Slum Redevelopments and Evictions in a Developing Megacity

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Abstract

Slum redevelopment policies are widely used to curb slum growth and regenerate urban neighbourhoods. I study the short- and medium-term effects of slum clearance and redevelopment on incumbent slum residents in Mumbai by assembling a novel residential mobility panel that tracks ∼10 million residents of the city as they move across neighbourhoods over 15 years by digitising and matching electoral roll records. Exploiting variation in the timing of redevelopment approvals across slums, I use a staggered difference-in-differences design to estimate these effects. Slum residents who are entitled to in-situ compensation — ownership of an apartment in the redeveloped neighbourhood — are persistently displaced from the neighbourhood. Redevelopment approvals increase the probability of living in formal housing by 6 p.p., but the effect on the probability of living in other slums is four times as large, shifting slum residents across slum neighbourhoods more than out of slum living. Using digitised project records and high-resolution daytime satellite data, I document substantial non-completion after slum clearance and large lags between slum clearance and completion of units for slum residents. A key feature of the policy design is the timing mismatch between displacement and compensation: residents are cleared before receiving replacement housing, which is delivered only when units are built on the cleared site. Transitions out of slum living are 250% as large in completed projects and largest where completion occurs soon after clearance. For every individual housed in formal housing on site, an estimated 9.5 incumbent residents entitled to own an apartment in the redeveloped slum are displaced to slums elsewhere, undermining the broader goal of curbing slum growth in the city.

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1 Introduction

More than one billion people live in slums (UN-Habitat, 2024).[1] Slums feature extremely poor living conditions for inhabitants and potentially negative externalities to nearby neighbourhoods.[2] It has been argued that slums could very well be 'spatial poverty traps', mired in policy and coordination failures that hinder investment and unsanitary living conditions that erode human capital (Marx, Stoker, and Suri, 2013).[3]

The arguments against the proliferation of slums provide an equity and efficiency rationale for slum redevelopment, a widely used policy tool in developed countries in the past and developing countries today to curb slum growth and regenerate urban neighbourhoods.[4] Indeed, slum redevelopments can improve the housing quality in the redeveloped neighbourhood and generate positive spillovers to property values nearby (Collins and Shester (2013); Gertler, Gonzalez-Navarro, Undurraga, and Urrego (2024); LaVoice (2024)). These neighbourhood-level benefits must nonetheless be set against the distributional costs of redevelopment: incumbent residents bear the burden of displacement, and their movement into other slum neighbourhoods may constitute a mechanism through which city-wide slum growth is reinforced rather than reduced.

Despite the scale and prevalence of slum redevelopment as a policy instrument, empirical evidence on its effects on incumbent residents remains scarce. This gap is in large part a data scarcity problem: in developing country cities, the informal nature of slum settlements makes it challenging to track residents across neighbourhoods over time. I address this challenge by constructing a residential mobility panel for the city of Mumbai, digitising and matching more than 800,000 pages of electoral rolls spanning 15 years. I use this panel to estimate the short- and medium-term effects of redevelopment on the living conditions of the residents whose neighbourhoods are cleared, focusing primarily on in-situ redevelopment, under which

[1] UN-Habitat (2003) defines a 'slum household' as any household lacking access to improved water, improved sanitation, sufficient living area, durable housing, and secure tenure.

[2] Schall (1976) show that negative externalities in 'blighted' neighbourhoods and the resulting coordination problems require a coordinated 'big-push' policy to overcome these challenges.

[3] On the other hand, slums could potentially be a cheap stepping stone to opportunities in the city and eventually, better living conditions (the 'modernisation view') (Frankenhoff (1967); Glaeser (2012); Turner (1969); Bank (2009)).

[4] Slum clearance and redevelopment were a widely used policy tool to regenerate 'blighted' urban neighbourhoods in the late 19th and early 20th centuries in cities in developed countries (e.g. Title I of the Housing Act, 1949 was used to demolish slums across cities in the United States of America, the early slum clearances in London and Manchester date back to the Victorian Era, Haussmann's renovation of Paris in the 1850s launched by Emperor Napoleon III cleared slums in the city) and are now increasingly common in cities in developing countries from the late 20th century.

incumbent residents are entitled to ownership of an apartment on the redeveloped site as compensation.

The residential mobility panel tracks individual-level residential moves across granular neighbourhoods for the city's ∼10 million residents over a 15-year period. Slum redevelopment applications are matched to electoral rolls of the neighbourhood using redevelopment project documentation and individuals are then tracked across neighbourhoods in the city over time using electoral rolls. I combine these administrative data sources that I digitise with daytime satellite data to estimate these effects. The timing of redevelopment varied across slums, and eligibility to obtain an apartment in the redeveloped slum (in-situ compensation) of a slum household was based on their location of residence before policy announcement. My identification strategy leverages spatial variation in the timing of redevelopment approvals of slums to compare individuals in slums that were approved for redevelopment to individuals in slums that were later approved or never approved but were all conditionally approved for redevelopment in a *staggered difference-in-differences* design (Callaway and Sant'Anna, 2021).

In principle, because compensation is delivered as housing at the original site, in-situ redevelopment should preserve residents' location and social networks, reducing the costs of displacement, while the housing entitlement should increase transitions out of slum living. In practice, however, because replacement housing is built on the cleared site, eviction is immediate, while the asset arrives only if and when construction is completed. This gap may be particularly costly for poor slum residents, who may lack the savings to absorb the shock of eviction and can neither borrow against a delayed asset nor insure against the risk that it is never delivered.

The *Slum Rehabilitation Act* was passed in 1995 with the aim to make cities slum-free. The program was large in scope: more than 2 million residents of the city of Mumbai lived in notified slums alone and were eligible for this policy. All individuals who were resident in the slum before the policy was announced were legally guaranteed ownership of an apartment in the redeveloped slum neighbourhood. The policy featured immediate eviction, i.e. a negative mobility shock, and a positive formal housing asset shock once construction was completed for those resident in the slum before policy announcement. Slums were redeveloped by consent of slum residents who were in the slum before 1995. Slums were approved for redevelopment only with the consent of more than 70% of eligible slum residents, resulting in variation in the timing of redevelopment approvals from 1995 to 2025. The slum residents who moved in after the cutoff year were evicted without legal guarantees of compensation. Redevelopments were conducted and financed by pri-

vate developers, who were incentivised by regulatory accommodations that allowed them to (i) build above the statutory floor-area-ratio limits in their construction projects based on the built area of housing for slum residents; and, (ii) increase the area of land available for construction.[5] Importantly, all slum residents could freely choose where they live once evicted and were guaranteed ownership of the apartment in the redeveloped slum regardless of their choice of residence.

I assemble a panel dataset from 2007 to 2022 of all the individuals in slums that were redeveloped between 2007 and 2022 in Mumbai. I take advantage of the fact that redeveloped neighbourhoods were censused before redevelopment and that electoral rolls were used as proof of residence in the slum to identify the redeveloped slum and its inhabitants in the electoral roll. I track these individuals across years by matching electoral rolls over time using the rich identifying information in the electoral roll.[6]

Within each slum, I identify residents who would be eligible for an apartment in the redeveloped neighbourhood if redevelopment were approved, based on their electoral roll residence in 1995. I compare outcomes for these residents in slums approved for redevelopment to outcomes for eligible residents in slums that were approved later or never approved, using a staggered difference-in-differences design. The identifying assumption is that, absent redevelopment approval, outcomes for eligible residents in treated and comparison slums would have evolved in parallel.

The focus of this paper is on the effects on the living conditions of slum residents whose neighbourhoods were redeveloped, especially whether they continue to live in a slum neighbourhood, for the following reasons. First, slum redevelopment policies aim to curb slum growth in the city. However, displaced slum residents moving away to create a new slum or adding to the density of an existing slum elsewhere may simply shift slum population from one place to another, capturing an important channel for non-local (negative) spillovers from slum redevelopments. Second, slum status of the neighbourhood is of particular interest as slums, in addition to being poor quality neighbourhoods indicative of income status, may be 'spatial poverty traps' (Marx et al., 2013) that entrench their residents in poverty but can potentially be overcome with large enough transfers. Using granular data from the Socio Economic and Caste Census, I document that slum neighbourhoods have worse housing quality, worse public and private service provision in the city and

[5]Policies that mandate building affordable housing units are also common in megacities in developed countries e.g. London requires a third of all apartments built on subsidised land to be affordable housing units, New York requires one third of all new builds to be affordable housing units.

[6]The electoral roll contains each individual's full name, father's/husband's full name, age and gender by household, building/neighbourhood and election ward.

are poorer than formal neighbourhoods, suggesting that residents are significantly more likely to enjoy better housing quality, better service provision and live in richer neighbourhoods in formal neighbourhoods. Third, a large literature shows that neighbourhood quality matters for downstream outcomes more closely related to long-term welfare of slum residents such as children's human capital and earnings of adults (Chetty, Hendren, and Katz (2016); Chetty, Friedman, Hendren, Jones, and Porter (2026); Belchior, Gonzaga, and Ulyssea (2023)).

I document severe lags and non-completion in redevelopment. An estimated 66% of projects are never finished after the slum is approved for redevelopment. 37% of slums are cleared and never redeveloped. Conditional on completion, the average redevelopment duration is 6 years. Redevelopment approvals significantly increase the likelihood of slum clearance completion by 60 p.p. and redevelopment by 27 p.p. on average.

Redevelopment approvals significantly increase the probability that slum residents with the right to an apartment in the redeveloped slum are persistently displaced. They move to neighbourhoods within 2.4 kilometres from their original neighbourhood on average. For slum residents eligible to own an apartment in the redeveloped slum, redevelopment approval significantly increases their probability of living in a formal neighbourhood after approval by only 6 percentage points. This small increase in the probability of living in a formal neighbourhood is not driven by residents with the right to an apartment in the redeveloped slum occupying the units they own in the redeveloped slum but is instead fully driven by residents moving to formal neighbourhoods elsewhere. However, I show that residents are four times as likely to move to slum neighbourhoods elsewhere as they are to live in formal neighbourhoods anywhere in the city, undermining the goal of the policy to curb the growth of slums by expanding or densifying slums nearby. I show that this displacement effect is missed in local spillover analysis at the neighbourhood level.

Residents entitled to an apartment in the redeveloped slum are 22% less likely to live near their former neighbours following redevelopment approval than their control group, with the effect growing over time. There are no economically relevant effects on the distance to urban amenities and public and private infrastructure like hospitals, schools, parks and public transit stops for residents who receive the right to an apartment in the redeveloped slum. I document very low distance segregation between slum and formal neighbourhoods and low average distance to urban amenities in the city, consistent with the idea that formal neighbourhoods crowd in amenities to slum neighbourhoods when there is low distance segregation

between slum and formal neighbourhoods (Harari, 2024).

I combine very high-resolution daytime satellite data and digitised project documents to understand why these effects arise. The evidence points to the construction phase being a key constraint that reduces transitions out of slum living. The construction phase introduces a lag between eviction and asset compensation due to the time taken for construction, and uncertainty in construction completion creates uncertainty in both the likelihood and timing of compensation. Around 29% of slums are never cleared or redeveloped following approval. In 37% of cases, the slum is cleared and residents are evicted but the redevelopment is never completed — that is, the negative mobility shock is realised but the positive asset shock is never realised. All transitions out of slum living are driven by residents in slums that were both cleared and redeveloped. The lag between eviction and asset compensation also matters for transitions out of slum living. Long time-to-build is a feature of large real estate projects everywhere and particularly so in Mumbai, where the average time-to-build is 8.5 years (Gandhi, Tandel, Tabarrok, and Ravi, 2021).[7] Even though the average construction time for redevelopments in our sample is 6 years, all transitions out of slum living are driven by residents in projects completed in under 4 years. These results are consistent with the idea that credit-constrained slum households are unable to transfer resources from the good state in the future — in which the positive asset shock is realised — to the bad state today, in which the negative mobility shock occurs.

Ineligible residents in approved slums are more likely to have arrived later than ineligible residents in never approved slums. Due to differential tenure in the slum neighbourhood for this group, I control for tenure in the slum and under additional assumptions, show that redevelopment approvals had noisily estimated negative effects on the probability of moving out of slum living for ineligible residents, i.e. ineligible residents move from one slum to another and are likely to continue in slum living longer relative to residents who are not evicted. These results suggest that evictions are costly since residents who do not have a right to compensation move to slum neighbourhoods elsewhere and stay entrenched in slum living longer than their non-evicted counterparts.

At the site-level, redevelopment approvals lead to a large and significant decline in population in informal housing but only a small and significant increase in population housed in formal housing within the site. For every individual housed in an apartment in the redeveloped slum, 9.5 incumbent residents with the right to an

[7]The average construction duration for a multi-family apartment in the US, in comparison, is 37 months (https://www.census.gov/construction/c30/pdf/t324.pdf).

apartment in the redeveloped slum are displaced to slums elsewhere.

Taken together, these results show that even redevelopments that grant residents ownership rights to an on-site apartment can contribute to slum creation, densification, or expansion elsewhere by displacing incumbent slum residents. I show that the combination of immediate eviction and delayed and uncertain asset compensation that characterises slum redevelopments in which redeveloped apartments are provided as compensation drives down transitions out of slum living.

The findings point to a specific and addressable feature of policy design rather than a fundamental indictment of in-situ redevelopment as a policy instrument. The results suggest that it is the timing mismatch between the immediate shock of eviction and the delayed and uncertain delivery of compensation that drives the failure to transition residents out of slum living. Reducing this lag, through stricter enforcement of construction timelines, interim housing support, or phased demolition and construction, is therefore central to how effective in-situ redevelopment is in achieving its stated objective. Where private provision cannot be made sufficiently reliable, compensation mechanisms that decouple housing delivery from on-site construction may offer a more robust alternative.

Contribution to the Literature. This paper contributes primarily to the literature on the impacts of slum clearance and redevelopment policies. Because slum residents are difficult to track once their neighbourhoods are cleared, this literature has largely evaluated redevelopment at the level of places, estimating impacts on the redeveloped neighbourhood and spillovers to nearby areas (Schall (1976); Collins and Shester (2013); LaVoice (2024); Gertler et al. (2024)). A small number of recent papers follow the residents themselves, studying clearance with relocation: Rojas-Ampuero and Carrera (2025) document negative long-run effects of relocation to the periphery relative to on-site rehousing in Santiago, and Bryan, Franklin, Getahun, and Winton (2025) find positive short-run economic effects of eviction relative to remaining in central slums in Addis Ababa. A consistent finding in this literature is that the costs of displacement rise with distance: relocation disrupts social and labour-market networks (Barnhardt, Field, and Pande (2017); Rojas-Ampuero and Carrera (2025)), and demand for rehousing falls sharply with distance from the original neighbourhood (Franklin (2020)). In-situ redevelopments can, in principle, preserve location and networks while delivering the housing asset to incumbent residents. This paper provides, to my knowledge, the first estimates of the effects of in-situ redevelopments on incumbent residents relative to the counterfactual of remaining in the original slum. The results provide two insights for this literature. First, legal entitlement to on-site housing does not prevent perma-

nent displacement when non-completion and long construction times can separate eviction from delayed and uncertain compensation. Second, combining the resident-level and site-level estimates, I identify a channel for potential negative non-local spillovers that place-based evaluations miss: the number of incumbent residents displaced to slums elsewhere is nearly an order of magnitude larger than the number housed formally at the redeveloped site, driven largely by project non-completion.

This paper also contributes more broadly to the active literature on slum policies (a dated overview in Marx et al. (2013)). Marx et al. (2013) hypothesise that slums are spatial poverty traps that, unlike rural areas, respond little to marginal interventions and may need 'large push' interventions to generate aggregate demand spillovers. Slum policies range from marginal upgrades to slum neighbourhoods by providing small upgrades to slum tenements and public infrastructure and providing property rights to crowd in private investment to relocation of slum residents to public housing elsewhere in the city. Existing evidence on marginal upgrading and provision of property rights show that while effects on housing quality and slum residents are positive in the short run (Field, 2005), neighbourhood quality worsens in the long run compared to non-upgraded slums (Harari and Wong, 2025), supporting the idea that marginal improvements and property rights are not enough to sustain quality improvements and instead make low quality infrastructure more durable and exacerbate hold-up costs. It is not clear how much of their results are driven by sorting through forced evictions, i.e. the non-upgraded and squatter slums being redeveloped as a result of displacement of slum residents. However, Michaels, Nigmatulina, Rauch, Regan, Baruah, and Dahlstrand (2021) show that in Tanzania, providing marginal upgrades and property rights while planning neighbourhoods for motivated individuals in the 20th–60th income percentiles have positive long run effects on housing quality and that sorting by education only explains part of this effect.

At the other extreme of slum policies are 'big push' interventions that relocate (forcibly or otherwise) slum residents to apartment buildings in the suburbs. Here, the evidence shows that relocation to locations farther away is costly. Barnhardt et al. (2017) show that even motivated slum residents move out from formal apartments in the outskirts of the city procured using heavily subsidised loans, foregoing huge financial gains. Using survey evidence, they show that an absence of informal social networks is the most significant reason they move back to their previous slum neighbourhood, suggesting that intra-city migration costs are large for slum residents. Franklin (2020) shows that the take-up probability of relocation to apartments depends very strongly on distance to their previous neighbourhood and that

relocation to nearby apartments increase family incomes by boosting employment rates.

Conceptually, in-situ slum redevelopment combines attractive features of marginal upgrading and relocation policies, improved housing in the same place, but features potential displacement of slum residents. Similar to marginal upgrading policies, the policy provides housing on-site to eligible slum-residents but similar to relocation policies, it provides fully formal housing. Differently from both, slum residents are temporarily displaced during the construction phase. In comparison to Harari and Wong (2025) and other papers that study marginal upgrades to existing slums, this project analyses the short- and medium-term effects of a high-cost high-benefit upgrading on-site as, on the one hand, slum residents face eviction and uncertainty in the probability and timing of redevelopment completion, but on the other hand, they receive a large housing asset shock. In addition, because of the difficulties in tracking slum residents, most papers in the slum upgrading literature focus on effects on the neighbourhood which means that in principle, all effects could arise from sorting which may result in different welfare implications. I demonstrate a novel use of the electoral roll data to track slum residents across houses and neighbourhoods within the city over time to understand these mechanisms and to directly look at the effect on slum residents. In comparison to papers that study relocation to public housing elsewhere, I am able to disentangle the effects of displacement and the effect of fully formal housing that the design of those policies do not allow them to do. Importantly, different from the existing literature on slum upgrades, I study a policy that aims to redistribute the post-liberalisation growth in real estate prices to the lower part of the income distribution through incentivised private provision.[8]

A related literature studies the distributional effects of urban transformations (Balboni, Bryan, Morten, and Siddiqi (2020); Gechter and Tsivanidis (2023); Brummet and Reed (2021)). Gechter and Tsivanidis (2023) shows how redeveloping previously undeveloped land gentrifies nearby neighbourhoods by clearing slums but increases aggregate welfare in downtown Mumbai by increasing the supply of residential and commercial floorspace. I trace out how redeveloping existing slums affects mobility responses and living conditions of slum residents who were entitled to apartments in the redeveloped slum and how these responses, in turn, can be a channel through which the goal of the policy may be undermined.

More broadly, I contribute to the growing literature on slums in cities in the developing world (Bryan, Glaeser, and Tsivanidis (2020)), which studies the forces shaping the emergence and persistence of slums (Ferreira, Monge-Naranjo, and Tor-

[8] A famous policy slogan was: "If inequity has to be removed, there have to be unequal laws."

res de Mello Pereira (2025); Cavalcanti, Da Mata, and Santos (2019); Henderson, Regan, and Venables (2021); Gonzalez-Navarro and Undurraga (2025)). I contribute to this literature by studying the consequence of a common policy response to the proliferation of slums, slum redevelopment, on incumbent slum residents, highlighting a channel through which slum redevelopment may undermine the policy goal to reduce slum growth.

2 Background: Slum Redevelopments in Mumbai

The slum redevelopment policy was enacted in 1995 following the recommendations of the Afzalpulkar Committee constituted by the Government of Maharashtra. The aim of the policy was to make Mumbai 'slum-free' on the back of the post-liberalisation growth in the real estate market in Mumbai. Under the redevelopment policy, all slums that were recognised by the government until 1995 were eligible to be redeveloped. Occupants of the slum at the time of redevelopment who had been living in the slum since 1995, as indicated in the 1995 electoral roll, were eligible to receive a new apartment in the redeveloped slum neighbourhood. This requirement was later weakened to mandate either (i) their name in the 1995 electoral roll or (ii) possession of a paid electricity bill for that house in 1995, or (iii) a *gumasta* licence for an establishment operating from the slum. The apartments provided were one-bedroom apartments of at least 25 sq.m. with sanitation facilities, equivalent to a $60,000 asset shock based on current prices of these apartments in Mumbai. The households also received *property rights*, which included the right to mortgage and the right to sell after a lock-in period of 10 years.

The policy incentivised private developers to build 'formal' apartments for eligible slum residents in the location of their slum by providing transferable development rights in the form of higher floor space index over regulatory limits for every sq.m. of redevelopment housing built, i.e. redevelopments were fully cross-subsidised by apartments built for sale elsewhere using this incentive.

Slums could only be redeveloped by consent: the Slum Rehabilitation Authority had to be approached after the collective agreement of 70% of the eligible slum residents in a locality to be redeveloped. After a survey of households in the slum by the Slum Rehabilitation Authority and submission of proof of eligibility, the slum is conditionally approved to be redeveloped. However, not all conditionally approved slums are eventually approved for construction due to regulatory reasons. Regulation does not allow tall buildings within a certain radius of the coastline, waterbodies and the airport. The developer is required to provide transit accommodation in formal housing during redevelopment to eligible inhabitants as close

as possible to the original site. Once the slum is redeveloped, the developer can use/sell the offered transferable development rights. The redevelopment timeline is depicted in Figure 20.

The Slum Rehabilitation Authority received 5,055 redevelopment applications between 1995 and 2022 in Mumbai. Figure 2 shows the share of applications that passed each stage of the redevelopment process. Out of all the applications received, only 52% are conditionally approved. Out of applications that are conditionally approved, only 80% receive approvals for construction from the urban planning authority (this constitutes 41% of all redevelopment applications). The mean duration of redevelopment is 6 years conditional on completion, but the variance is large. Out of projects that are approved for construction, only 43% complete redevelopment by 2025.

Figure 3 shows the variation in the timing of approval over time. Figure 4 shows the geographical extent and expansion of the policy over time by median approval date. In Section 4, I discuss the characteristics of slums that reach each stage of redevelopment.

3 Data and Measurement

3.1 Data sources

In this section, I summarise the data collection process. I first construct a dataset of slum redevelopment applications, including land survey numbers, execution timelines and a census of inhabitants of the slum. I then construct an urban mobility panel at the individual-level that tracks adult members of each household in the city across neighbourhoods in the city over time by digitising and matching electoral rolls over time. The cadastral number information in the slum redevelopment applications is used to georeference slums and link redevelopments to daytime satellite data and other georeferenced administrative data sources. The slum census and the proof of eligibility submitted along with the redevelopment application is used to identify slum inhabitants in the electoral roll data and track them over time.

Slum Redevelopment Data. My dataset comprises the universe of Slum Redevelopment applications ever submitted. The Slum Rehabilitation Authority, Mumbai hosts the paper trail of all redevelopment applications from application to construction completion on its website.[9] From the paper trail of each slum redevelopment application, enumerators manually digitise the date of approval of redevelopment, commencement of construction as well as detailed information on

[9]Website of the Slum Rehabilitation Authority: https://dms.sra.gov.in/SRAPUBLIC/

the redevelopment programs: the name of the developer, date of approval, land parcel numbers to identify the location of the slum and redevelopment plans, and occupancy certificate to identify when the flats are ready to be occupied and a list of eligible households from a slum census conducted before approval as well as their electoral roll numbers in the 1995 electoral roll or a copy of the 1995 electoral roll for the neighbourhood. The paper trail of slum rehabilitation projects is publicly available for buyers to independently verify details about the building, for example, whether the building has the minimum age required for legally permissible sales of apartments in the building. Land parcel numbers are used to georeference slum polygons. Section A.4.1 provides detail on the slum redevelopment project documents and their digitisation.

Electoral Rolls. I use the electoral rolls to identify eligible households and in a novel application, track individuals across time using name data. The electoral roll contains the list of eligible voters for each election revised by extensive house-to-house listing of voting age individuals before every election.[10] The electoral rolls contain rich information using which individuals can be tracked over time: name, parents' names, age, gender, house number, neighbourhood/building name. The smallest geographical unit in an electoral roll is the building/neighbourhood, followed by electoral ward part and the electoral ward. The average neighbourhood contains 25 households. Names are arranged by house number within each building/neighbourhood in the electoral roll (see Figure A.4.2.2 and Figure A.4.2.1 for images of typical electoral rolls in various years). Details of the digitisation process are in Section A.4.2. I use computer vision and optical character recognition tools to digitise electoral rolls between 2007 and 2022 and create individual-level electoral data containing each individual's full name, their father's or spouse's name, age and gender, along with their neighbourhood name, election ward part number and election ward number. The 1995 electoral rolls are available as scanned pdfs. To extract data from scanned pdfs, I train an object detection model to detect the layout of each electoral roll and extract data from scanned electoral rolls. Neigh-

[10]Eligible voters are all citizens of India who are over 18 years of age on 1 January of the year of the election, ordinarily resident in the concerned constituency and not disqualified from voting according to the provisions of the Representation of the People Act, 1951. Determination of citizenship requires documentary evidence. Ordinary residence is defined by the Election Commission as the place an individual regularly sleeps at night: there is no minimum qualifying period for the determination of ordinary residence and mere ownership of a dwelling does not translate to ordinary residence. Students residing in a different constituency are allowed to opt to retain their residence with their parents. Acceptable proof of ordinary residence includes address stated in utility bills, passport, driving licence, income tax assessment, rent agreement, delivered postal mail (Election Commission, 2016). The election commission targets the census population numbers and each political party representative is given a copy of the draft electoral roll to cross-verify and facilitate enrollment.

bourhoods in the electoral roll are geocoded using the Google Maps Geocoding API. To validate the coverage of my data, I compare the coverage of the electoral roll with the Censuses in years in which Censuses are conducted. Relative to the approximate population more than 15 years of age in Census 2011, the coverage of the 2012 electoral roll is 103%.[11] In comparison, the coverage of the Socio Economic and Caste Census is 67%.

Socio Economic and Caste Census. The Socio Economic and Caste Census (SECC) 2012 describes the name, age, gender, education, occupation, and caste status for every household member, as well as a shortlist of assets used to rapidly assess socio-economic status. I digitise individual level data from SECC pdfs collected by Asher and Novosad (2020).

Spatial datasets on urban public infrastructure. The Unified District Information System for Education (DISE) dataset from the Ministry of Education is a dataset on schools in the city with their opening year, measures of school quality and addresses that are geocoded using the Google Maps API. Geolocated data on other urban public infrastructure such as hospitals, public transit stops, parks, etc. are obtained from the Brihanmumbai Municipal Corporation.

Cadastral maps. From the Land and Property Register of the Municipal Corporation, I obtain cadastral maps with land parcel numbers to create policy maps.

Daytime satellite data. I augment slum redevelopment timelines inferred from paper trails from the slum rehabilitation authority by independently collecting data on the timing of slum clearance and construction completion from georeferenced slum polygons using very high resolution daytime satellite data from 2012–2022 hosted on Google Earth.

3.2 Matching process

Constructing the residential mobility panel. The digitised electoral roll contains the full name, father's/husband's name, age and gender, along with the name of their neighbourhood, election ward part number and election ward number. I use the full name, father's name, age and gender across electoral rolls from different years to identify each individual across different electoral roll years. Importantly, matches are not conditioned on location or neighbourhood names to allow for mobility across neighbourhoods. I use a fuzzy string matching algorithm for names

[11] I compute the total number of individuals in Mumbai more than 15 years of age by multiplying the share of individuals more than 15 years of age in urban Maharashtra (the state in which Mumbai is in) with the total population of Mumbai.

to allow for optical character recognition errors. Individuals who leave the city leave this panel as the electoral rolls I use are those of the city of Mumbai. Out of the 9 million individuals in the 2007 electoral roll, 65% appear in the balanced panel, i.e. in all the years following redevelopment. The match rates are affected by optical character recognition errors in age. Note that measurement error from optical character recognition errors should be uncorrelated with treatment status and should not bias my estimates. Nevertheless, to limit panel attrition due to optical character recognition errors in age, I check robustness using a matching procedure that relies only on fuzzy matches in name and father's/spouse's name. I then weight observations by the inverse frequency of name combinations, assigning greater weight to more unique string combinations. This increases the match rate to 98%.

Identifying slums in redevelopment applications in the electoral roll data. Using the electoral roll data from 1995 from the policy documents, I identify the treated and control neighbourhoods and individuals in the electoral roll. The electoral rolls are linked to slum redevelopment data using voter rolls/ voter roll data submitted to the slum redevelopment authority at the time of application. Slum redevelopment applications contain a copy of the 1995 electoral roll. Before applications are conditionally approved by the Slum Rehabilitation Authority, a slum census is also conducted by the Authority to identify the eligible households in the slum. I use the name of the neighbourhood from the 1995 electoral roll and the list of eligible households to identify slums in the electoral roll in the earliest election year before conditional approval. I then track them across time using the residential mobility panel.

Identifying slum residents with right to compensation and without right to compensation. The electoral rolls, combined with the slum census and copies of 1995 electoral roll submitted along with the redevelopment application allow me to identify eligible slum residents. I define eligible residents (residents with right to compensation) in my dataset as those households that are in the slum in the electoral roll year before approval and in the 1995 electoral roll. The other households in the slum in the year before approval are defined as ineligible households (residents with no right to compensation). Note that the group that I define as ineligible may contain slum residents who were in the slum in 1995 but do not appear in the electoral roll (for example, those who arrived after house-listing) and may be able to prove their eligibility using the other proof of address they may submit as well as others who were not eligible for in-situ compensation who may or may not attempt to fabricate eligibility. Hence, I treat this group as the group

that is less likely to receive in-situ compensation.

Creating policy maps. To link spatial datasets to slum redevelopment applications, I use the cadastral maps to manually georeference the slums that applied for redevelopment using the cadastral map numbers provided in the application for redevelopment in the slum rehabilitation authority data.

3.3 Measuring outcomes

Measuring slum status of the neighbourhood. The Government of India defines a slum as a 'compact area of poorly built congested tenements, unhygienic environment with inadequate infrastructure and lack of proper drinking water and sanitation facilities'. Official classifications have not caught up with the rate of slum creation, i.e. not all neighbourhoods that satisfy these criteria have been recognised as slums by the government. To identify the slum status of the neighbourhood, I combine data on slum status from several data sources and check the robustness of my results to alternative sources and definitions of slum status.

The first data source I use comes from the Slum Rehabilitation Authority. When a neighbourhood applies for redevelopment, the Slum Rehabilitation Authority classifies the neighbourhood as a slum if it satisfies the definition and is not a declared slum based on the government definition before redevelopment is approved. In 2015, the Authority conducted a drone survey to identify the location and names of all slum neighbourhoods in the city. I use neighbourhood names from this dataset to identify slum neighbourhoods in the electoral roll.

The second data source is the Census. In the census, all neighbourhoods that satisfy the Government of India definition and have more than 60 households are categorised as slums. I use neighbourhood names from this dataset to identify slum neighbourhoods in the electoral roll.

Lastly, I use the name of the neighbourhood in the electoral roll to infer slum status. I define a slum neighbourhood as a neighbourhood that has the name for slum neighbourhoods in Marathi, *chawl* or *jhopadpatti*, in the name of the neighbourhood. The neighbourhood names from the electoral roll are also used by the Government of Maharashtra to rapidly measure growth in slum structures (Ashar, 2012). Although naming of neighbourhoods need not correspond to official definitions, the slum population share computed using this definition closely matches the slum population share in the Slum Census[12] (see Figure 19 in Appendix).

Measuring religious composition within the neighbourhood. To identify the religion of each individual, I leverage the unique naming patterns in Muslim

[12]Micro data for the slum census is not available.

names to predict religion from the name using a neural network for text classification trained on 4 million names to create measures of the share of disadvantaged groups in the neighbourhood and the share of own group.[13]

Measuring slum clearance and new construction timelines. I use very high resolution daytime satellite data to record the slum clearance start dates and end dates and construction start dates and end dates for each redevelopment project. See Section A.4.3 for more details.

3.4 Estimation sample and summary statistics

The estimation sample is limited to voting age residents of slums that were conditionally approved for redevelopment between 2007 and 2022. Out of a total of 592 slum redevelopment projects between 2007 and 2022, the final matched sample consists of eligible and ineligible slum residents from 254 slums where slum redevelopment projects could be mapped to electoral roll data. Slum projects could not be mapped to electoral rolls in cases where: (i) redevelopment project documents in the slum rehabilitation authority website did not include electoral roll information on the slum redevelopment application; (ii) scanned pages from the 1995 electoral roll obtained from the Election Department did not include the pages relevant for the slum redevelopment project; and, (iii) there are language mismatches between the 1995 electoral roll and the residential mobility panel. In Table 5, I compare matched redevelopment projects to all redevelopment projects between 2007 and 2022 using data from slum redevelopment project paper trails. In comparison to all redevelopment projects, matched redevelopment projects are not significantly different in terms of area of the slum, number of eligible households, floor area ratio sanctioned, construction duration and in terms of built area constructed for rehabilitating eligible slum residents and for sale. However, matched projects are more likely to have been conditionally approved a year earlier, have a higher likelihood of approval, and are approved, on average, 8 months earlier post conditional approval when compared to all redevelopment projects.

4 Identification Strategy

I use a staggered difference-in-differences design to identify the intent-to-treat effects of slum clearance and redevelopment on the neighbourhood and incumbent slum residents.

[13] I use the Python package *pranaam* developed by Rajashekar Chintalapati, Aaditya Dar, and Gaurav Sood.

My identification strategy for the neighbourhood level outcomes involves comparing approved slums to slums that will be approved in the future and conditionally approved slums that are never approved in a staggered difference-in-differences design. The treatment group in year t^* are slums that are approved to be redeveloped in year $t \leq t^*$. The control group in a particular year are slums that were approved to be redeveloped after that year or conditionally approved slums that were never approved. The identification assumptions are the following: (i) the timing of approval of slum redevelopment is not driven by the differential trends in that slum relative to trends in other slums, and (ii) treated slums would have had similar trends as control slums, absent the policy.

For the individual level outcomes, I compare eligible (ineligible) residents in approved slums to *would be* eligible (ineligible) residents in slums that will be approved in the future and conditionally approved slums that are never approved in a staggered difference-in-differences design (see Table 1 for a pictorial representation of my identification strategy). The treatment group in year t^* are slum residents in a slum that is approved to be redeveloped in year $t \leq t^*$. The control group in a particular year are slum residents in slums that were approved to be redeveloped after that year or conditionally approved slums that were never approved. The identification assumptions are the following: (i) the timing of approval of slum redevelopment is not driven by the differential trends in eligible (ineligible) slum residents, and (ii) eligible (ineligible) slum residents in treated slums would have had similar trends as control slums, absent the policy.

I validate these assumptions in two ways. First, I test for pre-trends in mobility patterns and transitions out of slum living up to 15 years before redevelopment approval between approved slums and later and never approved slums. These results are plotted along with the post-approval effects in the difference-in-differences graphs. Second, a concern could be that a hyper-local productivity shock drives a construction boom in the neighbourhood and also drives mobility patterns and transitions out of slum living. This would imply that even if trends were similar in the lead-up to approval, they would have been different absent approval. I use high frequency high resolution daytime satellite data to identify area under construction in a 100 meter radius of the slum to show that there are no differential trends in area under construction around the slum between approved slums and later and never approved slums around the year of redevelopment approval, inconsistent with this alternative explanation. Figure A.2.1 plots the results of this estimation.

The simple dynamic difference-in-differences specification with staggered adoption may use already approved slums as controls and result in biased estimates

(Goodman-Bacon (2021), Callaway and Sant'Anna (2021)). Hence, I use the Callaway and Sant'Anna (2021) estimator that does not perform such forbidden comparisons and estimate group-time average treatment effects on approval that I aggregate up by relative time to approval to obtain the dynamic difference-in-differences estimates.

As a first stage, I measure the effect that approvals had on slum clearance and redevelopment completion by running the Callaway and Sant'Anna (2021) equivalent of the following site-level specifications:

$$SlumCleared_{st} = \sum_{k=-K}^{K} \beta_k D_{sk} + \gamma_s + \delta_t + \epsilon_{st} \tag{1}$$

$$Redeveloped_{st} = \sum_{k=-K}^{K} \beta_k D_{sk} + \gamma_s + \delta_t + \epsilon_{st} \tag{2}$$

where $t = t^*$ is the time at which the slum in site s is approved to be redeveloped, $SlumCleared_{st}$ takes the value 1 in all periods t after the slum in site s is cleared and $Redeveloped_{st}$ takes the value 1 in all periods after the earliest occupancy certificate given to a building in the redeveloped site. Similarly, to understand the neighbourhood-level effects of slum redevelopments, I estimate the Callaway and Sant'Anna (2021) equivalent of the following site-level specification:

$$Y_{st} = \sum_{k=-K}^{K} \beta_k D_{sk} + \gamma_s + \delta_t + \epsilon_{st} \tag{3}$$

where Y_{st} is the outcome for site s at time t. In all site-level specifications, standard errors are clustered at the site level since the treatment is at the level of the site (Rambachan and Roth, 2025). In a similar fashion, to identify local spillovers of redevelopment on nearby neighbourhoods, I compare outcomes of neighbourhoods within a ring of radius $r \in \{100m, 200m, 300m, 400m, 500m\}$ between approved slums and later and never approved slums.

To identify the effect of the policy on incumbent slum residents, I use the Callaway and Sant'Anna (2021) equivalent of the following individual-level specification:

$$Y_{ist} = \sum_{k=-K}^{K} \beta_k D_{sk} + \gamma_s + \delta_t + \epsilon_{ist} \tag{4}$$

where $t = t^*$ is the time at which slum in site s is approved to be redeveloped, Y_{ist} is the outcome for eligible slum individual i living in a slum in site s at time t. I

run these regressions separately for eligible and ineligible slum residents. Similar to the site-level specifications, I cluster standard errors at the site level (Rambachan and Roth, 2025).

Selection into approval and redevelopment completion. I investigate whether neighbourhoods that were approved and those that were eventually redeveloped are different in levels from those that were conditionally approved. Table 7 shows characteristics of all conditionally approved, approved and redeveloped slums. Approved and redeveloped slums are largely statistically similar to all conditionally approved slums. In comparison to all conditionally approved slums, those approved are more likely to have a marginally higher share of eligible residents, a marginally lower share of Muslim (minority group) residents and more likely to be in a ward with marginally lower slum shares but mixed proximity to urban amenities and infrastructure. Those redeveloped are even more likely to be selected along these dimensions.

5 Slum Clearance and Construction Completion

In this section, I show descriptive facts on slum clearance and construction completion and as a first step, examine the changes in the neighbourhood that followed redevelopment approval. The main first stage outcomes of interest are the probability and timing of slum clearance, end of construction and handover of occupancy certificates to slum residents.

5.1 Descriptive facts on the slum redevelopment process

High rates of non-completion in slum redevelopment projects. Redevelopments are undertaken by private developers whose decision to continue the redevelopment depends on expected economic returns. Figure 5 plots the share of projects that pass each stage of redevelopment conditional on approval. In my analysis sample, 37% of slums are cleared and never redeveloped resulting in slum residents being evicted without any compensation. Only 33% of slums are cleared and redeveloped. 29% of slums approved for redevelopment are never cleared.

Long time-to-build durations for units for slum residents. Figure 6 plots the distribution of slum redevelopment projects by the time taken for construction of units for slum residents conditional on redevelopment completion using the universe of completed slum redevelopment projects. The average redevelopment project, conditional on completion, takes 6 years. This implies an average eviction duration of at most 6 years conditional on completion for slum residents eligible to own an

apartment in the redeveloped slum. Importantly, 50% of projects take more than 5 years to be completed. Large construction durations are a feature of development projects everywhere and this is particularly a concern in Mumbai, where the average construction duration is 8.5 years (Gandhi et al. (2021)).

5.2 Effects on slum clearance and construction completion

As a first step, we need to see whether redevelopment approvals significantly increased the probability of slum clearance and redevelopment. This is important for two reasons: (i) it is not clear that all approvals lead to slum clearance or redevelopment completion as this depends on the expectation of economic returns by the developer; (ii) understanding the impact on slum clearance and redevelopment is important to interpret the individual-level impacts.

In this section, using slum-level data, I analyse the effect of redevelopment approvals on slum clearance and redevelopment. Redevelopments are financed by private developers and probability of completion depends on economic returns from redevelopment.

Figure 8a reports the staggered difference-in-differences estimates of the impact of approvals on slum clearance. Standard errors are clustered at the slum level to allow for correlations within slums. The average treatment effect of approvals on slum clearance calculated using Callaway and Sant'Anna (2021) is 60 p.p. Most slum clearances begin within 3 years of approval. The coefficient is less than 1, implying that not all approvals lead to slum clearance. In the appendix, I show estimates for the probability of slum clearance completion and construction start dates.

Figure 8b similarly reports the staggered difference-in-differences estimates of the impact of approvals on the probability of occupancy certificates being issued for slum residents. The average treatment effect of approvals on the probability of redevelopment calculated using Callaway and Sant'Anna (2021) is 27 p.p. Most buildings are completed within 5 years of approval. The coefficient is less than 1, implying that not all approvals lead to slum redevelopment.

6 Comparison between Slum Neighbourhoods and Formal Neighbourhoods

My main outcome variable of interest is the slum status of the neighbourhood. What does slum status of the neighbourhood mean in terms of housing quality, service provision at the neighbourhood level and wealth levels? Using data from

the Socio Economic and Caste Census 2012, I examine how slum neighbourhoods differ from formal neighbourhoods in housing quality and in terms of assets owned by the residents.[14] The results are in Figure 7. Overall, these results show that residents in formal neighbourhoods are richer, have higher quality of housing and enjoy better service provision compared to residents in slums.

Housing quality. Slum neighbourhoods in the city have significantly lower housing quality in terms of roof and wall material and presence of a separate kitchen. Slums have similar access to electricity as formal neighbourhoods.

Service provision at the neighbourhood-level. Slum neighbourhoods also have worse service provision as measured by access to closed drainage and access to piped drinking water. Within a neighbourhood, either 0% or 100% of households have access to these services since public infrastructure at the neighbourhood level is a pre-condition for households to access these services (Asher, Jha, Novosad, Adukia, and Tan (2024)).

Ownership of assets. Slum neighbourhoods are also poorer as measured by ownership of consumer durable assets: motor vehicle, refrigerator, car, computer, television etc. but have similar levels of access to phones and homeownership although houses in slums are poorer quality compared to houses in formal neighbourhoods.

7 Effects on residents with the right to compensation

The previous section shows that approvals significantly increase the probability of slum clearance and redevelopment. In this section, I provide evidence that approvals result in the displacement of incumbent slum residents to slums elsewhere. The effect on displacement to slums elsewhere is four times as large as the effect on transitions out of slum-living.

7.1 Mobility responses of slum residents

I begin my analysis of individual-level impacts by looking at the mobility response of slum residents to approval for redevelopment. The main outcomes I look at are the probability of moving away from the original slum neighbourhood and the distance from their original neighbourhood.

Probability of moving away from the original slum neighbourhood. I

[14]Note that the Census only classifies slums with more than 60 households as slums, i.e. smaller slums and unrecognised slums are misclassified as formal neighbourhoods. Hence, the differences here are likely to be smaller than the true differences; the true differences are likely to be more stark.

start by looking at the mobility responses of eligible slum residents to approval for redevelopment. First, I plot the raw probabilities of moving out of the slum after approval in Figure 9. In the figure, you can see that the share of slum residents who were eligible for in-situ compensation that move out of the original slum jumps on approval to 60% (remember that the probability of slum clearance increases by 60% on average due to approval). Importantly, note that even several years after approval, there is a very small share who return to the original slum neighbourhood that is now redeveloped.

To isolate the causal effect of approval on the probability of moving out of the original slum neighbourhood, I compare the slums that were approved to those that are later approved and never approved using my identification strategy. Figure 10a shows the intent-to-treat effect of redevelopment approval on the probability of moving out of the original slum neighbourhood.

Redevelopment approvals significantly increase the probability that residents with the right to own an apartment in the redeveloped slum move out of their slum neighbourhoods. The average intent-to-treat effect on eligible households is 33 p.p. for households eligible to own an apartment in the redeveloped slum. The intent-to-treat effect corresponds to a 173% increase in the probability of moving out of the original slum neighbourhood relative to the control mean. These results are similar when we limit the control group to never approved slums (see Section A.2 for details).

Distance from the original slum neighbourhood. I next examine the impact of redevelopment approval on the distance between individuals' subsequent residence and their original slum neighbourhood. Figure 10b presents the intent-to-treat effect of redevelopment approval on this distance. Ceteris paribus, moving costs are likely to be lower when residents are able to relocate close to their original neighbourhood, thereby minimising disruptions to access to workplaces, schools, and other amenities.

Consistent with the previous result, Figure 10b shows that redevelopment approvals increase the distance of their current residence to the original slum neighbourhood for eligible residents. On average, residents move 0.87 kilometres farther as a result of redevelopment approvals relative to eligible residents in control slums. There is some churn in control slums as well, they are, on average, 1.55 kilometres far from their original slum i.e. the average resident in a redevelopment approved slum moves approximately 2.4 kilometres away from their original slum. These results are similar when we limit the control group to never approved slums (see Section A.2 for details).

7.2 Effects on living conditions

In the following analyses, I study the impact on the living conditions experienced by slum residents.

Slum status of the neighbourhood. The main outcome of interest is the slum status of the neighbourhood that slum residents live in. Figure 11 shows the impact that redevelopments had on the probability of living in a formal neighbourhood for both eligible and ineligible slum residents.

The results show that redevelopment approvals significantly increase the probability of living in a formal neighbourhood for eligible slum residents. This effect starts immediately during the period in which slum neighbourhoods are likely to be under construction when developers are supposed to provide payments equivalent to the rent amount for formal housing or temporary provisions for formal housing. The effect sees a persistent increase over the 15 years after approval. On average, redevelopment approval increases the probability of living in a formal neighbourhood by 6 p.p. for eligible slum residents. Redevelopment approvals result in a 100% increase in the probability of living in a formal neighbourhood over the control mean of 0.06 for eligible slum residents. These results are similar when we limit the control group to never approved slums (see Section A.2 for details).

What does slum status of the neighbourhood mean in terms of housing quality and neighbourhood composition? In Figure 7, I document that slum neighbourhoods in the city have significantly lower housing quality in terms of access to closed drainage, access to piped drinking water, roof and wall material, presence of a separate kitchen. Slums have similar access to electricity as formal neighbourhoods. Slum neighbourhoods are also poorer as measured by ownership of consumer durable assets: motor vehicle, refrigerator, car, computer, television etc. but have similar levels of access to phones and homeownership although houses in slums are poorer quality compared to houses in formal neighbourhoods. These results show that residents in formal neighbourhoods are richer and have higher quality of housing compared to residents in slums.

Proximity to public and private infrastructure. The most important measure of neighbourhood quality in my data is the slum status of the neighbourhood. I augment this binary measure of neighbourhood quality with other measures of neighbourhood quality: proximity to hospitals, schools, parks and public transport.

The impact on distance to schools is plotted in Figure 25a, the impact on distance to green spaces is plotted in Figure 25c, the impact on access to public transport is plotted in Figure 25b and the impact on distance to hospitals is plotted in

Figure 25d.

Taken together, these figures show that there is no statistically significant impact of redevelopment approvals on access to a variety of public and private infrastructure for both eligible and ineligible households. These results are similar when we limit the control group to never approved slums (see Section A.2 for details).

Why is it the case that despite the differential effects on the probability of living in a slum-neighbourhood, there are precise null effects on distance to urban amenities? In Table 6, I document that the distance of each neighbourhood in the city to slum and formal neighbourhoods of varying levels of Muslim-majority as well as distance to urban amenities is very low, i.e. there is very low distance segregation between slum and formal neighbourhoods and between Muslim majority and non-Muslim majority neighbourhoods. Cities with low distance segregation between slums and formals are more likely to have equal levels of urban amenities in both slum and formal neighbourhoods as formals crowd in amenities that nearby slum neighbourhoods can enjoy (Harari, 2024).

Co-location with former neighbours. The costs of displacement documented in the relocation literature operate substantially through the disruption of neighbourhood-based social networks (Rojas-Ampuero and Carrera (2025); Bryan et al. (2025)). A feature of on-site rehousing is that it should leave these networks intact: because compensation is delivered as an apartment at the original site, residents are not, by design, permanently separated from their neighbours. Whether this holds in practice depends on where residents actually live during and after the construction phase. I measure whether residents remain co-located with the individuals who were their neighbours before redevelopment, defining former neighbours as those living in the electoral roll wave preceding conditional approval and 1995. Figure 13 reports the effect of redevelopment approval on the share of a resident's former neighbours living in their current neighbourhood. For residents with the right to compensation, redevelopment approval reduces this share by 10.7 p.p. against a control mean of 0.486 (i.e. a decline of 22%). This negative effect persists across the 15 years after approval.

7.3 Decomposition of effects by location and neighbourhood type

I split the outcome space into four parts by the location of the resident relative to their original slum neighbourhood (displaced/not displaced) and the type of neighbourhood (slum/nonslum): (i) in a formal neighbourhood out of the original location; (ii) in a formal neighbourhood in the original location; (iii) in a slum neighbourhood in the original location; and, (iv) in a slum neighbourhood out of

the original location. Moving out of the neighbourhood may result in residents incurring moving costs which may be compensated by the increases in housing quality due to transitions out of slum living.

In Figure 14, I compare each of these outcomes for residents with the right to own an apartment in the redeveloped slum in approved slums to later approved and never approved slums in a staggered difference-in-differences design. These results are similar when we limit the control group to never approved slums (see Section A.2 for details).

Compared to similar residents in control slums which were not approved for redevelopment, residents with the right to own an apartment in the redeveloped slum are significantly more likely not to live in the original neighbourhood. They are not significantly more likely to live in an apartment in the redeveloped slum. They are significantly more likely to move to formal neighbourhoods elsewhere but the magnitude of this effect is one-fourth of the effect on the probability of living in slum neighbourhoods elsewhere. The overwhelming majority of displaced residents move to slum neighbourhoods elsewhere. Slum redevelopments, even when residents receive the right to an apartment in the redeveloped slum, displace incumbent residents to slum neighbourhoods elsewhere, identifying a channel through which redevelopment may increase pressure on other slums.

7.4 What drives transitions out of slum living?

In this section, I provide evidence that project non-completion and delays between eviction and the construction of units for slum residents reduce the likelihood of transitions out of slum living.

Non-completion of redevelopment projects. I divide slums that are approved for redevelopment into three groups by redevelopment status: (i) those that are never cleared; (ii) those that are cleared but never redeveloped; and, (iii) those that are cleared and redeveloped. I compare outcomes of residents with the right to an apartment in the redeveloped slum in approved slums to residents in later approved slums within each of these groups using Callaway and Sant'Anna (2021). Figure 26 shows that pre-trends are parallel in each of these groups prior to approval. The results are plotted in Figure 15. Residents with the right to an apartment in the redeveloped slum in slums that are never cleared experience no increase in the probability of living in a formal neighbourhood. The point estimate is slightly positive but very noisily estimated. The slight increase is consistent with consumption smoothing motives that can drive increases in consumption of housing quality in anticipation of a future asset shock. Residents with the right to an apartment in the

redeveloped slum in slums that are cleared but never redeveloped experience small and insignificant decreases in the probability of transitioning out of slum living. The effect on this group is a composite of forces that act in opposite directions. On the one hand, consumption smoothing in anticipation of a future asset shock as well as potential temporary compensation by developers during redevelopment increase the likelihood of moving to a formal neighbourhood while on the other hand, the potential moving costs associated with evictions can decrease the probability of moving to a formal neighbourhood. Finally, residents with the right to an apartment in the redeveloped slum in slums that are redeveloped experience the largest increase in the probability of transitioning out of slum living.

Lags between eviction and redevelopment completion. I divide slums that are redeveloped into three groups by eviction duration and compare outcomes for residents with the right to an apartment in the redeveloped slum in the following groups: (i) redeveloped slums that have an eviction duration of less than 5 years to later redeveloped slums that have an eviction duration of less than 5 years; (ii) redeveloped slums that have an eviction duration of 6–10 years to later redeveloped slums that have an eviction duration of 6–10 years; and, (iii) redeveloped slums that have an eviction duration of more than 10 years to later redeveloped slums that have an eviction duration of more than 10 years. The results are plotted in Figure 16. Residents with the right to an apartment in the redeveloped slum in slums that have the shortest delay, 0–4 years, between eviction and construction completion of units for slum residents experience the largest gains in probability of living in a formal neighbourhood. The probability of living in a formal neighbourhood steadily decreases with an increase in eviction duration. Larger eviction durations may be associated with larger moving costs as well as delays in the asset shock that could drive down consumption of better housing.

8 Residents with no right to compensation

In this section, I study the intent-to-treat effects of redevelopment-driven evictions on ineligible slum residents — those evicted without legal guarantees of compensation. A clean causal interpretation for this group faces an important challenge: ineligible residents in approved slums are more likely to be recent in-migrants than ineligible residents in later and never approved slums, plausibly reflecting attempts to fabricate eligibility ahead of anticipated approval. This generates differential pre-trends in out-migration from the slum neighbourhood, violating parallel trends in mobility. Following Roth and Rambachan (2022), I do not select on pre-tests. The results in this section should be interpreted as causal only under the assumption

that differential in-migration rates do not imply differential trends in neighbourhood quality outcomes absent approval. To the extent that shorter tenure in the slum lowers eviction costs, this assumption biases estimates toward zero, suggesting the results below represent a lower bound on the true magnitude of the negative effects of uncompensated eviction. Despite the pre-trends in out-migration, there is no evidence of pre-trends in outcomes related to living conditions, lending some support to this assumption.

8.1 Mobility responses of slum residents

I start by looking at the mobility responses of slum residents without legal guarantees of compensation to approval for redevelopment. First, I plot the raw probabilities of moving out of the slum after approval in Figure 9. In the figure, you can see that the share of slum residents who were ineligible for in-situ compensation that move out of the original slum jumps on approval to 60% (remember that the probability of slum clearance increases by 60% on average due to approval).

While we see that ineligible slum residents move out of the neighbourhood in a pattern similar to eligible residents post approval, looking at the pre-approval trends, ineligible slum residents in approved neighbourhoods are more likely to have been recent in-migrants into the neighbourhood than ineligible residents in the control group and hence have different pre-trends in in-migration into the slum neighbourhood. These trends may be suggestive of attempts to fabricate eligibility. Hence, we must be careful not to interpret these results as causal.

Following recent recommendations in the econometrics literature (Roth and Rambachan, 2022), I refrain from selecting on pre-tests and present results on the effects on ineligible slum residents for completeness and discuss additional assumptions required to make causal claims. The results on ineligible residents are available in Appendix Section A.3.

The results on neighbourhood quality outcomes may only be interpreted as causal under the assumption that differential in-migration rates do not imply differential trends in neighbourhood quality outcomes absent approval and similarly for all other outcomes. Despite differential trends in in-migration rates into the neighbourhood, the pre-trends in probability of living in a formal neighbourhood as well as proximity to urban amenities are flat, suggesting that this assumption may hold. However, they may estimate a lower bound on the negative impacts of eviction if it is the case that shorter tenure in the slum results in lower costs of eviction.

8.2 Effects on living conditions

In the following analyses, I describe the impacts on the neighbourhood quality experienced by slum residents. Since slum residents in approved slums have differential tenure in the slum in comparison to slum residents in later approved and never approved slums, I control for tenure in slum in all the following specifications. Even with these controls, residents with the same tenure may not be comparable in approved and later approved and never approved slums, for example, if those that differentially arrive in approved slums before approval have different motivations, for example, fabricating eligibility. The following results may be interpreted as causal only under the assumption that differential in-migration rates do not imply differential trends in neighbourhood quality outcomes absent approval and similarly for all other outcomes.

Slum status of the neighbourhood. Now we turn to estimating the effects on the probability of living in a slum neighbourhood for residents with no right to compensation. Appendix Section A.3 plots the results.

My results suggest that approvals had noisily estimated negative effects on the probability of living in a formal neighbourhood for ineligible residents, i.e. redevelopment-driven evictions shifted them to different slum neighbourhoods and prolonged their length of slum living relative to those in not approved slums. These results represent a lower bound on the magnitude of the true negative effects since this group may contain individuals who were resident in the slum in 1995 but were not in the electoral roll (for example, those who arrived after the electoral roll listing in 1995) and hence legitimately received compensation.

In comparison with the results for the group with the right to compensation that saw increases in the probability of living in a formal neighbourhood, the group with no right to compensation move to slums elsewhere and have longer tenures in the slum, suggesting that redevelopments without compensation not only move residents to slums elsewhere but also prolong their tenure in the slum while redevelopments with in-situ compensation persistently increase their probability of moving to formal housing.

Proximity to public and private infrastructure and amenities. I now turn to the impacts on distance to urban amenities. Appendix Section A.3 shows that redevelopments do not result in any economically or statistically significant changes in the distance to urban amenities. These results are in line with the low distance segregation between slum and formal neighbourhoods that can facilitate the crowding in of urban amenities by formal neighbourhoods (Harari, 2024).

9 Neighbourhood-level Effects of Slum Redevelopments

In this section, I use neighbourhood-level data to analyse the effects of redevelopment approvals on neighbourhoods undergoing redevelopment. I study the effects of approvals on neighbourhood-level outcomes, including the total number of people housed in the neighbourhood, the distribution of residents across informal and formal housing, and the composition of the resident population.

Total population. Figure 17 shows that total population on the site falls by 162.7 residents (i.e. about 15.5 percent of the control mean), with the point estimate growing to around −280 a decade after approval, though the slum-level analysis with the size of the current sample is underpowered to precisely estimate the decline in population. Given that we saw earlier that not all slum redevelopment approvals resulted in clearance and even fewer complete some redevelopment, it is likely that the population housed in these neighbourhoods declines because the decline in slum population is not offset by an increase in formal population, as the majority of replacement apartments were never built. To investigate this reason, I split the sample into slums that eventually completed some construction and slums that never complete any construction based on whether they were ever issued some occupancy certificate. Figure 21 shows the effects on the split sample.[15] The figures show that the declines were larger for the group where new buildings were never completed versus in cases where some redevelopment was completed, although insignificant as the size of the sample is further reduced. But importantly, the population still declines for the group where some construction of formal housing was completed, suggesting that the decline in population is not completely an artefact of non-completion.

Next, I decompose the effects on total population into the effects on slum population and formal population.

Slum population. Figure 18a plots the effects on informal population within the neighbourhood. Approval sets off a decline in the informal population living on the site. The slum population falls significantly by 179.5 residents against a control mean of roughly 1,048, a decline of about 17.12%. The event study shows the drop arriving at approval, consistent with clearance beginning once a project is approved, and deepening to around −250 residents a decade later.

Formal population. Figure 18b plots the effects on formal population within the neighbourhood. Approval raises the formal population by 16.7 residents ($p <$

[15]Note that only slums that were approved before 2017 have at least some parts ready to be occupied by 2022, the last year of our panel, so I cannot estimate the pre-period effects between 11 and 15 years before approval for the group of slums that complete some construction.

0.01).[16] The dynamics are the mirror image of the slum decline: the formal population builds gradually, growing through five and ten years after approval as construction completes and households move in. However, this increase is modest, partially due to the fact that not all redevelopment projects have any completed unit.

The new formal housing replaces only about one-tenth of the informal population displaced within the window I observe. In-situ redevelopment, on net, depopulates the site because the increase in formal population is an order of magnitude smaller than the decrease in population housed in informal units.

Neighbourhood composition. Do redevelopment approvals change *who* the neighbourhood houses? The modest increase in formal population should not create substantial changes in the composition of these neighbourhoods. First, I look at the share of current residents who lived in a slum in the previous 5 years i.e. recent arrivals from informal settlements, a proxy for poorer entrants. Approval has no statistically significant effects on the share of individuals from slums: the ITT is -5.5 percentage points against a control mean of 28.5 percent. Second, the share of marginalised groups housed by the site, i.e. the share of Muslims, is unchanged (-0.4 percentage points, s.e. 0.6, against a base of 11.9 percent), a tight null indicating no detectable shift in the site's religious composition. Taken together, these results show that redevelopment approvals change how many people the site houses and not their composition.

Spillovers to nearby neighbourhoods. Given that the redeveloped neighbourhood houses no more residents than the pre-existing slum — and, if anything, becomes less populous as dense, low-rise slums are replaced by taller buildings — I now ask whether redevelopment reshapes the population of the surrounding area. The concern cuts both ways. Slum clearance, or the anticipation of clearance following redevelopment approval, could push displaced residents and other migrants into nearby slums, raising demand for informal housing and expanding slums just outside the treated site. Alternatively, replacing a slum could improve the local environment and expand the supply of formal housing, drawing in formal residents.

Figures 23, 24a and 24b report the average effects on total, slum and formal population by radius. Across all three outcomes and every radius, I find no statistically significant local spillover effects. The estimates therefore rule out large local effects, such as a wholesale expansion of nearby slums or a substantial increase in the formal population.

Read alongside the earlier displacement results, these null local estimates indicate that redevelopment relocates residents to neighbourhoods elsewhere rather

[16] Note that the pretrends are not informative here since they are mechanically 0.

than nearby — a margin that any spatially local spillover analysis at the neighbourhood-level is, by construction, unable to detect.

10 Discussion

The results highlight a central design problem in in-situ slum redevelopment: the timing mismatch between displacement and compensation. In principle, in-situ redevelopment combines attractive features of two classes of slum policies. Like marginal upgrading, it promises improvements in housing quality without permanently relocating residents away from the original neighbourhood. Like relocation to formal housing, it offers a large formal housing asset. However, the delivery of this asset requires a construction phase during which residents are displaced. When construction is delayed or never completed, the policy no longer operates as immediate in-situ upgrading, but as clearance followed by uncertain future compensation, creating slum-to-slum moves instead of moves to formal housing.

The evidence points to the construction phase as an important constraint on transitions out of slum living. The policy promises a formal housing asset in the original location once evicted, but this asset is realised only if construction is completed and only after a potentially long delay. Non-completion lowers the expected value of compensation, while construction lags delay the realisation of the asset shock. For credit-constrained households, a future and uncertain asset may be an imperfect substitute for immediate housing security. Consistent with this interpretation, transitions into formal neighbourhoods are concentrated among residents of projects that are completed, and especially among residents of projects completed soon after clearance. This pattern suggests that the effect of in-situ compensation depends not only on the legal entitlement to future housing, but also on the credibility and timing of housing delivery.

Comparing site-level and resident-level effects. The results also allow me to weigh the displacement effects on incumbent residents against the place-level benefits of redevelopment. The site-level estimates show that redevelopment raises the population in formal housing on the site by 16.72 residents on average, while displacing an estimated 158 residents with the right to an apartment in the redeveloped slum elsewhere.[17] For every adult housed in a formal apartment on the redeveloped site, 9.5 adult residents are displaced to slums elsewhere. Evaluating

[17]The number displaced is calculated as the average number of residents on a treated site (726) multiplied by the effect of redevelopment approval on the probability that an incumbent slum resident with the right to an apartment in the redeveloped slum relocates to another slum (0.218), giving $726 \times 0.218 \approx 158$. The formal population housed on-site is the ITT estimate on formal population (16.72, SE 5.688).

the policy at the redeveloped site alone would overstate its effect on slum residence, since the number of residents pushed into informal settlements elsewhere is roughly an order of magnitude larger than the population in formal housing on-site within the 15 years after redevelopment. In-situ redevelopment couples the place-level benefits with the resident-level displacement effects. Non-completion results in no increase in formal housing supply and even larger displacement to slums elsewhere. However, even when at least some housing for incumbent residents is completed, 5.61 incumbent residents with the right to compensation are displaced for every individual in formal housing in the redeveloped slum.

External validity. The absence of large effects on proximity to amenities should be interpreted in light of Mumbai's urban geography. Mumbai is characterised by low distance segregation between slum and formal neighbourhoods as documented in this paper and similar proximity to urban infrastructure in slums and formal neighbourhoods. This spatial structure may limit the losses from remaining in slum neighbourhoods or moving to other nearby slums, consistent with the idea that low distance segregation between slum and formal neighbourhoods crowds-in amenities for slum residents by allowing amenities attracted by formal neighbourhoods to be accessible to nearby slum residents (Harari, 2024). In cities with greater spatial separation between informal and formal settlements, the costs of displacement to other slums may be more severe, as slum neighbourhoods are less likely to benefit from the crowding-in of amenities by nearby formal neighbourhoods, and labour market frictions may prevent compensated residents from accessing formal housing that is farther away. The findings should therefore be applied to other settings with attention to the degree of spatial separation between informal and formal neighbourhoods.

Taken together, the results suggest that the effects of in-situ redevelopment depend critically on the design of the redevelopment process. The policy's promise of compensation in the original location is weakened when residents are displaced before replacement housing is credibly available. Design features that reduce the duration and uncertainty of the construction phase — including stronger enforcement of completion timelines, credible interim housing support, performance guarantees, and penalties for non-completion — may therefore be central to whether redevelopment increases transitions out of slum living or instead shifts displaced residents to informal settlements elsewhere. Without such safeguards, in-situ redevelopment can impose substantial displacement costs on incumbent residents. More generally, raising the speed of construction completion towards that of higher-income countries could increase transitions out of slum living by shortening the lag be-

tween eviction and compensation. Importantly, part of this lag is administrative rather than structural. Reducing such delays offers the government a direct lever to increase transitions out of slum living.

11 Conclusion

This paper provides new evidence of the short- and medium-term impacts of slum clearance and redevelopments on slum residents by tracking them over 15 years with a residential mobility panel assembled by digitising and matching electoral rolls. I exploit variation in the timing of redevelopment approvals across slums in a staggered difference-in-differences design to study these effects.

My results show that slum residents with the right to receive ownership of an apartment in the redeveloped slum are permanently displaced with very limited transitions out of slum living. Despite the small decrease in slum living overall, the vast majority of incumbent residents with the right to an apartment in the redeveloped slum move to slum neighbourhoods elsewhere, undermining the goal of the policy to curb the growth of slums by shifting slum population elsewhere.

I use daytime satellite data and digitised slum redevelopment project documents to uncover evidence of substantial non-completion and delays in construction completion that increase the lag between eviction and the housing asset shock. I show that project non-completion and lags between eviction and in-situ compensation decrease the slum residents' likelihood of moving to a formal neighbourhood.

More than 50% of the population in rapidly urbanising Sub-Saharan African and South Asian cities live in slums (Bryan et al., 2020). This paper contributes to our understanding of policy responses that support and minimise the costs of this transition for slum residents as these cities develop while fulfilling the goals of this policy to curb the growth of slums. Although there is limited evidence on the effects of slum redevelopments on incumbent slum residents, privately provided in-situ slum redevelopments are increasingly recommended to cities in Sub-Saharan Africa with soaring real estate markets (UN-Habitat, 2013). My results highlight a central policy trade-off in slum redevelopment. While relocation programmes move residents to suburban housing at the cost of reduced access to jobs and social networks, in-situ redevelopment is intended to avoid these costs by preserving location. I show that this advantage is eroded by a key feature of such policies: the construction phase. Delays and non-completion in housing delivery create a gap between eviction and rehousing that generates substantial displacement and reduces transitions out of slum living. The displacement of residents to slums elsewhere is approximately an order of magnitude larger than the population living in

formal housing in the redeveloped site within the 15 years, mainly driven by non-completion of redevelopment projects. Non-completion undermines the place-level increase in formal housing supply and increases resident-level displacement to slums elsewhere.

These findings suggest that the effectiveness of in-situ redevelopment as a tool for curbing slum growth depends critically on the speed and reliability with which compensation is delivered. Design alternatives that reduce the lag between eviction and housing delivery — through phased construction that limits the period of displacement, better-implemented interim housing support, or stricter enforcement of developer obligations — would be expected to improve living conditions for incumbent residents. However, the reliance on private developers introduces a fundamental incentive problem that such measures may only partially address: limited liability means that the costs of non-completion fall on slum residents rather than on the firms responsible for construction, and completion rates are sensitive to real estate market conditions that lie outside the control of the policy. In contexts where private provision is unreliable, decoupling compensation from on-site construction — for instance, by matching displaced residents to available apartments in nearby buildings — may offer a more robust alternative.

Figures and Tables



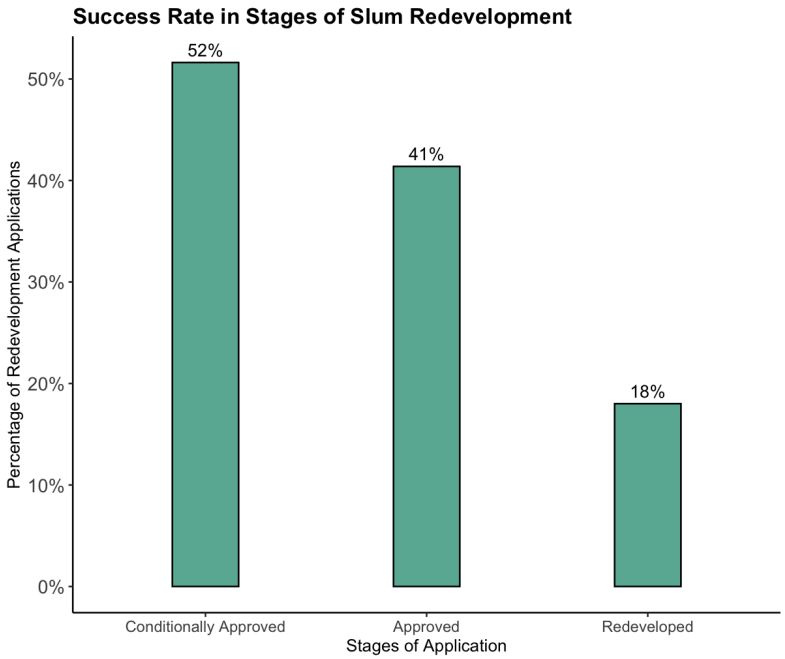
Figure 1: Site before and after redevelopment

Notes. The figure depicts a typical slum redevelopment project in very high resolution daytime satellite data. The left panel shows the neighbourhood before redevelopment, the right panel shows the neighbourhood after redevelopment.

Slums / Residents of the slum	**In 1995 roll**	**Not in 1995 roll**
Approved slum	A	C
Later/never approved slum	B	D

Table 1: Pictorial representation of the identification strategy

Figure 2: Success rate across stages of redevelopment



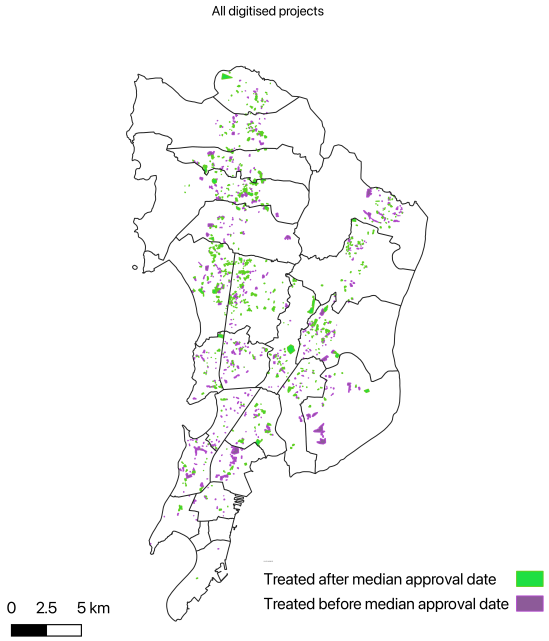
Notes. This figure plots the share of redevelopment applications that passed different stages of the slum redevelopment. The graph has been made with data on all slum redevelopment projects.

Figure 3: Temporal variation in redevelopment approvals



Notes. This figure plots the number of redevelopment approvals by year. The red dotted lines represent the start date and end date of our analysis sample.

Figure 4: Spatial variation in redevelopment approvals



Notes. This figure plots the spatial variation in the timing of redevelopment approvals by the median approval date.

	Displaced	**Not Displaced**
In slum	34.6	52.6
Not in slum	10.5	0.2

Table 2: Share of incumbent slum residents by location and slum status of the neighbourhood after redevelopment approval.

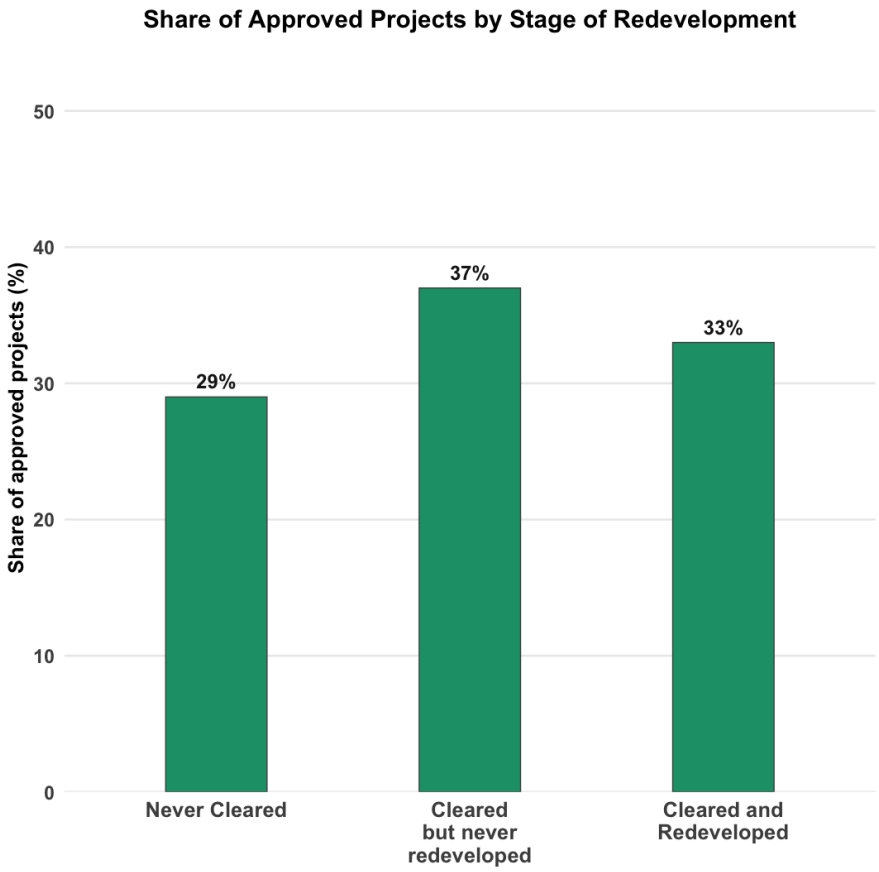
Notes. The shares after approval are calculated by adding the intent-to-treat estimate to the respective share before redevelopment approval.

	Displaced	**Not Displaced**
In slum	12.8	80.9
Not in slum	4.9	0

Table 3: Share of incumbent slum residents by location and slum status of the neighbourhood before redevelopment approval.

Table 4: Comparison of neighbourhood type and location of slum residents with right to compensation before and after redevelopment approval

Figure 5: Share of approved projects by stage of redevelopment



Notes. This figure plots the share of approved slums in the analysis sample that are never cleared, cleared and never redeveloped and complete construction. The shares plotted in this figure are calculated using daytime satellite data for slums in the analysis sample.

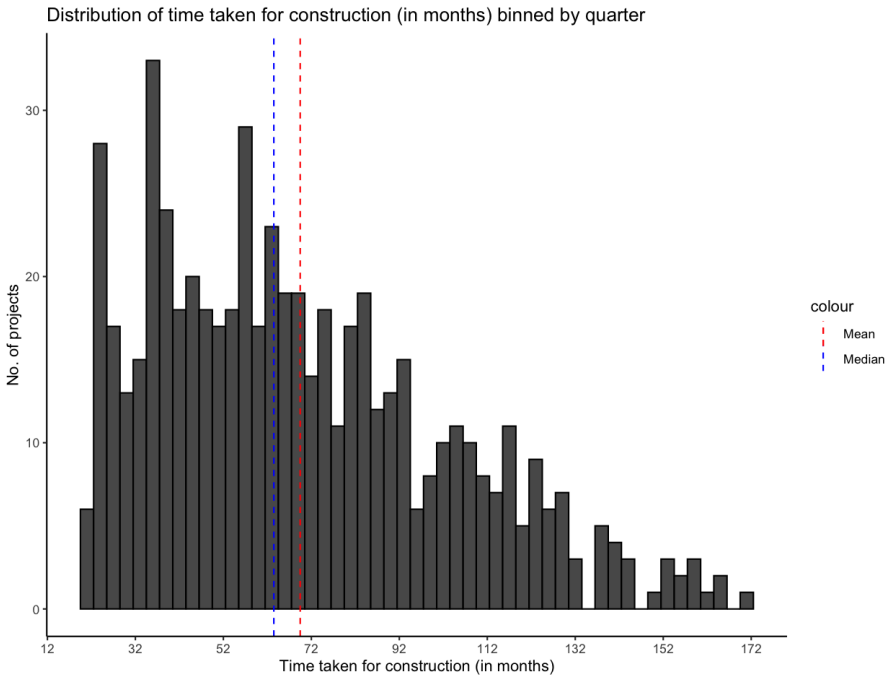
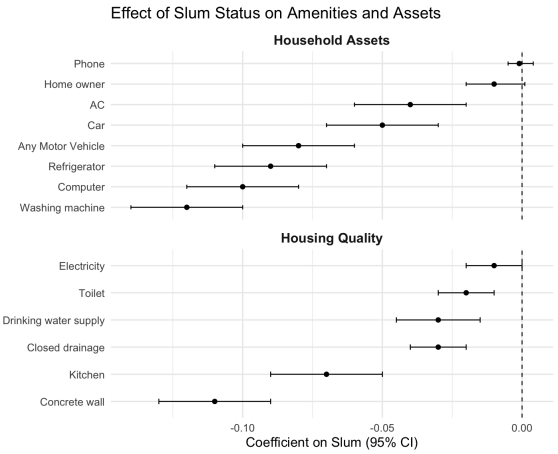


Figure 6: Distribution of construction duration conditional on completion

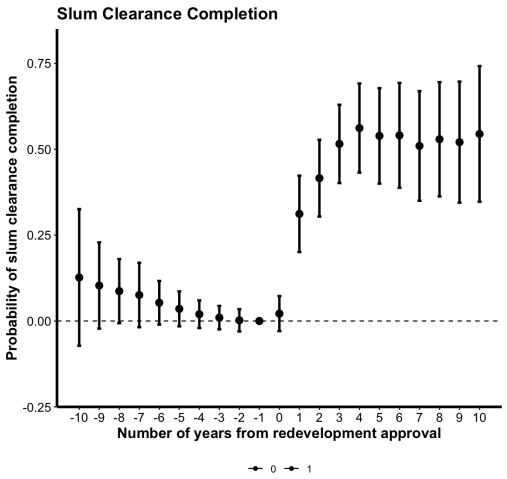
Notes. This figure plots the distribution of slum redevelopment projects by construction duration conditional on completion. The distribution is plotted using the universe of slum redevelopment projects that completed redevelopment.

Figure 7: Correlation between slum status and housing quality and household assets

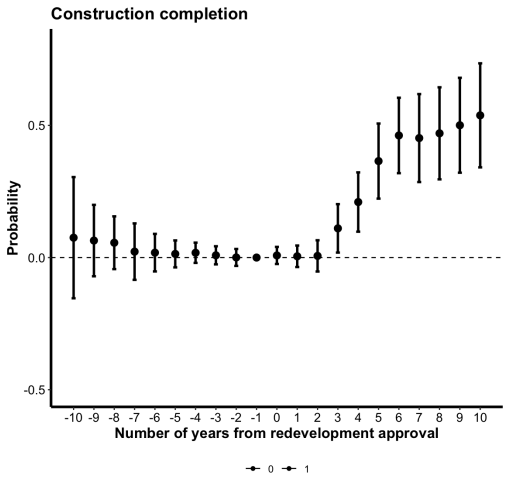


Notes: This figure plots the coefficient of slum status when it is regressed on housing quality measures and asset ownership shares in the neighbourhood. Standard errors are clustered at the neighbourhood level.

Figure 8: Effect on slum clearance and redevelopment

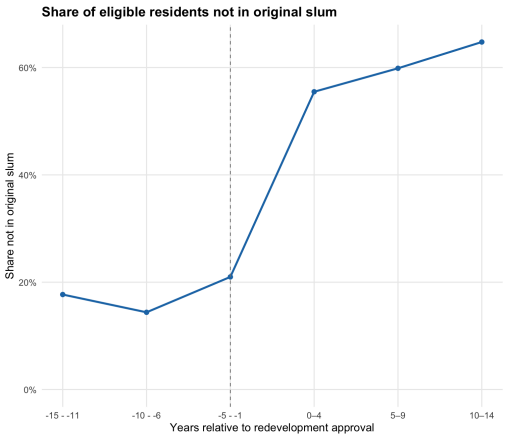


(a) Slum clearance

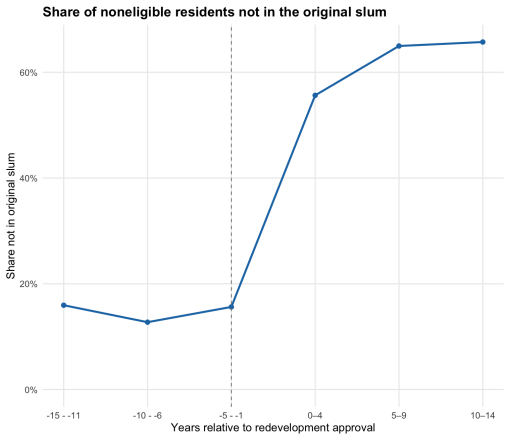


(b) Some redevelopment completion

Notes. These figures plot the β_k from Equation 1 and Equation 2 and 95% confidence intervals. The outcome variable in Panel A is a dummy variable that takes the value 1 in all periods after slum clearance completion. The outcome variable in Panel B is a dummy variable that takes the value 1 in all periods after at least some units within the site complete construction. Panel A shows the impact of redevelopment approval on slum clearance and Panel B shows the impact of redevelopment approval on redevelopment completion. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The estimation is carried out using the sample of slums that were conditionally approved for redevelopment between 1997 and 2022. The treatment group at year t consists of slums that were approved for redevelopment before year t. The control group in year t consists of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.



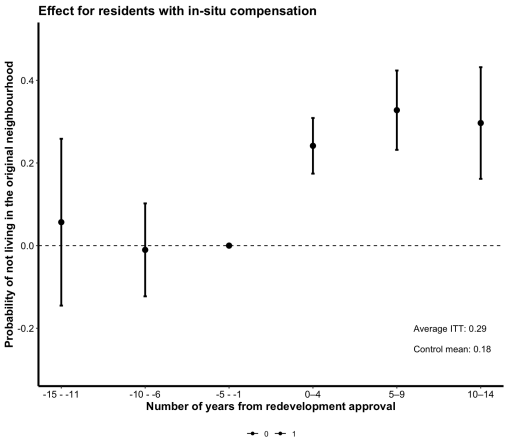
(a) Residents with right to in-situ compensation



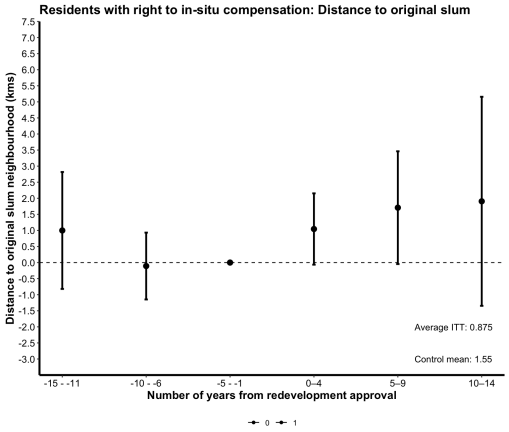
(b) Residents with no right to compensation

Figure 9: Share displaced in the raw data

Figure 10: Displacement effect of in-situ redevelopments on incumbent residents



(a) Probability of not being in the slum neighbourhood



(b) Distance from the slum neighbourhood

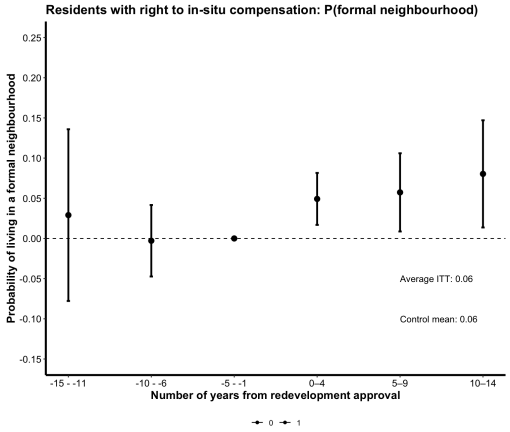
Notes. These figures plot the β_k from Equation 4 and 95% confidence intervals. The outcome variable in panel (a) is a dummy variable that takes the value 1 when the individual lives outside their original slum and 0 otherwise. The outcome variable in panel (b) is the distance from the original slum neighbourhood. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval and in 1995 i.e., those who were eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of residents of slums that were approved for redevelopment before year t. The control group in year t consists of residents of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.

Table 5: Comparison of matched redevelopment projects to all redevelopment projects

Project Characteristic	All projects	Matched projects	p-value
Area of the slum	9644.26	7111.77	0.46
No. of eligible hhs	343.21	298.08	0.71
Floor Area Ratio sanctioned	3.18	3.14	0.71
Built area for eligible hhs	18128.08	15257.69	0.75
Built area for sale	18614.50	13024.08	0.44
Built area for sale on site	14528.07	8207.42	0.12
Share of built area for sale on site	0.85	0.85	0.97
Year of conditional approval	2010.00	2011.71	0.00
Share approved	0.55	0.64	0.02
Share redeveloped	0.21	0.26	0.14
Time taken for approval in years	2.60	1.83	0.01
Construction duration	3.59	4.39	0.34

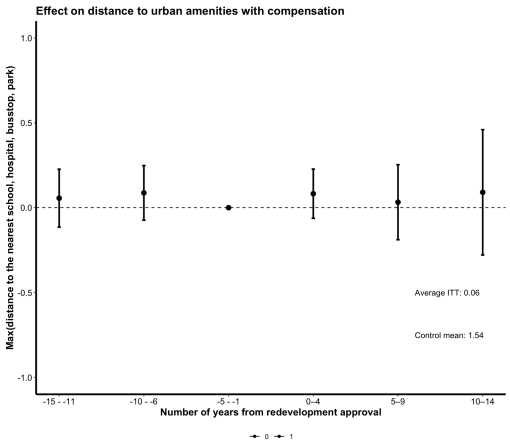
Notes. This table reports the mean project characteristic observed at the time of conditional approval separately for all slum redevelopment projects and for matched slum redevelopment projects as well as the p-value from a difference of means test with standard errors clustered at the slum level.

Figure 11: Effect of in-situ redevelopments on incumbent residents: Probability of living in a formal neighbourhood



Notes. This figure plots the β_k from Equation 4 and 95% confidence intervals. The outcome variable is a dummy variable that takes the value 1 when the individual lives in a formal neighbourhood and 0 otherwise. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval and in 1995 i.e., those who were eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of residents of slums that were approved for redevelopment before year t. The control group in year t consists of residents of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.

Figure 12: Effect of in-situ redevelopment on the incumbent residents: Distance to urban amenities



Notes. This figure plots the β_k from Equation 4 and 95% confidence intervals. The outcome variable is the maximum distance to the nearest school, hospital, park and bus-stop. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The results for each urban amenity separately are in the Appendix. The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval and in 1995 i.e., those who were eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of residents of slums that were approved for redevelopment before year t. The control group in year t consists of residents of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.

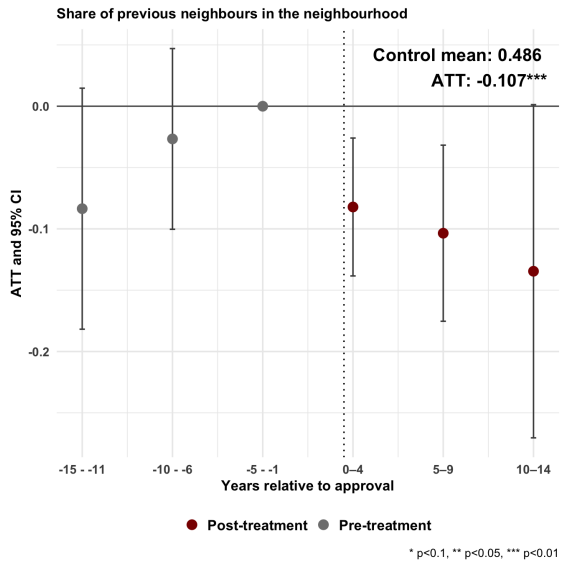
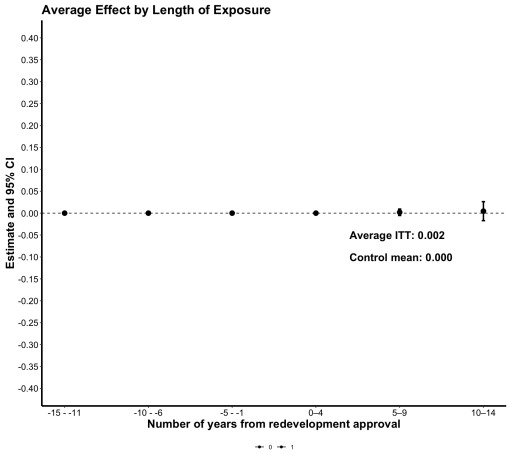
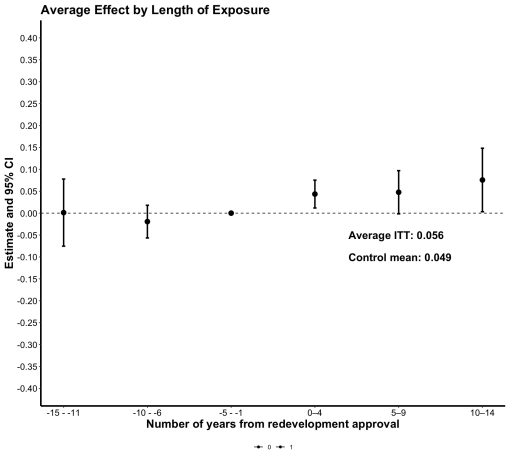


Figure 13: Social network effects of in-situ redevelopment on incumbent residents: Share of previous neighbours within the neighbourhood

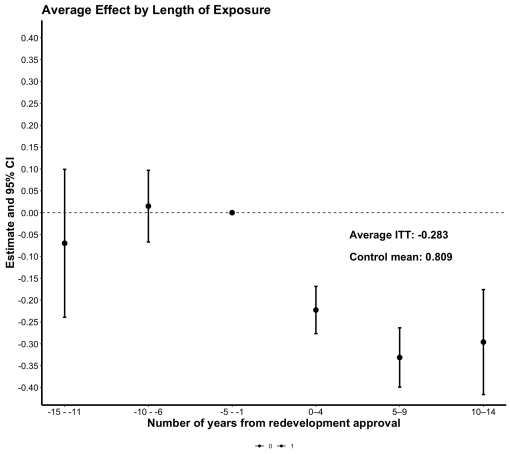
Notes. This figure plots the β_k from Equation 4 and 95% confidence intervals. The outcome variable is a share of previous neighbours that live in the same neighbourhood with the resident. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval and in 1995 i.e., those who were eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of residents of slums that were approved for redevelopment before year t. The control group in year t consists of residents of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.



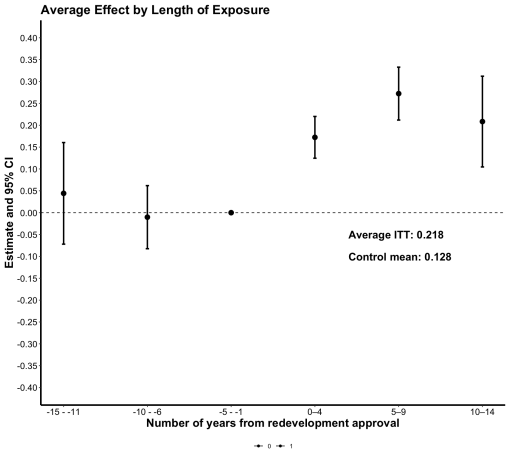
(a) Probability of living in a formal neighbourhood in place



(b) Probability of living in a formal neighbourhood elsewhere



(c) Probability of living in the slum neighbourhood in place

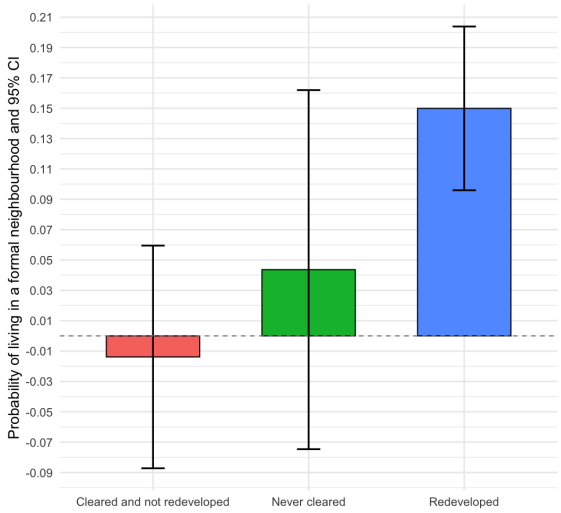


(d) Probability of living in a slum neighbourhood elsewhere

Figure 14: Effect of in-situ redevelopment on incumbent residents: Location and formality of neighbourhood

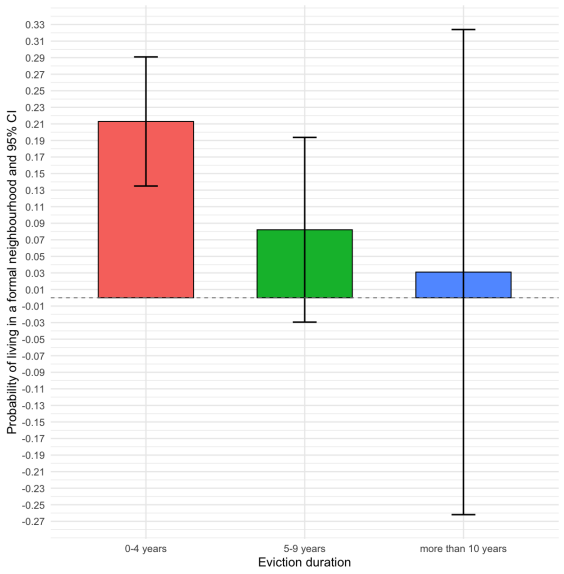
Notes. These figures plot the β_k from Equation 4 and 95% confidence intervals. The outcome variables are from top left clockwise: (i) probability of living in a formal neighbourhood in place; (ii) probability of living in a formal neighbourhood elsewhere; (iii) probability of living in a slum neighbourhood in place; and, (iv) probability of living in a slum neighbourhood elsewhere. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval and in 1995 i.e., those who were eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of residents of slums that were approved for redevelopment before year t. The control group in year t consists of residents of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.

Figure 15: Effect of in-situ redevelopment on the probability of living in a formal neighbourhood by status of redevelopment



Notes. This figure plots the average effect of redevelopment approvals and 95% confidence intervals estimated using Callaway and Sant'Anna (2021) from three regressions comparing approved slums to later approved slums that are in the following categories, from left to right: (i) approved slums that were cleared but not redeveloped to later approved slums that were also cleared and not redeveloped; (ii) approved slums that were never cleared to later approved slums that were also never cleared; and, (iii) approved slums that were redeveloped to later approved slums that were also redeveloped. Standard errors are clustered at the slum level.

Figure 16: Effect of in-situ redevelopment on the probability of living in a formal neighbourhood by delay between eviction and compensation with an apartment in the redeveloped slum



Notes. This figure plots the average effect of redevelopment approvals and 95% confidence intervals estimated using Callaway and Sant'Anna (2021) from three regressions comparing redeveloped slums to later redeveloped slums that are in the following categories, from left to right: (i) redeveloped slums that have an eviction duration of less than 5 years to later redeveloped slums that have an eviction duration of less than 5 years; (ii) redeveloped slums that have an eviction duration of 6–10 years to later redeveloped slums that have an eviction duration of 6–10 years; and, (iii) redeveloped slums that have an eviction duration of more than 10 years to later redeveloped slums that have an eviction duration of more than 10 years. Standard errors are clustered at the slum level.

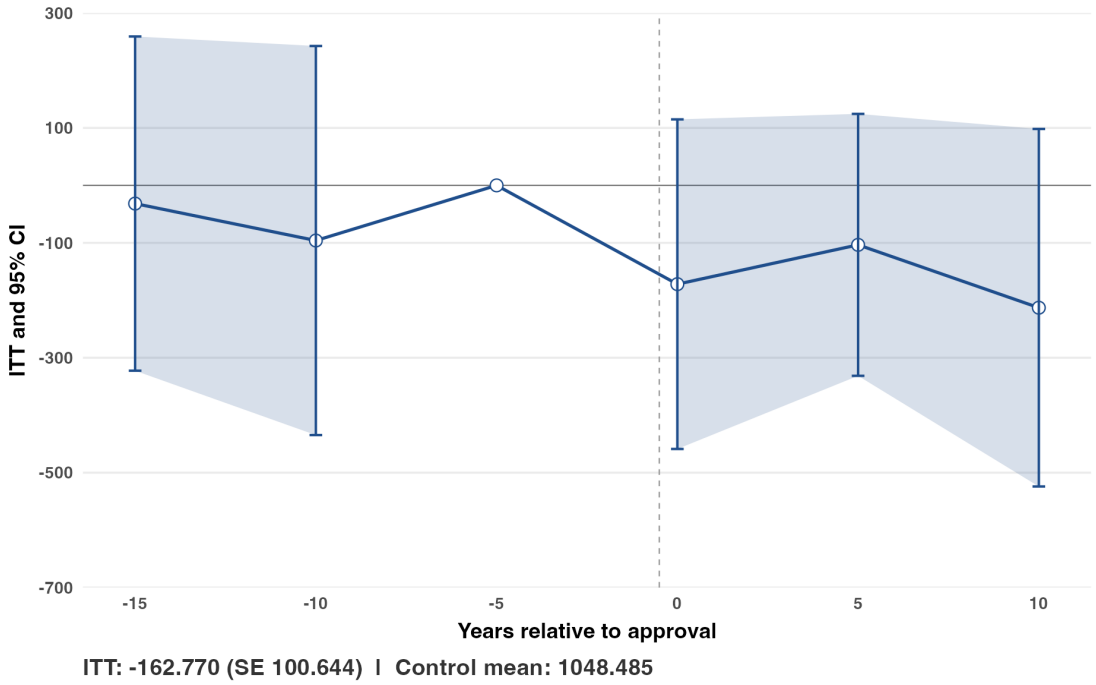
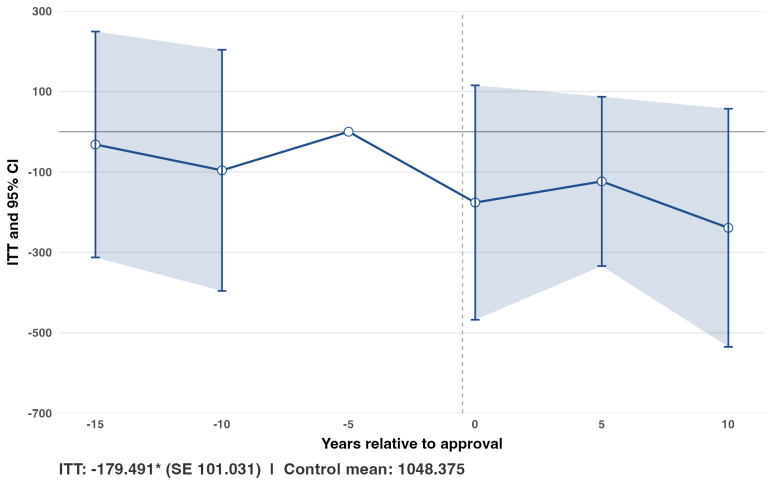
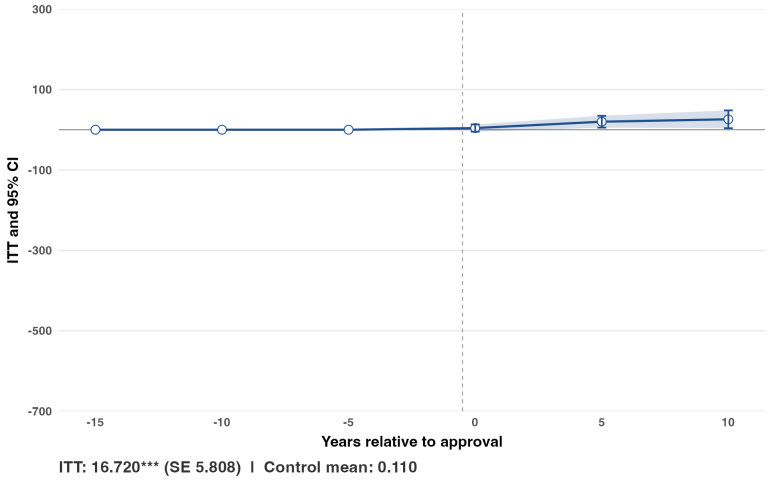


Figure 17: Effect of redevelopment approval on total population living in the neighbourhood

Notes. These figures plot the β_k from Equation 3 and 95% confidence intervals. The outcome variable is the number of residents in the neighbourhood. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The treatment group at year t consists of slums that were approved for redevelopment before year t. The control group in year t consists of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.



(a) Population in informal housing



(b) Population in formal housing

Figure 18: Effect of redevelopment approval on population living in the site by formality of housing

Notes. These figures plot the β_k from Equation 3 and 95% confidence intervals. The outcome variable in Panel a is the number of residents in informal housing in the neighbourhood; in Panel b it is the number of residents in formal housing. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The treatment group at year t consists of slums that were approved for redevelopment before year t. The control group in year t consists of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.

Table 6: Baseline summary statistics

Distance of neighbourhood (in km)	Mean	SD
Distance to nearest hospital	1.50	0.76
Distance to nearest park	0.35	0.26
Distance to nearest school	0.30	0.21
Distance to nearest bus stop	0.15	0.18
Distance to nearest slum	0.00	0.02
Distance to nearest formal neighbourhood	0.00	0.00
Distance to nearest Muslim minority neighbourhood (less than 25%)	0.00	0.00
Distance to nearest Muslim minority neighbourhood (more than 75%)	0.02	0.05

Notes. This table describes the mean and standard deviation of the distance of each neighbourhood to urban public and private infrastructure and other neighbourhoods with specific characteristics in kilometres.

Table 7: Selection into approval and redevelopment

Variable	Cond. Approved	Approved	Redeveloped
% eligible	0.41	0.47*	0.51*
% Muslim	0.12	0.09*	0.07*
Muslim share in ward	0.11	0.10	0.07*
Slum share in ward	0.50	0.48*	0.46*
Dist. to nearest slum	0.00	0.00	0.00
Dist. to nearest formal	0.00	0.00	0.00
Dist. to nearest hospital	1.37	1.57*	1.60*
Dist. to nearest bus stop	0.16	0.13	0.15
Dist. to nearest park	0.40	0.34	0.34
Dist. to nearest school	0.35	0.30	0.32
Area of the slum (sq.m.)	7505.55	6889.87	7282.75
No. of eligible households	273.68	242.18	268.10
Tenement density per sq.m.	0.079	0.073	0.078
% in privately owned land	0.09	0.11	0.12

Notes. This table reports the average of slum characteristics observed at the time of conditional approval for slums that were conditionally approved, approved and redeveloped separately. * denotes that the difference between the characteristic of the slum in that group is different from that of the respective characteristic for all conditionally approved slums is statistically significant at the 95% level. Standard errors are clustered at the slum level.

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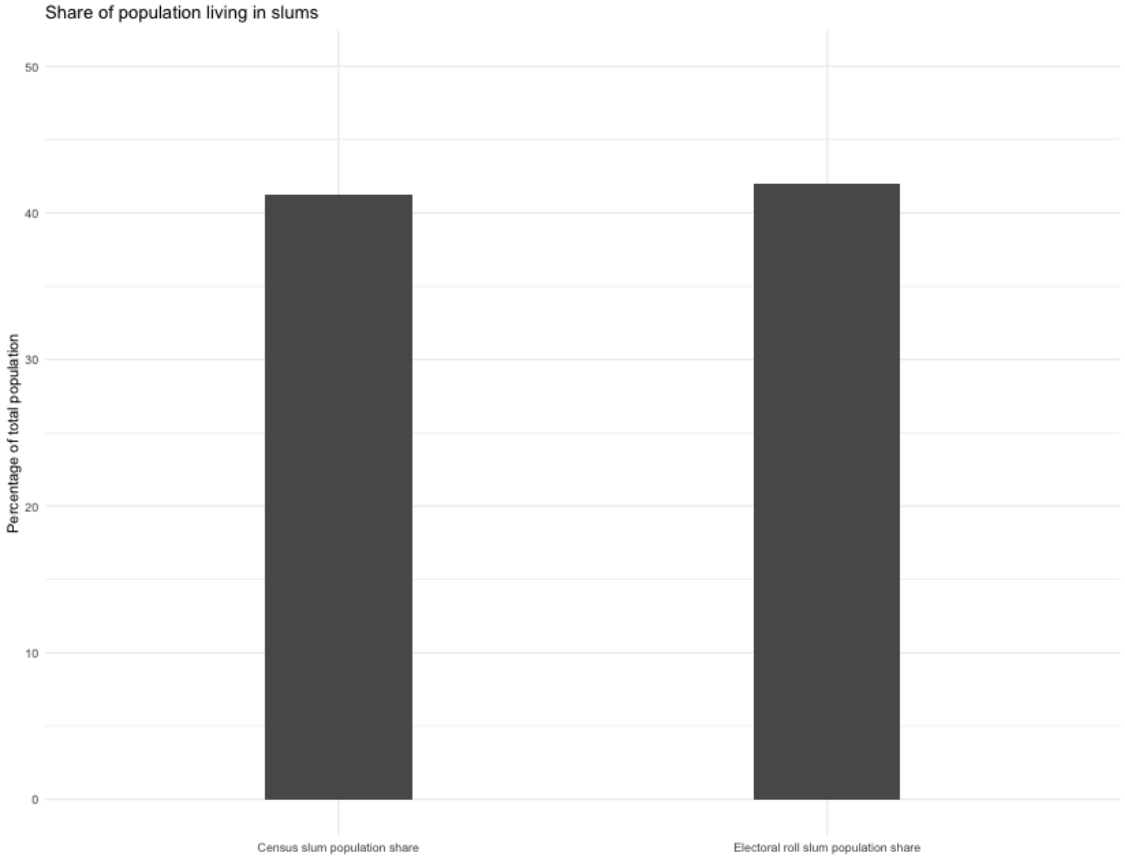
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Appendix

A.1 Supplementary tables and figures

Figure 19: Comparison of slum population according to the Census and Electoral Roll



Notes. This figure shows the share of population living in slums in Mumbai, India according to the Slum Census 2011 (Census, 2011) and according to the electoral roll published on 1 January, 2012. The Slum Census defined a slum as a 'compact area of poorly built congested tenements, unhygienic environment with inadequate infrastructure and lack of proper drinking water and sanitation facilities'. I define a slum neighbourhood in the electoral roll as a neighbourhood that has the name for slum neighbourhoods in Marathi, chawl or jhopadpatti, in the name of the neighbourhood.

Table 8: Effect of in-situ redevelopment on incumbent residents' choice of neighbourhood and mobility

Period relative to approval date	P(Formal neighbourhood)	P(Displaced)	Distance to original slum neighbourhood (km)
-15 to -11 years	0.026	0.045	0.999
	(0.048)	(0.082)	(0.677)
-10 to -6 years	-0.007	-0.028	-0.108
	(0.022)	(0.040)	(0.380)
-5 to -1 years	0.000	0.000	0.000
	(–)	(–)	(–)
0 to 4 years	0.049	0.217	1.044
	(0.017)	(0.026)	(0.295)
5 to 9 years	0.058	0.321	1.707
	(0.025)	(0.036)	(0.461)
10 to 14 years	0.088	0.284	1.899
	(0.039)	(0.060)	(0.687)
Average ITT	0.063	0.29	0.875
Control Mean	0.063	0.178	1.55
Slums	254	254	254

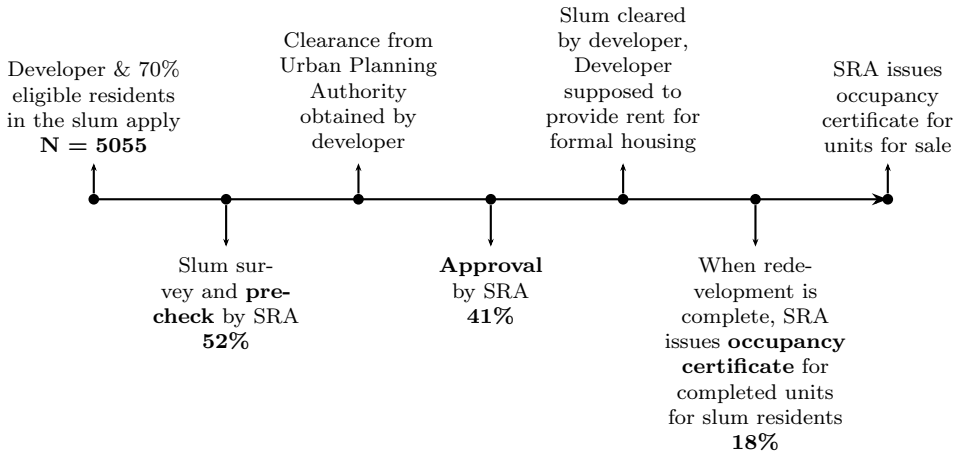
Notes. This table shows the results from estimating Equation 4 using Callaway and Sant'Anna (2021). The outcome variables are, from left to right: (i) probability of living in a formal neighbourhood; (ii) probability of moving from the original slum neighbourhood; and, (iii) distance from the original slum neighbourhood (in km). The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval and in 1995 i.e., those who were eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of residents of slums that were approved for redevelopment before year t. The control group in year t consists of residents of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.

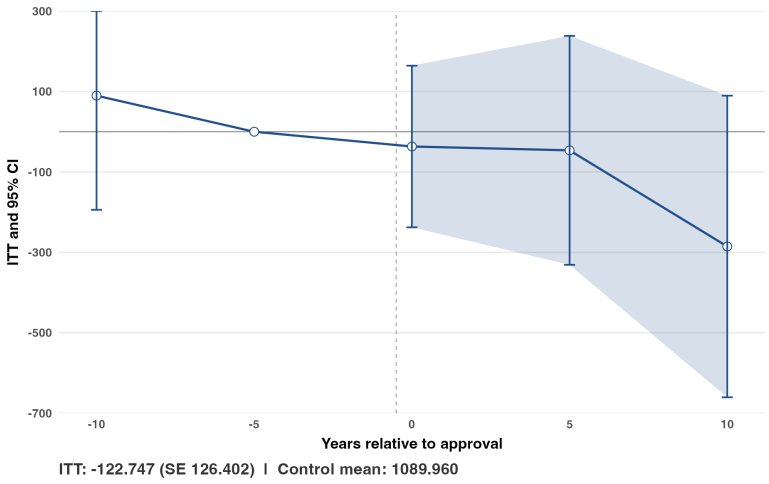
Table 9: Decomposition of effects by location and neighbourhood type

Period relative to approval date	Formal x Displaced	Formal x Same place	Slum x Displaced	Slum x Same place
-15 to -11 years	0.001	0.000	0.044	-0.070
	(0.042)	(–)	(0.064)	(0.084)
-10 to -6 years	-0.019	0.000	-0.010	0.015
	(0.021)	(–)	(0.035)	(0.046)
-5 to -1 years	0.000	0.000	0.000	0.000
	(–)	(–)	(–)	(–)
0 to 4 years	0.044	0.000	0.172	-0.223
	(0.018)	(–)	(0.025)	(0.027)
5 to 9 years	0.048	0.002	0.272	-0.331
	(0.025)	(0.004)	(0.032)	(0.038)
10 to 14 years	0.076	0.005	0.208	-0.296
	(0.036)	(0.011)	(0.051)	(0.054)
Average ITT	0.056	0.002	0.218	-0.283
Control Mean	0.049	0.000	0.128	0.809
Slums	254	254	254	254

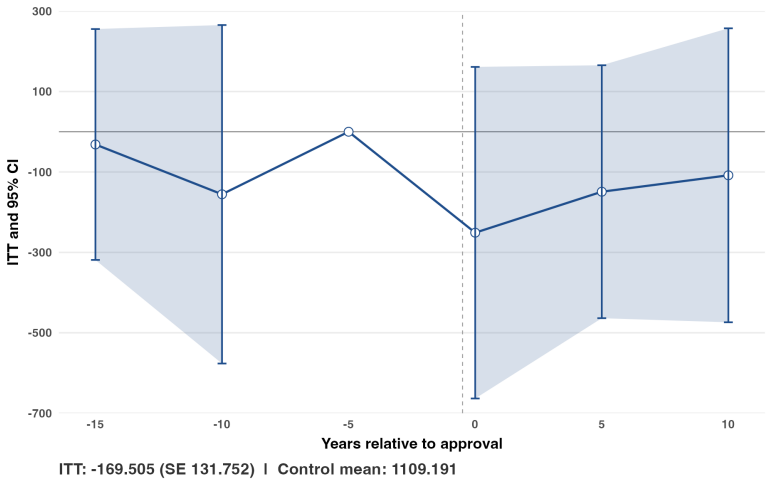
Notes. This table shows the results from estimating Equation 4 using Callaway and Sant'Anna (2021). The outcome variables are from left to right: (i) probability of living in a formal neighbourhood elsewhere; (ii) probability of living in a formal neighbourhood in place; (iii) probability of living in a slum neighbourhood elsewhere; and, (iv) probability of living in a slum neighbourhood in place. The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval and in 1995 i.e., those who were eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of residents of slums that were approved for redevelopment before year t. The control group in year t consists of residents of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.

Figure 20: Timeline of the slum redevelopment process under the SRA





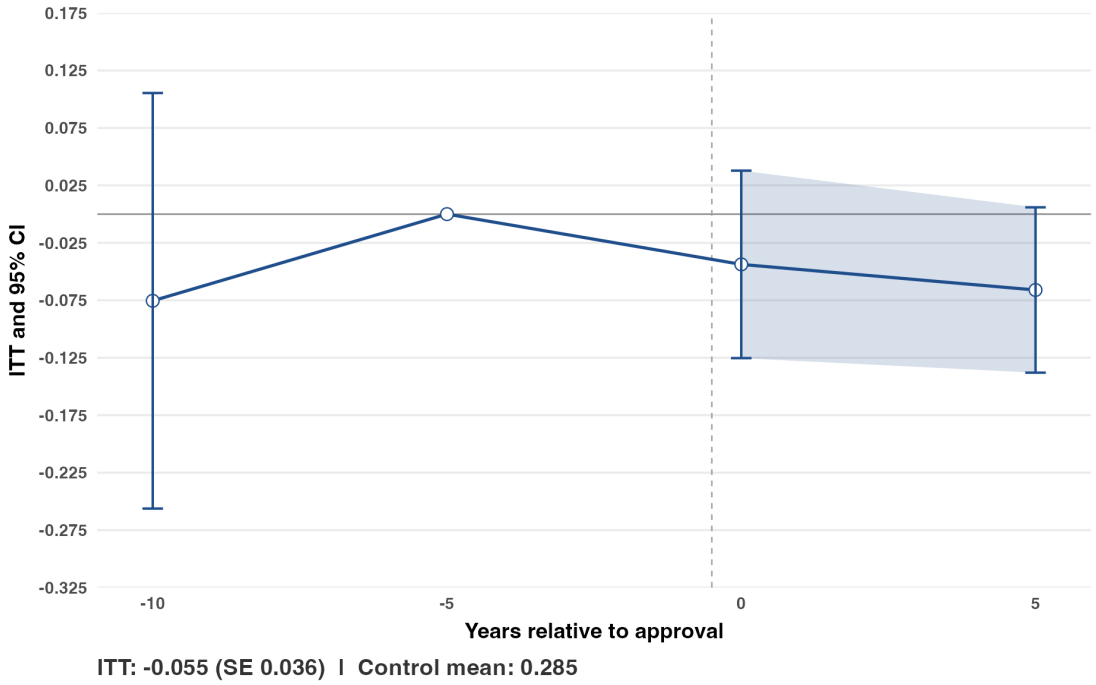
(a) Some construction completion



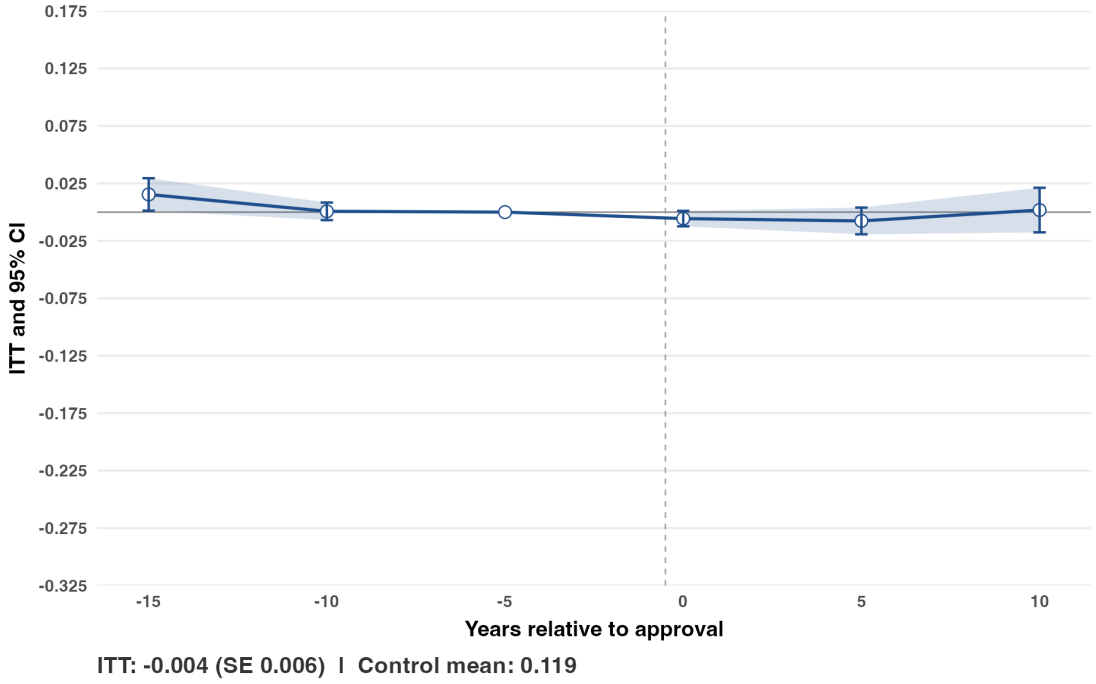
(a) No construction completion

Figure 21: Effect of redevelopment approval on total population by completion status

Notes: These figures plot the β_k from Equation 3 and 95% confidence intervals. The outcome variable is the total number of residents in the neighbourhood. Panel (a) is estimated on a sample of sites that were eventually issued occupancy certificates for at least some completed buildings; Panel (b) is estimated on a sample of sites that were never issued any occupancy certificate. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The treatment group at year t consists of slums that were approved for redevelopment before year t. The control group in year t consists of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.



(a) Share of residents living in a slum in the past 5 years



(b) Share of residents classified as Muslim

Figure 22: Effects of redevelopment approval on neighbourhood composition within the redeveloped site

Notes: The figures plot β_k from 3 and 95% confidence intervals using the Callaway and Sant'Anna (2021) estimator. Panel (a) plots the effect of redevelopment approvals on the share of current residents who lived in a slum neighbourhood in the previous electoral-roll wave as a proxy for poor residents. The outcome variable in panel (b) is the share of residents classified as Muslims within the neighbourhood. Shares are computed over the site's total population. Standard errors are clustered at the site level. Confidence intervals are corrected for multiple hypothesis testing.

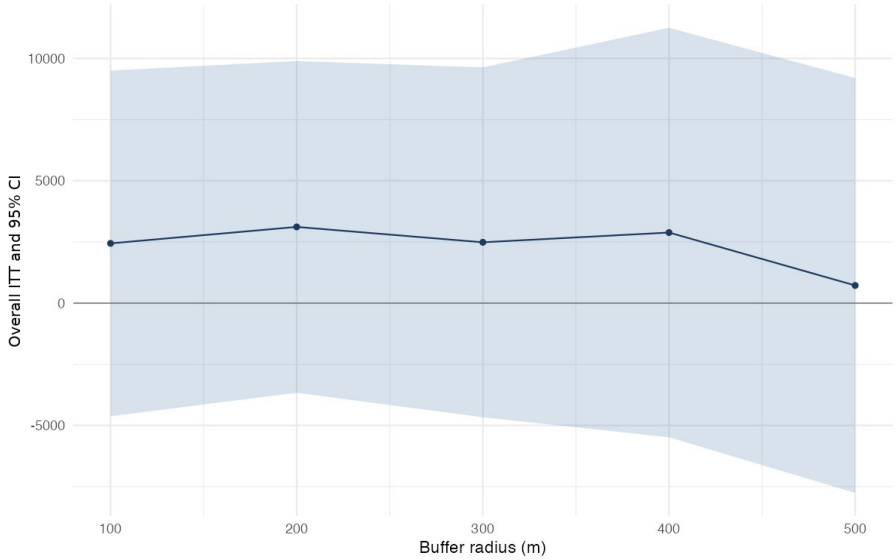
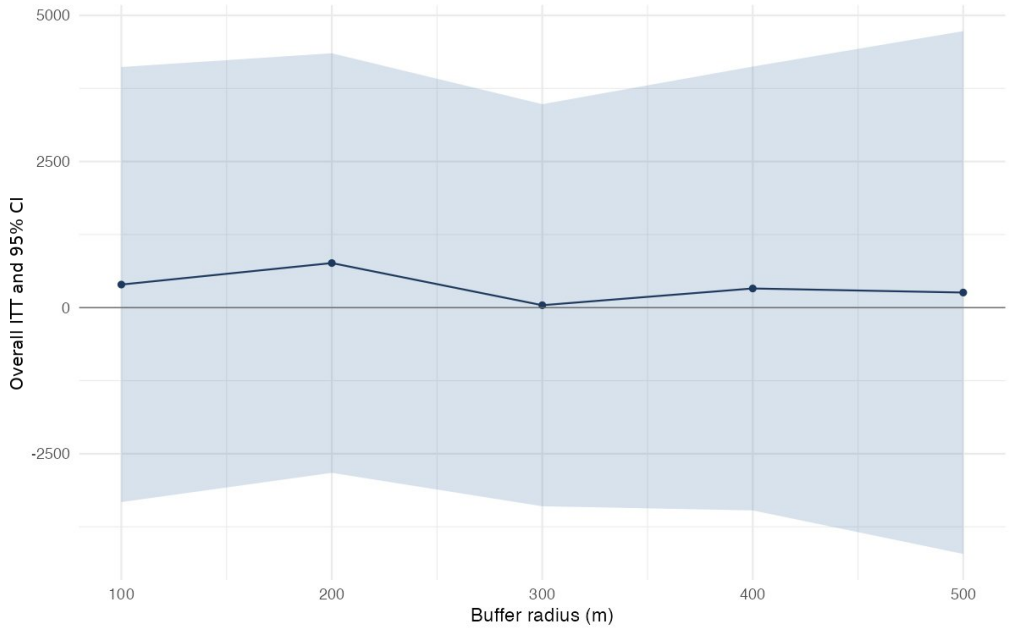
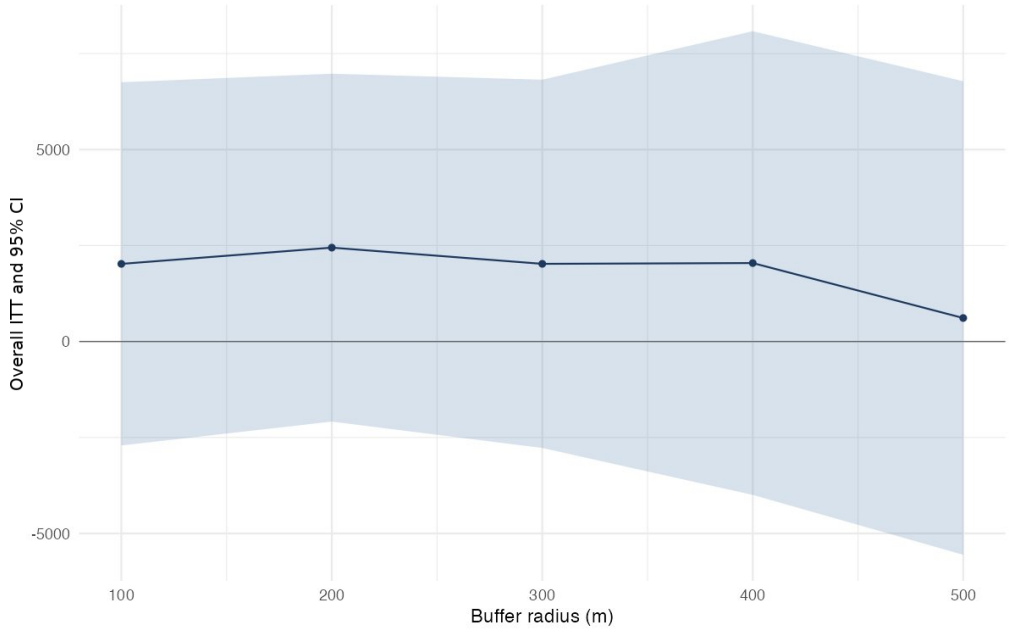


Figure 23: Effect of redevelopment approval on total population in nearby neighbourhoods by radius r

Notes: These figures plot the average effect from Equation 3 and 95% confidence intervals. The outcome variable is the total population within a ring of radius r around the neighbourhood. The radius $r \in \{100m, 200m, 300m, 400m, 500m\}$. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The treatment group at year t consists of slums that were approved for redevelopment before year t. The control group in year t consists of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.



(a) Slum population



(b) Formal population

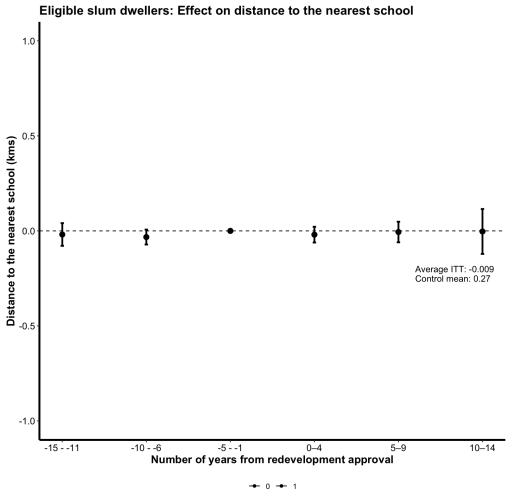
Figure 24: Effect of redevelopment approval on slum and formal population in nearby neighbourhoods by radius r

Notes: These figures plot the average effect from Equation 3 and 95% confidence intervals. The outcome variable is the slum population (Panel (a)) and formal population (Panel (b)) within a ring of radius r around the neighbourhood. The radius $r \in \{100m, 200m, 300m, 400m, 500m\}$. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The treatment group at year t consists of slums that were approved for redevelopment before year t. The control group in year t consists of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.

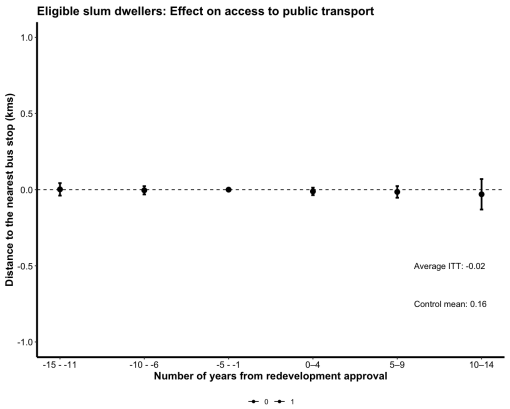
Table 10: Effect of in-situ redevelopments on incumbent residents' neighbourhood characteristics

Period relative to approval date (in years)	Maximum distance to urban infrastructure and amenities (km)	Distance to nearest bus stop (km)	Distance to nearest hospital (km)	Distance to nearest park (km)	Distance to nearest school (km)
-15 to -11	0.126	0.130	-0.019	0.063	0.002
	(0.078)	(0.078)	(0.026)	(0.025)	(0.013)
-10 to -6	0.104	0.105	-0.032	0.022	-0.004
	(0.047)	(0.048)	(0.013)	(0.016)	(0.008)
-5 to -1	0.000	0.000	0.000	0.000	0.000
	(–)	(–)	(–)	(–)	(–)
0 to 4	0.086	0.087	-0.020	0.031	-0.011
	(0.044)	(0.045)	(0.011)	(0.014)	(0.007)
5 to 9	-0.016	-0.016	-0.006	0.037	-0.015
	(0.052)	(0.057)	(0.015)	(0.017)	(0.009)
10 to 14	0.023	0.024	-0.003	0.018	-0.029
	(0.094)	(0.092)	(0.024)	(0.028)	(0.019)
Average ITT	0.054	0.055	-0.013	0.028	-0.010
Control Mean	1.542	1.538	0.275	0.319	0.131
Slums	254	254	254	254	254

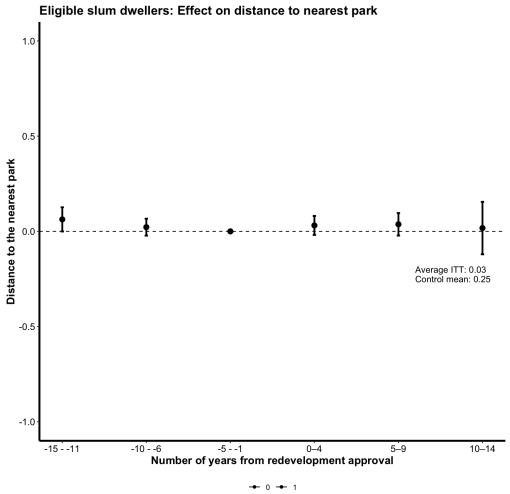
Notes. This table shows the results from estimating Equation 4 using the Callaway and Sant'Anna (2021) estimator. The outcome variables are from left to right: (i) maximum distance to urban infrastructure and amenities; (ii) distance to nearest bus stop; (iii) distance to hospital; (iv) distance to nearest park; and, (v) distance to nearest school. The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval and in 1995 i.e., those who were eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of residents of slums that were approved for redevelopment before year t. The control group in year t consists of residents of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.



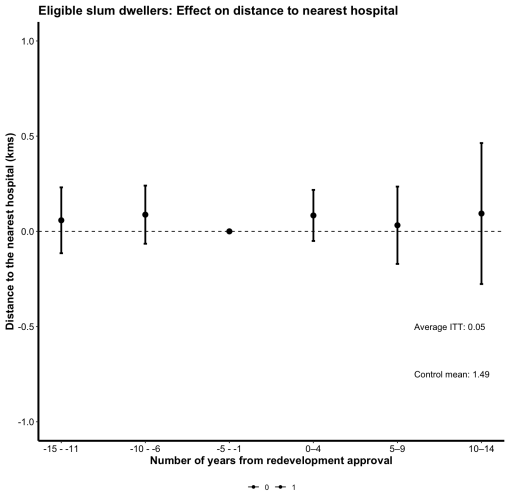
(a) Distance to nearest school



(b) Access to public transport



(c) Access to green spaces

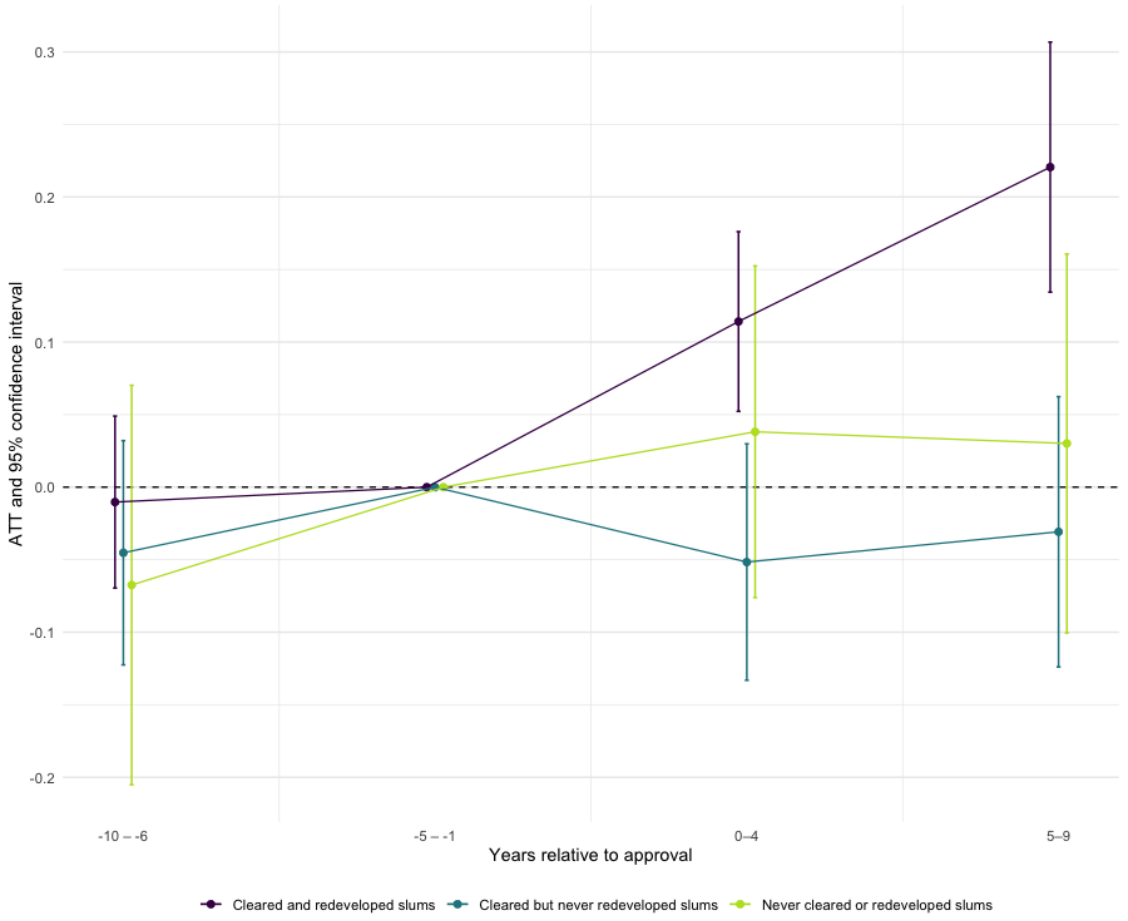


(d) Distance to nearest hospital

Figure 25: Effect of in-situ redevelopment on incumbent residents: Distance to urban infrastructure and amenities by amenity

Notes. These figures plot the β_k from Equation 4 and 95% confidence intervals. The outcome variables are distances to urban infrastructure and amenities. All distances are in kilometres. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval and in 1995 i.e. individuals who were eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of residents of slums that were approved for redevelopment before year t. The control group in year t consists of residents of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.

Figure 26: Dynamic effects of the probability of living in a formal neighbourhood by redevelopment status



Notes. This figure plots the β_k and 95% confidence intervals estimated using Callaway and Sant'Anna (2021) from three regressions comparing approved slums to later approved slums that are in the following categories: (i) approved slums that were cleared but not redeveloped to later approved slums that were also cleared and not redeveloped; (ii) approved slums that were never cleared to later approved slums that were also never cleared; and, (iii) approved slums that were redeveloped to later approved slums that were also redeveloped. These categories are created for the subset of slums that could be georeferenced using cadastral maps. The coefficient for the period before approval is normalised to 0. Standard errors are clustered at the slum level. The coefficients and standard errors are in Table 11.

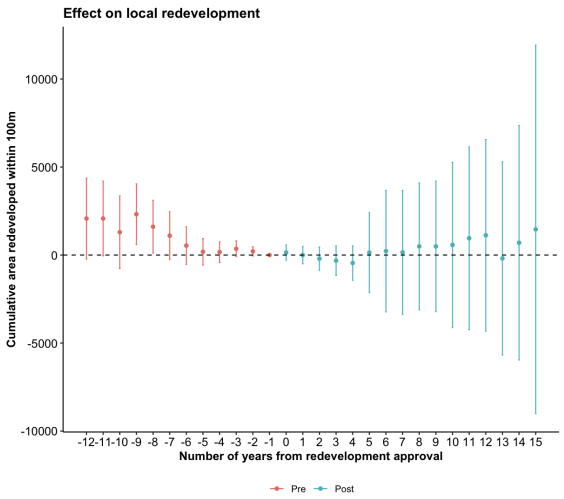
Table 11: Event-study estimates around year of approval by status of redevelopment

	Outcome: Probability of living in a formal neighbourhood		
Period relative to approval (in years)	Cleared and redeveloped slums	Cleared but never redeveloped slums	Never cleared or redeveloped slums
-10 to -6	-0.010 (0.030)	-0.045 (0.039)	-0.067 (0.070)
-5 to -1	0.000	0.000	0.000
0 to 4	0.114 (0.032)	-0.052 (0.042)	0.038 (0.058)
5 to 9	0.221 (0.044)	-0.031 (0.048)	0.030 (0.067)
Control mean	0.111	0.106	0.100

Notes. This table shows the β_k and standard errors estimated from three regressions using Callaway and Sant'Anna (2021) comparing approved slums to later approved slums divided into three different samples: (i) approved slums that were cleared but not redeveloped to later approved slums that were also cleared and not redeveloped; (ii) approved slums that were never cleared to later approved slums that were also never cleared; and, (iii) approved slums that were redeveloped to later approved slums that were also redeveloped. These categories are created for the subset of slums that could be georeferenced using cadastral maps. The coefficient for the period before approval is normalised to 0. Standard errors are clustered at the slum level.

A.2 Robustness checks

Figure A.2.1: Effect of redevelopment approvals on local constructions



Notes. These figures plot the β_k and 95% confidence interval of a slum level difference-in-differences regression similar to 2 where the outcome variable is the cumulative area under construction in square metres in a 100 metre radius of the slum (not including the slum itself). This serves as a placebo test to identify hyper-local productivity shocks that drive a local construction boom and potentially transitions out of slum living in the neighbourhood. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval and in 1995 i.e. individuals who were eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of slums that were approved for redevelopment before year t. The control group in year t consists of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.

Table A.2.1: Robustness Check: Effect of in-situ redevelopment on incumbent residents' choice of neighbourhood and mobility

	Control group: Approved but never treated slums		
Period relative to approval date (in years)	P(Formal neighbourhood)	P(Displaced)	Distance to original slum neighbourhood (km)
-15 to -11	0.026 (0.050)	0.045 (0.077)	0.999 (0.703)
-10 to -6	-0.007 (0.022)	-0.028 (0.042)	-0.108 (0.379)
-5 to -1	0.000 (–)	0.000 (–)	0.000 (–)
0 to 4	0.049 (0.017)	0.217 (0.028)	1.044 (0.291)
5 to 9	0.058 (0.026)	0.321 (0.033)	1.707 (0.467)
10 to 14	0.088 (0.037)	0.284 (0.055)	1.899 (0.731)
Average ITT	0.036	0.140	0.923
Control Mean	0.063	0.178	0.875
Slums	254	254	254

Notes. This table shows the results from estimating Equation 4 using Callaway and Sant'Anna (2021). The outcome variables are, from left to right: (i) probability of living in a formal neighbourhood; (ii) probability of moving from the original slum neighbourhood; and, (iii) distance from the original slum neighbourhood (in km). The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval and in 1995 i.e., those who were eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of residents of slums that were approved for redevelopment before year t. The control group in year t consists of residents of conditionally approved slums that were never approved for redevelopment. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.

Table A.2.2: Robustness check: Effect of in-situ redevelopment on incumbent residents' neighbourhood characteristics

	Control group: Approved but never treated slums				
Period relative to approval date (in years)	Maximum distance to urban infrastructure and amenities (km)	Distance to nearest bus stop (km)	Distance to nearest hospital (km)	Distance to nearest park (km)	Distance to nearest school (km)
-15 to -11	0.002	0.130	0.063	-0.019	0.126
	(0.014)	(0.076)	(0.027)	(0.028)	(0.076)
-10 to -6	-0.005	0.109	0.031	-0.030	0.108
	(0.008)	(0.050)	(0.016)	(0.014)	(0.048)
-5 to -1	0.000	0.000	0.000	0.000	0.000
	(–)	(–)	(–)	(–)	(–)
0 to 4	-0.011	0.065	0.024	-0.014	0.064
	(0.006)	(0.040)	(0.012)	(0.011)	(0.040)
5 to 9	-0.015	-0.029	0.031	-0.004	-0.029
	(0.010)	(0.053)	(0.017)	(0.016)	(0.058)
10 to 14	-0.029	0.024	0.018	-0.003	0.023
	(0.018)	(0.086)	(0.025)	(0.025)	(0.090)
Average ITT	-0.010	0.050	0.028	-0.012	0.049
Control Mean	0.131	1.538	0.319	0.275	1.542
Slums	254	254	254	254	254

Notes. This table shows the results from estimating Equation 4 using the Callaway and Sant'Anna (2021) estimator. The outcome variables are from left to right: (i) maximum distance to urban infrastructure and amenities; (ii) distance to nearest bus stop; (iii) distance to hospital; (iv) distance to nearest park; and, (v) distance to nearest school. The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval and in 1995 i.e., those who were eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of residents of slums that were approved for redevelopment before year t. The control group in year t consists of residents of conditionally approved slums that were never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.

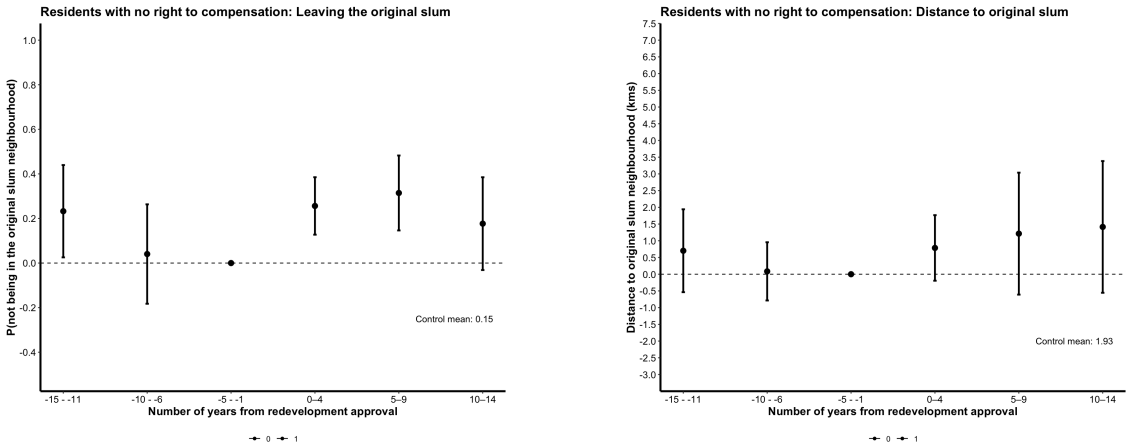
Table A.2.3: Decomposition of effects by location and neighbourhood type

	Control group: Approved but never treated slums			
Period relative to approval date(in years)	Formal x Displaced	Formal x Same place	Slum x Displaced	Slum x Same place
-15 to -11	0.001	0.000	0.044	-0.070
	(0.040)	(–)	(0.063)	(0.081)
-10 to -6	-0.006	0.000	0.021	-0.028
	(0.020)	(–)	(0.036)	(0.045)
-5 to -1	0.000	0.000	0.000	0.000
	(–)	(–)	(–)	(–)
0 to 4	0.045	0.000	0.169	-0.218
	(0.016)	(–)	(0.022)	(0.026)
5 to 9	0.048	0.002	0.268	-0.325
	(0.025)	(0.003)	(0.033)	(0.039)
10 to 14	0.076	0.005	0.208	-0.296
	(0.038)	(0.011)	(0.048)	(0.055)
Average ITT	0.027	0.001	0.118	-0.156
Control Mean	0.049	0.000	0.128	0.809
Slums	254	254	254	254

Notes. This table shows the results from estimating Equation 4 using Callaway and Sant'Anna (2021). The outcome variables are from left to right: (i) probability of living in a formal neighbourhood elsewhere; (ii) probability of living in a formal neighbourhood in place; (iii) probability of living in a slum neighbourhood elsewhere; and, (iv) probability of living in a slum neighbourhood in place. The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval and in 1995 i.e., those who were eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of residents of slums that were approved for redevelopment before year t. The control group in year t consists of residents of conditionally approved slums that were never approved for redevelopment. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.

A.3 Effects on ineligible slum residents

Figure A.3.1: Displacement effect on ineligible residents

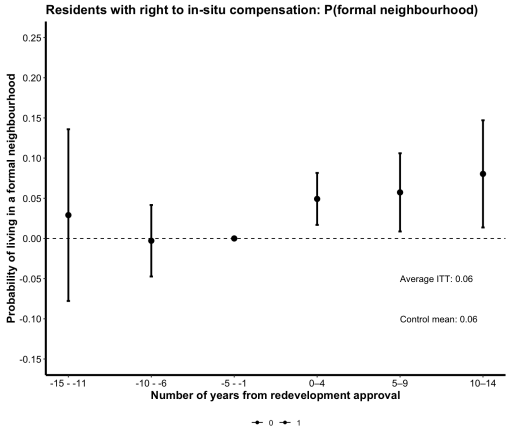


(a) Probability of not being in the slum neighbourhood

(b) Distance from the slum neighbourhood

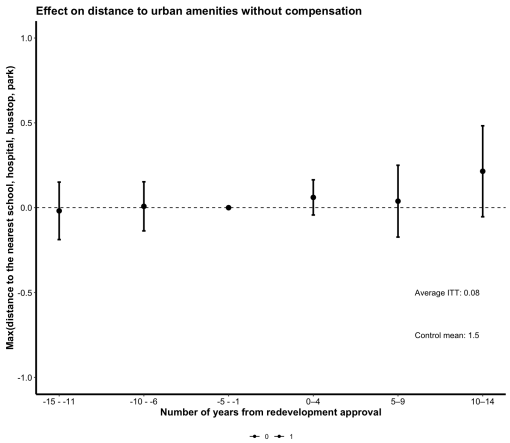
Notes. These figures plot the β_k from Equation 4 and 95% confidence intervals. The outcome variable in panel (a) is a dummy variable that takes the value 1 when the individual lives outside their original slum and 0 otherwise. The outcome variable in panel (b) is the distance from the original slum neighbourhood. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval but not in 1995 i.e., those who were less likely to be eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of residents of slums that were approved for redevelopment before year t. The control group in year t consists of residents of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.

Figure A.3.2: Effect of in-situ redevelopments on incumbent residents: Probability of living in a formal neighbourhood

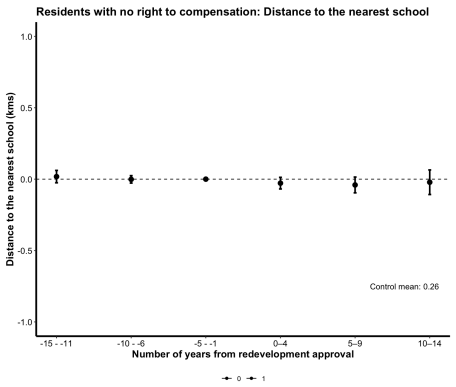


Notes. This figure plots the β_k from Equation 4 and 95% confidence intervals. The outcome variable is a dummy variable that takes the value 1 when the individual lives in a formal neighbourhood and 0 otherwise. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval but not in 1995 i.e., those who were less likely to be eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of residents of slums that were approved for redevelopment before year t. The control group in year t consists of residents of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.

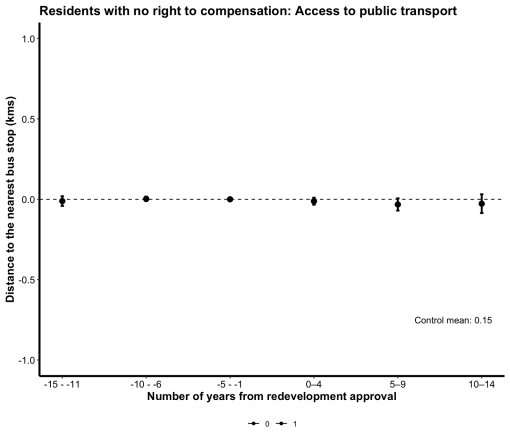
Figure A.3.3: Ineligible residents: Effects on distance to urban infrastructure and amenities



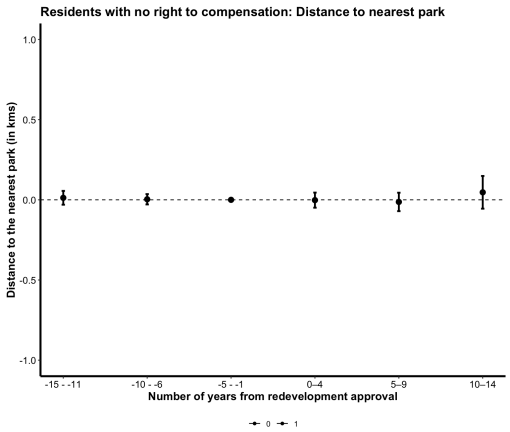
Notes. This figure plots the β_k from Equation 4 and 95% confidence intervals. The outcome variable is the maximum distance to the nearest school, hospital, park and bus-stop. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval but not in 1995 i.e., those who were less likely to be eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of residents of slums that were approved for redevelopment before year t. The control group in year t consists of residents of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.



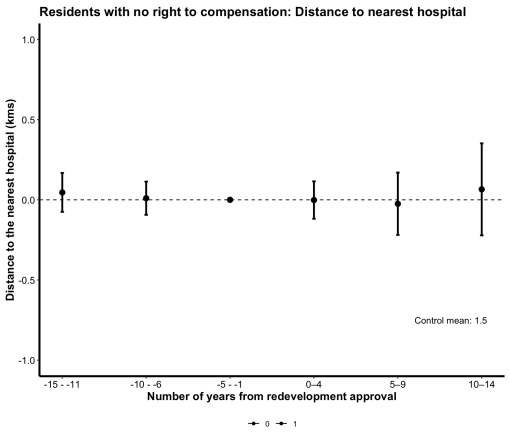
(a) Distance to nearest school



(b) Access to public transport



(c) Access to green spaces



(d) Distance to nearest hospital

Figure A.3.4: Ineligible residents: Effects on distance to urban infrastructure and amenities by amenity

Notes. These figures plot the β_k from Equation 4 and 95% confidence intervals. The outcome variables are distances to urban infrastructure and amenities. All distances are in kilometres. I use Callaway and Sant'Anna (2021) to compute the estimates and 95% confidence intervals. The estimation is carried out using a balanced sample of individuals who lived in the slum at the time of conditional approval but not in 1995 i.e., those who were less likely to be eligible for compensation with an apartment in the redeveloped slum. The treatment group at year t consists of residents of slums that were approved for redevelopment before year t. The control group in year t consists of residents of conditionally approved slums that were approved for redevelopment after year t or never approved. Standard errors are clustered at the slum level. The coefficient is normalised to 0 in the period before redevelopment approval.

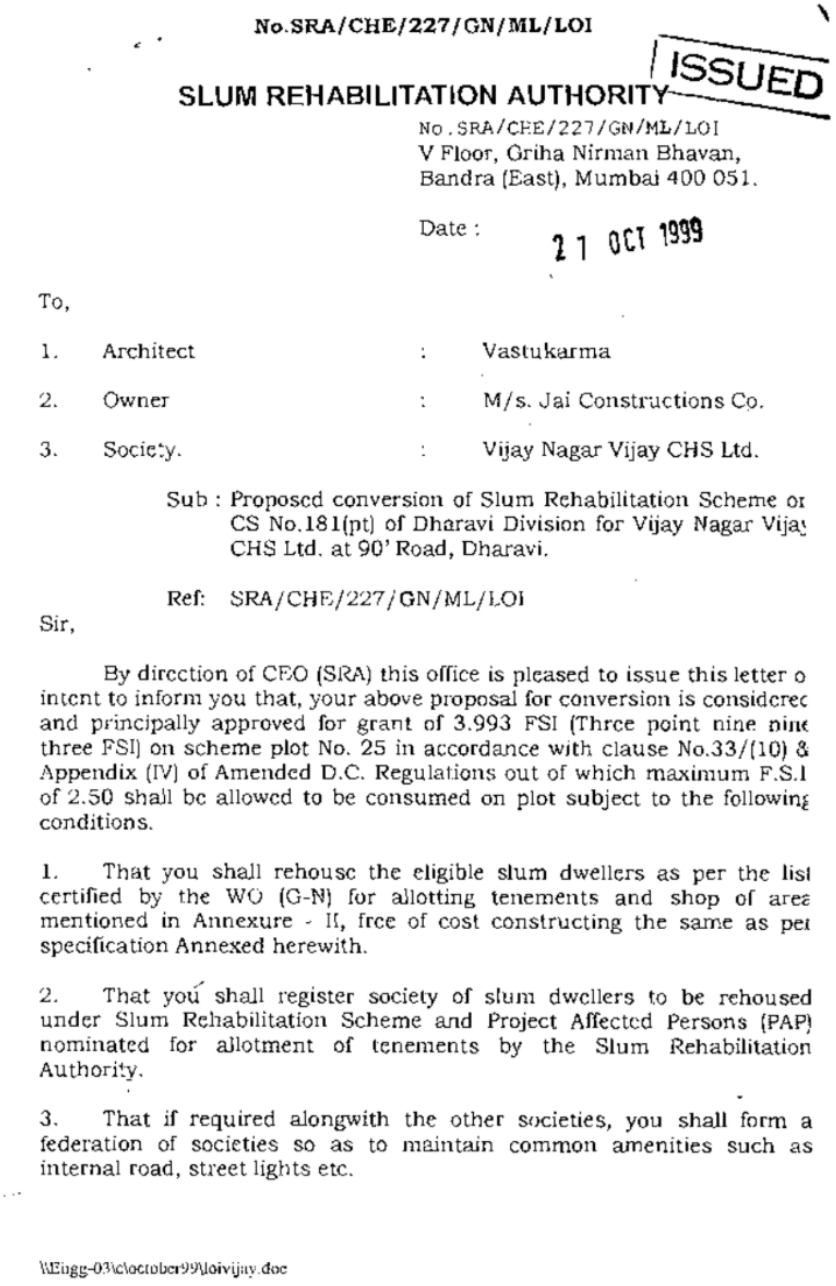
A.4 Data appendix

A.4.1 Digitisation of slum redevelopment project documents

Each slum redevelopment project folder within the website hosted by the Slum Rehabilitation Authority contains thousands of pages of project documents. Enumerators manually search through these pages to identify the earliest issued conditional approval for redevelopment (see an example in Figure A.4.1.1), the earliest issued approval for redevelopment (see an example in Figure A.4.1.3), the earliest issued occupancy certificate (see an example in Figure A.4.1.4) certifying that at least one building for incumbent slum residents has been completed, a copy of the list of incumbent slum residents from the slum census (see an example in Figure A.4.1.5) and a copy of the 1995 electoral roll for the slum neighbourhood. The voter roll serial numbers from the slum census are used to identify the slum neighbourhoods from the 1995 electoral rolls when the roll is not in the redevelopment project documents. A 10% random sample of entries is cross-verified for accuracy using a double-entry system.

From the earliest issued conditional approval, enumerators extract the date of conditional approval as well as features of the slum redevelopment project including the area of the slum, the cadastral map number of the slum, the built area used for housing slum residents and its composition, the built area for sale, the Floor Area Ratio sanctioned for the project as well as information on the developer and the housing society. Enumerators also extract dates from the earliest approval and the earliest occupancy permission.

Figure A.4.1.1: Certificate of conditional approval for slum redevelopment



No.SRA/CHE/227/GN/ML/LOI

ISSUED

SLUM REHABILITATION AUTHORITY

No.SRA/CHE/227/GN/ML/LOI
V Floor, Griha Nirman Bhavan,
Bandra (East), Mumbai 400 051.

Date : 21 OCT 1999

To,

1. Architect : Vastukarma
2. Owner : M/s. Jai Constructions Co.
3. Society. : Vijay Nagar Vijay CHS Ltd.

Sub : Proposed conversion of Slum Rehabilitation Scheme or CS No.181(pt) of Dharavi Division for Vijay Nagar Vijay CHS Ltd. at 90' Road, Dharavi.

Ref: SRA/CHE/227/GN/ML/LOI

Sir,

By direction of CEO (SRA) this office is pleased to issue this letter o intent to inform you that, your above proposal for conversion is considered and principally approved for grant of 3.993 FSI (Three point nine nine three FSI) on scheme plot No. 25 in accordance with clause No.33/(10) & Appendix (IV) of Amended D.C. Regulations out of which maximum F.S.I of 2.50 shall be allowed to be consumed on plot subject to the following conditions.

1. That you shall rehouse the eligible slum dwellers as per the list certified by the WO (G-N) for allotting tenements and shop of area mentioned in Annexure - II, free of cost constructing the same as per specification Annexed herewith.

2. That you shall register society of slum dwellers to be rehoused under Slum Rehabilitation Scheme and Project Affected Persons (PAP) nominated for allotment of tenements by the Slum Rehabilitation Authority.

3. That if required alongwith the other societies, you shall form a federation of societies so as to maintain common amenities such as internal road, street lights etc.

\\Engg-03\c\october99\loivijay.doc

Notes. This image shows the first page of a typical certificate of conditional approval for redevelopment or the Letter of Intent. The date the certificate was issued is stamped on the top right. The document is issued by the Slum Rehabilitation Authority to the slum resident society and the construction company to certify that the redevelopment project is principally approved. The cadastral map number of the slum can be extracted from the subject of the certificate. The body of the document provides information on the characteristics of the redevelopment project. Please note that all these images are drawn from different documents.

Figure A.4.1.2: Characteristics of the slum redevelopment project from the certificate of conditional approval

The salient features of the scheme are as under:

Sr. No.	Description	Area in Sq. mtr.
1	Area of slum plot (As per Annexure-II)	3966.29
2	Deduct:	
	a) Area under 12.20 m wide D.P. Road	1379.31
3	Net plot area	2586.98
4	Add: Area under 12.20 m wide D.P. Road	1379.31
5	Plot area for FSI	3966.29
6	Max. FSI permissible on plot	3.00
7	Max. BUA permissible on plot	11898.87
8	Rehab FSI	3903.53
9	Passage area & Amenity structure area	1318.42
10	Rehabilitation component (8+9)	5221.95
11	Sale component permissible	5221.95
12	Total BUA sanctioned for project (8+11)	9125.48

SRA/ENG/1049/ PS /MHL/LOI 15 APR 2009

13	FSI sanctioned for Project (12/5)	2.30
14	Sale in situ BUA proposed	5211.68
15	Total BUA proposed in situ (8+14)	9115.21
16	Area of 12.20 m wide D.P. Road to be surrendered	1379.31

(a)

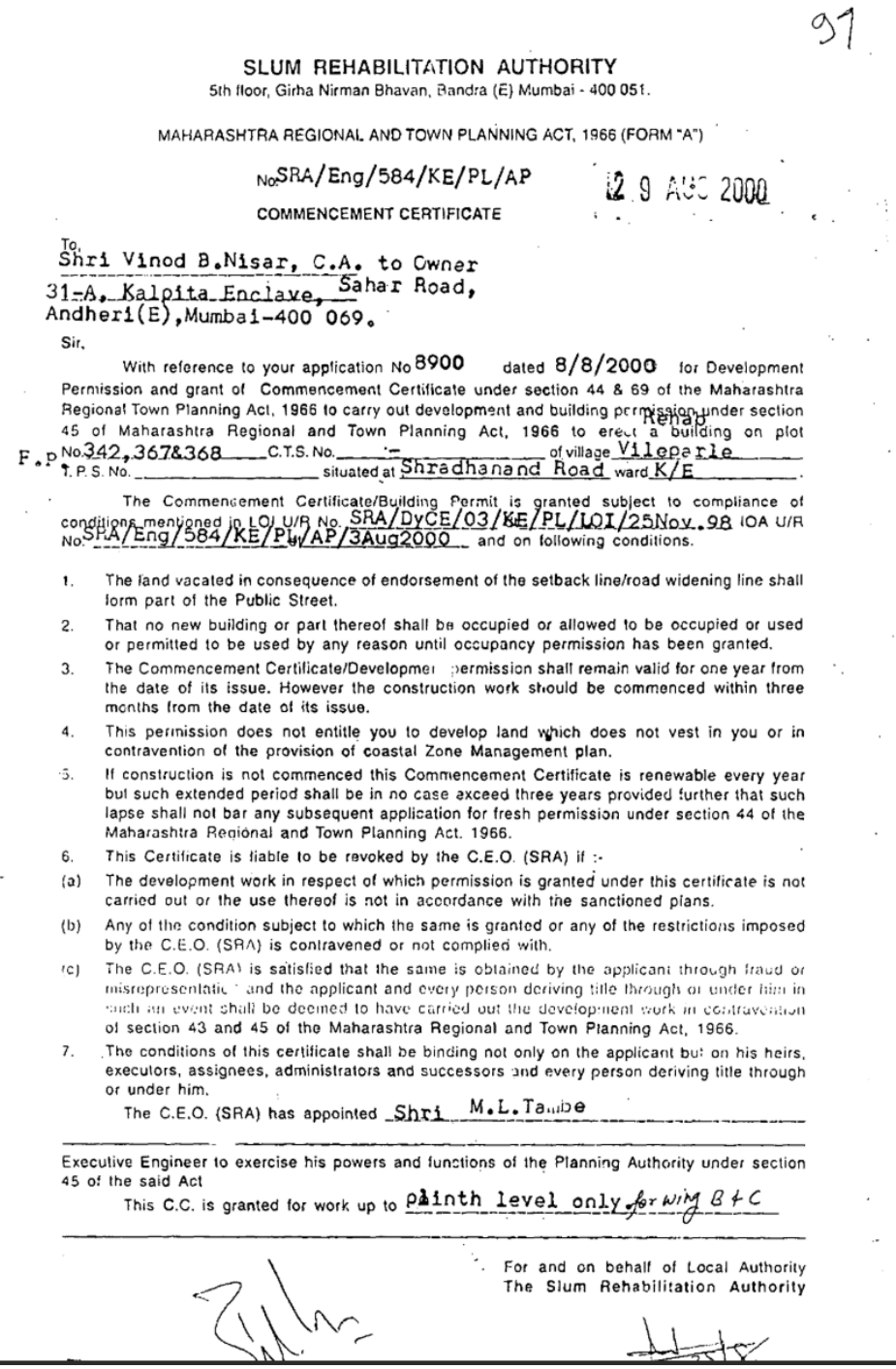
23. That the rehabilitation component of scheme shall include.

1)	45	No. of Residential tenements.
2)	19	No. of Commercial tenements.
3)	01	No. of Balwadies.
4)	01	No. of Welfare Centres.
5)	01	No. of Society office.

(b)

Notes. Figure (a) shows a typical table in the certificate of conditional approval providing information on the characteristics of the redevelopment project. The area of the slum, the formal built up area for the incumbent slum residents with the right to compensation (rehabilitation component) and the formal built up area for sale (sale component) as well as the Floor Area Ratio (or Floor Space Index) sanctioned for the redevelopment project are extracted from this table. Figure (b) shows a typical table in the certificate of conditional approval providing information on the composition of the built up area allotted for incumbent slum residents with the right to compensation i.e. the number of apartments built for residential purposes (residential tenements), the number of commercial units (commercial tenements), the number of child care centers (balwadis), the society office and the welfare center. Please note that all these images are drawn from different documents.

Figure A.4.1.3: Certificate of approval for slum redevelopment



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SLUM REHABILITATION AUTHORITY
5th floor, Griha Nirman Bhavan, Bandra (E) Mumbai - 400 051.

MAHARASHTRA REGIONAL AND TOWN PLANNING ACT, 1966 (FORM "A")

No. SRA/Eng/584/KE/PL/AP 29 AUG 2000

COMMENCEMENT CERTIFICATE

To,
Shri Vinod B.Nisar, C.A. to Owner
31-A, Kalpita Enclave, Sahar Road,
Andheri(E),Mumbai-400 069.

Sir,

With reference to your application No 8900 dated 8/8/2000 for Development Permission and grant of Commencement Certificate under section 44 & 69 of the Maharashtra Regional Town Planning Act, 1966 to carry out development and building permission under section 45 of Maharashtra Regional and Town Planning Act, 1966 to erect a building on plot No. 342,367&368 C.T.S. No. - of village Vileparle (Revised)
F.P. No. _____ T. P. S. No. _____ situated at Shradhanand Road ward K/E.

The Commencement Certificate/Building Permit is granted subject to compliance of conditions mentioned in LOI U/R No. SRA/DyCE/03/KE/PL/LOI/25Nov.98 IOA U/R No. SRA/Eng/584/KE/PL/AP/3Aug2000 and on following conditions.

1. The land vacated in consequence of endorsement of the setback line/road widening line shall form part of the Public Street.
2. That no new building or part thereof shall be occupied or allowed to be occupied or used or permitted to be used by any reason until occupancy permission has been granted.
3. The Commencement Certificate/Developmer permission shall remain valid for one year from the date of its issue. However the construction work should be commenced within three months from the date of its issue.
4. This permission does not entitle you to develop land which does not vest in you or in contravention of the provision of coastal Zone Management plan.
5. If construction is not commenced this Commencement Certificate is renewable every year but such extended period shall be in no case exceed three years provided further that such lapse shall not bar any subsequent application for fresh permission under section 44 of the Maharashtra Regional and Town Planning Act. 1966.
6. This Certificate is liable to be revoked by the C.E.O. (SRA) if :-

(a) The development work in respect of which permission is granted under this certificate is not carried out or the use thereof is not in accordance with the sanctioned plans.

(b) Any of the condition subject to which the same is granted or any of the restrictions imposed by the C.E.O. (SRA) is contravened or not complied with.

(c) The C.E.O. (SRA) is satisfied that the same is obtained by the applicant through fraud or misrepresentation and the applicant and every person deriving title through or under him in such an event shall be deemed to have carried out the development work in contravention of section 43 and 45 of the Maharashtra Regional and Town Planning Act, 1966.

7. The conditions of this certificate shall be binding not only on the applicant but on his heirs, executors, assignees, administrators and successors and every person deriving title through or under him.

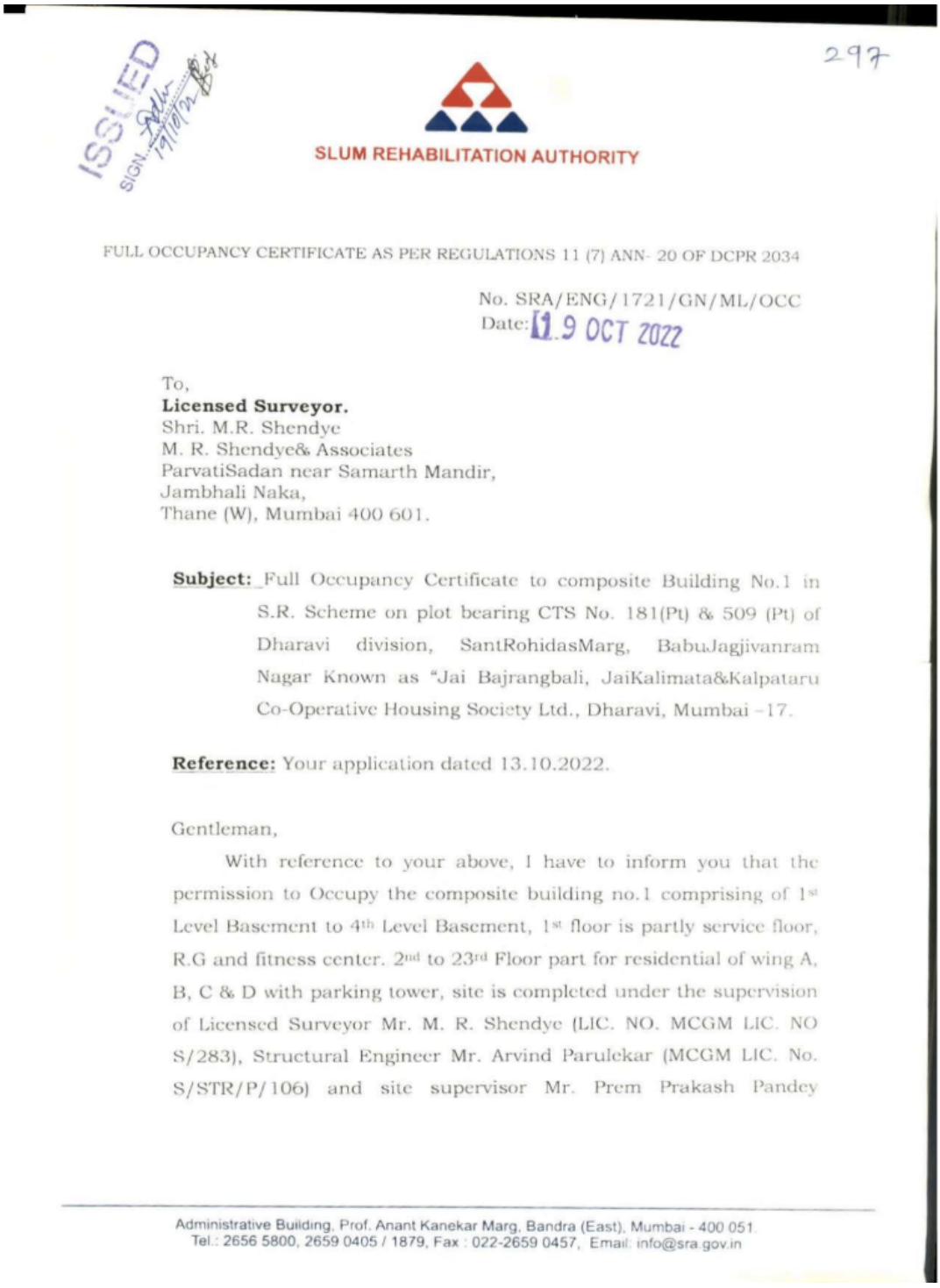
The C.E.O. (SRA) has appointed Shri M.L.Tambe
Executive Engineer to exercise his powers and functions of the Planning Authority under section 45 of the said Act

This C.C. is granted for work up to plinth level only for wing B+C

For and on behalf of Local Authority
The Slum Rehabilitation Authority

Notes. This image shows the typical certificate of approval for redevelopment or the Commencement certificate. The date the certificate was issued is stamped on the top right. The document is issued by the Slum Rehabilitation Authority to certify that the redevelopment project can commence, i.e. the slum can be cleared and construction may begin.

Figure A.4.1.4: Occupancy permission



ISSUED
SIGN. 19/10/22

297

SLUM REHABILITATION AUTHORITY

FULL OCCUPANCY CERTIFICATE AS PER REGULATIONS 11 (7) ANN- 20 OF DCPR 2034

No. SRA/ENG/1721/GN/ML/OCC
Date: 19 OCT 2022

To,
Licensed Surveyor.
Shri. M.R. Shendye
M. R. Shendye& Associates
ParvatiSadan near Samarth Mandir,
Jambhali Naka,
Thane (W), Mumbai 400 601.

Subject: Full Occupancy Certificate to composite Building No.1 in S.R. Scheme on plot bearing CTS No. 181(Pt) & 509 (Pt) of Dharavi division, SantRohidasMarg, BabuJagjivanram Nagar Known as "Jai Bajrangbali, JaiKalimata&Kalpataru Co-Operative Housing Society Ltd., Dharavi, Mumbai -17.

Reference: Your application dated 13.10.2022.

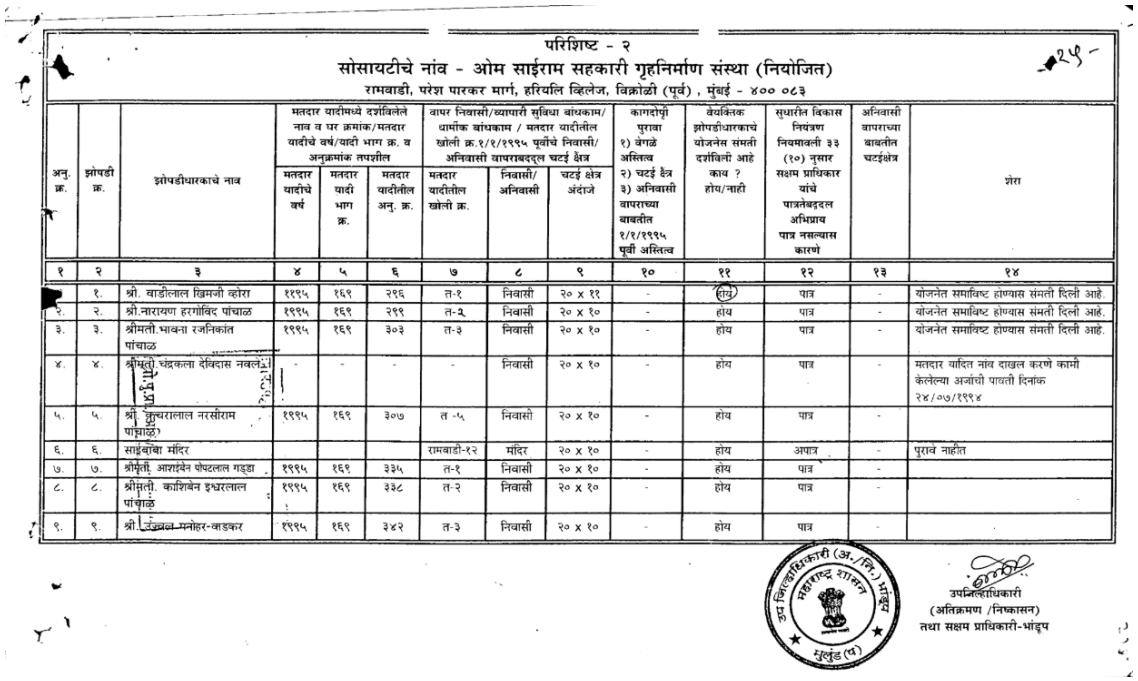
Gentleman,

With reference to your above, I have to inform you that the permission to Occupy the composite building no.1 comprising of 1st Level Basement to 4th Level Basement, 1st floor is partly service floor, R.G and fitness center. 2nd to 23rd Floor part for residential of wing A, B, C & D with parking tower, site is completed under the supervision of Licensed Surveyor Mr. M. R. Shendye (LIC. NO. MCGM LIC. NO S/283), Structural Engineer Mr. Arvind Parulekar (MCGM LIC. No. S/STR/P/106) and site supervisor Mr. Prem Prakash Pandey

Administrative Building, Prof. Anant Kanekar Marg, Bandra (East), Mumbai - 400 051.
Tel.: 2656 5800, 2659 0405 / 1879, Fax : 022-2659 0457, Email: info@sra.gov.in

Notes. This image shows the typical certificate that gives permission to occupy the formal apartment building or Occupancy Certificate. The date the certificate was issued is stamped on the top right. The document is issued by the Slum Rehabilitation Authority to certify that the building can be occupied after inspection following construction completion.

Figure A.4.1.5: Slum census data



परिशिष्ट - २

सोसायटीचे नांव - ओम साईराम सहकारी गृहनिर्माण संस्था (नियोजित)

रामवाडी, परेश पारकर मार्ग, हरियलि व्हिलेज, विक्रोळी (पूर्व) , मुंबई - ४०० ०८३

अनु. क्र.	झोपडी क्र.	झोपडीधारकाचे नाव	मतदार यादीमध्ये दर्शविलेले नाव व घर क्रमांक/मतदार यादीचे वर्ष/यादी भाग क्र. व अनुक्रमांक तपशील			वापर निवासी/व्यापारी सुविधा बांधकाम/ धार्मीक बांधकाम / मतदार यादीतील खोली क्र.१/१/१९९५ पूर्वीचे निवासी/ अनिवासी वापराबद्दल चटई क्षेत्र			कागदोपत्री पुरावा १) वेगळे अस्तित्व २) चटई क्षेत्र ३) अनिवासी वापराच्या बाबतीत १/१/१९९५ पूर्वी अस्तित्व	वैयक्तिक झोपडीधारकाचे योजनेस संमती दर्शविली आहे काय ? होय/नाही	सुधारीत विकास नियंत्रण नियमावली ३३ (१०) नुसार सक्षम प्राधिकार यांचे पात्रतेबद्दल अभिप्राय पात्र नसल्यास कारणे	अनिवासी वापराच्या बाबतीत चटईक्षेत्र	शेरा
			मतदार यादीचे वर्ष	मतदार यादी भाग क्र.	मतदार यादीतील अनु. क्र.	मतदार यादीतील खोली क्र.	निवासी/ अनिवासी	चटई क्षेत्र अंदाजे					
१	२	३	४	५	६	७	८	९	१०	११	१२	१३	१४
१.	१.	श्री. वाडीलाल खिमजी व्होरा	१९९५	१६९	२९६	त-१	निवासी	२० x ११	-	होय	पात्र	-	योजनेत समाविष्ट होण्यास संमती दिली आहे.
२.	२.	श्री.नारायण हरगोविंद पांचाळ	१९९५	१६९	२९९	त-२	निवासी	२० x १०	-	होय	पात्र	-	योजनेत समाविष्ट होण्यास संमती दिली आहे.
३.	३.	श्रीमती.भावना रजनिकांत पांचाळ	१९९५	१६९	३०३	त-३	निवासी	२० x १०	-	होय	पात्र	-	योजनेत समाविष्ट होण्यास संमती दिली आहे.
४.	४.	श्रीमती.चंद्रकला देविदास नवले	-	-	-	-	निवासी	२० x १०	-	होय	पात्र	-	मतदार यादित नांव दाखल करणे कामी केलेल्या अर्जाची पावती दिनांक २४/७७/१९९४
५.	५.	श्री. मुरारलाल नरसीराम पांचाळे	१९९५	१६९	३०७	त -५	निवासी	२० x १०	-	होय	पात्र	-	
६.	६.	साईबाबा मंदिर				रामवाडी-१२	मंदिर	२० x १०	-	होय	अपात्र	-	पुरावे नाहीत
७.	७.	श्रीमती. आशाबेन चंपटलाल गड्डा	१९९५	१६९	३३५	त-१	निवासी	२० x १०	-	होय	पात्र	-	
८.	८.	श्रीमती. काशिबेन इश्वरलाल पांचाळे	१९९५	१६९	३३८	त-२	निवासी	२० x १०	-	होय	पात्र	-	
९.	९.	श्री. उत्तम मनोहर-वाडकर	१९९५	१६९	३४२	त-३	निवासी	२० x १०	-	होय	पात्र	-	

उप जिल्हाधिकारी (अ./नि.) भांडुप महाराष्ट्र शासन मुलुंड (प.)

उपजिल्हाधिकारी
(अतिक्रमण /निष्कासन)
तथा सक्षम प्राधिकारी-भांडुप

Notes. This image shows a page of the typical output from the slum census conducted by the Slum Rehabilitation Authority before issuing conditional approval. Column 3 lists the names of residents, columns 5 and 6 list the ward part number and serial number of residents in the 1995 electoral roll and column 12 lists whether the resident has the right to an apartment in the redeveloped slum.

A.4.2 Digitisation of electoral rolls

Electoral rolls from 2007 to 2022 are used to build the residential mobility panel (see Figure A.4.2.2 for pixelated sample images). Because these rolls are generated directly from digital text rather than scanned from physical originals, they render as clean, high-resolution page images that are free of the noise, skew and artefacts typical of scanned documents. I use computer vision tools to detect the layout of each year's electoral roll and optical character recognition to extract each individual's full name, father's name, age and gender.[18]

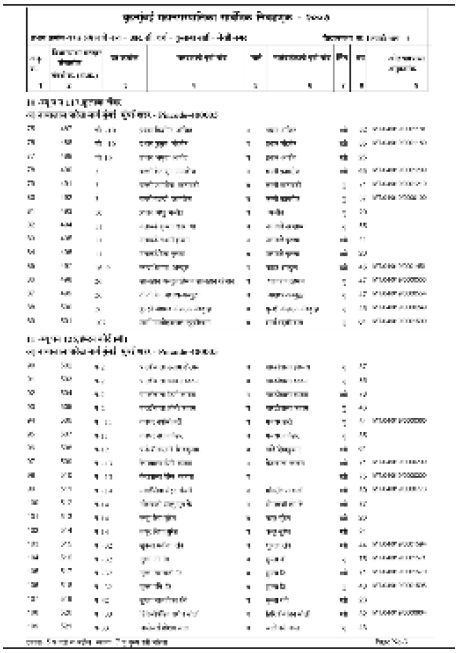
Scanned copies of the 1995 electoral rolls (see an example in Figure A.4.2.1) are used to identify incumbent residents with the right to compensation. Rolls prior to 2007 are available only as scanned images and lack a machine-readable text layer. Since the layout varies from page to page, I re-train a layout-detection model on hand-labelled pages to identify the layout, and use optical character recognition to extract each individual's full name, father's name, age and gender.

[18]Non-pixelated versions of the electoral rolls cannot be displayed here, as they contain identifying information on individuals, including their addresses.

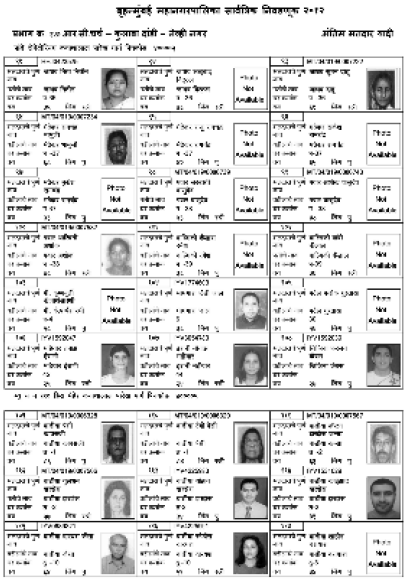
Figure A.4.2.1: 1995 electoral roll



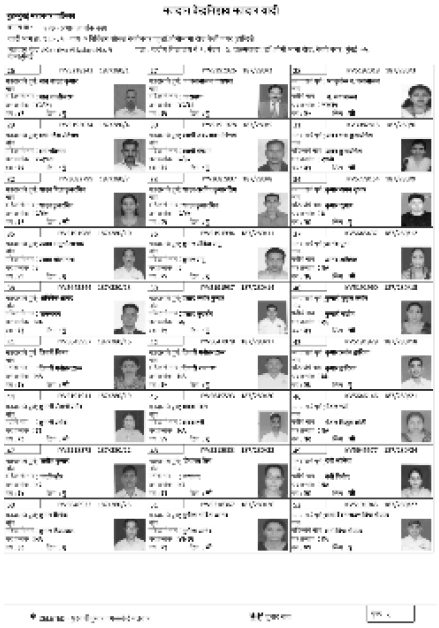
Notes. This image shows a sample 1995 electoral roll. The image is pixelated to preserve the anonymity of individuals. Each page is divided into two columns. Each column contains a table listing individuals within the neighbourhood. The house number is marked in blue, the full name of the individual is marked in red, gender is marked in green, age is marked in orange. The heading in bold marked in yellow represents the name of the building or neighbourhood and the contents of the table that follow detail the individuals that live in the building. The page headers show the electoral ward number and the ward part number. Electoral rolls are made public by the election commission the year before each election.



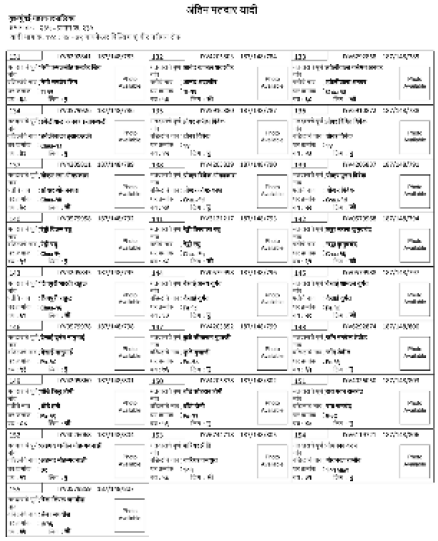
(a) Sample electoral roll from 2007



(b) Sample electoral roll from 2012



(c) Sample electoral roll from 2017



(d) Sample electoral roll from 2022

Figure A.4.2.2: Electoral rolls used to build the residential panel

Notes. These images show pixelated sample electoral roll pages from years 2007, 2012, 2017 and 2022 used to build the residential mobility panel. Images are pixelated to preserve the anonymity of individuals. The rolls are divided into wards, and further subdivided into ward parts and finally, buildings or neighbourhoods. Under each neighbourhood/building name information on individuals living in the neighbourhood is written down alongside their photo in some cases. The information includes their full name, their father's name, age and gender. These rolls are generated directly from digital text rather than scanned from physical originals and have an embedded, machine-readable text layer.

A.4.3 Redevelopment timeline from satellite data

Slums are georeferenced from their cadastral map numbers using georeferenced cadastral maps, complemented by the Slum Rehabilitation Authority's georeferenced slum boundaries for a subset of redevelopment projects. These boundaries are used to locate each site. Very-high-resolution daytime satellite imagery, available at annual frequency, is then used to determine the first dates at which the slum is cleared, construction starts, the first building is completed, and all buildings are completed.

Figure A.4.3.1: Stages of the redevelopment



Notes. This image shows stages of the redevelopment process. Clockwise from top left: (i) slum in 2011 before redevelopment; (ii) slum is cleared in 2013; (iii) construction begins in 2014; and, (iv) first apartment building is completed by 2017.