DRAFT: May 15, 2016

SOME ARE SLUMMIER THAN OTHERS: A Continuum of Slums and the Prognosis for Secular Improvements

Saumya Jain, Anirudh Krishna, Emily Rains, Jeremy Spater and Erik Wibbels
Duke University

Paper prepared for presentation at the 2nd Workshop on Urban Poverty in Developing Countries, Duke University, May 18-20, 2016

Abstract

A series of household and neighborhood surveys undertaken in more than 150 slum settlements in Bengaluru between 2010 and 2015, including detailed interviews with more than 3,000 slum residents, show that a continuum of slums can be distinguished, ranging from a distinctive lowest type, with comparatively poor living conditions, to a higher category, with living conditions that are superior. Between the poorest and best settlements, a range of slums exists, exhibiting regular increments in living conditions. These differences matter importantly for conceptual clarity and policy design. A slum is not just a slum: different types have varying needs and require diverse assistance. How exactly differences arise among slums at different points in the continuum and how they play out over time remains, for now, a matter of speculation. We introduce some initial evidence to account for differences among slums in Bengaluru. Our ongoing analyses will help clarify the sources of these differences.

In the era of assembly-line manufacturing in the West vast numbers of people moved off farms and into factories, emptying rural areas. Urbanization was an integral part of economic growth and improved living conditions in countries that became advanced industrial economies. Many analysts and policy elites expect that countries of the global South will undergo a similar experience, with cities becoming conveyer belts to a high-consumption society (e.g., Glaeser 2009; World Bank 2009). Following a logic born partly out of a sense of historical determinism and partly from observing the growing agglomeration economies in this era of globalization, the biggest cities are seen in policy circles across a swathe of the developing world as the loci of upward mobility for individuals and centers of growth and modernization for the nation. Public investment priorities have followed these sensibilities. A "metropolitan bias" has emerged because of which "service availability is greatest in the largest cities, those where governments, the middle-classes, opinion-makers and airports are disproportionately located."[1] In India, too, in policy circles, big cities are viewed as "the reservoirs of skills, capital and knowledge… the centers of innovation and creativity… the generators of resources for national and state exchequers… the hopes of millions of migrants from the rural hinterland and smaller settlements."[2]

The evidence about whether and how these hopes have been fulfilled remains patchy and inconclusive. Investigating different cities of the developing world, scholars have found slums proliferating, and becoming, not way stations to a better life, but a long-term destination, constituting a "poverty trap" for millions of rural-urban migrants.[3] Studies undertaken in Indian cities have commonly come upon situations of stasis, for instance, finding that: "slum communities saw little or no increase in their real income or in improved job opportunities [over a 25-year period] – and little possibility of getting accommodation outside the slums. Longer urban experience did not necessarily ensure access to better opportunities… Children tended to ply, by and large, the same trades and occupations as their parents."[4]

These situations need to be studied carefully. Slums are growing apace in India and in other parts of the developing world, as globalization has accelerated the mismatch between where people live and where jobs are located. A large rural-urban migration has resulted, with many millions of the rural poor relocating to urban slums. Our contribution is to assess how this migration looks from the point of view of the urban poor and the slums in which they settle in Bengaluru, India. Relying on a large quantity of original household and neighborhood data and the tools of classificatory statistical analysis, we explore the range of home characteristics, neighborhood services and household assets that characterize slums. Contrary to popular conception and simple definitions, we find a range of human and neighborhood experiences. These findings call for a nuanced approach to public policy and point to the need for additional work on the factors that shape the dynamics of slum emergence and evolution through time.

Rural-Urban Migration and Slums

The movement of people from villages to cities is hardly a new experience in India. For generations, people from villages have been coming to cities.[5] However, the size of this flow has greatly accelerated.[6] People have come to towns in increasing numbers, not only because of the metropolitan bias – a pull factor – but also because of a secular decline in economic prospects in most of rural India (a push factor). This paper does not provide the occasion for an extended discussion of agrarian distress, about which there are many fine commentaries, but two facts will help to sketch the contours of the larger discussion.[7] The average size of the family plot fell more than 3 hectares in 1947 to 1.1 hectares in 2003. Since then, it has fallen further. Productivity increases have been too small to compensate for the large decline in average landholding, and few alternative occupations have arisen in rural areas. The consequence is that large numbers of rural households – between 40 and 70 percent at any given time – have at least one member who lives and works in an urban area.[8]

What happens to people who come into towns – and to their children and grandchildren – remains, however, a vexed question, on which there is, to date, spartan evidence and no consensus. The situation is made complex because there are distinct streams of in-migrants, consisting of different socioeconomic strata.[9]

Individuals from villages located a short bus-ride away come into the city as *day migrants*. They arrive in towns each morning and return in the evening to their family homes in the village. The numbers of these day migrants is not known with any assurance.

People from villages located further from towns cannot so easily come and go every day, and living in the city can be expensive, so they look for and create cheaper lodging alternatives. These are the *short-term itinerant migrants*. The pay is low and the job is not assured. It seems wiser to leave one's family behind in the security of the village home, rather than to bring them to a precarious and rootless urban existence. Single men of working ages are predominantly represented within this stream of migration. Several short-term single migrants get together to rent a small accommodation, sleeping ten to a room, often in shifts – or they live rough on railway platforms and city pavements.[10] The existing methodologies of population estimation have been unable to keep track of their numbers.

A third stream of migrants consists of what we will refer to in this paper as the *blue-polygon people*, so termed because clusters of their homes – four poles surmounted by a blue plastic sheet – appear as blue rectangles in satellite images. There is a little more rootedness in these people's lives compared to the two previous types of migrants. Still, they are a transient lot, their lives split between a city and a village. Up to one-quarter of the meager amounts they make are spent on journeys to the village home and debt repayments. A majority of the men and women of blue-polygon settlements (and many older children, too) work on construction sites as irregular, daily-waged, labor.

The *fourth type* of migrants are those who come to the city, find a more secure toehold, and remain there permanently. The less well educated among them move into slums of different types.

A small subset among the fourth type have done the best economically – these are the people who have arrived in the city bearing the credentials required for a higher-paying formal-sector job in this era of skills-biased technology-driven globalization.[11] Because of the methods they have adopted, official agencies, including the Census of India and NSSO, have overstated the numbers of this subset of migrant, while understating the numbers of the other three types.[12] Independent surveys, adopting a more comprehensive methodology, show that the first three types of migrants outnumber those who have relocated to cities permanently.[13]

Between the third and fourth type of migrants, there are different substrata of city residents. Slums of diverse types have come up, helter-skelter, as people, particularly poorer ones, have been unable to find places in planned neighborhoods with municipal services.

A rough idea of differences in living conditions can be gleaned from the photographs presented in Figures 1 and 2. The blue-polygon slums represent the worst kind of slum living conditions (Figure 1). At the other end, there are three-story tenements built by the government, which are also termed slums in the official lexicon (Figure 2). The term "slum" does not any longer, if it ever did, refer to a homogeneous set of living arrangements. An entire range of slums has come up in Bengaluru and other cities.

- FIGURES 1 and 2 ABOUT HERE -

The existence of a continuum of slums representing regular improvements in living conditions suggests the possibility of secular improvements: what starts out as a blue-polygon slum might end up becoming a three-story tenement. But has such a hope been realized in practice? Where and under what conditions has progress been achieved by slum residents, and where else have stasis and a poverty trap been the more usual situation?

This paper and the research project upon which it rests are aimed at uncovering the conditions under which slum settlements are able to upgrade the conditions of living over time and the circumstances in which slum residents are able to achieve significant upward mobility.

We begin by discussing the need for primary data collection, and we present a methodology we have developed which relies upon a combination of household surveys and satellite image analysis. Collecting data in slum settings is tedious and time-consuming work, but it is unavoidable, since the existing data sources are partial, biased, and dated. Our methodology significantly reduces costs while adding reliability. With suitable modifications, it can be extended to identify, map, categorize and track slum settlements in other cities.

We go on to describe some features of the slum continuum that we constructed with the help of an original database of more than 150 slum settlements and interviews with nearly 3,500 slum residents in Bengaluru. Finally, we present a snapshot of what our ongoing examination of satellite images indicates about the trajectories of a sample of slum settlements. This part of the analysis is as yet incomplete; we are in the process of acquiring and analyzing higher-resolution images, going back 20 or 30 years, with the help of which we intend to examine the trajectories of a larger group of slum settlements. What we present, therefore, are preliminary findings, but ones that seem to be clearly indicative.

Data and methods

Government agencies in India have only recently started to count the number of people who live in slum settlements. The methodologies that different official agencies have adopted disagree with one another, but commonly they underestimate the slum population.[14] Adopting one definition of slums, the National Sample Survey Organization counted 44 million slum dwellers in 2008, but adopting another (and also flawed) definition, the Census of India counted 65 million slum dwellers in 2011.[15] Separately, UN-HABITAT, the international authority on slums, found that in 2014 India had as many as 104 million slum dwellers. This last number seems closer to the facts on the ground, as depicted by independent grassroots investigations.[16]

Not only is the true number of people in slums not clearly known in official circles, there's little information available that can help formulate answers to key policy questions: How many slums exist within the limits of a particular city? What is the physical extent of any particular slum? Where does one slum start and another stop? What types of slums exist in a particular city, requiring what kinds of policy packages? How should policies of service provision and urban poverty reduction be adjusted to account for the varying needs of people in different types of slums? Government agencies in India distinguish between declared and undeclared (or notified, recognized, and unrecognized) slums, but events have overtaken these gross distinctions. How slum settlements differ at a point of time is poorly understood. How their trajectories vary over time is almost completely unknown. Original data collection is necessary for filling these gaps in knowledge.

The data on which this analysis is based are drawn from three waves of original surveys that we conducted in Bengaluru between 2010 and 2015. The first survey was undertaken between June and August 2010. Following a track taken by much prior research on slums, we obtained a list from the municipal authority (Karnataka Slum Development Board or KSDB), and after categorizing all slums on this list in terms of a number of parameters, we randomly selected 14 slums for investigations, which were carried out by a locally recruited research team, with whom we trained extensively. Details of this investigation, including the process of sampling and interviewing are recounted in a prior publication.[17]

Interviews with a random sample of 1,481 households showed that the slums which appear on the official list represent the pinnacle of a vast iceberg, home not so much to the poorest people as to a settled lower-middle class, most of who have lived in Bengaluru for multiple generations: multi-story permanent constructions prevail; electricity connections and clean drinking water are commonly available; TVs, pressure cookers, and electric fans are commonly owned; poverty is low compared to the average for the city. As many as 606 of these 1,481 households (41 percent) own the homes in which they live, and of them, 70 percent possess official papers.

It became clear that in order to study the "real" slums, places that come closer both to the UN definition of slum as well as the common-sense understanding of the term, we would have to look at slums that are *not* on the official list. But how does one create a list of unlisted slums?

Since existing data sources are of little help, we developed new and reliable methods of data collection. Following a path taken by some other analysts, we looked to find leverage in satellite images.[18] We started by looking at images that are publicly available on Google Earth. More recently, we have been looking at higher-resolution images, including through a collaboration that our local partner, the Jana Urban Foundation, has struck with the Indian Space Research Organization, ISRO (about which more later).

We began our identification exercise by drawing the spatial borders of the area administered by the municipal authority. This area was divided into four equal-sized quadrants on a map of Bengaluru drawn on Google Earth. Considering each quadrant separately helped analyze a more manageable number of identified settlements (polygons), enabling ground verifications to be made quadrant-by-quadrant.[19] After several iterations between satellite-image identification and detailed verification on the ground, we shortlisted some criteria for identifying low-income settlements in Bengaluru:

- lack of space between shelter units;
- roofs that appeared to be low-quality based on their weathered brown or grey colours;
- a hodgepodge pattern of shelter units;
- lack of proper roads (if there are roads, they are brown, narrow and unpaved);
- lack of shadows adjoining the shelter units, signifying that they are low to the ground, thus not multi-storied.

Based on these identification criteria, 279 low-income polygons were identified. Even from looking only at their Google Earth images, blue-polygon slums could be clearly differentiated from the others. Settlements of this type were identified based on our initial rounds of field visits.

In exploring these settlements, we used the time slider feature on Google Earth and began noticing that blue-polygon settlements had come up in the most part within the past few years, although some have been around for much longer, growing in size over a period. We identified 61 such settlements in all, and our ground-verification exercises showed how these initial identifications were accurate in the vast majority of cases.

In our second round of household surveys, undertaken between August and December 2012, we conducted interviews with 631 households in 18 randomly selected blue polygon settlements. This wave of surveys took the surveyors into some of the roughest parts of the city. Most homes do not have electricity and there are no street lights, so working after dark is virtually impossible, but the residents, men and women, are at work during the daylight hours, which makes things difficult for the interviewers. The typical abode is a 7'x7' tent erected on land hired from a private owner. Families of between 3 and 5 individuals share these meager spaces. Prior to coming to the city the principal occupation of a little more than one-half, 52 percent, of residents was agricultural labor. Their reasons for coming to the city have to do with the agrarian distress and a consequent need to pay off accumulated debts.[20]

In our third and most recent round of surveys, we looked primarily at slums in which living conditions are of an intermediate kind – bracketed between the highest (notified or declared slums) and lowest (blue polygons). Beginning in May 2015, we interviewed 30+ households in each of 30 settlements representing a range of physical and legal statuses, as verified by prior neighborhood surveys.[21] We also resampled 30 households in 5 among the blue polygon settlements that we had investigated in 2012 and 5 among the declared settlements that we had sampled in 2010. In all, we collected data for 1,272 households in 30 diverse slums.

Over the entire course of these investigations, field teams have conducted neighborhood surveys (i.e., focus groups with a small group of residents) in 157 slums, which have provided useful information about the settlement's history, physical characteristics, demographics, neighborhood organization, and legal status. Our database at the time of writing this paper consisted, thus, of 3,384 household interviews; 157 neighborhood surveys; ethnographies and photo-narratives from a variety of slums (see the web site: urbanindiastories.com); and a growing pile of variously helpful administrative data and reports. Another round of surveys planned for June-August 2016 will help round out the picture.

A continuum of slums with varying living conditions

Prior studies have made notable contributions to the accumulation of knowledge about slums in Bengaluru.[22] We add to this body of knowledge by locating the slums of this city along a continuum that ranges from flimsy tarp-covered huts to three-story concrete structures (that are visually indistinguishable from other lower-middle class neighborhoods).

We employed a combination of cluster analysis and principal components analysis for this analysis (using data from the neighborhood surveys in conjunction with means and standard deviations from the household data). The placement of different slum settlements at particular points along the continuum is supported as well by the study team's observations of ground conditions.

We started the analysis by considering specific characteristics contained in the UN definition of a slum household – as one that lacks in one or more of the following conditions of living: safe drinking water; improved sanitation; sufficient living area; durable housing; and security of tenure.[23] For the present analysis, we left out security of tenure, preferring to examine this feature as part of the explanation (rather than as a part of the explanandum). Instead, we looked at a series of other indicators, analyzing them in diverse combinations and using different waves of survey data (Table 1).

- TABLE 1 ABOUT HERE -

Successive iterations of cluster analysis are depicted in Appendix Table A. Different survey waves contain somewhat different information, so adding observations comes at the expense of reducing common variables. Each time, we found that blue polygons were robustly identified as a distinct category. In a few iterations of the cluster analysis, we were able to identify two groups distinct from the blue polygons, but these findings were not robust to replication. We concluded that blue polygons are distinct, and the remaining slums, while not separable into distinct types, vary substantially in wellbeing, and these differences are arranged along a continuum.

Principal components analyses, undertaken separately, supported a similar conclusion.[24] Two variables had the highest loadings on the first principal component – household asset holdings and average drainage quality – suggesting that slums that are higher along the continuum have higher values on both variables. (The higher the loading of a variable on the principal component, the larger is the part of variation explained by the component. Predicted first component scores can be generated for each slum. The higher is this score, the further along a slum is located on the continuum). Figures 3 and 4 show scatterplots of the mean household assets and drainage scores against the principal component scores. Some other indicators also increase along the continuum, especially the average dwelling size, which tends to increase as one goes from lower to higher points along the continuum. Figure 5 demonstrates this relationship by plotting the mean dwelling size against the first principal component score.

- FIGURES 3, 4, 5 ABOUT HERE -

Figure 6 plots average dwelling size against mean household asset score, illustrating how the non-blue-polygon slums lie along a development continuum, but are quite distinct from the blue polygon settlements.

- FIGURE 6 ABOUT HERE -

Blue polygons are consistently worse off on multiple indicators. These settlements constitute a distinct type, clearly distinguishable from other slums on these and a number of other characteristics. The other slums show more continuous and finely graded variations, without clear points of inflection.

Table 2 shows the range of scores for the slums in the continuum and the blue polygons. Slums with the best living conditions are noted at the top of this table, and slums with the worst living conditions bring up the bottom of this table.

- TABLE 2 ABOUT HERE -

Taking this analysis forward, we looked at the Top 5 and the Bottom 5 slums of Table 2 (excluding the blue-polygon variables for now, and adding them back for later analyses). Using cluster analysis scores, we first compared some physical characteristics (Table 3).

- TABLE 3 ABOUT HERE -

Physical characteristics that best distinguish between the top and bottom of the continuum are the mean asset score, dwelling size, and height (or verticality), another aspect of housing stock quality, as well as some (but not all) aspects of service provision, especially, quality of water and drainage provision. Dwelling size increases near-monotonically along the continuum, and verticality and drainage scores also increase. Other characteristics related to service provision – road quality, garbage disposal – do not increase as clearly along the continuum (as also seen in Table 2).

In fact, higher household wealth and housing stock do not always go together with better service provision. In a bivariate regression of services on wealth, the coefficient is positive, but not statistically significant (p-value .3). In general, slums at higher points along the continuum have a higher overall service provision score, but the correlation is small and statistically weak.

Higher education levels and occupation status do, however, go together with higher points along the slum continuum. We also note that slums at higher points along the continuum tend to have more highly educated children. A child's education level appears to be more closely correlated with wealth of slum than with notification status or with service provision. Table 4 examines these and other household characteristics. Blue polygons are once again distinct in some respects, especially the number of years spent in Bengaluru. But in other respects – including percent SC/ST and percent Hindu – the three slum categories considered in this table are not considerably different.

Commonly, the share of SCs and STs (and OBCs) is very high in all types of slums – much higher than their share in the population of the city and the country. Studies of slums in other Indian cities have reported the same finding.[25]

- TABLE 4 ABOUT HERE -

Apart from these similarities, two notable differences are visible in Table 4. The first notable difference relates to the education level of the average adult. The values recorded here follow a particular scheme of coding: A value of 1 indicates the respondent can sign her name, 2 corresponds to her being able to read and write, 3 corresponds to passing primary school, 4 corresponds to taking but failing the SSLC exam, and so on. Thus, a difference of 1 in average scores represent a qualitatively higher average education level.

A second notable difference relates to the percentage of slum dwellers who *say* that their slum is notified by the government. Notice how this percentage is much higher in each case compared to the percentage of residents who have home and land titles. Even among blue-polygon residents, the quintessential squatters, 6 percent claimed to be living in a notified (or officially declared) slum.

The impact upon people's mindsets and investment decisions that is made by official notification (or even by the anticipation of notification) is something we discuss in a companion paper, where the point is made that notification (and the presumed legalization that comes together with it) matter more than the property titles that sometimes follow.[26]

In fact, the actual notification status also does not appear to move together with service provision (p-value .12), which is interesting given that legally, municipal services should be provided only after a slum receives notification status. In interviews with long-term slum residents, however, and in the slum histories narrated by neighborhood focus groups, we were told of numerous occasions when a particular service – such as street lights, or drinking water, or storm water drainage – had been provided to a slum because of the intervention of a powerful politician. Even in non-notified slums, which should not, strictly speaking, have been provided with any of these services, water and sanitation and roads and street lights were provided in an ad hoc fashion. Many notified slums lack the services that non-notified slums have been able to avail.

Finally, occupational categories vary significantly at different points along the continuum of slums, as indicated in Figure 7. A far higher share of blue-polygon residents is in low-paid and precarious occupations, especially those of informal construction laborers. Contrarily, a far higher proportion of the top-of-the-continuum residents are in relatively higher-paid and higher status occupations, grouped together under business and professional service. This variation, like those in education levels, asset holdings, dwelling size, and verticality, occurs regularly along the continuum of slums.

- FIGURE 7 ABOUT HERE -

Notably, however, nearly all slum residents, even those in higher-status occupations are employed in the informal sector. Hardly any have jobs that come together with tenure security, health care and old age benefits, etc., and the range of incomes is also on the low end of the scale prevalent in Bangalore.

We examined a list of 22 different assets and, on average; even those at the top of the continuum own less than 10 of these assets. However, those at higher points on the continuum do own more assets, for instance, those at the top are more likely to have a gas stove than a pump stove and a private bathroom than a common bathroom.

Conclusion: Settling the debate?

What is cause and what is effect? Does living in Bengaluru for a longer time improve the living conditions of blue-polygon residents, making them look first like the Bottom 5, then like the middle, and later like the top of the continuum? What do these findings suggest for the debate presented at the start of this paper, about whether slums are a conveyer belt to a better future or whether, instead, they are poverty traps?

It's hard to look at a static picture and draw conclusions about the dynamics. Either one of the following conclusions could be supported from the picture we've just drawn:

(a) *A story of secular improvement* - that over time, living in a city results in an improvement of people's living conditions. Their incomes increase, and that's when people invest in education and in housing stock, progressively improving their occupational status and adding to asset holdings; or

(b) *A story of assortative residential selection* – slums and their residents enter the continuum at different points and tend to remain more or less where they had started. People with higher levels of education, better occupational status, and bigger asset stocks tend to gravitate toward others of their kind, living in settlements with larger dwelling sizes and somewhat better service provision.

The truth might lie somewhere in between, with some of (a) and some of (b) occurring in practice. The evidence we have assembled to date is scattered and preliminary, but what there is indicates more of (b) and less of (a).

We examined satellite images of a random sample of 40 slums. Comparing images from different years we were able to identify the changes that had occurred in each of these slums over the period between 2000 and 2015.[27] In 17 of the random sample of 40 slums that we studied, there was no change in essential physical characteristics (building height, roofing materials, external roads, width of inner lanes, etc.). In another 17 slums, there were small positive changes over this 15-year period. Some slums experienced a transition from unpaved to paved roads; in others, a few buildings grew taller as additional stories were constructed; in yet others, roofs changed from a brown color (signifying cheaper construction) to a gray or white color (signifying a better type of roofing material). These changes aren't emblematic, however, of large lifestyle improvements. In only 3 out of the 40 cases we studied was there evidence of substantial improvements. These 3 settlements moved up the continuum, becoming a better type of habitation. Simultaneously, some other slums, which had existed 15 years earlier, showed evidence that the slum had been relocated, or had experienced a dramatic transition without experiencing improvements in living conditions.

The ethnologies and photo-narratives that we have collected, provide some stories of significant secular improvement – e.g., http://urbanindiastories.com/projects/namma-mane-our-home-vivekananda-vasanthi-sankeerna/ (which relates to one slum ranked 6th on the continuum). But there are more stories of relative stasis – e.g., http://urbanindiastories.com/projects/namma-mane-our-home-ashraya-nagar/ (one of our Bottom 5 slums); and http://urbanindiastories.com/projects/namma-mane-our-home-pattanduru-agrahara/ (which has remained a blue-polygon slum).

Overall, thus, the thesis of secular improvement does not receive unqualified support. Few among the lower or intermediate types of slums are progressing toward are a higher type of existence. In other cities, too, scholars have found that relatively little has changed for the majority of slum settlements, which have mostly remained as they were, experiencing little notable or sustained progress.[28]

This part of the analysis is continuing. We are further along than we were a year or two years ago. We have made an analysis of the satellite image record, but not yet a complete accounting of the trajectories of each of the 150+ Bengaluru slums. That's an ongoing process, in which we are collaborating, through our partners in India, with ISRO, where we have made some initial breakthroughs toward the goal of developing an algorithm for semi-automatic slum identification and classification. We are also exploring other avenues for obtaining access to high-resolution image histories of these slums. The next iteration of this paper should have more to say about the processes driving stasis and change.

Table 1: Characteristics and Indicators

Characteristics	*Indicators*
Access to improved water	Water source[29]
Access to improved sanitation	Neighborhood garbage disposal[30] Neighborhood drainage[31]
Sufficient-living area	Dwelling size[32] Verticality[33]
Durability of housing	Road quality[34]
Socioeconomic status	Assets[35]

Note: For all variables except dwelling size and assets, scores were given to each neighborhood based on the quality of infrastructure present. Higher scores correspond to higher quality. All scores were scaled from 0 to 1 before incorporated into analyses. Additional details on how each indicator was constructed are given in the endnotes.

TABLE 2: A Continuum of Slums and Key Characteristics

	Name	Water score	Drain score	Asset mean	Asset standard deviation	Garbage disposal score	Road quality score	Verticality score	Dwelling size
Continuum									
1	Rayapuram	3.00	2.70	1.62	1.38	2.00	2.00	2.85	404.40
2	Dasarahalli	3.00	3.00	0.44	1.50	2.00	2.40	1.90	397.33
3	Rudrappa garden	3.00	2.80	1.21	1.48	2.00	3.00	1.45	301.00
4	K G Halli	2.30	2.20	1.37	1.32	2.00	1.30	1.85	573.43
5	Kasturiba Colony	3.00	3.00	1.33	1.11	2.00	2.00	1.80	368.08
6	Vivekananda vasanthi Sankeerna	2.00	3.00	1.28	0.96	2.00	2.00	3.00	288.37
7	Kamalanagar	3.00	3.00	0.80	1.08	2.00	2.55	1.60	323.10
8	Nanjamba Agrahara	3.00	2.60	0.64	1.49	2.00	1.90	1.30	391.13
9	Kunti Grama	3.00	3.00	0.17	1.49	2.00	3.00	1.05	264.97
10	Sarbandepalya	3.00	2.90	0.65	1.25	2.00	2.00	1.85	282.07
11	Lakshmanmurthy Nagar	2.00	3.00	1.29	1.25	2.00	2.00	1.40	372.95
12	Jalakanteshwara Nagar	3.00	2.80	0.83	1.44	2.00	2.00	1.25	314.16
13	Someshwarnagar	3.00	3.00	1.06	1.14	2.00	2.00	1.05	359.77
14	V.V.Giri colony	3.00	3.00	0.44	1.42	2.00	1.95	1.55	274.30
15	Muneshwara Colony	3.00	3.00	0.75	1.09	2.00	1.80	1.55	321.37
16	Venkatraman Nagar	3.00	2.20	0.45	1.69	2.00	2.00	1.40	302.79
17	Bangi colony	3.00	3.00	-0.61	1.81	2.00	2.00	1.30	242.27
18	Hombegowda Slum	3.00	2.90	-0.36	1.38	2.00	2.00	1.90	236.23
19	Janata colony	3.00	2.90	0.84	1.25	2.00	2.00	1.40	243.73
20	Kasturamma Badwane	1.00	3.00	0.00	1.42	2.00	2.00	2.10	329.47
21	Gulbarga colony	2.50	2.80	0.27	1.53	2.00	2.00	1.25	293.63
22	Other: Mominpura	3.00	2.50	0.00	1.49	2.00	2.00	1.70	240.88
23	Shivananada	3.00	2.70	0.38	0.96	2.00	2.00	1.20	358.53
24	Ambedkar Colony	3.00	3.00	-0.01	1.55	2.00	2.00	1.10	213.03
25	Chamundi Nagar	1.00	3.00	1.18	1.06	2.00	2.65	1.45	277.13
26	Khata Nagar	3.00	2.70	0.57	1.11	2.00	2.00	1.25	249.93
27	Kaveri Nagar	3.00	2.55	0.49	1.23	2.00	1.80	1.30	213.07
28	Vijinapura	3.00	2.90	0.79	0.87	2.00	1.00	1.00	314.57
29	Ramanna Garden	3.00	3.00	-0.25	1.59	2.00	0.30	1.45	221.58
30	Uttarahalli	1.00	2.80	0.90	1.44	0.00	2.00	1.70	352.17
31	Ullal Upnagar	1.00	1.70	0.71	0.93	2.00	2.40	1.70	284.33
32	K.S.Garden	0.15	2.75	0.24	1.55	0.00	2.80	1.50	257.27
33	GD Mara Slum	2.00	2.00	-0.70	1.67	2.00	0.00	1.00	189.55
34	Vijayanagar	1.00	2.00	1.21	1.22	0.00	0.90	1.05	378.41
35	Ashraya Nagar	2.00	2.00	-1.76	1.94	2.00	0.00	1.00	169.67
Blue polygons									
1	Nallurhalli	0.00	0.00	-3.04	1.22	0.00	0.00	1.00	138.73
2	Pramod Nagar/Layout	2.00	0.00	-4.12	0.75	0.00	0.00	1.00	111.97
3	Gorguntepalya	0.00	1.00	-4.01	0.56	0.00	0.00	1.00	122.90
4	Uttarahalli lake	0.00	0.00	-4.06	0.51	0.00	0.00	1.00	117.03
5	Thobarahalli	0.00	0.00	-4.26	0.40	0.00	0.00	1.00	119.26

Table 3: Comparing Physical Characteristics

	Bottom 5	Top 5
Water	1.23 (.26, 2.20)	2.86 (2.47, 3.25)
Drain	2.09 (1.60, 2.58)	2.74 (2.33, 3.15)
Asset mean	(0.06) (-1.53, 1.41)	1.19 (.64, 1.75)
Asset standard deviation	1.46 (.97, 1.95)	1.36 (1.16, 1.55)
Garbage disposal	1.2 (-.16, 2.56)	2 (2, 2)
Road quality	1.22 (-.42, 2.86)	2.14 (1.37, 2.91)
Verticality	1.25 (.84, 1.66)	1.97 (1.32, 2.62)
Dwelling size	255.85 (152.60, 359.10)	408.8 (283.86, 533.84)

Table 4: Comparing Household Characteristics

	Blue Polygon		Bottom 5		Top 5	
	Mean	**N**	**Mean**	**N**	**Mean**	**N**
Percent Hindu	0.81 (.74, .87)	150	0.76 (.69, .83)	148	0.74 (.68, .81)	160
Percent Muslim	0.15 (.09, .20)	150	0.19 (.13, .25)	148	0.06 (.02, .10)	160
Percent Christian	0.04 (.01, .07)	150	0.05 (.02, .09)	148	0.19 (.13, .25)	160
Percent OBC	0.26 (.19, .33)	150	0.19 (.13, .25)	148	0.16 (.10, .21)	160
Percent SC/ST	0.55 (.47, .63)	150	0.50 (.39, .54)	148	0.44 (.36, .52)	174
Years lived in Bangalore	9.34 (8.14, 10.54)	149	28.97 (26.60, 31.35)	148	31.81 (29.15, 34.47)	158
Education level (coded)	1.74 (1.54, 1.95)	149	2.58 (2.33, 2.83)	148	3.54 (3.21, 3.86)	158
Education level of children (coded)	2.73 (2.53, 2.93)	109	3.63 (3.37, 3.88)	125	4.00 (3.67, 4.34)	129
Types of assets owned (out of 22)	2.16 (1.91, 2.41)	147	8.00 (7.57, 8.41)	147	9.55 (9.20, 9.90)	152
Percent with land and home titles	0	150	0.19 (.13, .25)	148	0.36 (.28, .43)	160
Percent saying slum is notified	0.06 (.02, .10)	150	0.63 (.55, .71)	148	0.75 (.68, .82)	160

Figure 1. Satellite image of a blue polygon slum

Figure 2. Satellite image of a more developed slum

Figure 3. Asset score versus first component score

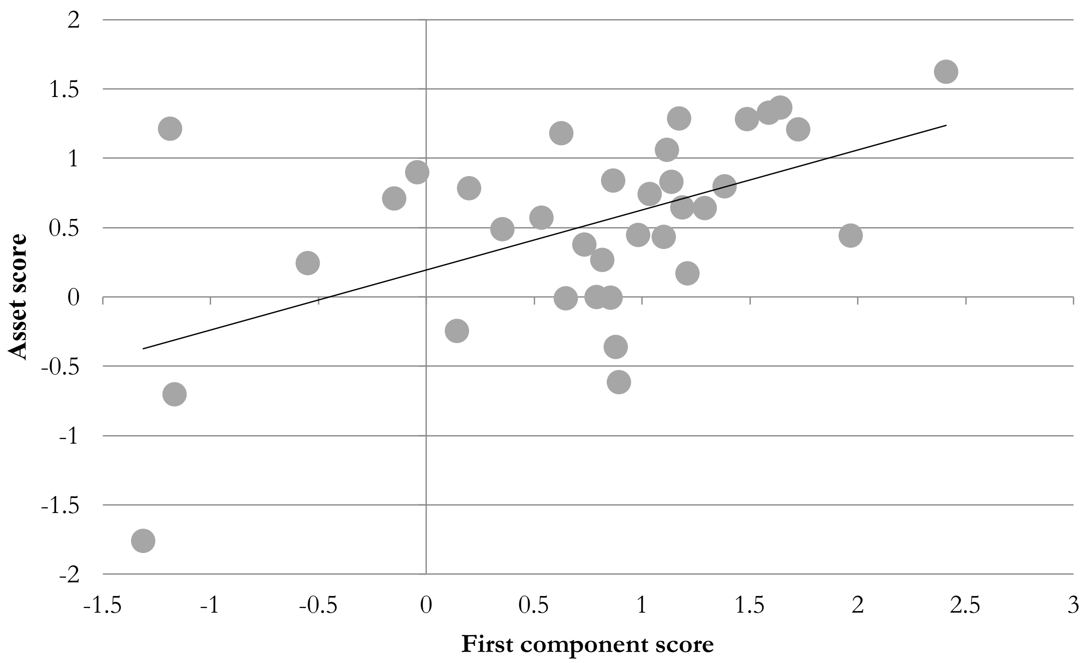


Figure 4. Drainage score versus first component score

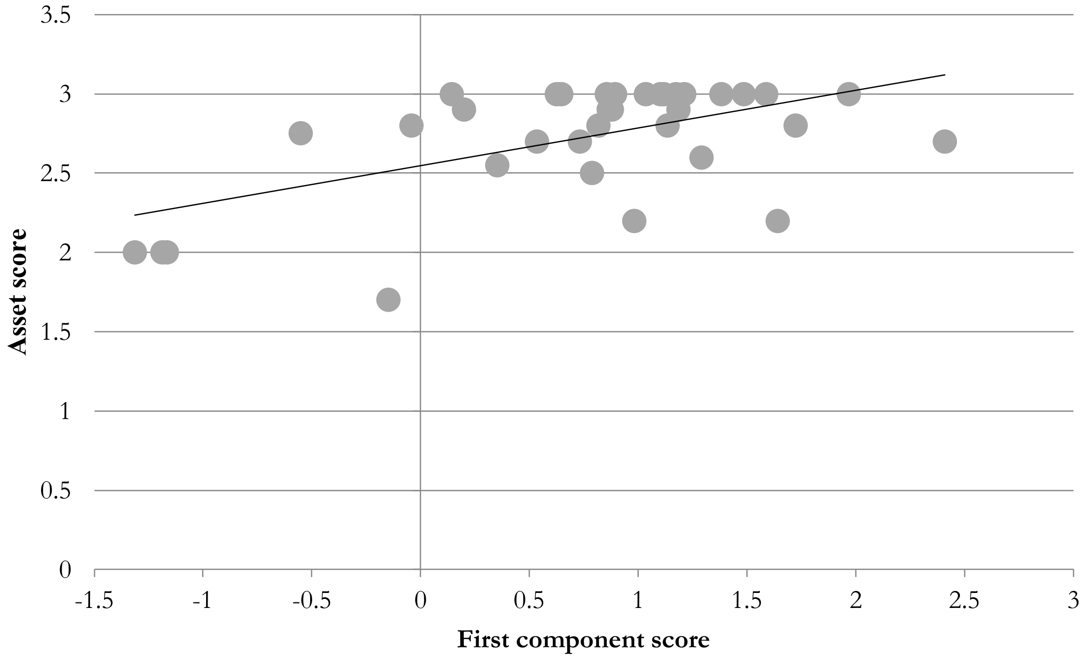


Figure 5. Dwelling size versus first component score

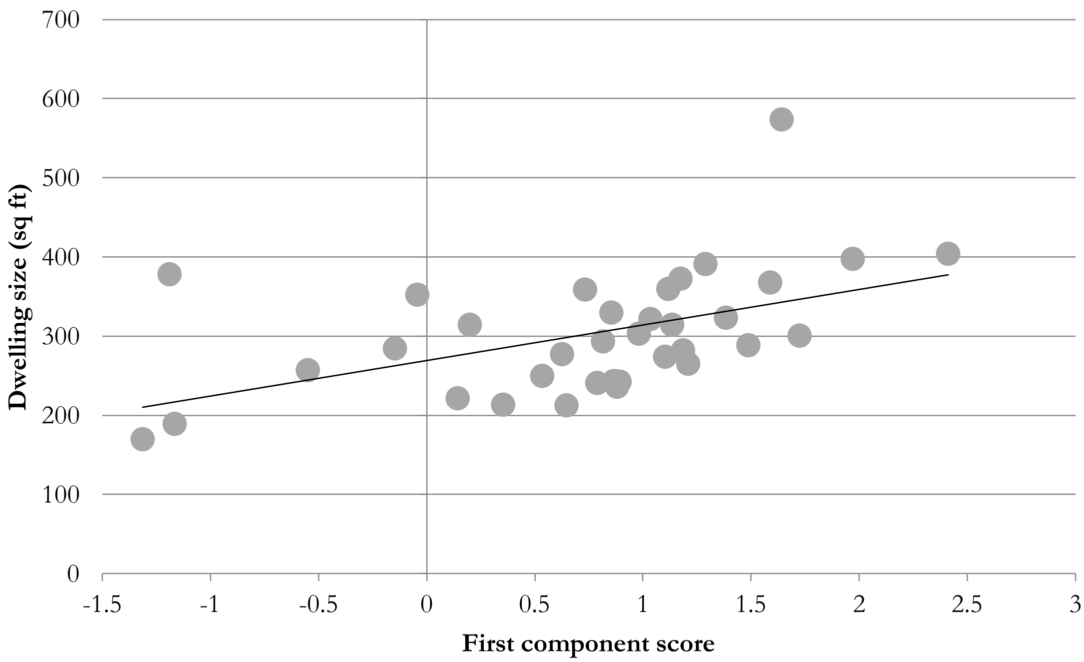
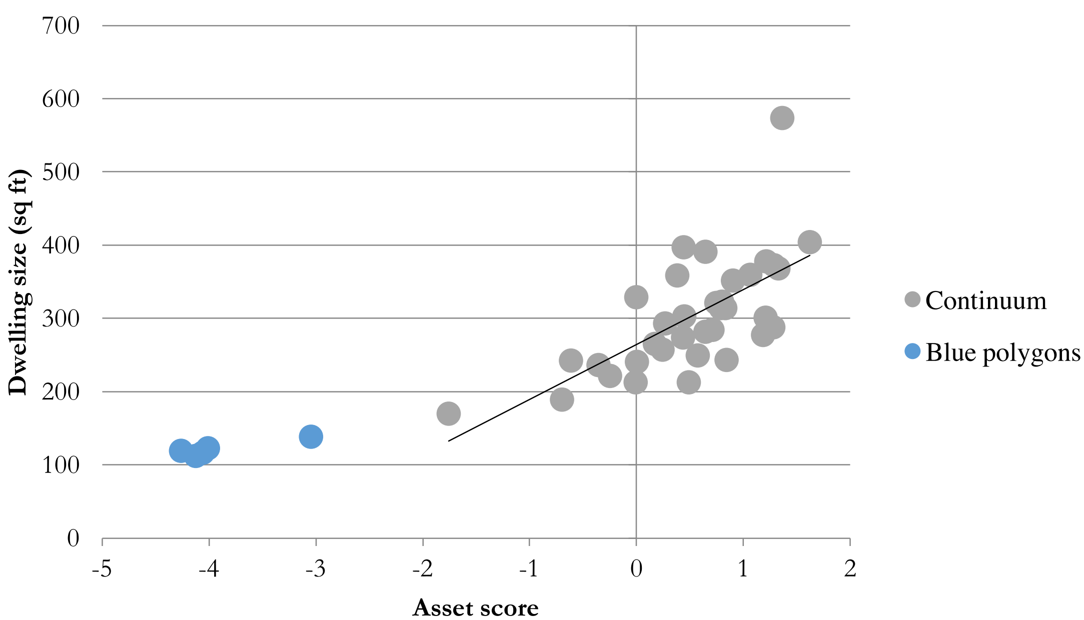


Figure 6. Dwelling size versus asset score for blue polygons and continuum



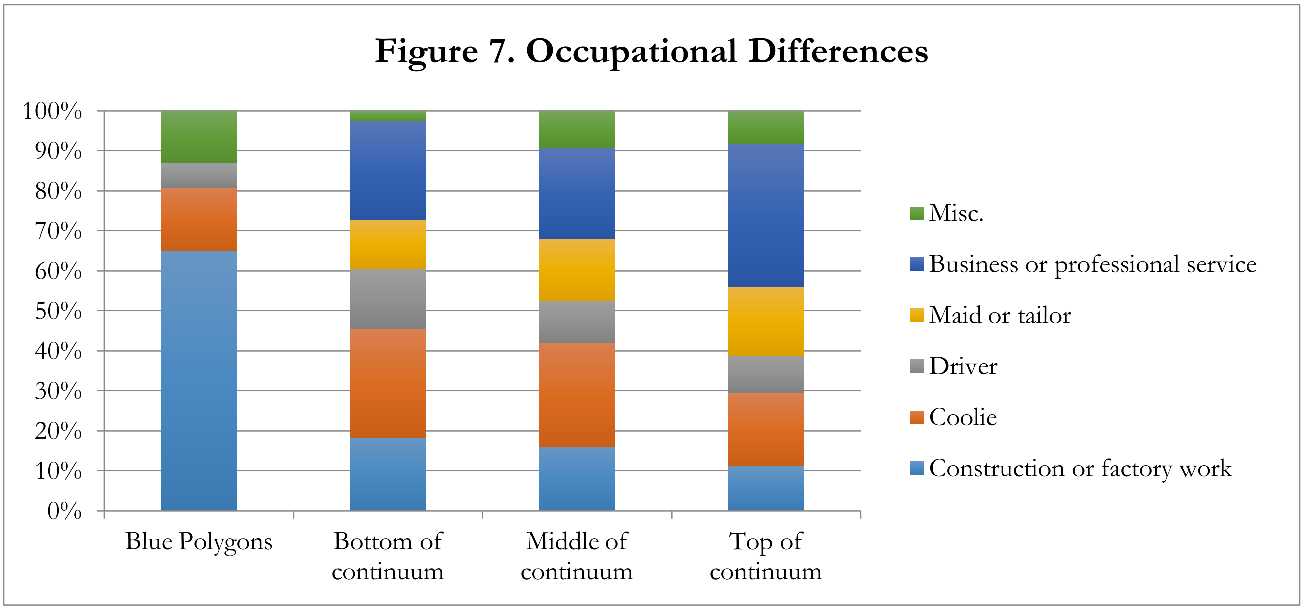


Figure 7. Occupational Differences
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Blue Polygons
Bottom of continuum
Middle of continuum
Top of continuum
Misc.
Business or professional service
Maid or tailor
Driver
Coolie
Construction or factory work

References

Amis, P. and Kumar, S. (2000). "Urban Economic Growth, Infrastructure, and Poverty in India: Lessons from Visakhapatnam." *Environment and Urbanization,* 12 (1): 185-96.

Auerbach, Adam M. (2016). "Clients and Communities: The Political Economy of Party Network Organization and Development in India's Urban Slums." *World Politics,* 68 (1): 111-48.

Bapat, Meera. (2009). "Poverty Lines and Lives of the Poor: Under-estimation of urban poverty – the case of India." *Working Paper. London, UK: International Institute of Environment and Development.*

Bhagat, Ram B. (2014). "World Migration Report 2015: Urban Migration Trends, Challenges and Opportunities in India." *International Organization for Migration Background Paper.*

Bhan, Gautam and Arindam Jana. (2013). "Of Slums or Poverty: Notes of Caution from Census 2011," *Economic and Political Weekly,* 48 918): 13-16.

Bhatia, N. and Chatterjee, A. (2010). "Financial Inclusion in Slums of Mumbai". *Economic and Political Weekly*, October 16, pp. 23-26.

Benjamin, S. (2000). Governance, Economic Settings, and Poverty in Bangalore. *Environment and Urbanization,* 12 (1): 35-56.

Benjamin, S. and Bhuvaneswari, R. (2001). Democracy, Inclusive Governance and Poverty in Bangalore. Working Paper 26, University of Birmingham, UK. Accessed on November 16, 2011 at http://casumm.files.wordpress.com/2011/02/democracy-poverty-and-goverance-in-bangalore.pdf

Breman, Jan. (2013). *At Work in the Informal Economy of India: A Perspective from the Bottom Up*. New Delhi: Oxford University Press.

Brynjolffson, Erik and Andrew McAfee. (2014). *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies.* New York: W.W. Norton.

Carr, Nicholas. (2014). *The Glass Cage: Automation and Us.* New York: Norton.

Chamarbagwala, Rubiana. (2006). "Economic Liberalization and Wage Inequality in India." *World Development,* 34(12): 1997-2015.

De Haan, Arjan, and Ben Rogaly. (2002). "Introduction: Migrant Workers and Their Role in Rural Change." In De Haan, Arjan and Ben Rogaly, eds., *Labour Mobility and Rural Society*, pp. 1-14. New York: Frank Cass Publishers.

De Haan, Arjan. (1997). "Rural-Urban Migration and Poverty: The Case of India." *IDS Bulletin,* 28(2): 35-47.

Deshingkar, Priya, and Shaheen Akter. (2009). "Migration and Human Development in India." *United Nations Development Programme Human Development Research Paper,* No. 2009/13.

Deshingkar, Priya and John Farrington. (2009). "A Framework for Understanding Circular Migration," in Priya Deshingkar and John Farrington, eds., *Circular Migration and Multilocational Livelihood Strategies in Rural India*, pp. 1-36. New Delhi: Oxford University Press.

Deshingkar, Priya, and Daniel Start. (2003). "Seasonal Migration for Livelihoods in India: Coping, Accumulation and Exclusion." *Overseas Development Institute Working Paper,* No. 220.

Dewit, M. (2001). Slum Perceptions and Cognitions, in H. Schenk (ed.), *Living in India's Slums: A Case Study of Bangalore*, pp. 79-112. New Delhi: Manohar Publishers.

Dubey, Amaresh, Shubhashis Gangopadhyay, and Wilima Wadhwa. (2001). "Occupational Structure and Incidence of Poverty in Indian Towns of Different Sizes." *Review of Development Economics,* 5(1): 49-59.

Ferre´, Celine, Francisco H.G. Ferreira, and Peter Lanjouw (2012). "Is There a Metropolitan Bias? The relationship between poverty and city size in a selection of developing countries." *World Bank Economic Review*, 26 (3): 351–382.

Florida, Richard. (2008). *Who's Your City: How the creative economy is making where to live the most important decision in your life.* New York: Basic Books.

Fox, Sean. (2014). "The Political Economy of Slums: Theory and Evidence from Sub-Saharan Africa." *World Development,* (54): 191-203.

Gardner, Katy, and Filippo Osella. (2004). "Migration, Modernity and Social Transformation in South Asia: An Introduction." In Osella, Filippo and Katy Gardner, eds., *Migration, Modernity and Social Transformation in South Asia*, pp. xi-xlviii. New Delhi: Sage Publications.

Glaeser, Edward. (2011). *Triumph of the City*. New York: Penguin.

GOI. (2007). *Report of the Expert Group on Agricultural Indebtedness*. New Delhi: Government of India, Ministry of Finance.

GOI. (2010). *Report of the Committee on Slum Statistics/Census*. New Delhi: Government of India, Ministry of Housing and Urban Poverty Alleviation. Accessed on April 20, 2016 at http://mhupa.gov.in/W_new/Slum_Report_NBO.pdf.

Gooptu, Nandini. (2001). *The Politics of the Urban Poor in Early Twentieth-Century India*. New York: Cambridge University Press.

Gooptu, Nandini. (2011). "Economic Liberalization, Urban Politics and the Poor." In Sanjay Ruparelia, Reddy, Sanjay, Harriss, John, and Stuart Corbridge, eds., *Understanding India's New Political Economy: A Great Transformation?,* pp. 35-48. New York: Routledge.

Harriss, John. (2005). "Political Participation, Representation, and the Urban Poor: Findings from Research in Delhi." *Economic and Political Weekly*, 40(11): 1041-54.

Heitzman, J. (2004). *Network City: Planning the Information Society in Bangalore*. New Delhi: Oxford University Press.

Jha, Saumitra, Vijayendra Rao, and Michael Woolcock. (2007). "Governance in the Gullies: Democratic Responsiveness and Leadership in Delhi's Slums." *World Development* 35 (2): 230–46.

Mitlin, Diana and David Satterthwaite. (2012). "Editorial: Addressing Poverty and Inequality; New Forms of Urban Governance in Asia." *Environment and Urbanization,* 24 (2): 395-401

Nair, Janaki. (2005). *The Promise of the Metropolis: Bangalore's Twentieth Century*. New Delhi: Oxford University Press.

Khasnabis, R. and Chatterjee, T. (2007). Enrolling and Retaining Slum Children in Formal Schools: A Field Survey in Eastern Slums of Kolkata. *Economic and Political Weekly*, June 2, pp. 2091-99.

Khandelwal, Rajiv, and Elon Gilbert. (2007). "Getting Set to Go: Upgrading Migration through an Innovative Educational Programme." *Journal of Education for Sustainable Development,* 1(1): 61-71.

Krishna, Anirudh. (2013). "Stuck in Place: Investigating Social Mobility in 14 Bengaluru Slums." *Journal of Development Studies,* 49 (7): 1010-28.

Krishna, Anirudh, M.S. Sriram, and Purnima Prakash. (2014). "Slum Types and Adaptation Strategies: Identifying Policy-Relevant Differences in Bangalore." *Environment and Urbanization,* 26 (2): 568-85.

Kundu, Amitabh and Niranjan Sarangi. (2007). ""Migration, Employment Status and Poverty: An Analysis across Urban Centres." *Economic and Political Weekly*, Vol. 42, No. 4, pp. 299-307.

Oleksandr, Lüdeke, Matthias, and Diana Reckien. (2013). "Defining the Bull's Eye: Satellite Imagery-Assisted Slum Population Assessment in Hyderabad, India." *Urban Geography*, 34 (3): 413- 24;

Lerche, Jens. (2010). "From 'Rural Labour' to 'Classes of Labour': Class Fragmentation, Caste and Class Struggle at the Bottom of the Indian Labour Hierarchy." In Harriss-White, Barbara and Judith Heyer, eds., *Comparative Political Economy of Development*, pp. 66-87. New York: Routledge.

Livengood, Avery and Keya Kunte. (2012). "Enabling Participatory Planning with GIS: a case study of settlement mapping in Cuttack, India." Environment and *Urbanization,* 24 (1): 77-97.

Mahadevia, D. (2010). Tenure Security and Urban Social Protection Links: India. *IDS Bulletin*, 41 (4): 52-62.

Marx, Benjamin, Thomas Stoker, and Tavneet Suri (2013). "The Economics of Slums in the Developing World." *Journal of Economic Perspectives,* 27(4): 187-210.

Mazumdar, Indrani, N Neetha, and Indu Agnihotri. (2013). "Migration and Gender in India." *Economic and Political Weekly,* 48(10): 54-64.

Mitra, Arup. (2006). "Labour Market Mobility of Low Income Households." *Economic and Political Weekly,* 41(21): 2123-30.

Mitra, Arup. (2010). "Migration, Livelihood and Well-being: Evidence from Indian City Slums." *Urban Studies*, 47 (7): 1371-90.

Moretti, Enrico. (2012). *The New Geography of Jobs*. New York: Houghton, Mifflin, Harcourt.

Picherit, David. (2014). "Neither a Dog, Nor a Beggar: Seasonal Labor Migration, Development and Poverty in Andhra Pradesh," in Nandini Gooptu and Jonathan Parry, eds., *Persistence of Poverty in India,* pp. 261-90. New Delhi: Social Science Press.

Ramachandran, H. and Sastry, G.S. (2001). An Inventory and Typology of Slums in Bangalore, in H. Schenk (ed.), *Living in India's Slums: A Case Study of Bangalore*, pp. 51-64. New Delhi: Manohar Publishers.

Ramachandran, H. and Subramanian, S.V. (2001). Slum Household Characteristics in Bangalore: A Comparative Analysis (1973 and 1992), in H. Schenk (ed.), *Living in India's Slums: A Case Study of Bangalore*, pp. 65-88. New Delhi: Manohar Publishers.

Reddy, D. Narasimha, and Srijit Mishra. (2009). "Agriculture in the Reforms Regime." In Reddy, D. Narasimha and Srijit Mishra, eds., *Agrarian Crisis in India*, pp. 3-43. New Delhi: Oxford University Press.

Rodgers, Gerry, and Janine Rodgers. (2011). "Inclusive Development? Migration, Governance and Social Change in Rural Bihar." *Economic and Political Weekly,* 46(23): 43-50.

Rogaly, Ben, et al. (2002). "Seasonal Migration and Welfare/Illfare in Eastern India: A Social Analysis." In De Haan, Arjan and Ben Rogaly, eds., *Labour Mobility and Rural Society*, pp. 89-114. New York: Frank Cass Publishers.

Satterthwaite, David and Diana Mitlin. (2013). *Reducing Urban Poverty in the Global South.* New York: Routledge.

Schenk, H. (2001). Living in Bangalore's Slums, in H. Schenk (ed.), *Living in India's Slums: A Case Study of Bangalore*, pp. 17-37. New Delhi: Manohar Publishers.

Shah, Alpa. (2006). "The Labour of Love Seasonal Migration from Jharkhand to the Brick Kilns of Other States in India." *Contributions to Indian Sociology,* 40(1): 91-118.

Shah, Svati P. (2014). *Street Corner Secrets: Sex, Work, and Migration in the City of Mumbai.* Durham: Duke University Press.

Singh, D.P. (2009). "Poverty and Migration: Does Moving Help?" in *India: Urban Poverty Report*, Oxford University Press, New Delhi, pp. 50-76.

Sudhira, H.S., Ramachandra, T.V. and K.S. Jagadish. (2004). "Urban Sprawl: Metrics, Dynamics, and Modeling using GIS." *International Journal of Applied Earth Observation and Geoinformation,* 5: 29-39.

Thachil, Tariq. (2016). "Do Rural Migrants Divide Ethnically in the City? Ethnographic and Experimental Evidence from Urban India. Downloaded on April 16, 2016 from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2455564.

Unni, J. and U. Rani. (2007). Informal Workers in Ahmedabad City, in A. Shaw (ed.), *Indian Cities in Transition*, pp. 217-37. Chennai: Orient Longman.

Vijay, G. (2005). "Migration, Vulnerability and Insecurity in New Industrial Labour Markets." *Economic and Political Weekly,* 40(22-23): 2304-12.

Wibbels, Erik, Anirudh Krishna, and M.S. Sriram (2016) ADD

World Bank (2009). *World Development Report 2009: Reshaping Economic Geography: Overview.* Washington, DC: World Bank.

World Bank. (2011). *Social Protection for a Changing India: Main Report.* Washington, D.C.

Appendix Table A: Cluster analysis iterations						
	Data used	**Waves used**	**Variables**	**Method**	**Groups formed**	**Notes**
1	HH and rich neighborhood	2012, 2015	Water score, garbage score, drain score, road quality score, verticality score, asset PC mean and standard deviation	Kmeans	2: Blue polygons from 2012 versus non-blues from 2015	All blues from 2015 drop out due to missing water or drain scores
1b	HH and rich neighborhood (dropping water and drain scores)[36]	2012, 2015	Garbage score, road quality score, verticality score, asset PC mean and standard deviation	Kmeans	2: Blue polygons from 2012 and the 5 from 2015 versus everything else	
2	HH and sparse neighborhood	2010, 2012, 2015	Water score, drain score, asset PC mean and standard deviation	Kmeans	2: Blue polygons from 2012 versus everything else	All blues from 2015 drop out due to missing water or drain scores
3	Rich neighborhood	2012, 2013, 2015	Water score, garbage score, drain score, road quality score, verticality score	Kmeans	3: Blue polygons plus two other groups	The elbow is not robust and appears to range from 2 to 6.
3b	Rich neighborhood (dropping 2012 blue polygons)[37]	2013, 2015	Water score, garbage score, drain score, road quality score, verticality score	Kmeans	3: Blue polygons plus two other groups	The elbow is not robust and appears to range.
4	Sparse neighborhood	2010, 2012, 2013, 2015	Water score, drain score	Kmeans	2: Not necessarily blue versus others	We note that using these scores is likely not sufficient to form meaningful clusters as this is the only analysis that does not

						differentiate the group of blue polygons.
5	Rich HH and rich neighborhood	2015	Weighted water score, weighted garbage score, drain score, weighted road quality score, weighted verticality score, dwelling size, asset PC mean and standard deviation	Kmeans	2: Blue drops out and then the others form a continuum	All blues drop out. The rest form a continuum – no clear elbow in the plot.

NOTES

[1] Ferre, Ferreira, and Lanjouw (2012: 353-4). Other works that independently uncover a similar trend in India include Dubey, Gangopadhyay, and Wadhwa (2001); Kundu and Sarangi (2007); and World Bank (2011).
[2] GOI. (2010). See also the report of the McKinsey Global Institute, which projects the urban population to grow to 590 million by 2030 (MGI 2010); Gooptu (2011); and World Bank (2011).
[3] Marx, Stoker and Suri (2013: 188) assert, for instance, that "in many countries, slums have been growing for decades, and millions of households find themselves trapped in slums for generations…life in the slum might constitute a form of poverty trap for a majority of their residents." Others overviews that come to a similar conclusion include Fox (2014) and Satterthwaite and Mitlin (2013).
[4] Bapat (2009: 19) reports this conclusion for slums in Pune. Another study, undertaken in Mumbai, found that "more than four-fifths had been staying in these slums for over 10 years… 41 percent were daily workers, most employed as cleaners of roads and sweepers, and over one-third were in service, mostly as maids, helpers and drivers" (Bhatia and Chatterjee, 2010: 24). Ramachandran and Subramanian (2001:72) similarly found how, despite the passage of nearly 20 years, "the nature of employment of the slum population did not appear to have undergone any positive change." Mitra (2010), studying four Indian cities – Jaipur, Ludhiana, Mathura, and Ujjain – found similarly that the probability of experiencing upward mobility is not significantly higher among longer-duration migrants.
[5] See Tumbe (2012); De Haan (2002); Gardner and Osella (2003) and Alpa Shah (2006).
[6] Census of India data show that the populations of many cities, including Delhi, Bengaluru, Ahmedabad, Patna, Pune and Surat doubled over the twenty years between 1991 and 2011. Partly, no doubt, these population increases have occurred on account of the spatial expansion of cities, and partly on account of the natural increase in these cities' populations, but a large – and as we will argue later – underestimated portion of the increase has come about on account of an influx of new migrants, many of a short-term and itinerant nature.
[7] See, for instance, GOI (2007); Lerche (2010); and Reddy and Mishra (2009).
[8] See, for instance, the studies by de Haan (2002); de Haan and Rogaly (2007); Deshingkar and Start (2003); Khandelwal and Gilbert (2007); Rodgers and Rodgers (2011); and Rogaly, et al. (2001).
[9] As Deshingkar and Farrington (2009: 10) have observed, migration to a city "starts from a differentiated situation. The social class of a migrant already predicts for what type of work the migrant has been qualified, equipped, or not, with education/skills and other forms of capital."
[10] For descriptions of the lives of such short-term itinerant migrants in different cities, their risky journeys to-and-fro, and the roles of labor contractors and other middlemen, see, for instance, Breman (2003); Thachil (2016); Vijay (2005); and Picherit (2014).
[11] On this point, there are a number of commentaries. See, for instance, Bryjolfsson and McAfee (2014) and Carr (2014). In the specific context of India, see Chamarbagwala (2006).
[12] Scholars are widely agreed that the definition adopted by the Census of India leads to a skewed representation of internal migrants (since it includes all women who moved to their husband's place of residence after marriage) as well as a huge underestimation of their likely numbers (because short-term migrants tend to be missed out, being enumerated in their "usual" place of residence, i.e., at the family home in the village). According to the national census of 2011, 22 percent of urban residents were internal migrants, in the sense that they were not born or previously lived in the city where they currently live but have moved to make this place their present residence, but this number is almost certainly an underestimate. The National Sample Survey Organization (NSSO), particularly in its 55th and 64th rounds, used a different definition and provided a different estimate of these numbers. It regarded individuals who stayed away from their usual place of residence for a period of 1 month or more but less than 6 months during the last 365 days for employment or in search of employment as short-term migrants, but by missing out on shorter-duration migrants, it, too, produced an underestimate, recording that in 2008 as many as 35 percent of urban residents were internal migrants. Independent estimates have recorded a much higher number of internal migrants. See, for instance, Singh (2009); Bhagat (2015); Breman (2013); and Deshingkar and Akhter (2009). Because of the definitions and methodologies they have adopted, NSSO and the Census tend to undercount the first three types of internal migrants, and analyzing these data leads to an over-emphasis on the positive achievements of new migrants, for instance, Kundu and Sarangi (2007).
[13] A survey undertaken between 2009 and 2011 with a sample frame spanning 20 of the country's 28 states found that "Only 42% of women migrants and 36% of males are long-term migrants; in other words, 58% of female labour migration and even more of male labour migration appears to be of a temporary nature" (Mazumdar, Neetha and Agnihotri 2013: 56).
[14] The national census of 2001 for the first time separately assessed the slum population in a few cities of India, considering three separate categories: (i) All areas in a town or city notified as 'Slum' by a state or local government; (ii) All areas recognized as 'Slum' by a state or local government, which may have not been formally notified; (iii) 'A compact area of at least 300 population or about 60-70 households of poorly built congested tenements, in unhygienic environment usually

with inadequate infrastructure and lacking in proper sanitary and drinking water facilities.' While slums of Categories (i) and (ii) exist on official records, Category (iii) slums are of a different type. Such types of slum settlements – neither notified nor recognized – are springing up all the time, often without well-known name or other indication of stable existence. They rarely form part of government records or city maps, so are harder to pin down, far less, enumerate. Census estimates of both 2001 and 2011 have missed out on the shabbiest settlements, as evidenced by the fact that, in 2011, an unbelievably larger share (81 percent) of these slum dwellings have bathrooms; 93 percent are of permanent (pukka) or semi-permanent construction; 74 percent have piped water connections; 53 percent have bank accounts; and 51 percent use LPG for cooking. Many states report no slums at all, which is also unrealistic. See Bhan and Jana (2013) and GOI (2010).

[15] Different estimates of the slum population are provided by NSSO because, instead of the Census' threshold number of 60-70 households, it utilizes a different definition of the third category, counting as slum even such settlements as have a minimum of 20 homes. Further, NSSO has changed its definition several times over the previous decades, revising the minimum number from 50 to 25 to the current definition of 20 homes. The estimates provided by Census and NSSO consequently differ, but both agencies' statistics are under-estimates. See http://mospi.nic.in/Mospi_New/upload/concepts_golden.pdf; http://indiasanitationportal.org/18551.

[16] See, for instance, Harriss (2005), and Mitra (2006) for Delhi; Khasnabis and Chatterjee (2007) for Kolkata; Mahadevia (2010) and Unni and Rani (2007) for Ahmedabad; and Amis and Kumar (2000) for Vishakhapatnam.

[17] See Krishna (2013).

[18] For instance, Oleksander, et al. (2013); Livengood and Kunte (2012); and Sudhira, et al. (2004).

[19] We found that examining images at an altitude of 4,000 feet was most helpful for our purposes. For most settlements, there are satellite images starting in 2000. However, some only have images dating back to 2002 or 2004. Similarly, the vast majority has an updated 2011 image, but some only some have images dating to 2010.

[20] For details about the methodology of this study and its findings, see Krishna, Sriram and Prakash (2014).

[21] We established the sample interval by dividing the number of households by 30 and again pursued the left-hand side rule. We interviewed more than 30 in slums where our initial fieldwork yielded less than 40 percent male respondents. In those cases we returned to the settlements to purposively sample an additional 8 men.

[22] Including Benjamin (2000), Benjamin and Bhuvaneswari (2001), Heitzman (2004), Nair (2005), Ramachandran and Sastry (2001), Ramachandran and Subramanian (2001), and Schenk (2001).

[23] See Millenium Development Goals Indicators:
http://mdgs.un.org/unsd/mdg/Metadata.aspx?IndicatorId=0&SeriesId=711

[24] We ran these analyses on all variables included in clustering exercise 5 in the appendix table, using the latest wave of survey data. In addition, we also run other PCAs by adding on the other two waves of dataset (2010 and 2013). This analysis includes observations, but comes at the expense of more detail. In this analysis, the loadings are highest for water score and drain score and the predicted PCA score rankings are inconsistent with those calculated just using the richer dataset. Therefore, we choose to proceed to work only with the richest dataset for the purpose of investigating differences and similarities along the continuum.

[25] See, for instance, and Shah (2014).

[26] See Wibbels, Krishna, and Sriram (2016).

[27] The year 2000 is as far back as publicly-available Google Earth images enable comparisons. We have just started working with higher-resolution images going further back in time.

[28] See, for instance, Jha, et al. (2007), Dewit (2001), Harriss (2005), and Mitra (2006)

[29] This is the weighted average of types of water sources used by the slum, where tanker equals 0, borewell equals 1, handpump equals 2, and private household connection equals 3.

[30] This is equal to 0 if the slum has no garbage disposal service, 1 if they use a private service, and 2 if they have access to a municipal service.

[31] This is weighted average of all of the types of neighborhood drainage in the slum, where none equals 0, open kaccha (not durable) equals 1, open pakka (durable) equals 2, and closed drainage equals 3.

[32] Dwelling size is the area in square feet.

[33] This is the weighted average height of buildings in the slum, where single storey buildings equal 1, two-story buildings equal 2, and three-story buildings equal 3.

[34] This is the weighted average of all of the types of roads in the slum, where unpaved equals 0, stone slabs equal 1, cement panels equal 2, and paved paved equals 3. Note that we did not include roof, wall, or floor quality because in initial analyses, we found that it contributed little to the classification relative to the other variables.

[35] This is the first component of a PCA on 22 binary variables indicating whether or not the respondent owns a particular asset (auto rickshaw, dressing table, bicycle, car, DVD player, gas stove, pump stove, tools, agricultural land, ceiling fan, common bathroom, private bathroom, mobile, motorbike, music system, pressure cooker, radio, refrigerator, sewing machine, TV, tractor, and washing machine.).

[36] Several slums have missing water and drainage scores, which leads to them dropping out of the analysis.
[37] We wanted to determine whether it would be easier to pick up on variation within the non-blues if we dropped the blues from the analysis.