It Takes A Village? Administrative Decentralization and Human Development*

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Abstract

We examine the human development consequences of administrative decentralization by exploiting differences in the timing of these reforms across Indian states. We find that devolution of the responsibility for health functions from state to local governments, without concomitant authority over personnel or taxation, results in a worsening of neonatal, infant and under-5 child mortality rates. Our results cannot be attributed to differential pre-trends or omitted variables bias, and are likely attributable to poorer provision of public health services. We also find lower rates of primary school completion in states that devolve education functions, but not functionaries or funds.

JEL codes: H77; H75; D73; H41

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1 Introduction

This paper examines the human development consequences of administrative decentralization. Administrative decentralization refers to the transfer of responsibility for providing public services from the central government and its agencies to sub-national or subordinate levels of government.[1] Administrative decentralization is distinct from fiscal decentralization, which involves the transfer of tax-and-spend powers to sub-national governments. It is also distinct from political decentralization, which refers to the extent to which local governments being directly elected by citizens.

Over 1970-2014, at least 123 countries have implemented administrative decentralization reforms (Tester, 2021). However, the development consequences of such reforms are ambiguous ex-ante. Devolving administrative authority to local governments can improve public service delivery because of better information availability, better knowledge of citizens' preferences or better monitoring capacity at the local level (World Bank, 2004; Bardhan and Mookherjee, 2006a). However, service delivery could worsen if state capacity is weaker at the local level, if local officials are more likely to be corrupt, if decentralization results in loss of economies of scale, or if local elites are more easily able to capture public resources (Oates, 1972; Smith, 1985; Besley and Coate, 2003; Bardhan and Mookherjee, 2005, 2006b). The empirical lit-

[1] Technically, administrative decentralization can occur via "deconcentration" to different levels of the central government, "delegation" to semi-autonomous bodies or "devolution" of authority to lower level governments. In a devolved system, local governments have clear and legally recognized geographical boundaries over which they exercise authority and within which they perform public functions (World Bank, 2001). We focus on administrative devolution in this paper, and will be using the terms "decentralization" and "devolution" interchangeably.

erature, reviewed in detail later, has documented both positive and negative consequences of administrative decentralization in different countries.

We examine a major decentralization reform in India, known as the *Panchayati Raj* Act, which was implemented via a constitutional amendment in 1993. India provides an important context for such a study because human development outcomes are generally poor (India was ranked 130 out of 189 countries in the U.N.'s Human Development Index in 2018), and part of the impetus for the 1993 legislation was to improve development outcomes (Chaudhuri, 2006). Many studies have established that India's poor human development outcomes are a result of poor quality or lack of effort in public service provision, rather than a lack of resources. A nationwide study from 2003 found that 40% of health service providers and 26% of teachers were absent on a typical working day (Chaudhury et al., 2006). Das et al. (2016) document substantially lower effort by public sector doctors in India, resulting in 83% of patient visits being to private doctors despite them being less qualified than public sector doctors. Prior studies in India and elsewhere have documented that better monitoring of public service providers results in improved service deliver (Björkman and Svensson, 2012; Duflo et al., 2012; Muralidharan et al., 2017, 2021). Administrative decentralization thus has the potential to improve human development outcomes via better monitoring and accountability of the public sector.

The *Panchayati Raj* Act provided for a comprehensive program of administrative, fiscal and political decentralization. States were required to set up a three-tier system of local government, comprising of village, intermediate and district level governance bodies. In terms of administrative decentralization, 29 functional areas were slated for devolution to these local government bodies, including control over education and public health facilities and

staff, water provision, sanitation and roads. For fiscal decentralization, states were to establish State Finance Commissions to provide recommendations on revenue-sharing arrangements and grants to these local government institutions. In terms of political decentralization, all members of these local bodies were to be directly elected by the people every five years, and at least one-third of all local council seats were to be filled by women.

To assess the effects of administrative decentralization, we put together new data on the state-level dates of *de facto* decentralization over the period 1990-2015, based upon a detailed reading of many official reports and documents. In particular, we track when states devolved administrative functions to local governments, and when they devolved the functionaries (namely the people tasked with performing or managing the functions). We then conduct a difference-in-difference estimation of the impact of decentralization on health and education outcomes, comparing each state to itself before and after devolution.

Our analysis yields two main results. First, while there were nationwide improvements in child health outcomes over this period, states that devolved health functions experienced significantly lower gains in neonatal, infant and under-5 child mortality compared to states that did not devolve health functions. Second, such worsening arises entirely from states that devolved health functions but did not devolve control over functionaries. For states where both functions and functionaries are devolved, we find no significant differences in child mortality rates between states that devolved and those that did not. We also find a similar result with regard to funds devolution: states that devolved functions but not the funds experienced a rise in child mortality, while states that devolved both funds and functions did not.

Our results are robust to a range of robustness tests, including the

inclusion of additional controls, checking for differential pre-trends and adjusting our estimates for heterogeneneous treatment effects across early and late adopters of devolution. We find many pieces of evidence that suggest that incomplete devolution results in a decline in the quality of public service provision. We document lower levels of prenatal care and immunization provision in states that devolved health functions but not functionaries, and we find that child mortality increases are highest among the poorest households, consistent with the idea that richer ones can afford private health care. Importantly, we find similar results for education, which was devolved at the same time as health. Primary school completion rates are lower among states that devolved only functions compared to states that did not devolve, while states that devolved functions and functionaries have similar outcomes to states that did not devolve. In contrast, middle school completion rates are higher for states that devolved functions and functionaries, but again no different for states that only devolved functions. Overall, our results suggest that devolving responsibility, without concomitant authority over personnel or funding autonomy, is detrimental for human development outcomes.

Recent difference-in-difference studies of country-specific decentralization reforms have found mixed results on its effects. For instance, Dahis and Szerman (2021) and Fleche (2021) document improvements in service delivery and subjective well-being in Brazil and Switzerland respectively, while Malesky et al. (2014) and Cassidy and Velayudhan (2022) find worse service delivery and economic growth in Vietnam and Indonesia. Prior cross-sectional or overtime studies also find varying results (Faguet, 2004; Galasso and Ravallion, 2004; Bardhan and Mookherjee, 2006c; Galiani et al., 2008; Khanna, 2015). We differ from all these previous studies by examining the exact processes involved in administrative decentralization rather than treating it as a uni-

fied package. We also go beyond the existing literature by documenting how the effects of administrative decentralization depend on the implementation of fiscal decentralization. Our approach is consistent with more recent work examining the mechanisms underlying decentralization. For instance, Dal Bó et al. (2021) document the informational advantage of subordinate levels of government.

The rest of the paper is structured as follows: Section 2 outlines the administrative decentralization reforms in India, Section 3 describes our data and Section 4 delineates our empirical strategy. Sections 5 and 6 document our results and Section 7 concludes.

2 Decentralization Reforms in India

2.1 India's *Panchayati Raj*

In April 1993, the 73$^{\text{rd}}$ and 74$^{\text{th}}$ amendments to the constitution of India came into force. These amendments, also known as the *Panchayati Raj* Acts, provided for a considerable degree of political, administrative and fiscal decentralization to local levels of government.[2] Each state was required to set up a three-tier system of local government, comprising village, intermediate and district level governance bodies, collectively known as *Panchayati Raj* institutions or PRIs. All members of these local bodies were to be directly elected by the people every five years, and the Act provided for the establishment of State Election Commissions to conduct such elections. States had the power to devolve 29 functional areas to PRIs, including services such as

[2]The 73$^{\text{rd}}$ Amendment applied to rural areas and the 74$^{\text{th}}$ amendment applied to urban local bodies.

water provision, sanitation, education, public health and roads, were to be devolved to these local government bodies (see Table A.1). The legislation called for State Finance Commissions to be periodically set up, which would provide recommendations on revenue-sharing and make grants to these local government institutions. Ghatak and Ghatak (2002) argue that prior to the 1990s, *panchayats* were generally ineffective, elections were not held regularly, and *panchayats* did not assume any active role in public service provision. A few states, most notably Maharashtra and Gujarat, did have effective *panchayats* and regular elections even prior to the 73rd Amendment. Bardhan and Mookherjee (2006) also highlight functioning *panchayats* in West Bengal dating to the late 1970s. However, all states had to modify their existing legislations along several dimensions to be in compliance with the *Panchayati Raj* Acts.

2.2 Progress of administrative decentralization

Most states amended or passed new *Panchayati Raj* Acts immediately in 1993 and 1994. These Acts called for the devolution of education and public health services, among others, to village *panchayats*, intermediate *panchayats* and district *panchayats*. Yet, these laws varied considerably in their specificity on the nature of such delegation. For example, Gujarat clearly specified the powers and duties for each of the three *panchayat* tiers in the education sector, with district *panchayats* being responsible for surveying and evaluating education activities, inspecting schools, and selecting text books; intermediate *panchayats* deciding primary school locations; and village *panchayats* promoting primary education, assisting with state compulsory education schemes and repairing school buildings. In contrast, states like Assam were much less spe-

cific, stating only that the "village *panchayats* may perform functions related to education."

Apart from a handful of states, there was little progress in actually devolving responsibility over public service provision to PRIs, with state health and education departments retaining control in most states (Chaudhuri, 2006). Disappointed with the slow and uneven pace of devolution, the central government began to advocate for states to move faster. The Ministry of *Panchayati Raj* became a separate ministry in May 2004 and took on a stronger advocacy role, coordinating regular conferences, commissioning studies, and publishing annual reports. The central Planning Commission published a report outlining the steps necessary for states to move towards full devolution (Government of India, 2006). This report asked states to conduct an activity mapping exercise for each devolved function that would unbundle the functions into "smaller units of work" and articulate the powers and duties vis-a-vis those smaller units to each *panchayat* tier, as was done in Gujarat's legislation. The report then encouraged states to pass executive orders operationalizing these activity mapping exercises. The report also highlighted that many states had not devolved the functionaries, i.e. made officials and employees fully accountable to local governments. Rather, public workers were still managed and monitored by their state-level departments. Moreover, very few states had delegated control of funds from state-level departments to the *panchayats*.

Based on our reading of states' activity mapping exercises for public health, we find that district *panchayats* typically coordinate participation and promotion of national and state health programs, pass information from lower levels of government to the state, and coordinate measures against epidemics and other infectious diseases. District and intermediate *panchayats* are also authorized to undertake surveys and reports, procure medicines and medical

equipment (e.g. X-ray machines), and promote various immunization and child welfare programs. In contrast, village *panchayats* help with the execution of specific public health programs, identify land for a health sub-centre, manage cleaning and latrine construction, stray dog control, removal of carcasses, and other such local functions. While there is some variation in the activity mapping across states, only a few states allowed *panchayats* to construct public health buildings, and it was observed that very few *panchayats* engaged in procuring medicines or equipment (John and Jacob, 2016) with Kerala being the exception.

With regard to education, the central government asked states to model their activity mapping exercise on Kerala.[3] Village panchayats in Kerala manage government pre-primary and primary schools including the maintenance of schools and monitoring of teachers. They also manage libraries and implement literacy programs. In other states such as Assam, village panchayats promote enrollment and attendance in primary school and monitor primary school teachers, while the intermediate panchayats manage the school buildings and the district panchayats oversee surveys and other educational programs. Such activity mapping exercises were not intended to be uniform across states. Rather, the central government wanted states to scope the appropriate duties for each level of government role depending on their situation.

2.3 Fiscal and political decentralization

Progress on fiscal decentralization has been very poor with local governments relying on higher levels of government for majority of their revenues. PRIs are funded from four sources: central grants based on the recommendations

[3]This is also true for other functions where Kerala was an early leader in activity mapping.

of the five-yearly Central Finance Commissions; funds from centrally sponsored schemes such as the National Rural Employment Guarantee program (NREGA); loans and grants from state governments based on the State Finance Commission recommendations; and their own sources of taxes and user fees on public services. Most local governments remain highly dependent on the state or central government for their revenues: as late as 2015, local governments generated only 8% of their revenues from their own sources of taxation and fees (Government of India, 2016a), compared to 6% in the 1990s (Government of India, 2000). Most accounts suggest PRIs have failed to expand their revenues because they change tax rates infrequently, they lack administrative capacity, they do not own productive assets and they are unable to charge user fees on state or central government properties (Government of India, 2016b).

Unlike administrative and fiscal decentralization, political decentralization has progressed the fastest, with elections eventually being conducted by all states, though there was considerable variation in the timing of elections across states (Iyer et al., 2012). As mentioned earlier, the political decentralization mandated one-third of all local council seats, and one-third of all local council head positions, to be filled by women. The effects of this gender quota have been examined by many prior studies, some of which find that women's political representation changes policy outcomes towards those preferred by women (Chattopadhyay and Duflo, 2004; Iyer et al., 2012), while others find no effect or even a lower efficiency of pro-poor targeting (Rajaraman and Gupta, 2012; Bardhan et al., 2010).[4] Starting in 2006, many states have increased the gender quota to one-half of all local council positions (Iyer

[4]Studies have also found that the gender quota led to improved attitudes towards women leaders after two electoral terms (Beaman et al., 2009) and higher aspirations and educational attainment of girls (Beaman et al., 2012).

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3 Data on Decentralization and Human Development

3.1 Dates of functions devolution

We code the progress of functions devolution by identifying the year when health and education functions were devolved (or not) to *panchayats* between 1993 and 2015. Our coding is based on a detailed reading of several different government publications and reports (see Table A.2), as well as consulting many state *Panchayati Raj* websites for specific government or executive orders. Our main indicator for functions devolution equals one for years in and after state governments conducted activity mapping exercises *and* passed government or executive orders to operationalize them. For some states, like Gujarat and Maharashtra, their *Panchayati Raj* legislations contained activity mapping provisions and the date of legislation served as the date of operationalization. For other states, the date of functions devolution is usually several years later than the passage of *Panchayati Raj* legislation. Our sources exhibit some ambiguity about the date of functions devolution in the case of Bihar and Rajasthan; while we use official sources to code the year of devolution, we verify that our results are not sensitive to recoding these dates.[5]

[5]For Bihar, official sources list the date of health devolution as 2014, but some descriptive accounts suggest that this may have happened as early as 2011. For Rajasthan, the official sources describe activity mapping and devolution in 2003, but field observations on select Rajasthani *panchayats* found that they were not performing any health functions (John and Jacob, 2016).

Our data reveals considerable variation in the timing of functions devolution (Table 1). Only a handful of states effectively devolved both health and education before 2000, and devolution activities increased after the publication of the Planning Commission report in 2006. Despite this progress, seven states (out of 25) had not devolved health functions as of 2015 and six had not devolved education. All but one state devolved education at the same time as health; in fact, many states devolved drinking water, family welfare and women and child development at the same time as well. So our estimates of the impact of health (or education) functions devolution should be interpreted as a result of the devolution of this larger policy bundle.

Why do dates of administrative decentralization vary across states? Based on the observed pattern, many factors appear to play a role including a prior history of well-functioning local governments (e.g. Gujarat and Maharashtra), party ideology (e.g. West Bengal and Kerala devolved when Communist parties were in power) and political factors such as intra-party competition (Bohlken, 2016)). As discussed earlier, nudges from the central government also appear to play a role, particularly after the 2006 Planning Commission report. In terms of our difference-in-difference analysis, factors such as a state's prior history or long-standing political institutions will be captured by the state fixed effects. Our estimates may be biased if the timing of devolution happens to be correlated with pre-existing trends in our outcome variables and/or the timing of administrative devolution is correlated with other budget or policy changes that also affect our outcomes. We will conduct several robustness tests to verify that this is not the case.

3.2 Dates of functionaries devolution

In addition to the year when functions were effectively devolved, we also code whether the devolution of functions was accompanied by any devolution of associated functionaries namely doctors, nurses, teachers and other public health and education workers. Full devolution of functionaries would, in theory, result in local bodies having the power to hire, monitor, sanction and fire public workers. This is not the case in any Indian state. Even in Kerala, a state with highly empowered local governments, *panchayats* cannot hire or fire doctors that are hired by separate state cadres and paid from state funds. However, *panchayats* in Kerala can monitor and sanction doctors, and have the authority to hire lower level public health workers such as ambulance drivers (John and Jacob, 2016).

Our data sources are less precise when it comes to the exact date of functionaries devolution. We only have information on whether states had devolved functionaries as of 2007 and whether they had devolved functionaries as of 2015 (Government of India, 2008, 2016a). Our coding proceeds as follows. For states that had devolved functionaries as of 2007 (only six states had), we code them as having devolved functionaries at the same time as health functions. For states that had devolved health functions but not functionaries in 2007, but were recorded as having devolved functionaries by 2015, we assign them a functionaries devolution date of 2008. For states that devolved health functions after 2007, and had devolved functionaries by 2015, we code them as having devolved functionaries at the same time as health functions. By this measure, 13 of the 18 states that had devolved health functions had also devolved health functionaries by 2015. We code the devolution of education functionaries in the same manner. Since most states devolved health

and education at the same time, and the data sources do not track functionaries of health and education separately, the functionaries devolution date for education closely mirrors that for health.

As a consistency check, we compare our coding of functionaries with other related measures. For example, the 2015-16 Devolution Report (Government of India, 2016b) reports the number of functionaries per 1000 population for all states in 2015. This includes both the local government's own functionaries such as the village *panchayat* secretary and functionaries transferred to local governments such as public health workers. The states that we code as having devolved functionaries reported 1.5 functionaries per 1000 population compared to 1.1 for states that we code as not having devolved functionaries.

3.3 Political and fiscal decentralization

We track the progress of political decentralization by coding the first year when the state conducted local council elections with the one-third gender quota, based on data from Iyer et al. (2012). Table 1 shows that political decentralization progressed much faster than administrative decentralization. By 2010, all states in our sample had implemented the gender quota.

Our data on funds devolution is limited. *Panchayats* in most states are empowered to collect taxes and charge user fees by legislation or government orders. Unfortunately, there is no uniform and consistent database of annual local government finances, a fact noted and bemoaned by multiple Central Finance Commissions. This makes it difficult to measure the extent of fiscal decentralization across states and over time. To measure PRI autonomy over funds, we therefore create an indicator for whether PRIs at any tier (district, intermediate or village) report collecting their own taxes. The 2015-16 Devo-

lution Report found that *panchayats* in only six states collected taxes as of 2015, with wide variation in the per capita amounts collected (Government of India, 2016b). All but one of these states also report PRIs collecting user fees.

State and central government funding of local governments account for over 90% of local government revenues, so we would need to ensure that our results on administrative devolution are not driven by concurrent changes in such funding sources. We therefore construct several approximate measures of such funding that go towards health and education outcomes or towards functioning of *panchayats*: annual per capita state government spending on health and education, a larger category of state social spending by the state (the sum of education, medical and public health, and water supply and sanitation), state government contributions to local bodies and *Panchayati Raj* institutions, and annual per capita measures of Central Finance Commission grants awarded to states for their local governments.[6]

Before concluding this section, we want to emphasize that our specific measures of effective devolution of public health and education are more precise than aggregate devolution indices constructed by different organizations and scholars alike beginning in the mid 2000s. This is because these indices combine facets of administrative, fiscal and political decentralization into a single index. As discussed earlier, these facets have proceeded at different speeds across Indian states and an aggregate index obscures such important variation. A second drawback is that the construction of these indices has changed from year to year with different organizations taking the lead between 2007

[6]In constructing this variable, we followed the recommendations noted in the chapter on local bodies pertaining to *Panchayati Raj* institutions in the 10^{th} to 13^{th} Central Finance Commission reports. Most of the five-year Finance Commissions use state population as the most important criterion in allocating such grants.

and 2015. In contrast, our measure of effective administrative decentralization captures the specific year in which a package of functions related to education and public health were devolved to *panchayats* through activity mapping exercises and related government orders.

3.4 Health outcomes

We obtained data on health outcomes from India's National Health and Family Survey (NFHS) of 2015-16, which is part of the widely used multi-country Demographic and Health Surveys. This survey asks retrospective data on birth outcomes and child health to women aged 15-49 at the time of the survey, enabling us to construct a detailed cohort-level dataset. The survey covers more than 568,000 households and over a million live births across all states of India.

We focus on child mortality as our main health outcome, for two reasons. First, infant mortality is a widely used measure of human development in both within-country and cross-country settings. Second, this outcome has the potential to be greatly affected by the functioning of the health system though channels such as providing pregnant mothers with information about proper nutrition and potential complications, providing services such as prenatal checkups and referrals to other health facilities and providing inputs such as prenatal vitamins and infant immunizations. Prior work in Uganda has shown that better monitoring of the public health facilities resulted in large declines in child mortality (Björkman and Svensson, 2012; Björkman-Nyqvist et al., 2017).

We compute child mortality outcomes at three early life stages: neonatal mortality is an indicator variable that equals one if a child died within the

first month of birth, infant mortality indicates whether a child died within the first year of birth and under-5 mortality indicates whether a child died within the first five years of birth. Note that these variables are conditional on the child completing the specified age e.g. under-5 mortality is not defined if the child was born less than five years prior to the survey. All of these variables display a decreasing secular trend over time (Figure A1).

Since these outcomes are conditional on a child being born, we also examine whether devolution is correlated with changes in the decision to give birth, and with changes in the sex of the child. For instance, if health facilities are dramatically improved as a result of devolution, more families may decide to conceive children and the resulting increase in demand for health services may in turn have a detrimental effect (Malhotra, 2019). Prior literature has also shown that greater in-utero stress, nutritional or otherwise, leads to more girl births (Waldron, 1983; Low, 2000; Gluckman and Hanson, 2005). To account for these possibilities, we also examine two additional outcomes, namely fertility (a dummy for whether a woman gave birth in a specific year) and a dummy for whether the child born was female.

Our estimation sample includes birth cohorts born between 1990 and 2016. We drop states where the 73$^{\text{rd}}$ Amendment was not applicable (Jammu and Kashmir, Meghalaya, Mizoram and Nagaland), as well as a few hill districts in the states of Assam, Manipur, Tripura and West Bengal where this amendment did not apply (Rural Local Bodies, 2014). In our final sample, we have 25 states that account for 95% of India's population, covering almost 1.1 million births over 26 birth cohorts (see Table A.3 for summary statistics).

The NFHS surveys also ask questions about prenatal care provision and immunization status of all births in the previous three or five years. To construct a partial panel of such variables over time, we pool together four

waves of NFHS surveys.[7] We track the following prenatal care outcomes: whether a mother had three or more prenatal health visits over the course of her pregnancy, whether a tetanus shot was provided and whether iron supplements were provided. We also track the immunization status of all children over the age of 12 months, who are required to have at least eight vaccinations in their first year of life (three polio shots, three shots of DPT and one each of BCG and measles vaccines). We construct indicators of whether the child had no vaccines, had at least one vaccine or was fully vaccinated.

3.5 Education outcomes

We use the 75th round of the National Sample Survey (NSS) conducted between July 2017-June 2018 to code the education outcomes. The NSS is a nationally representative survey of more than 500,000 individuals from 113,757 households across all Indian states. Our two main outcomes are primary school completion and middle school completion, since the devolution reform specified devolution of primary and middle schools in the 11th Schedule. Typically, students are enrolled in primary education from ages 6 to 10, and in middle school (grades 6-8) from ages 11 to 13. To allow for any potential delays in school enrolment and progression, we restrict our sample to individuals in ages 14 and above (for primary school completion) and to ages 17 and above (for middle school completion). Since there have been large secular increases in schooling across India over several decades (see Figure A.2), we exclude very old cohorts from our analysis by restricting to individuals aged 35 and below.

[7] The NFHS 1992-93 has these data on births in 1988-1993, NFHS 1998-99 covers births from 1996-1999, the NFHS 2005-06 has data for births in 2001-2006 and the NFHS 2015-16 covers births in 2010-2016.

4 Empirical Strategy

Our empirical strategy compares child mortality and education outcomes across birth cohorts that were exposed to devolution to those that were not. Variation in such exposure comes from the timing of devolution across different states. Our difference-in-differences (DiD) regression specification takes the following form:

$$Y_{ist} = \alpha_s + \delta_t + \beta * DEV_{st} + \mathbf{X_{ist}}\gamma + \epsilon_{ist} \tag{1}$$

where Y_{ist} is the health or education outcome of individual i born in state s and birth year t. As discussed earlier, our key health outcomes will be neonatal, infant and under-5 mortality.

Our main explanatory variable DEV_{st} is an indicator that equals one if the individual born in state s and year t is exposed to functions devolution. For health outcomes, this indicator equals one if the state has devolved health functions at least one year before the individual is born i.e. $DEV_{st} = 1$ if state s devolves health functions in year $t-1$ or earlier. We prefer this lagged specification, since devolution can affect child mortality outcomes via changes in effective prenatal care that takes place over the course of pregnancy.

For primary school completion and years of education, DEV_{st} equals one if state s has devolved education before the individual enters primary school i.e. in years $(t+5)$ or earlier. For middle school completion, DEV_{st} equals one if state s has devolved education functions in year $(t+11)$ or earlier. Note that these indicators measure whether an individual was exposed to devolution throughout their primary or middle school years. We can compute an alternative measure of partial exposure to devolution as indicators for whether their entire time in primary or middle school was subject to devo-

lution. The measure of partial exposure would equal one if state s devolved education functions prior to $(t+10)$ for primary school completion, and prior to $(t+14)$ for secondary school completion.

For both the child mortality and education regressions, α_s and δ_t are fixed effects for state s and birth year t respectively, that control for time-invariant state characteristics and annual factors that affect all states such as national policy changes. Such fixed effects control for events like national elections or the implementation of the National Rural Health Mission mentioned earlier. X_{ist} controls for characteristics of the individual or household that could affect health or education outcomes. For health outcomes, these include dummies for rural versus urban residence, caste and religion of the household, mother's age at birth, mother's birth year, education, age at marriage and height (as an indicator of the mother's nutritional and health history). We also control for the gender and birth order of child i in X_{ist}, since prior research has shown that health outcomes differ by birth order and gender (Jayachandran and Pande, 2017). For education outcomes, we control for gender, marital status, rural versus urban residence, indicators for caste and religion categories, and household income. Standard errors are clustered at the state level, since our main explanatory variable varies at the state level. Since we are restricted to only 25 states, we also report p-values using a wild bootstrap procedure.

To examine whether the impact of functions devolution depends on the status of functionaries devolution, we run the following interacted specification:

$$Y_{ist} = \alpha_s + \delta_t + \beta_1 DEV_{st} + \beta_2 DEV_{st} * FUNC_{st} + \mathbf{X_{ist}}\gamma + u_{ist} \qquad (2)$$

where DEV_{st} is as defined in equation (1) and $FUNC_{st}$ is defined similar to DEV_{st}, but using indicators for whether state s has devolved functionaries.

All other terms are the same as in equation (1). The coefficient β_1 therefore represents the impact of functions devolution without any devolution of functionaries, while β_2 reflects the additional impact of devolving functionaries in addition to functions. The total effect of devolution for states that devolved both functions and functionaries is therefore $\beta_1 + \beta_2$.

There are three potential threats to identification in our setting. First, this DiD approach assumes that states that devolved health functions would, in the absence of devolution, have had parallel child mortality trends to states that did not devolve health. Second, the timing of decentralization within states may be correlated with other economic or political factors that may independently affect our outcomes. Third, our estimator may be biased in the presence of heterogeneous treatment effects that vary across early versus late reformers. We examine all of these in detail in section 5.2.

5 Administrative Devolution and Health Outcomes

5.1 Devolving functions with and without functionaries

Our estimates from equation 1 show that the devolution of health functions from state to local governments results in increases in neonatal, infant and child mortality (Table 2, columns 1, 3, 5). The estimate for infant mortality is statistically significant at the 10% level of significance, while that for under-5 mortality is significant at the 5% level. P-values from a wild bootstrap procedure are shown in brackets below the standard errors in parantheses, and lead to similar conclusions regarding statistical significance.

This overall detrimental effect is entirely attributable to functions de-

volution that happens without functionaries devolution. The estimated β_1 coefficients from equation 2 indicate that such incomplete devolution increases neonatal mortality by 0.75 percentage points, infant mortality by 1.36 percentage points and under-5 mortality by 1.62 percentage points (Table 2, columns 2, 4 and 6). These are very large effects, corresponding to 19%, 25% and 24% of the sample means, and they are all statistically significant at the 1% level.

The estimated β_2 coefficients are negative, statistically significant and similar in magnitude to the β_1 coefficients. In other words, the combination of functions and functionaries devolution increases neonatal, infant and under-5 mortality by an insignificant 0.14, 0.38 and 0.6 percentage points respectively. We verify that the sum of the β_1 and β_2 coefficients is not statistically different from zero (see p-values in Table 2, columns 2, 4, 6). Our results suggest that administrative decentralization does not lead to improvements in health outcomes.

5.2 Robustness checks

We subject our results in Table 2 to a series of robustness checks; these are performed for the interacted specification of equation (2).

Differential pre-trends: To check whether health outcomes were trending differently in states that devolved, we plot year-by-year coefficients of the impact of devolution for five years before devolution and eight years after devolution in an "event-study" graph (Figure 1). For each of our outcomes, the left hand plot shows the estimated β_1 coefficients, while the right hand plot shows the estimated β_2 coefficients, while the vertical line represents the timing of devolution. We find, reassuringly, that neither of these coefficients is statistically significant in years prior to the functions or functionaries reforms,

while most of the post-reform coefficients are statistically different from zero. These significant effects can be discerned very quickly after the devolution date, and are very stable for several years after devolution i.e. our results on mortality increases are not simply due to temporary transition issues.

State- and time-varying omitted variables: We show that our results remain similar to the baseline results of Table 2 when we control for the timing of gender quota implementation (Table 3, columns 2, 4 and 6). This is important to verify since prior research has shown a strong role of women leaders in improving health and education outcomes (Bhalotra and Clots-Figueras, 2014; Brollo and Troiano, 2016). We show that the results remain very similar in magnitude and statistical significance when we control for state per-capita spending on the category of medical and public health services (Table 3, columns 1, 3 and 5). In additional results, we verify that other potentially important categories of state budgetary spending do not change with the implementation of administrative devolution. These include the broader category of social spending (education, public health, water and sanitation), per-capita transfers to local bodies and *Panchayati Raj* institutions and per-capita Central Finance Commission grants to local bodies (Table A.4). These results also highlight that administrative devolution was not correlated to changes in state budgetary priorities.

Recoding specific devolution dates: We examine sensitivity to recoding of devolution dates that we were unsure of (see section 3.1), namely recoding Bihar's devolution date to 2011 rather than 2014, recoding Rajasthan as "not devolved," and changing the date of functionaries devolution to three years ahead for the states where the documents did not clearly specify a date. All of these make little difference to the magnitude and significance of the β_1 coefficients; our β_2 coefficients are now slightly smaller in magnitude and

sometimes statistically insignificant; however, the sum $\beta_1 + \beta_2$ is still statistically indistinguishable from zero (Table A.5). This means that our substantive conclusions regarding the impact of devolution remain unchanged by such recoding.

Changing the estimation sample: We rerun our base specification after dropping families that report moving to their current area of residence after the child was conceived, or were recorded as visitors at the time of the survey.[8] This helps address the potential concern that families may migrate in response to better or worse quality of public services, as shown in some other settings (Urqiola, 2005). Our β_1 and β_2 coefficients retain their size and significance for all three child mortality outcomes even with this restriction (Table A.6, columns 1, 3 and 5). To rule out the concern that different types of households may choose to give birth before and after devolution, we rerun our regression with mother fixed effects, which effectively controls for any time invariant unobservable differences across mothers that could be correlated with a child's health outcomes.[9] While the estimated coefficients estimates are slightly smaller in magnitude, they remain statistically significant (Table A.6, columns 2, 4 and 6). We further verify that our results are not being driven by any one state being an outlier. We re-run our main regressions, dropping one state at a time, and the coefficients are all within a relatively narrow band (Figure A.3).

Heterogeneous treatment effects across early and late devo-

[8]Most migration in India is within-state, so that even if households have moved, they would still have been subject to the state's devolution reforms. The data do not allow us to distinguish between within-state and cross-state migrants, so that this restriction is likely to be more conservative than needed.

[9]We do not include any background characteristics of the mother in these specifications because they are captured by the mother fixed effects.

lutions: The DiD estimator is a weighted average of several different comparisons of "treated" units with "not-yet-treated" units and with "already treated" units. If states that devolve early have a different treatment effect than those that devolve later, then some of these comparisons may be entering with negative weights and thereby leading to a biased and misleading DiD coefficient (de Chaisemartin and D'Haultfoeuille, 2020; Goodman-Bacon, 2021). To assess the validity of this concern, we first present our DiD estimates (based on equation 1) separately for the sample of states that did not devolve functionaries and for those that did, as recommended by (de Chaisemartin and D'Haultfoeuille, 2020).[10] The results are shown in Table 4, panel A, and are consistent with those of Table 2: Incomplete devolution of functions leads to significantly worse child health outcomes across all three measures of child mortality (columns 1, 3, 5), while devolving functions and functionaries has no significant effect on child mortality outcomes (columns 2, 4, 6). Examining the weights involved in computing these DiD estimators, we find that the sum of the negative weights in any of these specifications is a maximum of 0.13 (out of a total of 1). We conclude that heterogeneous treatment effects by state are unlikely to be a source of bias in our data.

We also construct two alternative DiD estimators, as suggested by the recent literature. The first is based on de Chaisemartin and D'Haultfoeuille (2020), and compares outcomes from period (*t-1*) to period t (date of devolution) between groups that switch from untreated to treated with groups that are untreated at both dates (the "instantaneous" effect). A modified version of this compares the outcomes from period (*t-1*) to period (*t+6*), the sixth dy-

[10] In these specifications, we do not exploit the temporal variation in the timing of functionary devolution. Rather, we code an indicator for one if a state ever had functionary devolution.

namic effect. Reassuringly, we find consistent results across the standard DiD estimates in panel A of Table 4 and the de Chaisemartin and D'Haultfoeuille (2020) estimates in panel B. In both cases, devolution of health functions without functionaries increases neonatal, infant and under 5 mortality. The estimates are of comparable statistical significance, although some of the "instantaneous" effects lose statistical significance.

The second alternative DiD estimator is constructed using only the "not-yet-treated" units as the control group (Callaway and Sant'Anna, 2021; Sun and Abraham, 2021). For ease of computation, we pool the data to the state-birth year level and run weighted regressions using counts of individuals in each state-birth year as weights. These alternative estimators are similar in sign and significance for states that devolved functions but not functionaries, showing a rise in all three measures of child mortality (panel C, columns 1, 3, 5). This alternative DiD estimator shows increases in infant and under-5 mortality even for states that did devolve both functions and functionaries (panel C, columns 4 and 6).

5.3 Impact of fiscal decentralization

As discussed earlier, we do not have data on the timing of funds decentralization. We therefore show results separately for the states that had some funds decentralization (proxied by whether PRIs in the state report collecting any own taxes) and states that had no funds decentralization. Among states states with some funds decentralization, neither functions nor functionaries devolution is associated with a significant rise in child mortality rates (Table A.7, columns 1, 3 and 5). However, for states that had no funds decentralization, we see a significant rise in child mortality rates when health functions are de-

volved, which is reversed when functionaries are also devolved (columns 2, 4 and 6). This strongly suggests that building the capacity of local governance institutions, via strengthening their financial ability to raise revenues and/or supervisory authority, should be strongly emphasized in decentralization initiatives.

6 The Role of Public Service Delivery

6.1 Measures of health service provision

We first verify that the deterioration of child mortality outcomes is not driven by increased fertility in response to devolution (which may increase the burden on public health facilities), or by a changing gender mix of children (since male children are typically more fragile at very young ages). This is also an important check to perform, since child mortality outcomes are conditional on the birth of a child. In fact, we find that devolution of functions and functionaries results in significant decline in fertility, while devolution of functions alone has no effect (Table A.8, columns 1 and 2). This is consistent with better public health provision, which includes providing information about family planning and access to contraception. There is no significant effect of devolution on the probability of the child being a girl (Table A.8, columns 3 and 4).

Using direct measures of prenatal care provision, as well as indicators of child immunization, we show that devolution of health functions, without functionaries devolution, results in worse service delivery. Pregnant mothers in states with incomplete devolution are significantly less likely to be provided tetanus shots and their children are more likely to be unvaccinated (Table 5, columns 2 and 4). In both cases, these negative effects are reversed for states

that additionally devolved functionaries. Note that these regressions are not a full cohort level panel due to data constraints described in section 3.

6.2 Differential effects by gender and wealth

Many previous studies have documented the high degree of son preference in India and consequently, the fact that girl children are often more neglected than boys (see, among others, Jayachandran and Kuziemko, 2011). It is therefore important to examine whether child mortality of girls suffers more than that of boys when there is a decline in the efficiency of public health functioning. In the case of administrative devolution, the patterns are mostly similar for boys and girls (Table A.9). The estimated coefficients for β_1 and β_2 are larger in magnitude for girls across the three health outcomes, though they are not statistically different from those of boys. This is consistent with girls' mortality rates being more responsive to public health service quality, as families may be more willing to spend on private health care for boys.

A second dimension of heterogeneity may arise from household resources. Poorer households are likely to be more dependent on the public health system, while richer ones have the option to pay for private health care if public services deteriorate. We therefore examine whether administrative devolution has larger effects on poorer households, by running separate regressions for households in each of five wealth quintiles. As expected, we find that both the β_1 and the β_2 coefficients are higher for poorer households than for the richer ones, suggesting that poorer households are more affected by both devolution of functions and the devolution of functionaries (Table A.10).

6.3 Administrative devolution and education outcomes

Our analysis of primary school completion rates yields results very similar to those on child mortality. Primary school completion decreases among states that devolve education functions (Table 6, column 1). This negative effect is completely driven by states that only devolved functions and not functionaries; these states experience a 4.2 percentage point decline in primary school completion, corresponding to 4.6% of the sample mean. Among states that devolved both functions and functionaries we observe no difference in primary school completion compared to states that did not devolve (column 2).

We find slightly different results in the case of middle school completion. Middle school completion is no different among states that just devolved education functions without functionaries compared to those that did not. But, middle school completion is higher by 5.5 percentage points among states that devolved both functions and functionaries, corresponding to 7% of the sample mean (Table 6, column 4).

As for health outcomes, the results on primary and middle school completion are robust to controlling for per capita state spending on education (Table A.11, columns 1 and 4), as well as controlling for the timing of political decentralization (columns 2 and 5). The results are also similar if we use a "partial exposure" to devolution measure, which equals one if a state devolved at any time during a child's tenure in primary school; our original DEV measure equaled one if devolution happened before the child started primary school. The result with the partial exposure measure are shown in Table A.11, columns 3 and 6.

The education results show similar patterns of heterogeneity as the mortality ones, bolstering our conclusion that the main mechanism is a worsening

of public service delivery under incomplete devolution. When we look at the association iwth funds devolution, we see that there are no negative effects of devolving functions or functionaries in states where local governments collected at least some taxes on their own (Table A.12, column 1). But, devolving functions without associated functionaries and funds leads to lower primary school completion (column 2). In the case of middle school completion, we find that states that devolved both functions and functionaries do better regardless of whether they devolved funds. Local responsibility over functionaries seems to be an important driver of middle school completion.

Finally, examining heterogeneity by gender, we find significantly lower primary school completion for girls among states that just devolved education functions and not functionaries, and no significant impact on boys (Table A.13, columns 1 and 2). Both girls and boys experience higher middle school completion under complete devolution, with no improvement under partial devolution (columns 3 and 4). The coefficient for girls is almost twice as large as for boys, again consistent with the idea that girls' education is more dependent on public provision compared to boys.

7 Conclusions

We conduct the first analysis of the administrative devolution provisions of India's 73rd constitutional amendment. In contrast to prior studies on decentralization reforms, we examine the actual processes involved in administrative devolution, and find that these distinctions matter. In particular, devolution of health functions without devolution of either functionaries or funds results in a statistically significant increase in child mortality rates. The effects are somewhat higher for girl children and for children in poorer families. De-

volution of functions together with functionaries results in no net change in child mortality rates, suggesting that these reforms did not result in better functioning of the public health system in India.

Several pieces of evidence support the hypothesis that incomplete devolution results in a decline in the quality of public service provision. We find declines in the provision of prenatal care and immunization, and the effects are higher for poorer households and for girls. Since improving public service provision was one of the main drivers for the decentralization reforms in India, it is disappointing to find relatively little evidence of human development improvements as a result of these reforms, and particularly so for already disadvantaged groups. An important policy implication is that decentralization policies need to be implemented with care, and that separating responsibility from authority can be detrimental for human development. These results are important for academics and policymakers who seek to understand the conditions under which decentralization reforms can deliver better development outcomes.

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Table 1: Timing of Administrative and Political Devolution Across States

	Administrative Decentralization		Political Decentralization
	# of states devolved health	# of states devolved education	# of states held local elections with gender quota
Before 1993	0	0	4
1993	1	1	1
1994-1997	3	3	14
1998-2002	0	0	2
2003-2006	5	5	3
2007-2012	7	8	1
2013-2015	2	2	0
Not devolved as of 2015	7	6	0

Notes: See Table A2 for details of data sources. The 73rd amendment is not applicable to the states of Jammu & Kashmir, Meghalaya, Mizoram and Nagaland.

Table 2: Impact of Functions and Functionaries Devolution on Child Mortality

	(1)	(2)	(3)	(4)	(5)	(6)
	Neonatal Mortality		Infant Mortality		Under 5 Mortality	
Devolved Health (β_1)	0.0034	0.0075***	0.0072*	0.0136***	0.0092**	0.0162***
	(0.0020)	(0.0019)	(0.0035)	(0.0029)	(0.0039)	(0.0034)
	[0.1313]	[0.0031]	[0.0805]	[0.0072]	[0.0452]	[0.0051]
Devolved Health * Devolved Functionaries (β_2)		-0.0061*		-0.0098**		-0.0102**
		(0.0030)		(0.0040)		(0.0044)
		[0.090]		[0.0640]		[0.1004]
$\beta_1 + \beta_2 = 0$ (p-value)		0.5834		0.3524		0.1756
$\beta_1 + \beta_2 = 0$ (p-value), wild bootstrap		[0.6295]		[0.9483]		[0.2227]
Mean of dep var	0.039		0.055		0.068	
Child Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mother Controls	Yes	Yes	Yes	Yes	Yes	Yes
Birth year and state FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,097,697	1,097,697	1,054,264	1,054,264	869,522	869,522

Notes: Robust standard errors clustered at the state-level in parentheses. p-value from wild bootstrap in brackets. *** p<0.01, ** p<0.05, * p<0.1. Child controls include indicator for girls and birth order fixed effects. Mother controls include indicators for Muslim, SC, ST, OBC, and rural, indicators for mother's education, mother's age at child birth and its square, mother's year of birth fixed effects, categorical variables for mother's height and age at marriage.

Table 3: Impact of Devolution on Child Mortality, Robustness Checks

	(1)	(2)	(3)	(4)	(5)	(6)
	Neonatal Mortality		Infant Mortality		Under 5 Mortality	
	Control for per-capita state health spending	Control for timing of political decentralization	Control for per-capita state health spending	Control for timing of political decentralization	Control for per-capita state health spending	Control for timing of political decentralization
Devolved Health (β_1)	0.0072***	0.0075***	0.0125***	0.0136***	0.0155***	0.0162***
	(0.0019)	(0.0019)	(0.0028)	(0.0028)	(0.0034)	(0.0034)
Devolved Health * Devolved Functionaries (β_2)	-0.0058*	-0.0062**	-0.0086**	-0.0100**	-0.0088*	-0.0101**
	(0.0030)	(0.0029)	(0.0042)	(0.0038)	(0.0047)	(0.0042)
$\beta_1 + \beta_2 = 0$ (p-value)	0.5602	0.6031	0.3178	0.3647	0.1123	0.1723
Mother and Child Controls	Yes	Yes	Yes	Yes	Yes	Yes
Birthyear and State FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,072,713	1,097,697	1,029,280	1,054,264	844,538	869,522

Notes: Robust standard errors clustered at the state-level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Child controls include indicator for girls and birth order fixed effects. Mother controls include indicators for Muslim, SC, ST, OBC, and rural, indicators for mother's education, mother's age at child birth and its square, mother's year of birth fixed effects, categorical variables for mother's height and age at marriage.

Table 4: Impact of Devolution on Child Mortality, Alternative DiD Estimators

	(1)	(2)	(3)	(4)	(5)	(6)
	Neonatal Mortality		Infant Mortality		Under 5 Mortality	
	Functionary = 0	Functionary = 1	Functionary = 0	Functionary = 1	Functionary = 0	Functionary = 1
	Panel A: DiD Estimator, Split Sample					
Devolved Health (β)	0.0062***	0.0003	0.0119***	0.0018	0.0132***	0.0040
	(0.0018)	(0.0018)	(0.0035)	(0.0027)	(0.0034)	(0.0028)
Birth year and state FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	511,135	586,562	490,975	563,289	405,326	464,196
	Panel B: de Chaisemartin and D'Haultfoeuille (2020) Estimator					
Devolved Health (β)	0.0047	0.0017	0.0073***	0.0027	0.0056	0.0027
Instantaneous treatment effect	(0.0029)	(0.0029)	(0.0021)	(0.0028)	(0.0037)	(0.0032)
Devolved Health	0.0049**	-0.0008	0.0090***	0.0012	0.0070***	0.0034
Average Dynamic Treatment Effect (6)	(0.0023)	(0.0024)	(0.0018)	(0.0030)	(0.0031)	(0.0028)
	Panel C: State-Birthyear, Callaway and Sant'Anna (2021)					
Devolved Health (β)	0.0056***	0.0002	0.0112***	0.0047*	0.0097***	0.0079***
	(0.0014)	(0.0021)	(0.0017)	(0.0024)	(0.0029)	(0.0027)

Notes: Standard errors in parantheses, clustered at state level (panels A, C and D) or bootstrapped with state level clustering (panel B) . *** p<0.01, ** p<0.05, * p<0.1. There are no controls included in these specifications, other than state and year fixed effects.

Table 5: Impact of Devolution on Health Care Provision

	(1)	(2)	(3)	(4)	(5)	(6)
	Indicators of prenatal care			Childrens' immunization		
	Three or more prenatal visits	Tetanus injection provided	Iron supplements provided	No vaccinations	Partially vaccinated	Fully vaccinated
Devolved Health (β_1)	0.0446	-0.146**	-0.0367	0.0590*	0.0191	-0.0781
	(0.0580)	(0.0678)	(0.0488)	(0.0334)	(0.0495)	(0.0791)
	[0.5960]	[0.0750]	[0.4992]	[0.1251]	[0.7214]	[0.3770]
Devolved Health * Devolved Functionaries (β_2)	-0.00515	0.0783	0.00169	-0.0421	-0.0423	0.0844
	(0.0675)	(0.0795)	(0.0496)	(0.0390)	(0.0481)	(0.0784)
	[0.9465]	[0.3989]	[0.9768]	[0.3445]	[0.4227]	[0.3355]
$\beta_1 + \beta_2 = 0$ (p-value)	0.3281	0.1467	0.1724	0.5797	0.4789	0.9066
$\beta_1 + \beta_2 = 0$ (p-value), wild bootstrap	[0.3884]	[0.2218]	[0.2223]	[0.6221]	[0.5014]	[0.9190]
Mean of dep var	0.575	0.847	0.712	0.125	0.342	0.533
Observations	252623	252744	253645	253101	253101	253101
Birth year and state FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors clustered at the state-level in parentheses. p-value from wild bootstrap in brackets. *** p<0.01, ** p<0.05, * p<0.1.

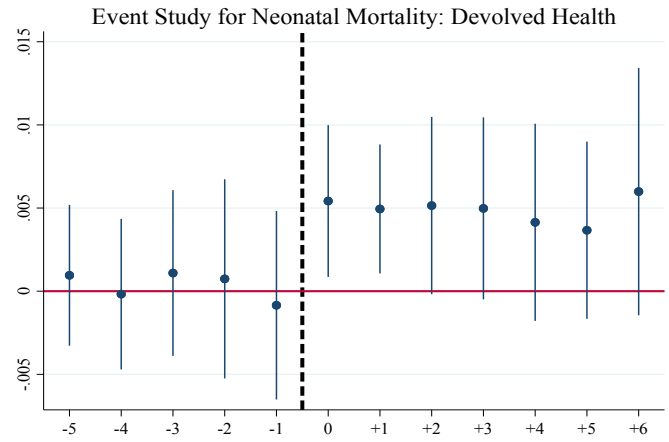
Table 6: Impact of Functions and Functionaries Devolution on School Completion

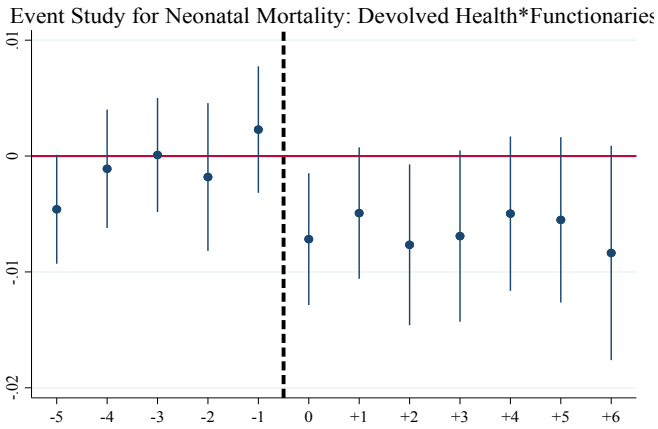
	(1)	(2)	(3)	(4)
	Primary School Completion		Middle School Completion	
Devolved Education (β_1)	-0.0276*	-0.0418**	0.0284*	-0.0160
	(0.0150)	(0.0163)	(0.0161)	(0.0173)
	[0.1083]	[0.0982]	[0.1161]	[0.3750]
Devolved Education * Devolved		0.0189		0.0707***
Functionaries (β_2)		(0.0227)		(0.0208)
		[0.5248]		[0.0106]
$\beta_1 + \beta_2 = 0$ (p-value)		0.2199		0.0029
$\beta_1 + \beta_2 = 0$ (p-value), wild bootstrap		[0.2847]		[0.0169]
Mean of dep var	0.901		0.805	
Individual and Family Controls	Yes	Yes	Yes	Yes
Birth year and state FE	Yes	Yes	Yes	Yes
Observations	177,516	177,516	149,239	149,239

Notes: Robust standard errors clustered at the state-level in parentheses. p-value from wild bootstrap in brackets. *** p<0.01, ** p<0.05, * p<0.1. Individual and family controls include indicators for gender, marital status, caste and religion categories, whether the household owns a computer, log of household's monthly income and indicator for rural households. An individual is exposed to decentralization if they are born at least 5 years prior to decentralization (for primary school) and at least 10 years prior to decentralization (for middle school). Sample is restricted to individuals aged 14 and above (for primary school completion) and those aged 17 and above (for middle school completion).

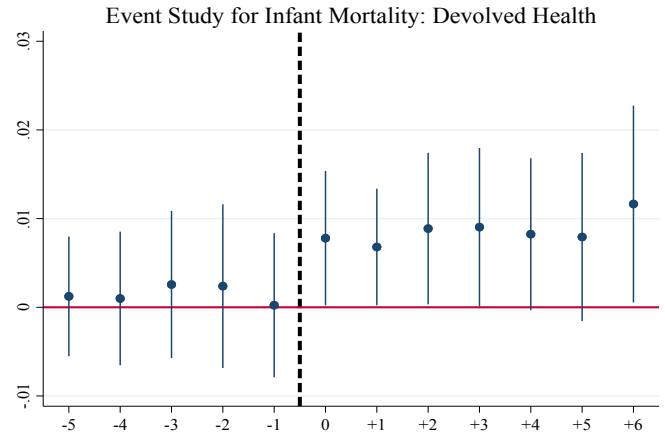
Figure 1: Year-by-year Effects of Administrative Decentralization on Child Mortality

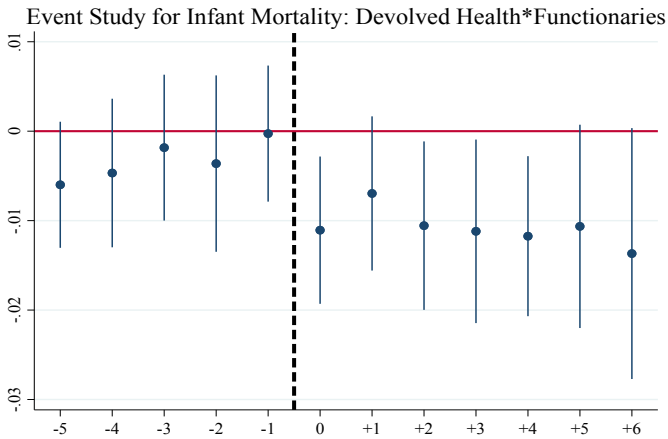
Panel A: Neonatal Mortality



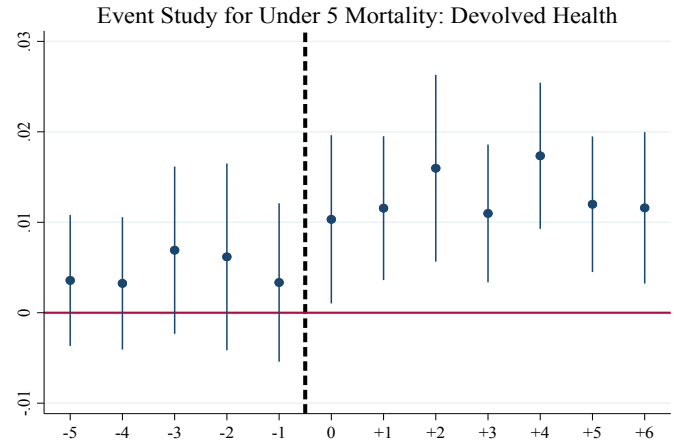


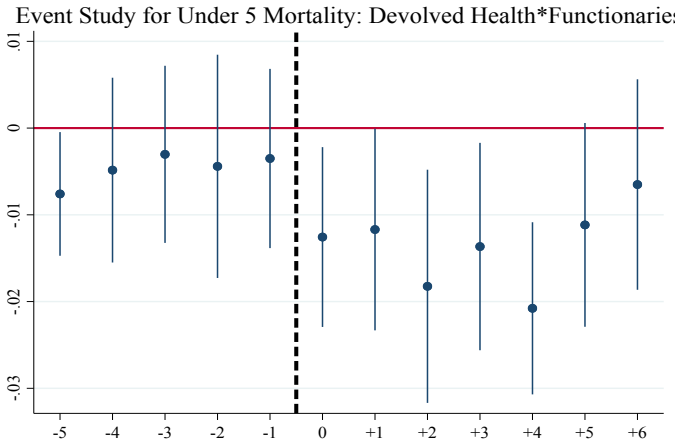
Panel B: Infant Mortality





Panel C: Under-5 Child Mortality





Figures on the left show the estimates β1 for each year before and after the functions devolution. Figures on the right show corresponding estimates β2 for each year before and after the devolution of functions and functionaries. Dashed vertical lines indicate the timing of the reform.

It Takes A Village? Administrative Devolution and Human Development

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Appendix Tables and Figures
July 2022

Table A.1: Devolution Areas Listed in the 11th Schedule of the Constitution of India

1. Agriculture including agricultural expansion
2. Land improvement & implementation of land reforms
3. Animal Husbandry, Dairying and poultry
4. Fisheries Industry
5. Minor irrigation, water management and watershed development
6. Social forestry and farm forestry
7. Small scale industries involving food processing
8. Minor forest produce
9. Safe water for drinking
10. Khadi, village and cottage industries
11. Rural housing
12. Fuel and fodder
13. Rural electrification, including distribution of electricity
14. Road, culverts, bridges, ferries, waterways and other means of communication
15. Education including primary and secondary schools
16. Non-conventional sources of energy
17. Technical training and vocational education
18. Adult and non-formal education
19. Public distribution system
20. Maintenance of community assets
21. Welfare of the weaker sections especially SC/ST
22. Social welfare, including welfare of the handicapped and mentally retarded
23. Family welfare
24. Women and child development
25. Markets and Fairs
26. Health and sanitation including hospitals, primary health centres and dispensaries
27. Cultural activities
28. Libraries
29. Poverty Alleviation Programmes

Notes: Obtained from https://www.jagranjosh.com/general-knowledge/list-of-subjects-covered-in-the-11th-schedule-of-the-indian-constitution-1510219894-1; accessed August 2021.

Table A.2: Data Sources

State legislation: Individual state *Panchayati Raj* Acts

Progress of administrative decentralization (functions, functionaries, funds): State profiles in *The State of Panchayats 2007-08* (Government of India, 2008); study commissioned by the Fourteenth Finance Commission (2014); Annual Report 2015-16 Ministry of Panchayati Raj (Government of India, 2016); *Devolution Report of 2015-16* (Government of India and Tata Institute of Social Sciences, 2016).

Executive orders: Department of *Panchayati Raj* websites of various states.

Progress of political decentralization: Iyer et al. (2012)

Table A.3: Summary Statistics, National Family Health Survey 2015-16

Variables	Obs	Mean	SD	Min	Max
Child mortality and birth outcomes					
Neo Mortality (child death in first month)	1,097,697	0.039	0.194	0	1
Infant Mortality (child death in first year)	1,054,264	0.055	0.228	0	1
Under 5 Mortality (child death in first five years)	869,522	0.068	0.251	0	1
Fertility (whether woman had any birth in that year)	10,017,968	0.109	0.311	0	1
Dummy for girl birth	1,102,907	0.475	0.499	0	1
Birth Order					
First birth	1,102,907	0.348	0.476	0	1
Second birth	1,102,907	0.294	0.456	0	1
Third birth	1,102,907	0.175	0.380	0	1
Fourth birth	1,102,907	0.093	0.290	0	1
Fifth or higher birth	1,102,907	0.089	0.285	0	1
Mother characteristics					
Muslim	1,102,907	0.14	0.34	0	1
Schedued Castes (SC)	1,102,907	0.20	0.40	0	1
Scheduled Tribes (ST)	1,102,907	0.14	0.35	0	1
Other Backward Castes (OBC)	1,102,907	0.43	0.49	0	1
Rural	1,102,907	0.76	0.43	0	1
Mother's age at birth of child	1,102,907	23.97	4.84	13	49
Education categories					
No education	1,102,907	0.47	0.50	0	1
Primary education	1,102,907	0.15	0.36	0	1
Secondary education	1,102,907	0.32	0.47	0	1
More than secondary	1,102,907	0.05	0.22	0	1
Mother height categories					
Less than 148 cm	1,102,907	0.24	0.43	0	1
Between 148 and 151 cm	1,102,907	0.25	0.43	0	1
Between 151 and 155	1,102,907	0.25	0.43	0	1
More than 155 cm	1,102,907	0.25	0.43	0	1
Missing	1,102,907	0.01	0.11	0	1

Mother's age at marriage categories					
Less than 15	1,102,907	0.15	0.36	0	1
15<=age married<18	1,102,907	0.33	0.47	0	1
18<=age married < 21	1,102,907	0.29	0.45	0	1
Age married >=21	1,102,907	0.23	0.42	0	1
Missing	1,102,907	0.05	0.21	0	1

Table A.5: Robustness of Results to Recoding Devolution Timing for Specific States

	(1)	(2)	(3)	(4)	(5)	(6)
	Neonatal Mortality		Infant Mortality		Under 5 Mortality	
	Recode Bihar date to 2011	Recode Rajasthan as "not devolved"	Recode Bihar date to 2011	Recode Rajasthan as "not devolved"	Recode Bihar date to 2011	Recode Rajasthan as "not devolved"
Devolved Health (β_1)	0.0075***	0.0075***	0.0136***	0.0136***	0.0162***	0.0163***
	(0.0019)	(0.0019)	(0.0029)	(0.0027)	(0.0034)	(0.0033)
Devolved Health * Devolved	-0.0061*	-0.0058	-0.0098**	-0.0085	-0.0102**	-0.0076
Functionaries (β_2)	(0.0030)	(0.0037)	(0.0040)	(0.0052)	(0.0044)	(0.0054)
Mother and Child Controls	Yes	Yes	Yes	Yes	Yes	Yes
Birth year FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,097,697	1,097,697	1,054,264	1,054,264	869,522	869,522

Notes: Robust standard errors clustered at the state-level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Child controls include indicator for girls and birth order fixed effects. Mother controls include indicators for Muslim, SC, ST, OBC, and rural, indicators for mother's education, mother's age at child birth and its square, mother's year of birth fixed effects, categorical variables for mother's height and age at marriage.

Table A.6: Devolution and Child Mortality, Robustness to Choice of Sample

	(1)	(2)	(3)	(4)	(5)	(6)
	Neonatal Mortality		Infant Mortality		Under 5 Mortality	
	Drop Visitors and Movers	Mother Fixed Effects	Drop Visitors and Movers	Mother Fixed Effects	Drop Visitors and Movers	Mother Fixed Effects
Devolved Health (β_1)	0.0063***	0.0078**	0.0127***	0.0097**	0.0154***	0.0112**
	(0.0015)	(0.0032)	(0.0022)	(0.0040)	(0.0026)	(0.0040)
Devolved Health * Devolved Functionaries (β_2)	-0.0056**	-0.0077**	-0.0099**	-0.0091*	-0.0109**	-0.0103*
	(0.0027)	(0.0036)	(0.0036)	(0.0048)	(0.0040)	(0.0056)
$\beta_1 + \beta_2 = 0$ (p-value)	0.7832	0.9609	0.4763	0.8934	0.2773	0.8454
Child Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mother Controls	Yes	No	Yes	No	Yes	No
Birth year FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	849,731	1,097,697	813,371	1,054,264	661,536	869,522

Notes: Robust standard errors clustered at the state-level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Child controls include indicator for girls and birth order fixed effects. Mother controls include indicators for Muslim, SC, ST, OBC, and rural, indicators for mother's education, mother's age at child birth and its square, mother's year of birth fixed effects, categorical variables for mother's height and age at marriage.

Table A.7: Does the Impact of Functions Devolution Vary with Funds Devolution?

	(1)	(2)	(3)	(4)	(5)	(6)
	Neonatal Mortality		Infant Mortality		Under 5 Mortality	
	Funds - Yes	Funds - No	Funds - Yes	Funds - No	Funds - Yes	Funds - No
Devolved Health (β_1)	0.0028	0.0091**	0.0038	0.0174***	0.0018	0.0227***
	(0.0025)	(0.0031)	(0.0026)	(0.0044)	(0.0030)	(0.0044)
Devolved Health * Devolved Functionaries (β_2)	-0.0033	-0.0113**	-0.0048	-0.0190***	-0.0017	-0.0223***
	(0.0030)	(0.0045)	(0.0033)	(0.0054)	(0.0038)	(0.0041)
$\beta_1 + \beta_2 = 0$ (p-value)	0.7858	0.4917	0.6382	0.7019	0.9498	0.8929
Controls, Birth year and State FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	298,455	799,242	286,709	767,555	236,540	632,982

Notes: Robust standard errors clustered at the state-level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Child controls include indicator for girls and birth order fixed effects. Mother controls include indicators for Muslim, SC, ST, OBC, and rural, indicators for mother's education, mother's age at child birth and its square, mother's year of birth fixed effects, categorical variables for mother's height and age at marriage.

Table A.8: Impact of Devolution on Fertility and Girl Births

	(1)	(2)	(3)	(4)
	Mother's Fertility		Girl Birth	
Devolved Health (β_1)	-0.0034	0.0064	-0.0008	0.0029
	(0.0072)	(0.0068)	(0.0026)	(0.0049)
Devolved Health * Devolved Functionaries (β_2)		-0.0142**		-0.0056
		(0.0062)		(0.0048)
Mother and Child Controls	No	No	Yes	Yes
Birth year FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Observations	10,017,968	10,017,968	1,102,907	1,102,907

Notes: Robust standard errors clustered at the state-level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Child controls are birth order fixed effects. Mother controls include indicators for Muslim, SC, ST, OBC, and rural, indicators for mother's education, mother's age at child birth and its square, mother's year of birth fixed effects, categorical variables for mother's height and age at marriage. Fertility regressions also control for time since the last birth.

Table A.9: Does Administrative Devolution Affect Boys and Girls Differently?

	(1)	(2)	(3)	(4)	(5)	(6)
	Neonatal Mortality		Infant Mortality		Under 5 Mortality	
	Girls	Boys	Girls	Boys	Girls	Boys
Devolved Health (β_1)	0.0069***	0.0078***	0.0142***	0.0130***	0.0175***	0.0150***
	(0.0016)	(0.0027)	(0.0031)	(0.0030)	(0.0038)	(0.0036)
Devolved Health * Devolved Functionaries (β_2)	-0.0065***	-0.0056	-0.0108**	-0.0087*	-0.0121**	-0.0084*
	(0.0022)	(0.0039)	(0.0040)	(0.0046)	(0.0052)	(0.0045)
$\beta_1 + \beta_2 = 0$ (p-value)	0.8632	0.4467	0.4754	0.3011	0.339	0.0938
Controls, Birth year and State FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	521,395	576,302	500,769	553,495	412,189	457,333

Notes: Robust standard errors clustered at the state-level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Child controls include indicator for girls and birth order fixed effects. Mother controls include indicators for Muslim, SC, ST, OBC, and rural, indicators for mother's education, mother's age at child birth and its square, mother's year of birth fixed effects, categorical variables for mother's height and age at

Table A.10: Does Administrative Decentralization Affect Poor and Rich Families Differently?

	(1)	(2)	(3)	(4)	(5)
	Wealth quintile 1 (poorest)	Wealth quintile 2	Wealth quintile 3	Wealth quintile 4	Wealth quintile 5 (richest)
			Panel A: Neonatal Mortality		
Devolved Health (β_1)	0.0062**	0.0064**	0.0055**	0.0035	0.0012
	(0.0025)	(0.0024)	(0.0025)	(0.0023)	(0.0014)
Devolved Health * Devolved	-0.0058	-0.0064**	-0.0066*	-0.0023	-0.0033**
Functionaries (β_2)	(0.0051)	(0.0030)	(0.0034)	(0.0025)	(0.0014)
Observations	290,149	255,509	216,200	182,810	153,029
			Panel B: Infant Mortality		
Devolved Health (β_1)	0.0155***	0.0125***	0.0083**	0.0059**	0.0035*
	(0.0029)	(0.0039)	(0.0036)	(0.0023)	(0.0017)
Devolved Health * Devolved	-0.0144***	-0.0110**	-0.0064	-0.0034	-0.0056***
Functionaries (β_2)	(0.0046)	(0.0043)	(0.0053)	(0.0025)	(0.0020)
Observations	278,339	245,409	207,567	175,762	147,187
			Panel C: Under 5 Mortality		
Devolved Health (β_1)	0.0106***	0.0154***	0.0116**	0.0081***	0.0041**
	(0.0036)	(0.0046)	(0.0050)	(0.0026)	(0.0016)
Devolved Health * Devolved	-0.0074	-0.0128***	-0.0070	-0.0023	-0.0036
Functionaries (β_2)	(0.0054)	(0.0044)	(0.0063)	(0.0029)	(0.0022)
Observations	225,807	202,786	171,979	145,749	123,201

Notes: Robust standard errors clustered at the state-level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Wealth quintiles are as recorded in the NFHS-4 survey. All regressions include birth year and state fixed effects, child controls and mother controls. Child controls include indicator for girls and birth order fixed effects. Mother controls include indicators for Muslim, SC, ST, OBC, and rural, indicators for mother's education, mother's age at child birth and its square, mother's year of birth fixed effects, categorical variables for mother's height and age at marriage.

Table A.11: Devolution and School Completion, Robustness Checks

	(1)	(2)	(3)	(4)	(5)	(6)
	Primary School Completion			Middle School Completion		
	Control for per-capita state education spending	Control for timing of political decentralization	Partial exposure to devolution	Control for per-capita state education spending	Control for timing of political decentralization	Partial exposure to devolution
Devolved Education (β_1)	-0.0311*	-0.0415**	-0.0280*	-0.0131	-0.0160	-0.0265
	(0.0166)	(0.0172)	(0.0154)	(0.0186)	(0.0173)	(0.0208)
Devolved Education * Devolved Functionaries (β_2)	0.0134	0.0183	0.0655***	0.0662**	0.0701***	0.0970***
	(0.0222)	(0.0233)	(0.0167)	(0.0242)	(0.0205)	(0.0235)
$\beta_1 + \beta_2 = 0$ (p-value)	0.2319	0.2026	0.0144	0.0024	0.0046	0.0040
Individual and Family Controls	Yes	Yes	Yes	Yes	Yes	Yes
Birth year and state FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	165,548	177516	177516	137271	149239	149239
R-squared						

Notes: Robust standard errors clustered at the state-level in parentheses. p-value from wild bootstrap in brackets. *** p<0.01, ** p<0.05, * p<0.1. Individual and family controls include indicators for gender, marital status, caste and religion categories, whether the household owns a computer and log of household's monthly income. An individual is exposed to decentralization if they are born at least 5 years prior to decentralization (for primary school) and at least 10 years prior to decentralization (for middle school). Sample is restricted to individuals aged 14 and above (for primary school completion) and those aged 17 and above (for middle school completion).

Table A.12: Devolution and School Completion, Does Funds Devolution Matter?

	(1)	(2)	(3)	(4)
	Primary School Completion		Middle School Completion	
	Funds -Yes	Funds - No	Funds -Yes	Funds - No
Devolved Education (β_1)	-0.0256	-0.0556**	-0.0121	-0.0207
	(0.0199)	(0.0231)	(0.0217)	(0.0237)
Devolved Education * Devolved Functionaries (β_2)	-0.00694	0.0793***	0.0847**	0.0658**
	(0.0208)	(0.0210)	(0.0288)	(0.0270)
$\beta_1 + \beta_2 = 0$ (p-value)	0.1366	0.0704	0.0036	0.0391
Controls, Birth year and State FE	Yes	Yes	Yes	Yes
Observations	71,199	106,317	60,694	88,545

Notes: Robust standard errors clustered at the state-level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individual and family controls include indicators for gender, marital status, caste and religion categories, whether the household owns a computer and log of household's monthly income. An individual is exposed to decentralization if they are born at least 5 years prior to decentralization (for primary school) and at least 10 years prior to decentralization (for middle school). Sample is restricted to individuals aged 14 and above (for primary school completion) and those aged 17 and above (for middle school completion).

Table A.13: Differential Effects on Boys vs Girls's Education

	(1)	(2)	(3)	(4)
	Primary School Completion		Middle School Completion	
	Girls	Boys	Girls	Boys
Devolved Education (β_1)	-0.0688***	-0.0167	-0.0312	0.000320
	(0.0237)	(0.0128)	(0.0226)	(0.0138)
Devolved Education * Devolved Functionaries (β_2)	0.0334	0.00379	0.0921***	0.0472***
	(0.0357)	(0.0145)	(0.0300)	(0.0150)
$\beta_1 + \beta_2 = 0$ (p-value)	0.2245	0.2961	0.0258	0.0009
Controls, Birth year and State FE	Yes	Yes	Yes	Yes
Observations	81,163	96,353	68,465	80,774

Notes: Robust standard errors clustered at the state-level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individual and family controls include indicators for gender, marital status, caste and religion categories, whether the household owns a computer and log of household's monthly income. An individual is exposed to decentralization if they are born at least 5 years prior to decentralization (for primary school) and at least 10 years prior to decentralization (for middle school). Sample is restricted to individuals aged 14 and above (for primary school completion) and those aged 17 and above (for middle school

Figure A.1: Child Mortality Outcomes

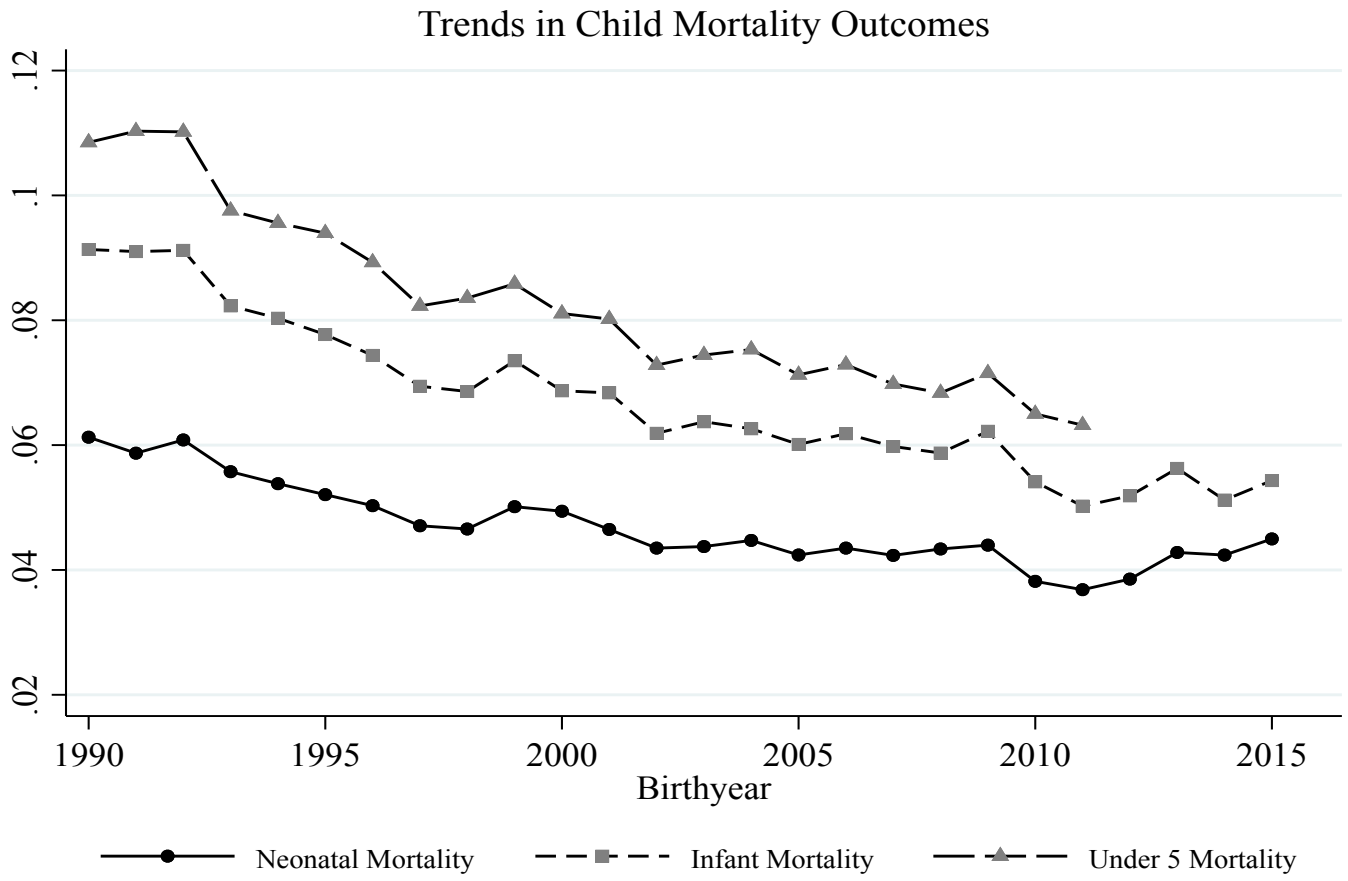


Figure A.2: Trends in School Completion Outcomes

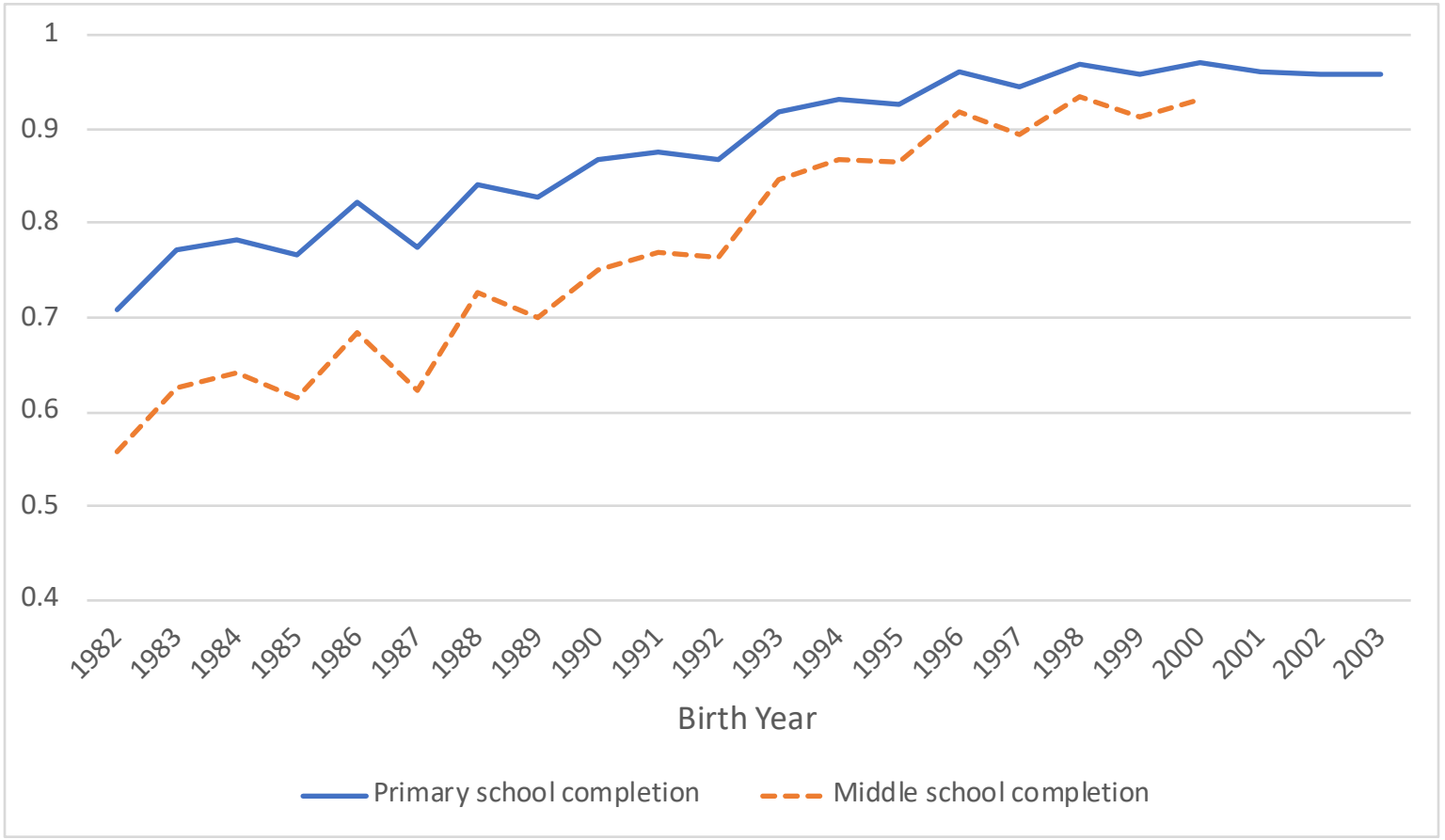
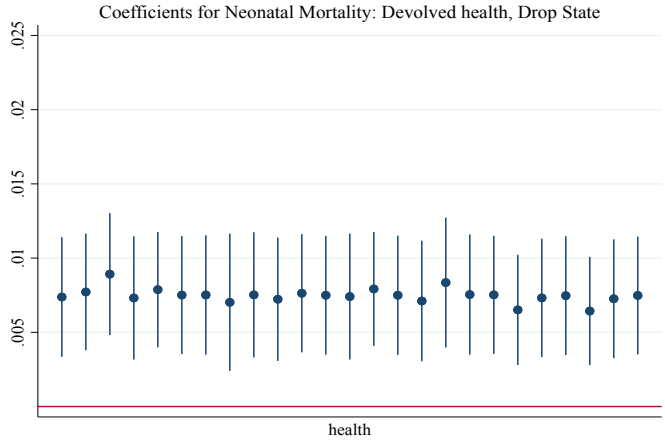
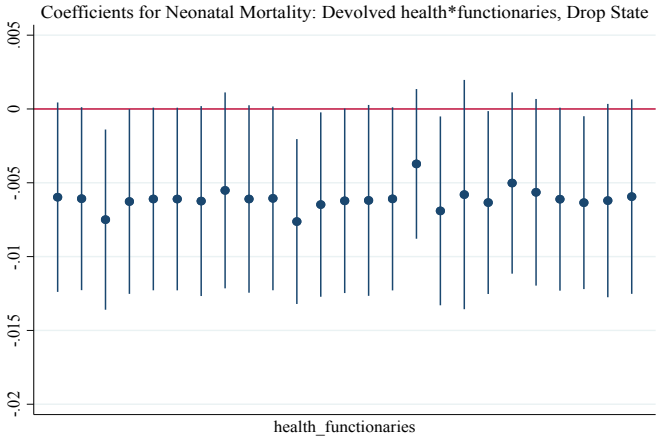


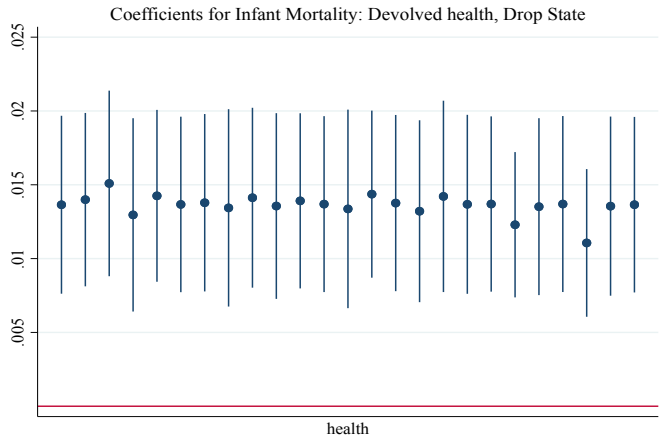
Figure A.3: Coefficients on Administrative Decentralization, Dropping One State at a Time

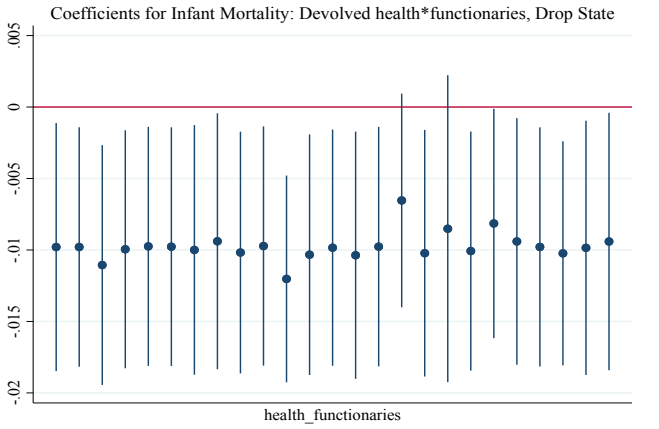
Panel A: Neonatal Mortality



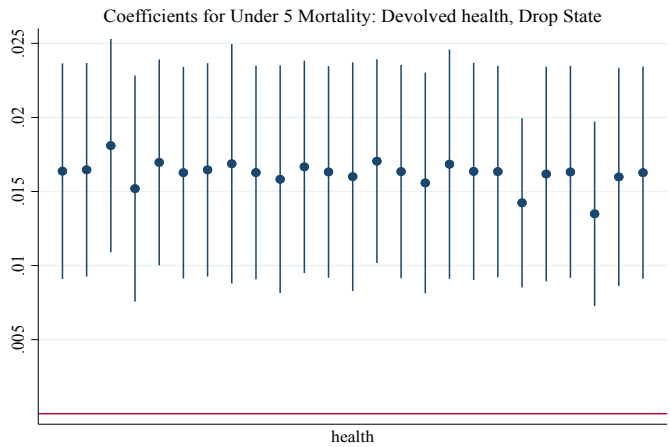


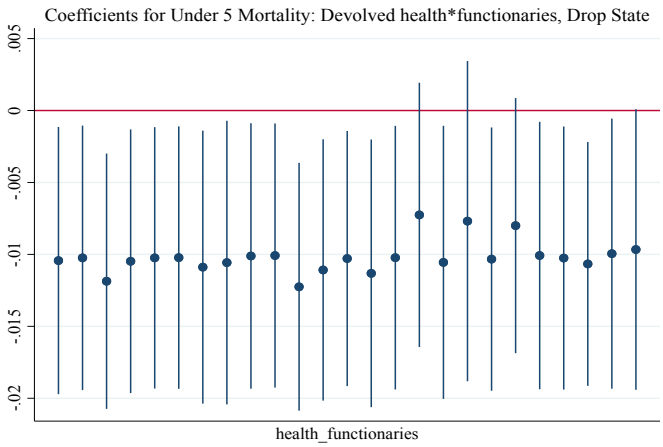
Panel B: Infant Mortality





Panel C: Under-5 Child Mortality





Figures on the left show the estimates β1 dropping one state at a time after the functions devolution. Figures on the right show corresponding estimates β2 for the devolution of functions and functionaries dropping one state at a time.