The dynamics of informality, insufficiency, and conflicts in slums:

Evidence from Patna, India

IGC

International Growth Centre

Ziming Li
Abhinav Alakshendra

DIRECTED BY

LSE | UNIVERSITY OF OXFORD

FUNDED BY

UKaid
from the British people

Slums are often associated with conflict, violence, and crime. Unfortunately, these negative views of slums and slum dwellers often gives rise to unfavorable views of the space and the people among policymakers. This may keep urban administrators from adopting and implementing inclusive and effective policies to overcome urban insecurity and poverty. This study examines the origins of neighborhood insecurity by rethinking the relationships between slums, informality, and local governance. The study identifies the physical, social, economic, and institutional determinants of diversified neighborhood conflicts and disputes through a mixed methods approach. The quantitative analysis uses household survey data collected between 2016 and 2017. We surveyed 225 households from 16 slums in Patna using multistage stratified random sampling. We also undertook focus group discussions and individual interviews of slum dwellers, civil society representatives, and policymakers to understand the perceptions of neighborhood insecurity and community governance. We use housing and land tenure as a proxy for informality and further calculate a compound index of informality incorporating housing and land tenure, employment, and infrastructure. We use logit and bivariate probit models as baseline models and Bayesian estimations as robustness checks.

The regression models suggest the perceived insufficiency of hard infrastructure, including water systems, sanitation, and energy compound informality measures, such as housing, land tenure, employment, and facilities provision and utilization and induces neighborhood conflicts and disputes. The findings suggest that even a small incremental change in infrastructure provision can reduce conflicts in informal settlements. Based on regression estimations, interviews, and focus group discussions, we also find that in organized slums, slum dwellers are more likely to engage in efforts to improve the built environment, such as trying to secure loans from local government for infrastructure building, and that this reduces neighborhood conflicts. These findings imply that formalizing slums through the small-scale provision and continuous maintenance of hard infrastructure could minimize water usage, relevant neighborhood conflicts and violence. We also find that empowering slums through civic education and engagement is a sustainable strategy in the long run in the context of slum upgradation and neighborhood security.

I.   Introduction

The theme of the World Urban Forum in 2018 was 'Cities for All,' which attached importance to inclusiveness for both formal and informal sectors in urban development. In India, informal settlements have grown significantly in the last 30-40 years. Massive urbanization, mostly due to rural-urban migration, is to blame for the rise in informal settlements in cities. Patna, the capital city of Bihar, is no different. It is the largest city of Bihar with a population of a little over 2 million. Bihar is the third most populous state in the country. However, only 11% of the population of Bihar lives in urban areas, compared to the national average of 31% (Census 2011). Presently, Patna is witnessing a surge in rural to urban migration as rural productivity has declined significantly and aspirations of the rural Bihar population are changing. Bihar is also one of the poorest states in the country, which explains why migrants to Patna make up a large proportion of the slum population (we will be using slum and informal settlement interchangeably). As per official city data in the census, Patna had 110 slums in 2011, and the number has been increasing every year.

Slums, by the definition of the Census of India (2001), are "dilapidated, overcrowded, having faulty arrangements and design of buildings, narrow or faulty arrangement of the street, improperly ventilated, having inadequate lighting, and having poor sanitation facilities," (Census of India, 2011). Beyond these physical features, Neuwirth (2004) described slums as "shadow cities" to demonstrate their informal social structure and community norms for outsiders. Some research based on Indian cities also finds that slums are not merely shelters for the urban poor to live, but also create a socioeconomic exchange space (Bhan, 2017). Bhan noticed that slum dwellers would rather perceive their settlements as a term of space, "basti," rather than jhuggi jhopdi clusters (meaning the poor's shacks). In this sense, slums are viewed as vibrant and dynamic sites for socioeconomic lives in informal or unorganized sectors (Harriss-White and Prosperi, 2014; IIHS, 2016; NCEUS, 2007).

The existing conflict theory and labeling theory differentiate between vulnerable groups and groups that might engender threats. Disadvantaged groups, especially minorities and the poor who have small deviant behaviors, are labeled as the source of threats by the dominant social group. Dominant social groups are able to minimize these threats through law and enforcement mechanisms (Klein, 1986; Petrocell et al., 2003; Quinney, 1974). More close observations and interviews in slums in developing countries reveal that a majority of slum dwellers are vulnerable to neighborhood conflicts (Neuwirth, 2004). There is also the popular perception that the poor are criminals and that slums correlate to violence and poverty worldwide (Perlman, 2010). Our household survey in 16 slums in Patna in 2016 and 2017 finds that due to inadequate space, public facilities, and policing within slums, the neighborhood conflicts stemming from fights for access to resources threatens slum dwellers regularly in some slums. These theories, however, fail to explain how vulnerable groups mitigate neighborhood conflicts when formal law enforcement is absent in informal settlements.

This paper aims to draw attention to the drivers of neighborhood conflicts within slums. It explains the dynamics of inclusivity and safety in informal settlements through a mixed methods approach. In the following section, we review the literature regarding neighborhood conflicts and informality. In the third section, we discuss the primary household survey, interviews, and focus

group discussions that were conducted, as well as the regression models used to identify the determinants of neighborhood conflicts. The fourth section reports two major results, namely that it is slum dwellers' *perception* of insufficient infrastructure rather than informality in terms of housing, land tenure, economy, and built environment that gives rise to neighborhood conflicts. The treatment effect models further evaluate how the institutional aspects of slum communities impact on infrastructure provision, thereby influencing conflicts and their mitigation. Robustness checks are discussed in the fifth section. The last section concludes.

II.   Literature review and theoretical framework

Conflict is primarily a social process (Simmel, 1950). Burton (1990) drew attention to the difference between dispute and conflict. 'Dispute' refers to some short-term disagreement that the disputants resolve, while conflict refers to constructed and non-negotiable controversies or disapproval (1990). Based on Maslow's human needs theory and Sites' control theory in *Control: The Basis of Social Order* (1973), Burton argued that individuals will attempt to "be in control in matters of human importance" once they have the chance (Burton, 1990: 92). Burton's argument can also be understood in the context of how slum dwellers choose to resolve conflict. Violent resolution of conflicts may signify individuals' attempt to control the matter.   Moser and McIlwaine (2006) and Winton (2004) linked violence with a means to resolve conflict or to gain power or control in the Global South. Our study also focuses on social structure as an institutional feature of the slum community in order to understand the effect of community governance on socio-economic well-being.

These sociological theories regarding conflict and violence omit the interaction between the informal built environment and individual behaviors in the open space in the context of informality. The concept of 'open space' generally refers to "any unbuilt land within the boundary or designated envelope of a neighborhood which provides, or has the potential to provide, environmental, social and/or economic benefits to communities, whether direct or indirect." (Campbell, 2001: 62). Open space in slums is usually a mixture of public and private space that serves multiple functions due to slums' over-crowdedness (Shobirin et al., 2018). How informality can be explained as "communicative rationality" linked with the "casual and spontaneous interactions" (Roy, 2009: 8) among slum dwellers remains a knowledge gap in the context of spontaneous neighborhood design by slum dwellers. There is no doubt that effective communication is a time-tested strategy and usually a winning one. This would be interesting to see if 'communicative rationality' which suggests that human rationality is a necessary outcome of successful communication could work in an informal setting.

Whyte (1980)'s research on the social life of small urban spaces inspires us to look at how individuals perceive the built environment and how rationally they take different actions to meet their interests at a micro level. Rational choice theory of utilitarianism explains rational actors' behaviors to maximize their utility based on the assumption that any resource, including space, time, materials, and attention, are comparatively scarce to individuals' ever-increasing desires (Blume and Easley, 2007; Heyne et al. 2014). Even in extremely deprived conditions, people think rationally, but formal

theories of economics easily omit or misunderstand the rationality of poor people (Banerjee and Duflo, 2012). Yiftachel (1998) theorized about planning as control and how a lack of urban planning from the top influences power and control in slums. Further analysis is needed on possible informal micro-mechanisms, such as individual choice, for maintaining public security.

In view of the deprived physical resources in slums, this paper assumes that the perceived insufficiency of facilities and social resources also constrains the slum dwellers' tradeoff between resorting to conflict or attempting mitigation in order to maximize the social interests of individuals and collectives. Both conflict resolution through resort to violence and peaceful long-term mitigation have benefits and costs. Conflict resolution by violence has an immediate payoff which may be attractive compared to longer-term solutions that may not even be realized. This paper aims to explore the role of insufficiency of resources in influencing neighborhood conflicts or disputes and slum dwellers' choice to use either violence or mitigation strategies.

There is a common belief that informal settlements or urban informality equates to a lack of access to basic infrastructure. However, differing administrative status across informal settlements in India's urban planning is associated with varying infrastructure provision (Bhan, 2017), e.g., non-notified status is associated with greater deprivation in access to basic services (Nolan et al., 2017). This requires us to shift our analysis from considering informality and slums from a general perspective to instead focus on resource distribution at the city, neighborhood, and household levels.

Many scholars further underscore the "state of exception" embodied in urban informality (Datta, 2012; Roy, 2005, 2009a; Yiftachel, 2009). Informality, in general, represents the "relationship of individuals and communities not in compliance with the recognized law", arising from "inadequate, inappropriate, ineffective policies or legal frameworks that regulate activities based on assumptions regarding the social-economic environment that do not reflect realities on the ground" (UN−Habitat, 2015: 1). Early on, De Soto linked informality with property rights issues, such as weak land or housing tenure, risk of land invasion and informal trade of property. Since then, informality has been discussed in the domain of economic rights and poverty alleviation during capital formation in developing countries (De Soto, 1989; La Porta and Shleifer, 2014). A strand of economics literature has discussed the pros and cons of tenure security and land titling in terms of the stability, welfare, or perception of security for informal settlements (Durand-Lasserve and Selod, 2009; Payne, 2002; Payne et al., 2009). Therefore, land and housing tenure is a consideration in evaluating the informality of slums. The implication from another strand of research on perception of land tenure or de facto land tenure, such as Aristizabal and Gomez (2004), Payne (2001), Reerink and Gelder (2010), inspired us to look at how slum dwellers' perceptions influence their investment choice in their built environment.

The recent research broadens the scope of informality into the social process of community planning and governance. For example, Roy (2005) considers informality not only as "underwriting the right to participate in the market," (Roy, 2005:152) but also as a "mode of metropolitan urbanization" (Roy, 2005:148), and scaling up local issues into the scope of global governmentality for a more comprehensive right to the city (Roy, 2005). Roy (2005) argues that informality is new

normal and for some cities/countries is unavoidable, and also that informality is now not always associated with poverty. Violence may not be the only solution to a conflict; we can look at how the grassroots engage slum residents in terms of community governance for social control and how support from non-governmental organizations (NGOs) works. De Eit and Berneer (2009) find that social cohesion is pivotal for the success of NGOs and community-based organizations (CBOs). They also suggest that further work be done to explore the effect and process of collective participation rather than involvement of community leaders' or elites' in empowering the urban poor in India.

We evaluate a more comprehensive informality relevant to slum dwellers' lives, incorporating informality levels regarding slum dwellers' employment and economic status, usage of public facilities, housing types, and housing and land tenures. This paper provides empirical evidences on how the community balances conflict arising from resource insufficiency and the pressing needs of those living in these neighborhoods.

III.   Research Design

3.1   Household survey and data

This paper employs primary household data collected in 16 slums in Patna between November 2016 and January 2017. Being the largest city in Bihar, Patna receives and accommodates a massive influx of the rural population. Most migrants end up in slums in Patna, thus growing the number of slums and density within the slums. This household survey has adopted multistage systematic random sampling for quantitative analysis. The first stage was to select 16 out of 110 slums,[1] using the official list of slums from the Patna municipal government. From this list, we know slum features, including tenure, population, and ward number (geographical and administrative identifier). After splitting the surveyed slums into four, based on their types of locality – notified, recognized, identified, and squatter - we randomly selected four slums from each group. The second stage was to select households from these 16 slums. We coded all dwellers of each slum for systematic random sampling and coded household identity numbers by ascending order and divided the total sample of each slum into four even subgroups. We then systematically selected representative households from each subgroup. There were 225 households selected and 224 valid samples. One male or female between 18 and 60 years old served as the respondent of each household. When women were answering questions, there was no adult male in the vicinity to influence their responses.

We asked whether their locality has a conflict/dispute due to the following 13 potential causes: toilets/open defecation, drainage, garbage disposal, water, washing utensils outside home, washing clothes outside home, female taking a bath outside home, parking, electricity, open spaces

---

[1] These slums are selected from four city circles. Bankipore Circle (Ambedkar Bhawan
in Nala Road), Kankarbagh Circle(Malahi Pakri, Kankarbagh Thana Jhuggi Jhopri in Lohiya Nagar, Dusadhi Pakri, Kumharar Mushar Toli, and Bhupatipur Musahri),New Capital Circle (Yarpur Ambedkar Colony,
China Kothi, Jagjivan Nagar, 16 Sahgaddi Masjid Patna, R-Block Halt Chauraha, Mushar Toli in Nehru Nagar), and Patna City (Domkhana near Mangaltalab, Maliya Mahadev, Alamganj Machua Toli).

usage, housing, common property resource, and specified others. Due to different understandings about disputes and conflicts among slum respondents, we use dispute and conflict interchangeably in our household survey. Table 1 shows that toilet/open defecation, drainage, garbage disposal, and water are the most mentioned causes of conflict.[2]

Table 1: Statistics of the source of disputes and conflicts

Types of Conflicts	No	Yes	Total	Percentage of Yes to Total (%)
Toilet/open defecation	138	85	223	*38.12*
Drainage	169	53	222	*23.87*
Garbage disposal	169	54	223	*24.22*
Fetching water	126	97	223	*43.50*
Washing utensils	165	58	223	*26.01*
Washing clothes	161	61	222	*27.48*
Female taking bath	164	57	221	*25.79*
Parking	192	29	221	13.12
Electricity	203	18	221	8.14
Open space	180	42	222	18.92
Housing	191	31	222	13.96
Common Property	168	34	202	16.83
Any other	96	24	120	20
Total	2,122	643	2,765	23.25

Note: The difference of percentage of "Yes" to Total between the first group and second group is not statistically significant through t-test.

We categorized resolution methods into four groups: resolving amicably through discussion, with the help of others (i.e. landlord/community members, police, political leader/Pradhan/councilor, resident association/Slum Welfare Association), physical fight, and verbal fight. Physical and verbal fight are highly correlated in practice and are the more violent resolution methods, therefore, we added them together to calculate 'violent resolution' (coded as *fight*). Table 2 shows that all resource disputes (except toilet/open defecation conflicts) were resolved by fighting more than 50% of the time. Disputes over electricity, parking, and garbage disposal were the most likely to be resolved by fighting.

Table 2: Percentage of resolutions of different types to total by conflict source (%)

%	Amicably	With others' help	Physical fight	Verbal fight	Fight	Total account
Toilet/open Defecation	26.32	*30.26*	11.84	30.26	42.11	76
Drainage	26.82	7.32	24.39	41.46	*65.85*	41
Garbage disposal	17.02	10.64	21.28	*51.06*	*72.34*	47
Getting water	21.59	23.86	13.64	40.91	54.55	88
Washing utensils	25.45	10.91	10.91	*52.73*	*63.64*	55
Washing clothes	*33.33*	6.67	13.33	*46.67*	60	60

---

[2] We integrate the water related binary variables into one dependent variable, "water-related dispute" (coded as Cf_wa in Table 5) in modeling.

Female taking bath	27.78	16.67	14.82	40.75	55.56	54
Parking	13.04	13.04	26.09	*47.83*	*73.91*	23
Electricity	12.5	6.25	*31.25*	*50*	*81.25*	16
Open space	18.92	16.22	16.22	*45.95*	62.16	37
Housing	15.38	26.92	*42.31*	15.38	57.69	26
Common Property	7.14	17.86	*32.14*	39.29	*71.43*	28
Any other	9.09	4.55	31.82	*54.54*	*86.37*	22
Total	22.16	16.40	18.67	42.23	60.91	573

Table 3 shows dwellers' perception of the most pressing needs for their household and slum, respectively. Respondents were asked to rank three needs in the order of importance. Toilets, water, housing, security of land, and employment were the top five pressing needs of both households and slums. Toilets was the most pressing need identified for both households and slums. Security/safety is one of the least pressing needs identified for both households and slums.

Table 3: Statistics of pressing needs of slums and households

Household pressing needs					Slum's pressing need				
Rankings (by total)	1st	2nd	3rd	Total	Rankings (by total)	1st-	2nd	3rd	Total
Toilets	46	42	14	102	Toilets	57	45	35	137
Getting water	41	44	5	90	Getting water	50	51	16	117
Housing	37	27	8	72	Employment	15	29	28	72
Security of land	40	13	14	67	Housing	23	16	33	72
Employment	28	31	8	67	Security of land tenure	32	16	18	66
Drainage	11	20	5	36	Drainage	20	24	15	59
Education facilities	10	16	5	31	Education facilities	13	9	23	45
Health facility	3	8	5	16	Health facility	4	12	8	24
Better policing	1	7	2	10	Sewage	3	4	12	19
Better Roads	1	4	2	7	Better Roads	3	5	3	11
Sewage	1	2	3	6	Better policing		6	6	12
More security and safety	1	1	0	2	More security and safety	1	1	7	9
Pensions	0	2	0	2	Other social facility	2	3	4	9
Other social facility	0	0	0	0	Pensions	0	1	2	3
Total	220	217	71	508	Total	223	221	208	652

3.2   Data collected from interviews and focus group discussions

To identify other influential institutional factors omitted in a standard questionnaire, we revisited these 16 slums at the end of 2017 and had accurate observations in 15 slums. There were 35 individual semi-structured interviews and 24 focus group discussions including eight women-only focus group discussions, eight male-only focus group discussions, and eight mixed gender focus discussions. The first issue raised in the focus groups was social structure and integration in slums. Respondents were asked four to five key questions relevant to their social integration and community governance during conversations. The key questions were:

- "Do you have community leaders or a self-organized group to help you when you/your community have troubles?"
- "When you cannot resolve the problems with your families, who do you expect to help you?"

- "If there was a governmental scheme for your colony, who in your colony would organize meetings among households or collect people's opinions?"
- "If you or your neighbors have applied for some financial support, facilities, housing, land tenure, etc. from the government, was the application under the collaboration with many neighbors?" If there was no application for any support from the government in the slums, what are the reasons? Is it due to insufficient capacity to apply, due to residents' unwillingness to represent your slums, or others?"

  According to their polarizing answers of all "yes" and or all "no" of the first questions, the slums are stylized as "organized" and "non-organized" groups.

These answers help us to check a slum's categorization. Nine slums (with 108 household samples) are defined as unorganized, and seven slums (with 116 household samples) are categorized as organized.[3]

The second issue raised in the focus groups was whether and how the slums received support from non-governmental organizations (NGOs). Some NGOs provide facilities including public toilets, water pumps, etc.; some provide services including teaching tutors or financial aid for children or women, nursing, health instruction or medicine, and civic education. The work of NGOs mitigates the absence of government in terms of public goods and service provision, which are the endogenous factors that influence the estimated impact of informality or infrastructure insufficiency in modeling.

Since our fieldwork only focuses on the perspective and awareness of slum dwellers, the bias of data is inevitable. For example, some slum dwellers were inclined to deny the benefits they have received from government and NGOs or had trouble distinguishing between governmental welfare and NGO support. To eliminate such bias, we observed their living conditions before the interviews and obtained details about service provision and usage of each type of facilities through interviews. We also checked NGO project signs printed in public spaces or on facilities. If they have self-help groups, community activities, or any other social or cultural projects, we asked whether any NGOs facilitated them applying for hard infrastructure. Matching the perception of slum dwellers, observed NGO signs, and the records from some NGOs, we categorized the slums into two groups: slums with NGO support for physical aspects and slums without such support. 110 households lived in the slums with NGO support versus 101 without.

Table 4 suggests that organized slums tend to have a lower incidence of conflict than the slums where NGOs are active and provide support. This is an important and unexpected finding that brings into question the role of NGOs. However, qualitative data provides a clearer explanation. In Patna, NGOs are active in slums, however, they mostly provide support to dwellers in securing hard infrastructure from government bodies. We found only two slums (China Kothi and 16 Sahgaddi Masjid Patna) that have NGOs actively engaged in providing education to slum dwellers. We

---

[3] i.e. 16 Sahgodai masjid Jhuggi Jhopari, Bhupatipur Mushari, China Kothi, Domkhana Mangaltalab, Machua Toli Alamganj, Mushar Toli in Nehru Nagar, and Yarpur Ambedkar Colony.

conclude that the presence of NGOs has not been able to reduce conflict, mostly because NGOs are not primarily working on reducing conflicts. However, we do not wish to generalize this conclusion.

Table 4: Differences by whether the slum is organized and whether they received NGOs' support

Code	Variable	Whether the slums are organized					Whether the slums have NGOs' support				
		No=0		Yes=1			No=0		Yes=1		
		Obs.	$Mean_0$	Obs.	$Mean_1$	Diff.	Obs.	$Mean_0$	Obs.	$Mean_1$	Diff.
CfS	Neighborhood conflict density	61	3.38	59	2.54	.83*	49	2.32	65	3.58	-1.26**
FightS	Violence density	107	2	116	1.16	.84**	100	1.37	110	1.93	-.56*
Cf_to	Defecation dispute	107	.36	116	.41	-.05	100	.3	110	.427	-.13**
Cf_wa	Water dispute	107	.64	116	.5	.14**	100	.62	110	.56	.06
Cf_ga	Garbage dispute	107	.25	116	.23	.01	100	.13	110	.37	-.24***
Cf_wb	Female bathing dispute	105	.30	116	.22	.08*	100	.31	108	.22	.09*
Fight	Whether use violent solutions	108	.43	116	.34	.09	101	.32	110	.49	-.17***
Fig_def	Whether use violence to solve defecation dispute	34	.56	42	.31	.25**	23	.52	45	.44	.08
Fig_drain	Whether use violence to solve drainage conflicts	25	.76	16	5	.26**					
Fig_ga	Whether use violence to solve garbage conflicts						12	.5	35	.8	-.3**
Fig_wau	Whether use violence to solve washing utensils outside conflicts	30	.73	25	.52	.21*					
Fig_wac	Whether use violence to solve washing cloth outside conflicts	33	.70	27	.48	.22**					
Fig_pa	Whether use violence to solve parking conflicts	11	1	12	.5	.5***	8	1	15	.6	.4**
Fig_ele	Whether use violence to solve electricity conflict	15	.8	22	.5	.3**					
Fig_hou	Whether use violence to solve housing conflict						11	.36	15	.73	-.37**
Fig_pro	Whether use violence to solve common property resource						5	.4	23	.78	-.38*
Def_vio	Facing violence when open defecation	108	.52	116	.22	.29***	101	.50	110	.16	.34***
Def_wo	Women facing privacy or insecurity problems when open defecation	108	.39	116	.19	.19***	101	.39	110	.13	.26***
N_Sec	Slum's pressing need of security	108	.05	115	.12	-.08**	101	.05	109	.13	-.08**

Notes. *, **, *** represent statistic significant of difference between $mean_0$ and $mean_1$ at 90%, 95%, and 99% confidential intervals through t-test. The blank rows are the insignificant differences that are not reported.

3.3   Modeling

3.3.1   Identifying determinants of conflicts in baseline models

In the baseline models, the groups of dependent variables are binary. Therefore, logit models are the primary selections due to their efficiency in identification.

Table 5 shows the statistics of the binary independent variables in the baseline models. Neighborhood conflicts/disputes incidence, coded as *Cf*, is the minimum incidence of neighborhood conflicts/disputes (i.e. if at least one of the causes of conflicts/disputes listed in Table 1 is "yes, it equals to 1; if all the answers are "no," it equals to 0). *Cf_to*, *Cf_wa*, *Cf_ga,* and Cf_wb represent the incidences of conflicts/disputes related to defecation, water (including drainage, getting water, washing utensils/clothes outside homes), garbage disposal, and female bathing, respectively.

Table 5: Statistic descriptions of dependent variables in baseline models

Code	Variable	Description	Obs.	Mean	Std. Dev.	Min	Max
Cf	Neighborhood conflicts/dispute	The minimum incidence of neighborhood conflicts/disputes, i.e. if at least one of the 13 source of conflicts/dispute listed in Table 1 is "yes" =1, if all the answer is "no"=0	224	.78	.42	0	1
Cf_to	Defecation conflicts/dispute	Has toilet/open defecation been a source of neighborhood conflict? (yes=1, no=0)	223	.38	.49	0	1
Cf_wa	Water-related conflicts/dispute	Has one of these sources including drainage, water, washing utensils/cloth, female bathing outside home been a source of neighborhood conflict? (yes=1, no=0)	223	.57	.50	0	1
Cf_ga	Garbage conflicts/dispute	Has garbage disposal been a source of neighborhood conflict? (yes=1, no=0)	223	.24	.43	0	1
Cf_wb	Female bathing conflicts/dispute	Has female bathing outside home been a source of neighborhood conflict? (yes=1, no=0)	221	.26	.44	0	1

Table 6 shows the independent variables which consist of two groups of indices. One is slum dwellers' perception of infrastructure insufficiency. Respondents ranked their household and slums' pressing needs as showed in Table 3. The binary variables, *Infra_H*, *Infra_HH*, and *Infra_SH*, represent the insufficiency of hard infrastructure (including water provision, drainage, toilets, sewerage, and road) and of soft infrastructure (including education and health facilities) for households, respectively. *Infra_N*, *Infra_HN*, and *Infra_SN* represent these three types of insufficiency for the slums. If they consider at least one of the hard infrastructure features as one of their three pressing needs at household and neighborhood levels, the value of *Infra_H* and *Infra_N* is 1; otherwise, it is 0. The same method applied to the perception of insufficiency of soft infrastructure.

Table 6: Statistic descriptions of independent and control variables in baseline models

Code	Variable	Description	Obs.	Mean	Std. Dev.	Min	Max
Perception of Infrastructure insufficiency							
Infra_H	Insufficiency of infrastructure for household	Among all the needs, whether one of the facilities including water, drainage, toilets, sewerage, road, health facility, and education facility are the most pressing need for your family (If yes=1, no=0)	220	.82	.39	0	1
Infra_HH	Insufficiency of hard infrastructure for household	Among all the needs, whether one of the facilities including water, drainage, toilets, sewerage, road are	220	.66	.48	0	1

		the most pressing need for your family (If yes=1, no=0)					
Infra_SH	Insufficiency of soft infrastructure for household	Among all the needs, whether one of the facilities including health facility, education facility are the most pressing need for your family (If yes=1, no=0)	220	.18	.39	0	1
Infra_N	Insufficiency of infrastructure for slum	Among all the needs, whether one of the facilities including water, drainage, toilets, sewerage, road, health facility, and education facility are the most pressing need for your colony (If yes=1, no=0)	223	.96	.21	0	1
Infra_HN	Insufficiency of hard infrastructure for slum	Among all the needs, whether one of the facilities including water, drainage, toilets, sewerage, road are the most pressing need for your colony (If yes=1, no=0)	223	.87	.33	0	1
Infra_SN	Insufficiency of soft infrastructure for slum	Among all the needs, whether one of the facilities including health facility, education facility are the most pressing need for your colony (If yes=1, no=0)	223	.24	.43	0	1
Informality							
HT	Housing type	Type of house (Pucca=4, Semi pucca=3, Kaccha=2)	214	2.95	.99	2	4
Inf_labor	Labor informality	What kind of labor contract is signed of main earner of the household (No written contract=1, Others=0)	173	.61	.49	0	1
Inf_houseo	Housing ownership	Under possession informlly//without legal rights, Garmajarua =1 Self-owned with legal rights, rented, provided by employer (pay or without rent), free provided by family/relatives, within employer's own residential premises (pay or without rent), sharing rented room/house, government provided, purchased=0	200	.6	.49	0	1
Inf_land	Land tenure	Encroached private land or public land=1 With patta, possession certificate/occupancy right, on rent=0,	200	.57	.50	0	1
Inf_HL1	Property informality	Inf_houseo+ Inf_land	188	1.15	.94	0	2
Inf_HL2		Inf_houseo* Inf_land	188	.53	.50	0	1
Inf_drain1	Drainage informality	Undergrand=1, covered pucca=2, open pucca=3, open katcha=4, no drainage=5	222	2.91	1.75	1	5
Inf_drain2		No drainage=1, others=0	222	.33	.47	0	1
For_ele	Electricity formality	Whether the household has metered electricity connection (yes=1, no=0)	197	.42	.50	0	1
Inf_hea1		Among top three selected healthcare type, when common/minor illness, at least mentioned "Unqualified Pvt. Physicians/quacks" =1, others=0	222	.14	.35	0	1
Inf_hea2	Healthcare informality	Among top three selected healthcare type, when major illnesses, "Unqualified, dispensaries, medical shop=1", others=0	224	.21	.41	0	1
In_hea		Min (Inf_hea1, Inf_hea2)	224	.93	.25	0	1
Im	Informality Index	Informality in terms of labor, house ownership, land tenure, healthcare selection, electricity, and drainage	126	4.53	2.49	1	8

		Im= $\sum$(Inf_labor, Inf_houseo, Inf_land, Inf_drain2, For_ele, Inf_HL1,Inf_hea1, Inf_hea2)					
Control							
Econ factor							
dc	Dependent ratio	Population ratio of the family members aged younger than 14 and older than 65 to total population in the household	224	.38	.24	0	1
engel	Engel coefficient	Ratio of food expenditure to total expenditure last month	193	.70	.17	0	1
Social factor							
NeiR	Neighborhood relations	How are your relations with people in your basti/colony: good=4, average=3, no relation=2, bad=1	223	3.44	.80	1	4
NeiR_g	Good neighborhood relations	How are your relations with people in your basti/colony: good=1, average, no relation, and bad=0	223	.57	.50	0	1
NeiR_b	Bad neighborhood relations	How are your relations with people in your basti/colony: bad or no relation=1, good and average=0	223	.07	.26	0	1
religion	Religion	Hindu=1, Muslim=2	222	1.13	.33	1	2
caste	Caste	Scheduled caste/tribe=3, Other backward=2, General=1	211	2.64	.57	1	3
Individual factor							
gender	Gender	male=1, female=0	221	.44	.50	0	1
edu	Education	Illiterate=1, literate without formal schooling=2, below primary=3, primary=4, middle=5, secondary=6, higher secondary=7, diploma/Certificate Course=8, graduate=9, postgraduate and above=10	217	2.72	2.39	1	10

The second group refers to informality. Nakamura (2016) establishes a positive relationship between perceived tenure security and housing investment behaviors. Our informality index covers the physical type of houses (*HT*), house ownership (*Inf_houseo*) and land tenure (*Inf_land*), employment contract type (*Inf_labor*), electricity supply type (*For_ele*), healthcare selection (*Inf_hea1* for minor illness, *Inf_hea1* for significant illness, and *Inf_hea* for the minimum of these two), and drainage (Inf_drain1 or Inf_drain2). In view of the high correlation between housing ownership and land tenure, we use *Inf_HL1* and *Inf_HL2* as the index of housing and land tenure informality by adding and multiplying *Inf_houseo* and *Inf_land,* respectively. *Im* is the comprehensive informality index, which is the algebraic sum of all these aspects of informality. This index covers both informality of the built environment and informality in terms of socioeconomic development and usage of facilities.

Due to the correlation between the comprehensive informality index (*Im*) and the index of other single aspects of informality (i.e. *HT*, *Inf_labor*, *Inf_drain1*, *Inf_drain2*, *For_ele*, *Inf_hea1*, *Inf_hea2*, and *Inf_HL1* or *Inf_HL2*), we adopt these indices of informality alternatively in different models. The three types of infrastructure insufficiency at household and slum level are also highly correlated; therefore, the models only select one of them as the dependent variable each time.

Control variables include household economic and social characteristics, as well as individual characteristics. Household economic features consist of dependent ratio and Engel coefficient of the

household. The dependent ratio is the ratio of family members aged younger than 14 and older than 65 to the total population in the household. Engel coefficient is the ratio of food expenditure to total expenditure in the last month. These two measures are the commonly used index of socio-economic status of families. We also use questions from the questionnaire like "How are your relations with people in your basti/colony". This question is a good proxy for respondents' relationship with other residents from the same slums. In different models, we use a four-degree categorical index of neighborhood relations (*NeiR*) and two binary indices: good neighborhood relations and bad neighborhood relations (*NeiR_g* and *NeiR_b*). The other variables are religion, caste, and respondents' gender and education.

3.3.2   Checking the endogeneity of neighborhood relations

Informality and family features, including religion, caste, economic status, and pressing household needs might influence respondents' relations with their neighbors. Different types of explanatory variables in the baseline models could influence each other and thereby generate endogeneity for identification. To find the fitted models, we adopt the binary form of respondents' good neighborhood relations (*NeiR_g*). *NeiR_g* does not correlate with neighborhood conflicts (*Cf*). However, it's hard to rule out no interaction and therefore the possibility of endogeneity cannot be ruled out either. Therefore, it's better to adopt a bivariate probit model. In the context of slums, insufficient infrastructure, social economic features of respondents' families, and respondents' demographic features might influence respondents' good relations with neighbors. According to Cappellari and Jenkins (2003), a bivariate probit model has a structure similar to that of a seemingly unrelated regression (SUR) which also has two binary dependent variables. Therefore, bivariate probit model is a viable option.

3.3.3   Impact of the institutions of community on conflicts and resolution

Treatment effect models are comprehensively adopted in social science for evaluating the impact of policies, reforms, or any exogenous changes (Morgan and Winship, 2007; Guo and Fraser, 2009; Imbens and Wooldridge, 2009). For selecting a good grouping, the value of the dependent variables should be significantly different between control and treated groups. Table 4 demonstrates the statistic difference of conflicts/disputes between organized and unorganized slums and between slums receiving NGO support and slums not receiving NGO support. The neighborhood conflict density (*CfS*) is statistically higher in unorganized slums and lower in slums without NGOs support. The sub-samples of households from organized and non-organized slums are almost equally distributed. Therefore, we consider households in organized slums as the treatment group and those in unorganized slums as the control group. To avoid bias brought from the selected covariate, we initially adopt the nearest neighbor matching method with bias-corrected matching estimator to identify the treatment effect of organized slums on the incidence of conflicts and violence. A further step is to adopt propensity score matching to identify the treatment effect of organized slums on respondents' selection of violent resolution. In view of a binary form of residents' selection of violent resolution, the last estimation is based on probit treatment models. Due to the high correlation between the dummy variable of *ngo* and *organized* and low correlation between *ngo* and dependent

variables, the treatment models finally drop *ngo* from covariates. The covariates left are "street lighting," "neighborhood relations," and "police patrolling." The statistics description is in Table 7.

Table 7: Statistics description of variables in treatment models

Code	Variable	Description	Obs.	Mean	Std. Dev.	Min	Max
Dep. Var.							
CfS	Conflict density	Counts of neighborhood conflicts/dispute. Sum up all the binary value of the incidence of conflicts listed in Table 1	120	2.97	3.37	0	13
FightS	Violence density	Counts of using violent solutions. Sum up the binary value of using physical/verbal fight to solve the conflicted listed in Table 2.1	223	1.57	3.31	0	13
Def_vio	Open defecation violence	Facing violence when open defecation. "In the case of open defecation, what top three troubles do your household member face?" (If verbal, physical, or sexual harassment is selected=1, otherwise=0)	224	.37	.48	0	1
Def_wo	Female open defecation insecurity	"In the case of open defecation, what top three troubles do your household member face?" (If women/girl privacy or women insecure at night is selected=1, otherwise=0)	224	.29	.45	0	1
N_Sec	Perception of slum security insufficiency	Among all the needs, whether "more security and safety" is among the top three pressing needs of your slum (yes=1, no=0)	223	.09	.28	0	1
Treated							
organized	Organized slum	Whether has community leaders, residents' self-organized organizations (at least could reach the consensus through public discussion) (yes=1, no=0)	224	.52	.50	0	1
Covariate							
ngo	NGO support	Whether the slum has gained support from NGO at any rate (yes=1, no=0)	211	.52	.50	0	1
StrLight	Street lighting	What is the condition of street-lighting? (very good=5, good=4, average=3, poor=2, very poor=1) Don't know/cannot say=NA	217	2.63	1.16	1	5
NeiR	Neighborhood relations	How are your relations with people in your basti/colony: good=4, average=3, no relation=2, bad=1	223	3.44	.80	1	4
PolP	Police patrolling	Do the police regularly patrol your basti/colony (yes=1, no=0)	224	.56	.50	0	1
Infra_HH	Insufficiency of hard infrastructure for household	Among all the needs, whether one of the facilities including water, drainage, toilets, sewerage, road are the most pressing need for your family (If yes=1, no=0)	220	.66	.48	0	1
Infra_SH	Insufficiency of soft infrastructure for household	Among all the needs, whether one of the facilities including health facility, education facility are the most pressing need for your family (If yes=1, no=0)	220	.18	.39	0	1
Infra_HN	Insufficiency of hard infrastructure for slum	Among all the needs, whether one of the facilities including water, drainage, toilets, sewerage, road are the most pressing need for your colony (If yes=1, no=0)	223	.87	.33	0	1
Infra_SN	Insufficiency of soft infrastructure For slum	Among all the needs, whether one of the facilities including health facility, education facility are the most pressing need for your colony (If yes=1, no=0)	223	.24	.43	0	1

IV.   Results

4.1   Baseline model: Influence of comprehensive informality

In the pre-test, the diversified impact of explanatory variables on different types of conflicts complicates identification in modeling and introduced uncontrolled bias. For the sake of reaching unanimous policy implications, we calculate the minimum incidence of neighborhood conflicts (*Cf*) for the new dependent variables for seeking the baseline models in Table 8 and Table 9.

Model (1) in Table 8 focuses on the perception of all types of infrastructure insufficiency at the household level and adopts a different index of informality. It shows that informality is significant, but the perception of infrastructure insufficiency at the household is not. However, this model glosses over the effects of different types of infrastructure insufficiency and informality. Therefore, Models (2) to (6) focus on evaluating the impact of perception of hard infrastructure insufficiency at the household level. They showed that the perception of hard infrastructure insufficiency at the household level is significant, while not all types of informality are significant. In particular, housing and land informality and comprehensive informality are insignificant. This means that insufficiency of hard infrastructure will likely lead to conflict regardless of land tenure and living conditions. The informality in terms of housing type, drainage, electricity, and healthcare are significant. Model (7) to Model (11) in Table 8 only focus on evaluating the impact of soft infrastructure and informality. The perception of soft infrastructure insufficiency is still significant, but the coefficient is negative which suggests that the impact of perceived soft infrastructure insufficiency is less than that of hard infrastructure. The opposite coefficients of the two perceptions explain why the perception of infrastructure insufficiency in Model (1) seems insignificant. These results also imply that once soft infrastructure insufficiency outweighs hard infrastructure insufficiency, informality becomes an influential factor in neighborhood conflicts.

Table 8: Baseline logit model: identifying household determinants of general neighborhood conflicts/dispute

Cf	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Perc. of infrastructure insufficiency at household level											
Infra_H	.14										
	(.62)										
Infra_HH		1.24*	1.60***	1.75***	1.49***	1.24**					
		(.66)	(.58)	(.56)	(.54)	(.52)					
Infra_SH							-1.34*	-1.25**	-1.42**	-1.41**	-1.39**
							(.71)	(.62)	(.60)	(.59)	(.61)
Informality											
HT		.30	.12	.157	.168		.25	.36	.051	.12	
		(.30)	(.27)	(.27)	(.26)		(.30)	(.27)	(.26)	(.27)	
Inf_labor		-.58					-.66				
		(.59)					(.61)				
Inf_HL1		.58	.62**	.55*			-.30	.43	.32		
		(.30)	(.31)	(.29)			(.33)	(.32)	(.30)		
Inf_HL2					.86					.60	
					(.53)					(.56)	
Inf_drain1		.25					.32				
		(.21)					(.20)				
Inf_drain2			.88	.84	.55			1.35*	1.31**	.87	
			(.74)	(.70)	(.68)			(.69)	(.66)	(.65)	

For_ele	-1.25* (.76)	-1.15* (.67)	-1.02 (.629)	-1.05* (.61)		-1.16 (.75)	-1.05 (.66)	-.89 (.62)	-.91 (.60)		
Inf_hea1						-.20 (.73)					
Inf_hea2		-1.71** (.71)	-1.54** (.65)					-1.60** (.68)	-1.37** (.63)		
Inf_hea				-1.67** (.83)						-1.78** (.81)	
Im	.25** (.11)					.16 (.11)					.12 (.12)
Control											
dc	1.38 (1.02)	1.22 (1.16)	1.65 (1.15)	1.4 (1.08)	1.50 (1.08)	1.06 (1.06)	1.36 (1.18)	1.81 (1.11)	1.52 (1.06)	1.75 (1.08)	1.25 (1.05)
NeiR	-.89** (.44)	-1.02* (.53)	-.86** (.40)	-.89** (.42)	-.817 (.40)	-.78* (.43)	-.82 (.54)	-.71* (.39)	-.71* (.40)	-.61 (.38)	-.61 (.45)
gender	.71 (.49)	1.10* (.61)	1.08* (.58)	1* (.56)	1* (.53)	.74 (52)	1.02* (.61)	1.06* (.55)	.96* (.53)	1.0* (.53)	.64 (.51)
edu	No	-1.11 (.13)	-.1 (.11)	-.05 (.11)	-.06 (.1)	No	-.12 (.13)	-.09 (.12)	-.05 (.11)	-.06 (.11)	No
religion	-.93 (.82)	-.82 (.99)	-.69 (.82)	-.57 (.72)	-.61 (.71)	-.75 (.43)	-.58 (1.00)	-.57 (.8)	-.50 (.72)	-.54 (.71)	-.54 (.89)
caste	-.86 (.56)	-.37 (.64)	-.128 (.58)	No	No	-.80 (.58)	-.31 (.63)	-.07 (.50)	No	No	-.73 (.58)
Obs.	113	110	141	149	149	113	110	141	149	149	113
Prob.>chi2	.0235	.0038	.0000	.0000	.0001	.0026	.0056	.0002	.0001	.0001	0.0030
Pseudo R2	.1279	.2374	.2790	.2752	.2551	.1732	.2406	.2512	.2437	.2420	.1702
Log likelihood	-55.18	-46.75	-53.55	-55.22	-56.76	-52.31	-46.55	-55.61	-57.62	-57.77	-52.50

Notes. 1. * $p<0.05$, ** $p<0.01$, *** $p<0.001$. Standard variation in parentheses.
2. Because Inf_drain1 correlates with multiple variables, the author replaces it with Inf_drain2 for the sake of avoiding multicollinearity. Caste and Religion also has medium correlations (-.48). The coefficient of Inf_houseoorm Inf_landorm is 0.805, therefore it is better to generate an interaction terms of these two variables.

The models in Table 9 adopt the perception of infrastructure insufficiency at slum level as the independent variables. The perception of infrastructure insufficiency in most models is not significant, except in Model (7) and (11) which adopt the comprehensive index of informality. This is quite expected as perceived insufficiency of infrastructure for the slum is not as important as that for the household.

Table 9: Baseline logit model: identifying determinants of neighborhood conflicts/dispute

Cf	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Perc. of infrastructure insufficiency at slum level											
Infra_N	-.45 (1.29)										
Infra_HN		1.09 (.78)	.62 (.65)	.75 (.62)	.70 (.63)	1.27** (.62)					
Infra_SN							-.77 (.60)	-.21 (.57)	-.48 (.54)	-.45 (.54)	-1.09** (.53)
Informality											
HT		.41	.11	.13	.18		.31	.05	.08	.13	

		(.31)	(.26)	(.26)			(.30)	(.26)	(.25)	(.25)	
Inf_labor		-.54	.61**				-.63				
		(.59)	(.30)				(.58)				
Inf_HL1		.51		.49*			.47	.61**	.47*		
		(.30)		(.27)			(.30)	(.30)	(.28)		
Inf_HL2					.81					.80	
					(.52)					(.52)	
Inf_drain1		.34					.37*				
		(.20)					(.19)				
Inf_drain2			1.4**	1.30*	.89			1.48**	1.35**	.95	
			(.70)	(.68)	(.66)			(.70)	(.67)	(.65)	
For_ele		-1.25	-1.19*	-.99*	-.99*		-1.17	-1.19*	-1.0*	-.99*	
		(.72)	(.64)	(.59)	(.58)		(.73)	(.64)	(.59)	(.57)	
Inf_hea1											
Inf_hea2			-1.67**	-1.36**				-1.70**	-1.31**		
			(.68)	(.62)				(.71)	(.64)		
Inf_hea					-1.83**					-1.77**	
					(.79)					(.81)	
Im	.20*					.16					.14
	(.11)					(.11)					(.11)
Control											
dc	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NeiR	Yes**	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
gender	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
edu	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
religion	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
caste	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Obs.	112	111	142	150	150	112	111	142	150	150	112
Prob>chi2	.0472	.0035	.0005	.0004	.0005	.0109	.0040	.0006	.0005	.0006	.0111
Pseudo R2	.1224	.2339	.2302	.216	.2131	.1550	.29309	.2252	.2118	.2098	.1545
Log likelihood	-56.22	-40.03	-58.33	-60.95	-61.19	-54.13	-48.22	-58.71	-61.28	-61.44	-54.16

Notes. 1. * p<0.05, ** p<0.01, *** p<0.001. 2. Standard variation in parentheses.

For the sake of evaluating the extent to which these factors influence neighbourhood conflicts, Table 10 reports the marginal effect of the best-fitted models in Table 8 and Table 9 by comparing the log likelihood. The marginal effect of the perception of hard infrastructure insufficiency at both household level and slum level are significantly positive. In particular, the marginal effect of perception of hard infrastructure insufficiency is between 18% and 19%, which means that a single unit increase in perceived insufficiency of the hard infrastructures will cause conflict to increase by more than 18%. In Model (9), which includes the comprehensive informality index, the marginal effect of informality is not significant and that of perception of infrastructure insufficiency is significant, which indicates that conflict reduces when perceived insufficiency of infrastructure reduces.

In contrast, the marginal effect of perception of soft infrastructure insufficiency at both household and slum levels are significant and negative. The perceptions of hard and soft infrastructure insufficiency are negatively correlated (i.e. the correlation coefficient between

Infra_HH and *Infra_SH* is -0.5311, and that between *Infra_HN* and *Infra_SN* is -0.3607). Their negative correlation explains why their coefficient in the baseline models in Table 8 and Table 9, as well as their marginal effect in Table 10, are negative. This result further supports the contention that perception of hard infrastructure insufficiency is one of the most important factors increasing neighborhood conflicts in slums.

Table 10: Marginal effect of facilities insufficiency and informality

Cf	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Infrastructure Insufficiency												
Infra_H	.02 (.10)											
Infra_HH			.18* (.10)	.19*** (.07)	.19** (.08)							
Infra_SH								-.20* (.11)	-.16* (.08)	-.23** (.12)		
Infra_N		-.08 (.22)										
Infra_HN						.16 (.12)	.21** (.11)					
Infra_SN											-.11 (.09)	-.18** (.09)
Informality												
HT			.04 (.04)	.01 (.03)		.06 (.05)		-.04 (.05)	.005 (.3)		.05 (.04)	
Inf_labor			-.08 (.08)			-.08 (.09)		-.10 (.09)			-.09 (.08)	
Inf_HL1			.07 (.04)			.08* (.05)		.04 (.05)	.06 (.04)		.07 (.04)	
Inf_HL2				.08** (.04)								
Inf_drain1			.04 (.03)			.05* (.03)		.05 (.03)			.05* (.04)	
Inf_drain2				.11 (.09)					.18** (.09)			
For_ele			-.18 (.11)	-.14* (.08)		-.19* (.11)		-.17** (.11)	-.14 (.09)		-.17* (.11)	
Inf_hea1								-.03 (.11)				
Inf_hea2				-.21** (.09)								
Inf_hea									-.21** (.09)			
Im	.04** (.02)	.03* (.02)			.02 (.02)		.03 (.02)			.02 (.02)		.02 (.02)
Control												
dc	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	.24* (.14)	Yes	Yes	Yes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
NeiR	-.14** (.07)	-.15** (.07)	-.15** (.07)	-.10** (.05)	-.12* (.07)	-.14** (.07)	-.12* (.07)	Yes	-.09* (.05)	Yes	-.14** (.08)	Yes
gender	Yes	Yes	.16* (.09)	.13* (.07)	Yes	Yes	Yes	-.15* (.09)	.14* (.07)	Yes	Yes	Yes
edu	Yes	Yes	Yes	Yes	Yes	-.03** (.02)	Yes	Yes	Yes	No	Yes	Yes
religion	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
caste	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	113	112	111	149	113	111	112	110	141	113	110	112

Notes: * p<0.05, ** p<0.01, *** p<0.001. Standard variation in parentheses.
Models (1) (2) (3) (6) (7) (8) and (11) in Table 8 correspond to the Models (1) (3) (4) (5) (6) (9) and (10) in Table 6.
The rest models in Table 8 correspond to the Model (1) (2) (6) (7) and (11) in Table 7.

4.3 The joint influence of the perceptions of infrastructure insufficiency at the household and slum levels

In the same slum, different households have different pressing needs. In view of such heterogeneity among households in the same slum, the models in Table 11 incorporate the perception of infrastructure insufficiency at both household and slum levels. Models (1) to (3) in Table 11 include the perception of infrastructure insufficiency at the neighborhood level (*Infra_N*) in the baseline models and are similar to Models (1) (6) and (11) in Table 8. Because of the high correlation between the perception of the same type of infrastructure insufficiency at the two levels, Models (1) (5) and (9) should be dropped due to the endogeneity issue. None of the other models show a significant impact of informality, however, the impact of perceptions of infrastructure insufficiency at the two levels are different. Models (2) (3) and (8) show the significant impact of the perceived hard or soft infrastructure insufficiency at the household level, which is similar to Models (6) and (11) in Table 8. In contrast, both Models (4) and (6) show the positive impact of perceived hard infrastructure at the neighborhood level. Model (7) shows the significant impact of perceived soft infrastructure insufficiency at neighborhood level rather than that at household level in baseline models.

Table 11: Logit models: impact of perceptions of infrastructure insufficiency at household and slum levels

Cf	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Infra_H	.16 (.70)			-.41 (-.71)			.09 (.63)		
Infra_HH		1.31** (.56)			.83 (.63)			1.00* (.58)	
Infra_SH			-1.35** (.64)			-1.10* (.64)			-1.11 (.77)
Infra_N	-.40 (1.47)	-1.07 (1.38)	.31 (1.31)						
Infra_HN				1.47** (.67)	.83 (.72)	1.12* (.65)			
Infra_SN							-.96* (.54)	-.54 (-.60)	-.42 (-.68)
lm	.24* (.11)	.15 (1.2)	.12 (.12)	.19 (.12)	.16 (.12)	.11 (.13)	.19 (.12)	.14 (.12)	.12 (.12)
engel	No	No	No	No	No	No	No	No	No

dc	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NeiR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
gender	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
edu	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
caste	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
religion	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	111	111	111	111	111	111	111	113	113
Prob>chi2	.0572	.0086	.0120	.0110	.0067	.0042	.0208	.0037	.0051
Log likelihood	-54.44	-51.65	-52.18	-51.99	-51.30	-50.66	-52.91	-51.90	-52.32
Pseudo R2	.1316	.1761	.1687	.1707	.1816	.1919	0.1560	.1797	.1731

Note. Std. Err in parentheses. * $p<0.05$, ** $p<0.01$, *** $p<0.001$

4.4 Impact of social structure on conflicts, resolution, and the awareness of insecurity

Among the models in Table 12 and Model (1) and (2) in Table 13, there is no significant treatment effect of organized slums towards incidence of conflicts of any type and a minimum level of violent resolution. However, Table 13 shows that organized slums do have a statistically significant impact on conflicts concerning open defecation and women's privacy (see Models (9) and (10)), and the effect of organized slums on choosing non-violent resolution to conflicts concerning four types of water-related conflicts are slightly significant (see Models (3) to (8) in Table 13). The negative coefficients of Model (9) and (10) in Table 13 suggest that in the organized slums, household members and females will face less open defecation violence. The positive coefficient of Model (11) in Table 13 suggests that in organized slums, dwellers are more likely or more able to perceive slum security as a pressing need. In other words, they are more aware of neighborhood insecurity than their counterparts in unorganized slums.

Table 12: Treatment effect of organized slums on the incidence of conflicts and violence: Nearest neighbor matching with bias-corrected matching estimator

	(1)	(2)	(3)	(4)	(5)
Outcome	Cf	Fight	Cf_wa	CfS	FightS
Treatment: organized					
ATT (m=1)	-.04	.06	-.06	-.46	.07
	(.06)	(.07)	(.07)	(.56)	(.31)
(m=2)	-0.4	.06	-.08	-.56	.05
	(.05)	(.07)	(.07)	(.57)	(.32)
(m=3)	-.04	.05	-.08	-.58	-.07
	(.05)	(.07)	(.07)	(.59)	(.31)
(m=4)	-.04	.05	-.08	-.62	-.07
	(.05)	(.07)	(.07)	(.58)	(.32)
(m=5)	-.05	.08	-.09	-.52	.05
	(.05)	(.07)	(.07)	(.56)	(.36)
Matching var.	Infra_HN NeiR PolP	Infra_HH NeiR PolP	Infra_HN NeiR PolP	Infra_HN NeiR PolP	Infra_HH NeiR PolP
Bias-adj. var. Same as above					
Obs.	210	207	209	114	206

Notes. 1. When selecting covariates, it is more precise and less biased if the covariates include all variables correlated to outcome. In contrast, if the covariates include the variables correlated to exposure but not the outcome,

20

the precision of the estimated exposure effect will decrease without decreasing bias. (Brookhart et al., 2006). The correlation coefficients between *ngo* and *organized* is 0.5566, which can be considered as strong correlation. In contrast, *ngo* has lower correlation with dependent variables. Therefore, *ngo* should be excluded from covariates. Without considering NGOs impact, the covariates cover Infra_HH, Infra_SH, Infra_HN, Infra_SN, and NeiR.

     2. Infra_SH and Infra_HN represent the pressing needs of different levels and they do not correlate with each other. NeiR_b represents the individuals' relations with their neighbors, if it is "bad", the report will also add bias, therefore it should be control variable.

Table 13: Treatment effect of organized slums: Probit treatment model by propensity score matching

	Cf	Fight	Fig_def	Fig_drain		Fig_wau	Fig_wac	Fig_pa	Def_vio	Def_wo	N_Sec	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Treatment: Organized												
ATT	-.05	-.09	-.28*	-.4***	-.24	-.18	-.27**	-.45***	-.26***	-.17***	.08*	.06
			(.13)	(.15)	(.20)	(.09)	(.11)	(.13)	(.08)	(.07)	(.04)	(.05)
Covariate												
Infra_HH	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Infra_SN	No	No	Yes	No	No	No	No	No	No	No	No	No
StrLight	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NeiR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PolP	Yes	Yes	No	Yes	No	No	No	No	Yes	Yes	Yes	No
Log likelihood	-136.51	-136.51	-47.88	-22.71	-24.77	-35.77	-38.89	-11.33	-136.51	-136.51	-138.41	-136.51
Pseudo R2	.0776	.0776	.0678	.1566	.0800	.0034	.0102	.2529	.0776	.0776	.0648	.0776
Prob>R2	.0001	.0001	.0693	.0770	.2301	.9704	.8497	.0534	.0001	.0001	.0003	.0001
Obs.	214	214	75	40	40	52	57	22	215	214	214	214

Notes. 1. AI robust Std. error in parentheses. 2. * p<0.05, ** p<0.01, *** p<0.001, respectively.

V.   Robustness Checks

In the baseline models, the respondents' relations with their neighbors are significant control variables. To avoid endogeneity, especially concerning respondents' good relations with neighbours, the models in Table 14 adopt the bivariate probit estimation. In Table 14, Models (1) (2) and (3) adopt housing and land tenure informality as the index; Models (4) to Model (9) adopt the comprehensive index of informality which includes variables such as quality of houses, house ownership status, employment contract, electricity connection type, etc. The impact of informality is significant only when considering the perception of entire infrastructure insufficiency, which can be explained by the opposite effects of perceived hard and soft infrastructure insufficiency (see Models (1) (4) and (7) in Table 14). Therefore, only Models (2) (3) (5) (6) (8) and (9) are reliable. They show that perceived infrastructure insufficiency plays an essential role in the origin of neighborhood conflicts and perceived infrastructure insufficiency at the household level also influences respondents' relations with their neighbors.

     Re-estimates of the perceived effects of infrastructure insufficiency were made using Bayesian estimations (see Table 15 and 16). It suggests that the baseline estimations are robust at the household level.

Table 14: Bivariate probit models: checking the endogeneity of neighborhood relations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

Dep. Conflicts

HL_inform1	.29** (.12)	.19 (.12)	.11 (.13)						
Im				.11** (.05)	.05 (.06)	.03 (.06)	.11** (.05)	.08 (.06)	.07 (.06)
Infra_H	.19 (.27)			-.04 (.34)					
Infra_HH		.82*** (.23)			.83*** (.29)				
Infra_SH			-1.01*** (.29)			-1.07*** (.34)			
Infra_N							-.38 (.67)		
Infra_HN								.84** (.37)	
Infra_SN									-.79*** (.29)

Dep. Neighborhood Relations_g

Infra_H	.17 (.26)			.30 (.33)			.53 (.68)		
Infra_HH		-.42* (.23)			-.57** (.27)			-.47* (.27)	
Infra_SH			1.01*** (.32)			1.35*** (.41)			1.32*** (.39)
gender	.63*** (.21)	.67*** (.20)	.64*** (.21)	.55** (.26)	.60** (.25)	.61** (.26)	.31* (.35)	.58** (.25)	.70*** (.25)
religion	-.36 (.37)	-.51 (.35)	-.63* (.36)	-.51 (.43)	-.72* (.43)	-.95** (.45)	-.56 (.26)	No	-.90** (.37)
engel	.25 (.64)	.41 (.62)	.54 (.62)	No (.16)	No	.52 (.86)	No	No	No
caste	.13 (.20)	.13 (.19)	.11 (.20)	.17 (.25)	.14 (.25)	.12 (.26)	-.17 (.25)	.32 (.22)	No
edu	.03 (.05)	No	No	.06 (.06)	.No	No	.06 (.06)	No	No
dc	.25 (.43)	.24 (.41)	.13 (.42)	No	No	No	No	No	No
/athrho	-.21 (.15)	-.16 (.15)	-.10 (.15)	-.31* (.21)	-.27 (.18)	-.20 (.19)	-.32* (.18)	-.21 (.27)	-.14 (.18)
rho	-.21 (.14)	-.16 (.14)	-.10 (.15)	-.30 (.16)	-.27 (.17)	-.20 (.18)	-.31 (.16)	-.20 (.18)	-.14 (.18)
Likelihood-ratio test of rho=0: Prob > chi2	.1424	.2647	.4908	.083	.1307	.2746	.0752	.2705	.4339
Obs.	167	172	172	111	113	113	111	114	120
Log likelihood	-187.63	-186.65	-183.00	-125.88	-122.85	-117.88	-125.71	-127.31	-125.24
Prob > chi2	.0120	.0000	.0000	.0346	.0004	.0000	.0302	.0023	.0000

Notes. * $p<0.05$, ** $p<0.01$, *** $p<0.001$. Standard variation in parentheses.

Table 15: Bayesian estimation of baseline logit models

Cf	(1)	(2)	(3)	(4)	(5)	(6)
Infra_H	-.03			.40		

	(1)	(2)	(3)	(4)	(5)	(6)
	(-1.29, 1.30)			(-.48, 1.55)		
Infra_HH		1.21			1.46	
		(.22, 2.28)			(.52, 2.45)	
Infra_SH			-1.34			-1.45
			(-2.61, -.34)			(-2.62, -.34)
Im	.24	.20	.14	.21	.12	.09
	(.01, .43)	(-.03, .43)	(-.08, .40)	(.02,.40)	(-.08, .32)	(-.12, .31)
dc	1.24	1.47	1.03	No	No	No
	(-1.01, 3.32)	(-.17, 3.07)	(-.72, 2.96)			
engel	.26	-.50	.88	No	No	No
	(-3.25, 3.25)	(-3.89, 2.59)	(-1.84, 3.67)			
NeiR	-.76	-.93	-.48	-.82	-.66	-.51
	(-1.55, .14)	(-1.95, -.09)	(-1.17, .22)	(-1.67, -.10)	(-1.46, .07)	(-1.45, .23)
gender	.70	.69	.71	No	No	No
	(-.47, 1.93)	(-.37, 1.82)	(-.31, 1.90)			
edu	-.04	.01	.01	No	No	No
	(-.24, .16)	(-.21, .22)	(-.21, .26)			
religion	-.64	-.96	-.05	No	No	No
	(-2.09, .85)	(-2.27, .35)	(-1.62, 1.54)			
caste	-.69	-1.02	-.56	No	No	No
	(-1.69, .25)	(-1.88, -.17)	(-1.61, .45)			
Obs.	111	111	111	124	124	124
Log marginal likelihood	-86.57	-86.40	-85.67	-76.96	-72.9	-73.86

Notes. 1. Models (1) (2) and (3) incorporate the variables of Models (1) (6) and (11) in Table 8 and Model (4) (5) and (6) drop the control variables of these models except "neighborhood relations". Models (4) (5) and (6) incorporate the variables of Models (1) (6) and (11) in Table 9, respectively. The rest models drop the control variables of these models except "neighborhood relations." The coefficient reported for each variable is the mean estimated by Bayesian rules after 10,000 Markov Chain Monte Carlo Simulation. There is a high autocorrelation after 500 lags. Therefore, we use less control variables in Model (4) (5) and (6).

2. In the first line of each row, the number is the mean value of Bayes estimator, 95% Cred.

3. Interval in parenthesis.

Table 16 : Bayesian estimation of logit model in Table 9

	(1)	(2)	(3)	(4)	(5)	(6)
Infra_N	-.35			-.52		
	(-3.20, 1.99)			(-3.78, 2.14)		
Infra_HN		1.45			1.45	
		(.25, 2.72)			(.16, 2.70)	
Infra_SN			-1.32			-1.16
			(-2.36, -.28)			(-2.17, -.14)
Im	.18	.14	.12	.20	.15	.14
	(.001, .37)	(-.06, .34)	(-.07, .31)	(.01, .40)	(-.06, .37)	(-.08, .37)
dc	No	No	No	No	No	No
engel	No	No	No	No	No	No
NeiR	-.81	-.69	-.55	-1.02	-.81	-.82
	(-1.59, -.12)	(-1.51, .01)	(.18, 6.54)	(-2.09, -.06)	(-1.73, -.05)	(-1.68, .07)
gender	No	No	No	.71	.74	.40
				(-.35, 1.78)	(-.29, 1.83)	(-.55, 1.50)
edu	No	No	No	-.10	-.12	-.06
				(-.30, .09)	(-.31, .08)	(-.25, .12)
religion	No	No	No	-.97	-.79	-1.03

				(-2.67, .81)	(-2.48, 1.04)	(-2.46, .54)
caste	No	No	No	-.77	-.76	-.82
				(-2.27, .30)	(-1.86, .31)	(-1.74, .06)
Obs.	126	126	126	112	112	112
Log marginal likelihood	-78.63	-76.33	-75.80	-84.11	-82.59	-83.90

VI.   Discussion

The focus group discussions helped us understand more about the differences between organized and unorganized slums. Most of the organized slums have private toilets or latrines, pucca houses and roads, frequent policing, and services or support from NGOs. All groups in the focus group discussions in organized slums (men, women, and by age) consider their slums to be conflict-free slums. Most organized slums actively seek political support at the district, municipal, and state levels, which lowered their fear of eviction and focused efforts on improving their built environment. On the other hand, unorganized slums lack public facilities generally available in organized slums. During the focus group discussions in unorganized slums, dwellers conceded that conflicts are part of their daily lives, however, they try their best to avoid violent resolution so that they don't attract law enforcement officers. The attitude of police towards these slums is hostile and police try to "find fault with the whole community", which increases eviction threats in the future. The behavior and socio-psychological differences between these two types of slums explains why the treatment effect of "living in organized slums," the index of social structure in Table 12 and 16, has insignificant impact on the conflicts but has significant impact on the awareness of public safety. Slum dwellers living in organized slums are not exposed to high incidences of conflicts and do not experience frequent confrontations with law enforcement officers, which enables them to focus instead on the larger issues of safety.

Community self-governance is important in maintaining public security through gradually securing more infrastructure provision from government. In contrast, NGOs' support does not necessarily strengthen community self-governance. We also find that without empowering dwellers to have a sense of community, NGOs' investment only in public facilities is not very effective in practice.

Sense of community among slum dwellers can have positive effects and may strengthen self-governance. For example, one slum, '16 Sahgaddi Masjid Patna' (see Figure 1) is governed in a paternalistic manner and is led by a 60-year-old woman with three years' of primary schooling. During the slum identification phase in Patna around 1997, she was selected by neighbors and approved by NGO agencies as the "leader" of her slum (i.e. community representative, "Mukhiya" in Hindi). She received basic training from UNICEF, which she thinks helped her in her fight for slum dwellers' human and economic rights. This slum was demolished and dwellers were evicted from the site of 'Eco Park' and moved to nearby Haj Bhawan in 1997. Under her leadership, dwellers understood the significance of a collective voice and the importance of children's education. She organized slum dwellers and pressed local government to provide clean water, installation of private toilets, street lights, garbage disposal, mosquito control, and better teachers and school facilities.

They received support from local government, politicians, and NGOs, including UNICEF and Save the Children. Today, dwellers of this slum have more amenities than they had before and they have a better relationship with the local government.
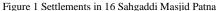

Figure 1 Settlements in 16 Sahgaddi Masjid Patna

Figure 2 Settlements of Ambedkar Bhawan on Nala Road

On the other hand, a slum at Ambedkar Bhawan on Nala Road (see Figure 2) demonstrates a different outcome when sense of community and self-governance are not present. This slum consists of two two-story concrete residential buildings and a one-story community hall built by the local government in 1999, which makes this slum formal in terms of housing materials used. The community meeting hall is used as a primary school. NGOs Save the children and UNICEF selected this slum to install water faucets in front of the buildings and eight gated toilet rooms in the back of the buildings in 2014. However, every respondent from our focus group discussions complained about the toilet cleanliness and lack of running water. Toilets and water pipes are separate and there is no proper underground sewage, which is inconvenient to clean. Therefore, respondents returned to open defecation and abandoned the dirty toilets (see Figure 3). NGOs installed water facilities in the open space near the busy 'Nala Road', but without proper walls protecting privacy when bathing, peeking and harassment are common (see Figure 4). Additionally, two women living downstairs during the interview complained that garbage and mud, mixed with excrement, blocked the alley outside their doors. They also claimed that government neglected their needs and demands.

Figure 3 Abandoned toilets- Ambedkar Bhawan, Nala Road

Figure 4 Open bathing facilities -Ambedkar Bhawan, Nala Road

Slum dwellers in Ambedkar Bhawan think it's not their responsibility to keep toilets and public space clean. Half of the participants in the male focus group reported having five to ten years' of schooling, and one participant reported having a bachelor's degree; but none showed any interest

in assuming a leadership role within the slum to push for better facilities. In contrast, most of slum dwellers living in 16 Sahgaddi Masjid report minimal schooling, however, they show higher participation in community affairs. This provides evidence of the spillover effect of housing provision on the perception of dwellers' pressing needs and their reactions in terms of community affairs. This is not a generalizable conclusion. We believe that housing provisions and other relevant policy measures will be highly effective and sustainable if a sense of community and some element of self-governance is present. Local governments can provide some basic training and create a framework to help dwellers identify slums leaders/representatives.

More importantly, how dwellers perceive pressing needs explains why the coefficients of perceived soft infrastructure insufficiency are negative in regression models. For example, the dwellers in 16 Sahgaddi Masjid Patna have gradually secured clean water for drinking and daily usage, private toilets, and street lights. Simultaneously, they have developed higher expectations and they are now trying to get more hard infrastructure provisions (e.g. installing pipes for sewage ditch) and soft infrastructure (including better teachers and school facilities). In contrast, few parents in Ambedkar Bhawan considered education as a necessity for their children. According to the focus group discussion in Ambedkar Bhawan and individual interviews with the primary schoolteacher there, more than half of their children of schooling age do not attend school regularly. Teachers try to persuade parents to send their children to school by explaining the importance of education and using beneficial policies for continuing attendance, including provision of school uniforms, free lunches, and scholarships. Few parents who belong to lower castes see education as a tool to achieve social mobility. In other unorganized slums (e.g. R-Block Charuraha, Kankarbagh Slums opposite to Doctor's Colony, and Malahi Pakri Slum), we found almost no hard infrastructure. Therefore, respondents from these slums gave higher priority to hard infrastructure, which is evident from the primary household data and also explains the negative coefficients for soft infrastructure insufficiency in regression results. Without this information from fieldwork, it is easy to reach a wrong interpretation that providing less soft infrastructure can decrease conflicts. Our results make a strong case for hard infrastructure provision as a potential policy prescription.

VII. Conclusions

Perceived infrastructure insufficiency, especially of hard infrastructure, rather than land tenure, quality of infrastructure, and physical housing condition, is the primary cause of neighborhood conflicts and violence in the slums in this study. Regression results imply that providing higher quality living conditions with sufficient formal hard infrastructure is pivotal for reducing neighborhood conflicts. In contrast, directly granting housing ownership and land tenure may not have an equivalent impact. These findings imply that formalizing slums through even small-scale and incremental provision of hard infrastructure could significantly reduce neighborhood conflicts and violence.

This paper further finds a strong connection between infrastructure insufficiency, neighborhood security, and community governance. In organized slums, slum dwellers are more aware of security and select less violent resolutions to water-related conflicts. They choose some

proactive mitigation strategies to solve neighborhood conflicts by cooperatively asking for better infrastructure provision. In unorganized slums, individuals would choose some passive mitigation methods to avoid conflict and violence induced by infrastructure insufficiency. Therefore, empowering slums through civic education and public engagement are sustainable and inclusive strategies which reduce neighborhood insecurity in the long run.

This paper has discussed a very important problem, however, there are several related issues which should be investigated in detail. We have not addressed the factors affecting perceived insecurity. We believe that understanding slum dwellers' perceptions is important for understanding the linkages between people's experience and the built environment. The gender differences in perceiving threat or insecurity would likely also provide a new perspective. The role of institutions and of civil society should also be examined to understand more about women and issues of informality. This paper provides ideas for a simple but quite effective urban planning intervention to reduce conflicts and incidence of violence in urban slums. It would be interesting to see if there are any similarities with other urban slums in the global south.

REFERENCES

Aristizabal, N. and Gomez, A. O. (2004). Improving security without titles in Bogotá, Habitat International, 28 (2), 245-258.

Banerjee, A. and Duflo, E. (2012). *Poor Economics: A radical rethinking of the way to fight global poverty*, New York: Public Affairs, March.

Bhan, G. (2017). From the basti to the 'house': Socio-spatial readings of housing policy in India, Current Sociology Monograph, 65(4), 587–602.

Blume L. E. and Easley, D. (2008). Rationality, in *The New Palgrave Dictionary of Economics*, 2nd Edition. London: Palgrave Macmillan.

Blundell, R. W., and Smith, R. J. (1989). Estimation in a class of simultaneous equation limited dependent variable models. *Review of Economic Studies*, 56, 37-58.

Brookhart, M.A. Schneeweiss, S. Rothman, K.J. Glynn, R.J. Avorn, J, and Stürmer T. (2006). Variable selection for propensity score models, *American J*ournal of Epidemiology, 163(12):1149-56.

Burton, J. W. (1990). *Conflict: Resolution and Prevention*. New York: St. Martin's Press.

Cappellari, Lorenzo, and Stephen Jenkins. (2003). Multivariate probit regression using simulated maximum likelihood. *Stata Journal*, 3, 278–94.

Campbell, K. (2001). *Rethinking Open Space: Open Space Provision and Management - A Way Forward*, Edinburgh: The Scottish Executive Central Research Unit.

De Soto, H. (1989). The other path: The invisible revolution in the third world. New York: Harper & Row, Publisher, Inc.

De Wit, J. and Berneer, E. (2009). Progressive patronage? Municipalities, NGOs, CBOs and the limits to slum dwellers' empowerment, *Development and Change*, 40(5), 927–947.

Dong, Y. and Lewbel, A. (2015). A simple estimator for binary choice models with endogenous regressors, *Econometric Reviews*, 34(1–2), 82–105.

Guo, S. and Fraser, M. (2009). Propensity score analysis: Statistical methods and application. SAGE Publication, Inc.

Heckman, J. J. (1976). Simultaneous equation models with both continuous and discrete endogenous variables with and without structural shift in the equations," in Steven Goldfeld and Richard Quandt (eds.), Studies in Nonlinear Estimation, Ballinger.

Heckman, J. J., and Robb, R. (1985). Alternative methods for estimating the impact of interventions," in James J. Heckman and Burton Singer (eds.), Longitudinal Analysis of Labor Market Data, Cambridge: Cambridge University Press.

Harriss-White, D. and Prosperi, V. (2014). The micro political economy of gains by unorganised workers in India. *Economic and Political Weekly*, 49(9), 39–43.

Heyne, P.; Boettke, P. J.; and Prychitko, D. L. (2014). *The Economic Way of Thinking* (13th ed.). London: Pearson.

IIHS (Indian Institute for Human Settlements) (2016). India Urban Evidence Report. Bangalore: IIHS.

Innes, J., Connick, S., and Booher, D. (2007). Informality as Planning Strategy: Collaborative Water Management in the CALFED Bay-Delta Program', Journal of the American Planning Association 73(2), 195–210.

Imbens, G. and Wooldridge, J. (2009). Recent developments in the econometrics of program evaluation, *Journal of Economic Literature*, 47, 5-86.

Klein, M. W. (1986). Labeling theory and delinquency policy: An experimental test. *Criminal Justice and Behavior,* 13(1), 47-79.

Lall, S. V. and Rajack, R. (2009). *Urban land markets: Improving land management for successful urbanization*, Dordrecht, Netherlands: Springer, 101-132.

La Porta, R.and Shleifer, A. (2014). Informality and Development, *Journal of Economic Perspectives*, 28(3),109–126.

Morgan, S. and Winship, C. (2007). *Counterfactuals and casual inference: Methods and principles for social research*. Cambridge: Cambridge University Press.

Moser, C. & McIlwaine, C. (2006). Latin American urban violence as a development concern: Towards a framework for violence reduction. *World Development*, 34(1), 89–112.

Nakamura, S. (2016). Revealing invisible rules in slums: The nexus between perceived tenure security and housing investment, *Habitat International*, 53, 151-162.

Nolan, L. B., Bloom, D. E. and Subbaraman, R. (2017).Legal status and deprivation in India's urban slums: An Analysis of two decades of national sample survey data, PGDA Working Paper No. 135https://cdn1.sph.harvard.edu/wp-content/uploads/sites/1288/2012/11/Legal-Status-and-Deprivation-in-Indias-Urban-Slums.pdf

NCEUS (National Commission for Employment in the Unorganised Sector) (2007). *Report on Conditions of Work and Promotion of Livelihoods in the Unorganised Sector*. New Delhi: NCEUS.

Neuwirth, R. (2004). *Shadow Cities: A billion squatters, a new urban world.* New York: Routledge.

O'Hagan, A. and Forster, J. (2004). *The Advanced Theory of Statistics, Vol. 2B: Bayesian Inference 2nd* Edition, London: Hodder Education Publishers.

Payne, G. (2001). Urban land tenure policy options: titles or rights? *Habitat International*, 25(3), 415-429.

Payne, G. (2002). Land, rights and innovation: Improving tenure security for the urban poor, ITDG Publishing, London, 3-22.

Payne, G. Durand-Lasserve, A. and Rakodi, C. (2009). The limits of land titling and home ownership, *Environment & Urbanization*, 21(2), 443–462.

Petrocelli, M., Piquero, A.R., and Smith, M.R. (2003). Conflict theory and racial profiling: An empirical analysis of police traffic stop data, *Journal of Criminal Justice*, 31(1), 1-11.

Perlman, J. E. (2010). *Favela: Four decades of living on the edge in Rio de Janeiro*. Oxford: Oxford University Press.

Quinney, R. (1974). A critical theory of law, in R. Quinney (Ed.), *Criminal justice in America*, Boston: Little, Brown and Company, 1-25.

Reerink, G. and Van Gelder, J. (2010). Land titling, perceived tenure security, and housing consolidation in the kampongs of Bandung, Indonesia, *Habitat International*, 34(1), 78-85.

Roy, A. (2009). Strangely familiar: Planning and the worlds of insurgence and informality, *Planning Theory*, 8(1). 7-11.

Sites, Paul. (1973). *Control: The Basis of Social Order*. New York: Dunellen.

Simmel, G. (1950). *The sociology of Georg Simmel*, Wolff, K. (tran), Glencoe, IL: Free Press.

Shobirin, A., Ramadhanty, A. H. and Hardiana, A. (2018). Multifunctional spaces in slum settlements and their relation to activity pattern case study of Kampung Sangkrah, Surakarta, AIP Conference Proceedings 1931, 030072 (2018); doi: 10.1063/1.5024131.

Urban Development Department and Bihar Urban Development Agency (2006, Nov.). *City Development Plan for Patna under JNNURM, Government of Bihar.*

UN-Habitat (2015). Habitat III Issue Papers. 5 – Urban Rules and Legislation, http://habitat3.org/wp-content/uploads/Habitat-III-Issue-Paper-5_Urban-Rules-and-Legislation-2.0.pdf

Whyte, W. H. (1980). The Social Life of Small Urban Spaces, Washington, D.C.: Conservation Foundation.

Winton, A. (2004). Urban violence: A guide to the literature. *Environment and Urbanization*, 16(2), 165–184.

Yiftachel. O. (1998). Planning and social control: Exploring the dark side, *Journal of Planning Literature*, 12(4), 395-406.

Yiftachel. O. (2009). Theoretical notes on 'Gray Cities': The coming of urban apartheid. *Planning Theories*, 8(1), 88–100.

The International Growth Centre (IGC) aims to promote sustainable growth in developing countries by providing demand-led policy advice based on frontier research.

Find out more about our work on our website www.theigc.org

For media or communications enquiries, please contact mail@theigc.org

Subscribe to our newsletter and topic updates www.theigc.org/newsletter

Follow us on Twitter @the_igc

Contact us
International Growth Centre,
London School of Economic and Political Science,
Houghton Street,
London WC2A 2AE

IGC
International Growth Centre