.182)	(0.202)	
Share of towns with railroad station	0.754	0.036	0.019	204 (72)
		(0.049)	(0.056)	
Share WWI casualties (per 1,000)	0.219	-0.036	0.085	204 (72)
		(0.072)	(0.071)	
District HQ latitude	24.411	-2.180**	-1.007	204 (72)
		(1.048)	(1.171)	
District HQ longitude	79.948	1.027	1.548	204 (72)
		(1.109)	(1.289)	
District HQ elevation (m)	226.324	-14.415	19.684	204 (72)
		(47.295)	(46.704)	
Historical average rainfall May-Oct	3.480	0.097	-0.039	204 (72)
		(0.114)	(0.139)	
Deviation from average rainfall May-Oct 1917	0.269	-0.006	-0.005	204 (72)
		(0.063)	(0.075)	
Deviation from average rainfall May-Oct 1918	-0.506	0.086	0.034	204 (72)
		(0.093)	(0.135)	
Share of Hindu population 1911	0.671	0.067	0.011	204 (71)
		(0.055)	(0.063)	
Share of Muslim population 1911	0.263	-0.065	0.023	204 (71)
		(0.053)	(0.061)	

Notes: Column 1 reports the mean for districts led by British district officers. Column 2 shows the mean difference in the full sample and column 3 reports the difference based on the districts that were ever led by an Indian officer between 1910-1917. In column 4, the number in parentheses report the observation count for the switcher sample (column 3). The number of districts led by Indian officers in 1918 is 32. Robust standard errors *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 2: Town-level mortality by Indian vs. non-Indian district officer

	(1)	(2)	(3)	(4)	(5)
	Log(Town-level deaths)				
Pandemic	0.272***	0.296***			
	(0.017)	(0.018)			
Indian DO	-0.124	-0.105			
	(0.105)	(0.105)			
Pandemic × Indian DO		-0.154***	-0.142***	-0.138***	-0.138***
		(0.042)	(0.041)	(0.038)	(0.043)
Town FEs			Y	Y	Y
Year FEs			Y		
State × Year FEs				Y	Y
Sample		Full sample			Switcher
Observations	14,745	14,745	14,714	14,714	5,232

Notes: Unit of observation is the town-year. Dependent variable is the (log) total number of deaths reported in a given town and year. Indian DO is a dummy that is 1 if the district officer in 1918 is Indian and 0 if British. Pandemic is a dummy that is 1 in the years 1918 and 1919. Switcher (column 5) sample restricts the British districts to only those that ever had an Indian DO between 1910-1917. Standard errors clustered at the district-level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

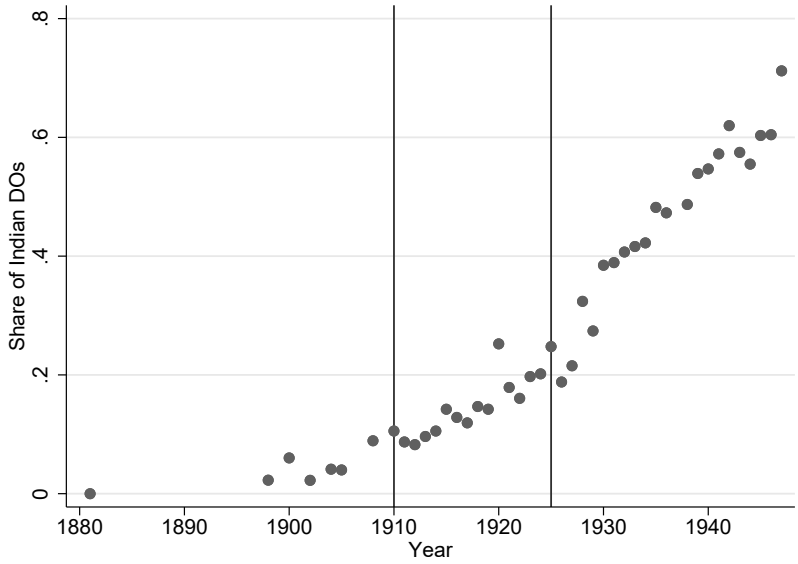
Table 3: Town-level mortality – District border town comparison

	(1)	(2)	(3)	(4)	(5)
	Log(Town-level deaths)				
Pandemic	0.249***	0.296***			
	(0.017)	(0.018)			
Indian DO	0.053	0.072			
	(0.149)	(0.149)			
Pandemic × Indian DO		-0.149***	-0.152***	-0.157***	-0.164***
		(0.040)	(0.041)	(0.042)	(0.045)
Border segment FEs		Y			
Town × Border segment FEs			Y	Y	Y
Year × Border segment FEs			Y	Y	Y
Sample restriction		[0km; 25km]		[5km; 25km]	[10km; 25km]
Observations	7,207	7,207	5,864	4,935	3,791

Notes: Unit of observation is the town-border segment-year. Dependent variable is the (log) total number of deaths reported in a given town and year. Border segments FEs are fixed effects that constrain the comparison of a town in an Indian administered district to the set of (comparison) towns in the British administered districts. Columns 4-6 restrict the British comparison towns by excluding towns in the close vicinity (0-5km, 0-10km). Standard errors clustered at the district-border segment-level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

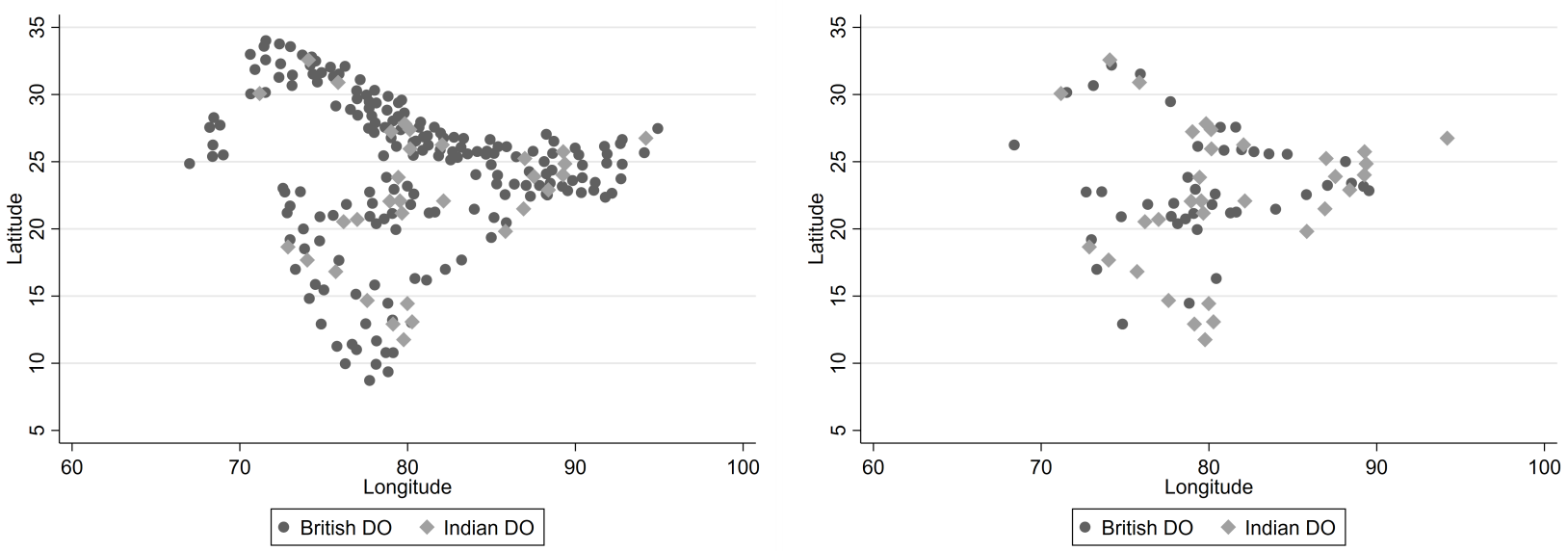
A Online appendix - Not for publication

Figure A1: Share of Indian district officers around 1918 pandemic



Notes: Share of Indian district officers. Solid line marks the study period 1910-1925.

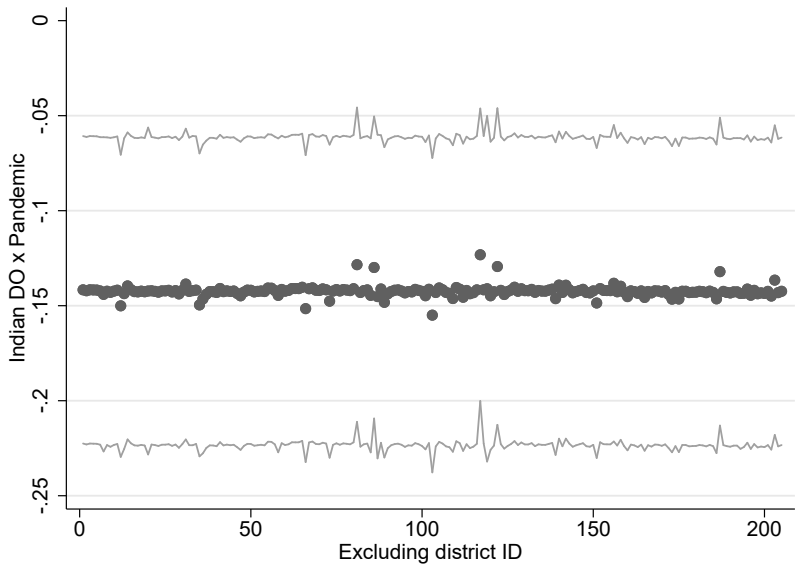
Figure A2: Spatial allocation of Indian district officers in 1918



(a) All districts of British India

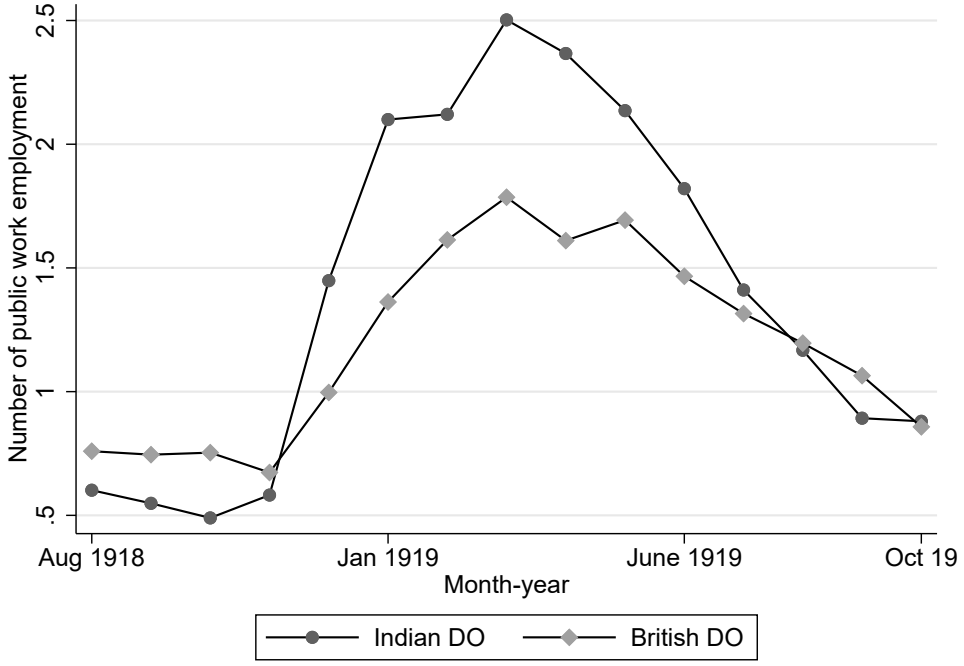
(b) Districts with Indian DOs between 1910-1917

Figure A3: Mortality effects - Dropping one district at a time



Notes: Estimating Table 2, Column 3 excluding one district at a time. Standard errors are clustered at the district-level. Reporting 95% confidence intervals.

Figure A4: Relief work and Indian vs. non-Indian district officer in 1918



Notes: Sample covers all districts in Central Provinces and Bombay. See Table A10, Panel B for the regression version.

Table A1: Indian district officer and town-level crude death rate per 1,000

	(1)	(2)	(3)	(4)	(5)
	Town-level crude death rate per 1,000				
Mean of dep. var	31.49	31.49	31.49	31.49	32.13
Pandemic	10.935***	11.517***			
	(0.736)	(0.826)			
Indian DO	-0.732	-0.247			
	(2.249)	(2.199)			
Pandemic × Indian DO		-3.743**	-3.546**	-3.390**	-2.919**
		(1.564)	(1.555)	(1.337)	(1.432)
Town FEs			Y	Y	Y
Year FEs			Y		
State × Year FEs				Y	Y
Sample		Full sample			Switcher
Observations	14,383	14,383	14,383	14,383	5,101

Notes: Unit of observation is the town-year. Dependent variable is the crude death rate (per 1,000), computed as the total number of deaths reported in a given town and year divided by the 1911 town-level population. Indian DO is a dummy that is 1 if the district officer in 1918 is Indian and 0 if British. Pandemic is a dummy that is 1 in the years 1918 and 1919. Switcher (column 5) sample restricts the British districts to only those that ever had an Indian DO between 1910-1917. Standard errors reported clustered at the district-level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A2: Allocation of Indian vs. British district officers 1910-1925

	(1)	(2)	(3)	(4)
	British	Diff: Indian-British		
	Mean 1910-25	1918	1918 vs. 1910-25	Obs.
Log(Census population 1911)	13.724	-0.027	-0.074	3,264
		(0.102)	(0.105)	
Death rate pre-1910	34.800	-1.170	-1.151	3,232
		(2.086)	(2.149)	
Log(Real income 1910)	16.789	-0.390	-0.379	2,672
		(0.300)	(0.303)	
Log(District area km^2 1911)	8.041	-0.146	-0.148	3,264
		(0.183)	(0.186)	
White pop. 1911 (per 1,000)	1.784	-0.667	0.872	3,248
		(1.035)	(1.050)	
Number of towns	4.522	0.138	0.169	3,280
		(0.811)	(0.838)	
Share urban population 1911	0.103	-0.006	0.024	3,264
		(0.031)	(0.031)	
Share employed in industry 1911	0.010	-0.000	0.007	3,264
		(0.006)	(0.006)	
Share born in district 1911	0.891	0.013	-0.006	3,264
		(0.014)	(0.014)	
Share aged 20-40 in district 1911	0.301	0.009*	0.006	3,184
		(0.005)	(0.005)	
Born in Bombay (per 1,000)	0.914	0.930	0.228	3,248
		(1.179)	(1.219)	
Log(Distance Bombay)	6.493	-0.152	-0.065	3,264
		(0.143)	(0.148)	
Log(Distance Madras)	6.594	-0.651	-0.511	3,264
		(0.428)	(0.431)	
Log(Distance Calcutta)	6.273	-0.118	0.019	3,264
		(0.174)	(0.180)	
Log(Distance to closest port)	6.493	-0.706*	-0.065	3,264
		(0.416)	(0.148)	
Number of railroad junction stations	0.931	-0.141	-0.117	3,264
		(0.182)	(0.187)	
Share of towns with railroad station	0.754	0.036	-0.004	3,264
		(0.049)	(0.051)	
Share WWI casualties (per 1,000)	0.214	-0.036	0.045	3,232
		(0.074)	(0.076)	
HQ latitude	24.411	-2.180**	-1.078	3,264
		(1.046)	(1.080)	
HQ longitude	79.948	1.027	0.557	3,264
		(1.107)	(1.143)	
HQ elevation (m)	226.324	-14.415	57.525	3,264
		(47.193)	(48.374)	
Historical average rainfall May-Oct	3.490	0.097	0.071	3,264
		(0.114)	(0.118)	
Deviation from average rainfall May-Oct 1917	0.265	-0.006	-0.029	3,264
		(0.062)	(0.065)	
Deviation from average rainfall May-Oct 1918	-0.502	0.086	0.025	3,264
		(0.093)	(0.098)	
Share of Hindu population 1911	0.671	0.067	0.046	3,264
		(0.055)	(0.057)	
Share of Muslim population 1911	0.263	-0.065	-0.049	3,264
		(0.053)	(0.055)	

Notes: Unit of observation is the district-year for the sample period 1910-1925. Column 1 reports the mean of districts under British district officers for 1910-25. Columns 2-3 report coefficients of the following regression: $y_{it} = \beta Indian_i + \gamma Indian_i \times \mathbf{1}[t = 1918] + \tau_t + \varepsilon_{it}$, where i denotes the district and t the year. Column 2 reports $\hat{\beta} + \hat{\gamma}$, the average difference between districts under Indian vs. British district officers in 1918. Column 3 captures $\hat{\gamma}$, the differential allocation effect in 1918 relative to the other years. Standard errors clustered at the district-level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A3: Town-level mortality effects - Placebo tests with leads and lags

	(1)	(2)	(3)	(4)
	Log(Town-level deaths)			
Pandemic × Indian DO in 1917	-0.037		-0.041	0.020
	(0.043)		(0.044)	(0.091)
Pandemic × Indian DO	-0.092**	-0.114**	-0.103**	-0.112**
	(0.036)	(0.045)	(0.041)	(0.044)
Pandemic × Indian DO in 1919		0.009	0.021	0.019
		(0.049)	(0.046)	(0.051)
Year FEs	Y	Y	Y	Y
Town FEs	Y	Y	Y	Y
Pandemic × All leads and lags in Indian DO				Y
Sample		Full sample		
p-value joint test: All pre-patterns =0				0.330
p-value joint test: All post-patterns =0				0.566
Observations	17,717	17,933	17,717	12,750

Notes: Unit of observation is the town-year. Dependent variable is the (log) total number of deaths reported in a given town and year. Indian DO is a dummy that is 1 if the district officer in 1918 is Indian and 0 if British. Indian DO in [year] is a dummy that is 1 if the district officer in that year is Indian and 0 if British. Pandemic is a dummy that is 1 in the years 1918 and 1919. Column 4 includes all leads and lags for the Indians DO 1910-1925 (coefficients omitted). p-value joint test: All pre/post-patterns = 0 provide joint significance tests for all leads/lags. Standard errors clustered at the district-level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A4: Town-level mortality effects - Annual panel variation in Indian DO status

	(1)	(2)	(3)	(4)	(5)
	Log(Town-level deaths)				
Pandemic × Indian DO (in 1918)	-0.142***				
	(0.041)				
Indian DO in current year		-0.005	-0.005	0.000	-0.016
		(0.021)	(0.021)	(0.018)	(0.021)
Pandemic × Indian DO in current year		-0.146***	-0.146***	-0.139***	-0.120**
		(0.052)	(0.052)	(0.048)	(0.059)
Town FEs	Y	Y	Y	Y	Y
Year FEs	Y	Y	Y		
State × Year FEs				Y	Y
Sample		Full sample			Switcher
Observations	14,714	14,714	14,714	14,714	5,232

Notes: Unit of observation is the town-year. Dependent variable is the (log) total number of deaths reported in a given town and year. Indian DO is a dummy that is 1 if the district officer in 1918 is Indian and 0 if British. Column 1 is the baseline specification of Table 2, column 3 that only exploits the cross-sectional variation of Indian vs. British DOs in 1918. Indian DO in current year is a dummy that is 1 if the district officer in a given year is Indian and 0 if British. Pandemic is a dummy that is 1 in the years 1918 and 1919. Standard errors clustered at the district-level. Switcher (column 5) sample restricts the British districts to only those that ever had an Indian DO between 1910-1917. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A5: Town-level mortality effects - Dropping one province at a time

	(1)	(2)	(3)	(4)	(5)
	Log(Town-level deaths)				
Pandemic × Indian DO	-0.142***	-0.141***	-0.145***	-0.159***	-0.136***
	(0.041)	(0.042)	(0.045)	(0.041)	(0.043)
Drop province	None	Assam	Bengal	B&O	Bombay
Town FEs	Y	Y	Y	Y	Y
Year FEs	Y	Y	Y	Y	Y
Observations	14,714	14,384	12,900	13,821	13,050
	(1)	(2)	(3)	(4)	(5)
	Log(Town-level deaths)				
Pandemic × Indian DO	-0.124***	-0.120**	-0.140***	-0.139***	-0.165***
	(0.046)	(0.049)	(0.041)	(0.044)	(0.042)
Drop province	CP	Madras	NWFP	Punjab	UP
Town FEs	Y	Y	Y	Y	Y
Year FEs	Y	Y	Y	Y	Y
Observations	12,998	10,334	14,558	12,423	13,244

Notes: Unit of observation is the town-year. Dependent variable is the (log) total number of deaths reported in a given town and year. Indian DO is a dummy that is 1 if the district officer in 1918 is Indian and 0 if British. Pandemic is a dummy that is 1 in the years 1918 and 1919. Dropping one district at a time. B&O=Bihar & Orissa; CP=Central Provinces; NWFP=Northwestern Frontier Provinces; UP=United Provinces. Standard errors clustered at the district-level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A6: Town-level mortality effects - Matching

	(1)	(2)	(3)	(4)	(5)
	Log(Town-level deaths)				
Pandemic	0.235***	0.267***			
	(0.018)	(0.017)			
Indian DO	-0.025	-0.005			
	(0.098)	(0.099)			
Pandemic × Indian DO		-0.159***	-0.149***	-0.153***	-0.160***
		(0.044)	(0.044)	(0.042)	(0.050)
Town FEs			Y	Y	Y
Year FEs			Y		
State × Year FEs				Y	Y
Sample		Full sample			Switcher
Observations	10,185	10,185	10,184	10,184	4,050

Notes: Unit of observation is the town-year. Dependent variable is the (log) total number of deaths reported in a given town and year. Indian DO is a dummy that is 1 if the district officer in 1918 is Indian and 0 if British. Pandemic is a dummy that is 1 in the years 1918 and 1919. Switcher (column 5) sample restricts the British districts to only those that ever had an Indian DO between 1910-1917. Sample uses coarse exact matching (Iacus et al., 2012) based on town-level population in 1911 and the average town-level death rates between 1900-1910. The sample is smaller as 189 towns cannot be matched. Standard errors are reported in parentheses and clustered at the district-level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A7: Characteristics of Indian vs. British district officers in 1918

	(1)	(2)	(3)
	District officers		
	British Mean	British-Indian	Obs
Tenure	21.37	1.908	203
	(1.419)		
BA degree	0.761	0.761	205
	(0.085)		
MA degree	0.195	0.036	205
	(0.081)		

Notes: Comparing individual-level characteristics of Indian vs. British district officers in 1918. Column 1 shows the mean for the British officers and column 2 reports the mean difference between Indian vs. British. Tenure is the years since entering the service; BA degree is a dummy that is 1 if the officer has obtained a bachelor's degree. MA degree is a dummy that is 1 if the officer has obtained a graduate degree. Robust standard errors in parentheses.

Table A8: Controlling for differential education and experience

	(1)	(2)	(3)	(4)
	Log(Town-level deaths)			
Indian DO × Pandemic	-0.142***	-0.138***	-0.126***	-0.120***
	(0.041)	(0.043)	(0.042)	(0.043)
Has BA degree		-0.015		-0.027
		(0.036)		(0.037)
Has MA degree		0.053		0.051
		(0.033)		(0.035)
Tenure × Pandemic			-0.004	-0.004
			(0.003)	(0.003)
Year FEs	Y	Y	Y	Y
Town FEs	Y	Y	Y	Y
Observations	14,714	14,218	13,910	13,910

Notes: Unit of observation is the town-year. Dependent variable is the (log) total number of deaths reported in a given town and year. Indian DO is a dummy that is 1 if the district officer in 1918 is Indian and 0 if British. Pandemic is a dummy that is 1 in the years 1918 and 1919. Column 2 controls for the interaction of having a BA or MA and the pandemic dummy. Column 3 controls for the interaction of experience with the pandemic dummy. Column 4 includes both sets of interactions. Standard errors clustered at the district-level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A9: Town-level mortality effects by newly appointed DOs

	(1)	(2)	(3)
	Log(Town-level deaths)		
Pandemic × Indian DO	-0.142***	-0.168***	-0.072
	(0.041)	(0.045)	(0.055)
Pandemic × Appointed Jan-July 1918		0.074**	0.124***
		(0.030)	(0.028)
Pandemic × Appointed Jan-July 1918 × Indian DO			-0.216***
			(0.077)
Total pandemic effect for		-0.094*	-0.164***
Indian DO=1 and Appointed Jan-July 1918=1		(0.051)	(0.051)
Town FEs	Y	Y	Y
Year FEs	Y	Y	Y
Observations	14,714	14,277	14,277

Notes: Unit of observation is the town-year. Dependent variable is the (log) total number of deaths reported in a given town and year. Indian DO is a dummy that is 1 if the district officer in 1918 is Indian and 0 if British. Pandemic is a dummy that is 1 in the years 1918 and 1919. Appointed Jan-July 1918 is a dummy that is 1 if the officer was appointed *just* before the pandemic hit between Jan-July 1918. In columns 2-3, the total pandemic effect is computed by summing all reported coefficients. Standard errors clustered at the district-level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A10: Hospital utilization, spending and relief measures

Panel A: Hospitals	(1)	(2)	(3)	(4)	(5)	(6)
	(Log) admissions			Beds	Death/Treat	Exp.
Indian DO	0.031	0.049				
	(0.068)	(0.064)				
Pandemic	0.005	0.002				
	(0.015)	(0.020)				
Pandemic × Indian DO		-0.015	-0.034	0.024	-0.223	-0.026
		(0.032)	(0.035)	(0.052)	(0.345)	(0.052)
Year FEs			Y	Y	Y	Y
District FEs			Y	Y	Y	Y
Sample			Bihar & Orissa, Madras			Madras
Observations	6,046	6,137	5,706	5,742	5,722	3,018
Panel B: Public works & Relief	(1)	(2)	(3)	(4)	(5)	(6)
		Public works employment (IHS)				Gratuitous relief (IHS)
Indian DO	0.210	-0.206	-0.206			
	(0.289)	(0.398)	(0.406)			
Pandemic	0.747***	0.587***				
	(0.151)	(0.183)				
Pandemic × Indian DO		0.512*	0.536*	0.552**	0.459**	0.939**
		(0.280)	(0.278)	(0.277)	(0.217)	(0.399)
Month × Year FEs			Y	Y	Y	Y
District FEs				Y	Y	Y
Division FEs × Post					Y	Y
Sample			Bombay & Central Provinces			
Observations	367	367	367	367	367	331

Notes: In **Panel A**, the unit of observation is the hospital-year, and the standard errors are clustered at the district-level. (Log) admissions is the (log) number of patients admitted to the hospital in a given year; beds is the number of in-patient beds; death/treat is the death-to-treated ratio; Exp. is the total expenditures of the hospital in a year. In **Panel B**, the unit of observation is the district-year. The dependent variables are computed using the inverse hyperbolic sine transformation to account for the large number of 0s. Public works employment is the number of individuals employed through public works. Gratuitous relief is the number of individuals in a district receiving relief materials like food and shelter. Indian DO is a dummy that is 1 if the district officer in 1918 is Indian and 0 if British. Pandemic is a dummy that is 1 in the years 1918 and 1919. Standard errors are computed using Wild boostrap SEs due to the small number of districts. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A11: Census population change - Indian vs. non-Indian district officer

	(1)	(2)	(3)	(4)	(5)
	Decadal population growth				
Mean of dep. var	0.0507	0.0507	0.0507	0.0362	0.0362
Indian DO	-0.021*	-0.040**	-0.043***		
	(0.011)	(0.016)	(0.015)		
Pandemic	-0.105***	-0.113***	-0.108***		
	(0.013)	(0.014)	(0.014)		
Indian DO × Pandemic		0.059*	0.056*	0.064**	0.054*
		(0.031)	(0.030)	(0.032)	(0.028)
State FEs			Y		
(Sub-district) tehsil FEs				Y	Y
Year FEs				Y	
State FEs × Year FEs					Y
Observations	2,646	2,646	2,646	2,084	2,084

Notes: Unit of observation is the sub-district unit (tehsil) - census round. The dependent variable is the (log) difference in population between two census rounds. Indian DO is a dummy that is 1 if the district officer in 1918 is Indian and 0 if British. Pandemic is a dummy that is 1 between the census rounds 1911 and 1921. See Appendix C for a detailed discussion of the results. Standard errors clustered at the district-level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A12: Town-level mortality effects - Bihar, Orissa and Madras

	(1)	(2)	(3)	(4)
	Log(Town-level deaths)			
Indian DO	-0.105		-0.182	
	(0.105)		(0.157)	
Pandemic	0.296***		0.286***	
	(0.018)		(0.024)	
Indian DO × Pandemic	-0.154***	-0.142***	-0.159**	-0.133*
	(0.042)	(0.041)	(0.073)	(0.072)
Town FEs		Y		Y
Year FEs		Y		Y
Sample	All provinces		Bihar, Orissa, Madras	
Observations	14,745	14,714	5,289	5,273

Notes: Unit of observation is the town-year. Dependent variable is the (log) total number of deaths reported in a given town and year. Indian DO is a dummy that is 1 if the district officer in 1918 is Indian and 0 if British. Pandemic is a dummy that is 1 in the years 1918 and 1919. Standard errors clustered at the district-level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A13: Town-level mortality effects - Division fixed effects

	(1)	(2)	(3)
	Log(Town-level deaths)		
Indian DO × Pandemic	-0.138***	-0.160***	-0.183***
	(0.038)	(0.038)	(0.056)
Town FEs	Y	Y	Y
Year FEs	Y	Y	Y
State × Year FEs	Y		
Division × Year FEs		Y	Y
Sample	Full sample		Switcher
Observations	14,714	14,703	5,211

Notes: Unit of observation is the town-year. Dependent variable is the (log) total number of deaths reported in a given town and year. Indian DO is a dummy that is 1 if the district officer in 1918 is Indian and 0 if British. Pandemic is a dummy that is 1 in the years 1918 and 1919. Standard errors clustered at the district-level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

B Data sources

Data source	Constructed variables
Provincial Civil Lists	ICS officer names, district assignments, education (BA/MA), years of experience
Sanitary reports	Town-level mortality, district-level mortality
Provincial census of India	Population, district area, number of towns, share of white population, share of urban population, share employed in industry, share born in same district, share born in Bombay province, share aged 20-40, share of Hindu population, share of Muslim population
Own calculation	Geolocation of towns and distances
Donaldson (2018)	District-level real income
Google Maps API	Elevation
Reports on civil hospitals and dispensaries	Hospitalization, capacity, treatment outcomes and expenditures
Famine Reports	Relief measures, public works employment
Commonwealth War Graves Commission	World War I casualties from India
Weather statistics	India Weather Review: Monthly Weather Report 1917, 1918

Notes: Data sources used for this study.

C Alternative measurement and effects beyond urban areas

The main results rely on reported deaths from the vital statistics. This may raise the potential concern that the results stem from misreporting. If, for example, Indian district officers are more likely to underreport deaths, the observed difference in mortality may only be an artifact of differential reporting and not reflect real effects. To address this, I complement the main results using census data.

Census data in British India is collected every ten years, with the pandemic falling between census rounds 1911 and 1921. The data is collected by the Census bureau, providing a measurement independent from the vital statistics which are collected by the Sanitary Commissioner. Furthermore, population levels are arguably less controversial than a flow variable

such as annual deaths. By 1921, 94% of the DOs have rotated out, further reducing the possibility and incentives for misreporting.

Another advantage of the census data is that it allows us to go beyond urban areas. In contrast to vital statistics, data on the population count is also available at the disaggregated tehsil level, allowing me to study the impact on rural areas. This is important as this is where the bulk of India's population resides. Rural areas are also harder to reach and control for the colonial administration. Furthermore, as most Indian DOs hail from elite urban backgrounds, it is also ex-ante unclear whether bureaucratic representation extends beyond urban areas. I digitized tehsil-level population data to repeat the exercise for the rounds 1901-1931, covering 1,262 tehsils.[19] To mirror the main econometric specification, I test for a difference in population growth between 1911 and 1921 when comparing towns under Indian vs. British DOs. For town i in district $J(i)$ and census year t, I estimate,

$$d_{it} \equiv \log y_{it} - \log y_{it-10} = \beta \times Indian_{J(i)} \times Pandemic_t + \theta_i + \tau_t + \varepsilon_{it} \tag{3}$$

Pandemic is a dummy that is 1 in 1921, the first census round after the pandemic, and 0 otherwise. If the observed mortality effects are real, one would expect the population decrease to be smaller in areas under Indian administrators ($\beta > 0$). Since the measurement occurs three years after the pandemic, however, the net effect will not only depend on differential mortality but also differences in post-pandemic fertility and migration. These may magnify or dampen the effect. The resulting estimates are thus likely to be relatively noisy. As before, the standard errors are clustered at the district-level, coinciding with the unit of assignment

[19] The relevant section is titled "Provincial Table I" and only available for the selected years.

for the district officers.

The census results are reported in Table A11. Consistent with the mortality effect of the pandemic, I find that the change in population – while averaging 5% over the entire sample period – is 10.5% points lower between 1911 and 1921, the decade the pandemic occurred (column 1). Consistent with the mortality effects, towns under Indian DOs experienced a smaller decline in population growth (column 2). While towns in districts administered by British DOs shrank on average by 11.3%, towns administered by Indian DOs only experienced stagnation. In the remaining column, I introduce tighter specifications. The population results, while expectedly noisier, suggest that misreporting is unlikely to be the driver of the mortality effect. The results also suggest that the reach of officers extended into rural areas.