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Off the map: the health and social implications of being a non-notified slum in India

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Abstract

Approximately half of all slums in India are not recognized by the government. Lack of government recognition, also referred to as “non-notified status” in the Indian context, may create entrenched barriers to legal rights and basic services such as water, sanitation, and security of tenure. In this paper, we explore the relationship between non-notified status and health outcomes in Kaula Bandar (KB), a slum in Mumbai, India. We illuminate this relationship using the findings of a four-year series of studies in the community. By comparing KB’s statistics to those from other Mumbai slums captured by India’s National Family Health Survey-3, we show that KB has relative deficiencies in several health and social outcomes, including those for educational status, child health, and adult nutrition. We then provide an explanatory framework for the role that KB’s non-notified status may play in generating poor health outcomes by discussing the health consequences of the absence of basic services and the criminalization of activities required to fulfill fundamental needs such as water access, toileting, and shelter. We argue that the policy vacuum surrounding non-notified slums like KB results in governance failures that lead to poor health outcomes. Our findings highlight the need for cities in India and other developing countries to establish and fulfill minimum humanitarian standards in non-notified slums for the provision of basic services such as water, sanitation, solid waste removal, electricity, and education.

Keywords

health; slums; inequality; poverty; security of tenure; housing; governance

I. INTRODUCTION

India has the world's second largest urban population, and roughly 93 million Indians reside in urban slum conditions, which may adversely impact health.⁽¹⁾ Large-scale national datasets have highlighted the problem of intra-urban disparities in health and social indicators between slum and non-slum populations in India.⁽²⁾ Fewer studies have explored the question of inter-slum disparities—the fact that even between different slums within a given city, there may be dramatic differences in access to resources and health outcomes.⁽³⁾

The variable legal status of different slums in the eyes of the government may be one factor that contributes to inter-slum health disparities. Each Indian state uses different policies to determine if a community qualifies as being a legal slum. Being given legal recognition by the government is often a prerequisite to the receipt of municipal services such as piped water, toilets, and electricity. Given the nature of the government's selection criteria, however, a *de facto* slum community may fail to secure *de jure* status. This categorization process results in two classes of slums: government-recognized slums (i.e., “notified” slums) and government-unrecognized slums (i.e., “non-notified” slums). As per India's 2008 National Sample Survey (NSS), approximately half of slums in India and 45% of slums in Maharashtra (the state in which Mumbai is located) are non-notified.⁽⁴⁾

In this paper, we highlight the problem of inter-slum health disparities in Mumbai, India, using the findings of a four-year series of studies of Kaula Bandar (KB), a non-notified slum. KB has a population of 10,000 to 12,000 people and is located on a wharf on Mumbai's eastern waterfront (Figure 1). Originally established by Tamil migrants more than 50 years ago, KB has seen the arrival of migrants from North India in recent years. By comparing data from KB to statistics from Mumbai slums captured by India's National Family Health Survey-3 (NFHS-3), we show that KB's health indicators are relatively worse than those of other Mumbai slums. We then provide an explanatory framework for the role that KB's non-notified status may play in generating poor health outcomes and discuss the larger implications for governance and public health in slums.

II. THE LEGAL BACKDROP

To appreciate the implications of non-notified status, the legal backdrop governing slums in Mumbai must first be understood. The rights of slum dwellers residing on city-owned land in Maharashtra are delineated in a 1995 addendum to the Maharashtra Slum Areas Act of 1971.⁽⁵⁾ The addendum states that the city government must extend basic amenities (e.g., water, sanitation) to slum residents who have proof of residency prior to January 1, 1995. Such residents are also entitled to security of tenure and rehabilitation in formal housing in

¹Government of India (2010), *Report of the committee on slum statistics/census*, Ministry of Housing and Urban Poverty Alleviation, New Delhi, 60 pages.

²Gupta, K, F Arnold, and H Lhungdim (2009), *Health and living conditions in eight Indian cities: National Family Health Survey (NFHS-3) 2005–06*, International Institute for Population Sciences, Mumbai, 113 pages.

³Osrin, D, S Das, U Bapat, G Alcock, W Joshi, and NS More (2011), “A rapid assessment scorecard to identify informal settlements at higher maternal and child health risk in Mumbai”, *Journal of Urban Health*, Vol 88, No 5, pages 919–932.

⁴Government of India (2010), *Some characteristics of urban slums: Data from the 65th round of the National Sample Survey 2008–2009*, Ministry of Statistics and Programme Implementation, New Delhi, 32 pages.

⁵Government of Maharashtra (1971), *Maharashtra Slum Areas (Improvement, Clearance, and Redevelopment) Act of 1971, addendum to section 3-B*, accessible at http://www.legalpundits.com/Content_folder/MahSlum260209.pdf. Also see the Mumbai Development Control Rules, DCR-33 (10).

the event of displacement from their homes. While this addendum established entitlements for some slum dwellers, others who arrived in Mumbai after 1995 or who lack pre-1995 residential proof are barred from legally receiving basic amenities and security of tenure from the municipality.

Rare exceptions have been made to the “1995 rule.” For example, during expansion of railway lines for the Mumbai Urban Transportation Project, all project-affected individuals were rehabilitated in new homes without regard to a residential cut-off date.⁽⁶⁾ In addition, certain projects designated as having vital public importance have been allowed to use a more liberal cut-off date of January 1, 2000 for identifying families that should benefit from resettlement; however, each such cut-off date modification requires extensive legal proceedings in court by the Government of Maharashtra. Despite such rare exceptions, on the whole, the “1995 rule” has created significant inequality in resource access between and within slum communities, especially with regard to water and sanitation.

KB faces additional legal barriers to resource access, since it is located on land belonging not to the city government, the Municipal Corporation of Greater Mumbai (MCGM), but rather to a central (federal) government agency, the Mumbai Port Trust (MbPT). The Constitution of India places certain vicinities in Mumbai (including seaport, railway, airport, and defence areas) under the legislative jurisdiction of the central government, which means that Maharashtra state government regulations do not apply in these areas. The state government therefore cannot engage in any activities (e.g., extension of water and sanitation services to slums) on these lands without obtaining a document called a No Objection Certificate (NOC) from the respective central government agency responsible for that land.

Central government agencies are hesitant to provide NOCs, as they fear that extension of services by the state government may bolster slum dwellers’ claims to land tenure. Even though state government policies are not applicable, the central government has not formulated a coherent slum policy to fill this legal vacuum.^(7,8) As a result, slums on central government land occupy a legal “no man’s land,” in which no government authority takes responsibility for providing access to basic services.

In addition to these well-defined legal barriers, we also argue that KB has been victim to other, less tangible impediments to resource access. The “non-notified slum” label becomes a conceptual lens through which government officials view communities. This deprioritization of non-notified slums may prevent extension of particular resources to these slums even when legal barriers technically do not exist or can be negotiated. To use Appadurai’s phrase, non-notified slum residents may be viewed as “citizens without a city” – residents who are deprived of their right to city resources not only on *de jure* but also *de facto* grounds.⁽⁹⁾

⁶Patel, S, C D’Cruz, and S Burra (2002), “Beyond evictions in a global city: people-managed resettlement in Mumbai”, *Environment and Urbanization*, Vol 14, No 1, pages 159–172.

⁷Gangan, S (2010), “Maharashtra CM Ashok Chavan to Centre: have a slum policy like we do”, *DNA* 22 August 2010, accessible at http://www.dnaindia.com/mumbai/report_maharashtra-cm-ashok-chavan-to-centre-have-a-slum-policy-like-we-do_1426904.

⁸Alternative Law Forum (2005), “Mumbai to Shanghai without slums-3: slum policies”, accessible at <http://www.altlawforum.org/globalisation/research-publications/mumbai-to-shanghai-without-slums/slum-policies>.

⁹Appadurai, Arjun (2001), “Deep democracy: urban governmentality and the horizon of politics”, *Environment and Urbanization* Vol 13, No 2, pages 23–43.

III. METHODS

a. Research collaboration

In 2008, researchers from Partners for Urban Knowledge, Action, and Research (PUKAR), the Harvard School of Public Health (HSPH), and New York University (NYU) formed a collaboration to perform a series of public health studies in KB. Research units were formed across institutions to optimize skillsets. HSPH students collaborated with PUKAR's research coordinators and "Barefoot Researchers," who are Mumbai youth (many of whom are from KB) trained in data collection techniques by PUKAR. Ethics committees at PUKAR, HSPH, or the Harvard Medical School approved all study protocols.

b. Data sources and statistical analysis

Data for this comparative study come from two sources: datasets on KB from the PUKAR-HSPH-NYU collaboration and datasets from India's NFHS-3. Indicators from all datasets were summarized using STATA (v12, College Station, TX).

Tables 1 and 2 summarize the quantitative and qualitative studies performed by the PUKAR-HSPH-NYU collaboration. Studies evaluated "core" public health indicators (e.g., immunization rates) and less commonly studied issues (e.g., mental health).

The findings of the 2010 Anthropometrics survey are particularly relevant to our investigation of inter-slum disparities; we will therefore briefly discuss the methods used in that study.⁽¹⁰⁾

The Anthropometrics survey collected health and social information (e.g., literacy, immunization history), as well as anthropometric measurements (e.g., height, weight). Instruments were harmonized with NFHS to allow for comparison. Every weekend from March 2010 to January 2011 a uniformly trained team of two physicians, four research coordinators, and 20 Barefoot Researchers collected data from KB residents, after obtaining informed consent. To facilitate participation, researchers visited each home at least three times for recruitment. Anthropometric measurements were collected at a central tent that was shifted to different locations in the slum. In total, data were collected from 1701 households and 6063 individuals, including 811 children under the age of five.

To compare to our findings from KB, we analyzed raw datasets from the NFHS-3, a nationally-representative survey of health in India conducted in 2005/6. These data can be disaggregated to look at specific urban sub-populations such as slums. The NFHS-3 collected data from a representative sample of 1104 households in Mumbai that are classified as being located in slums according to the 2001 Census of India (hereafter referred to as "NFHS slums"). The 2001 Census classified a community as a slum if it was notified or recognized by the state or local government, or if it contained more than 300 people (i.e., 60–70 households) and had an environment subjectively assessed as being "congested," "unhygienic," or lacking in key infrastructure.⁽¹¹⁾ Therefore, the comparative analysis that follows highlights inter-slum variability through a comparison of the "average" slum conditions in Mumbai (as represented by the NFHS slums) to the conditions of the particular slum of KB.

¹⁰Findings from the other studies are also included in this paper. Readers with questions about the methods underlying these studies should contact the authors.

¹¹While we are assuming that the NFHS slums are a representative sample, there may be sampling biases deriving from the survey's classification of communities as being "slums" based on the 2001 Census. According to a recent report, the 2001 Census undercounted non-notified slums in many cities, such that "the slum population of the country was grossly underestimated" (see reference 1). Given the possible omission of non-notified slums, the sample of NFHS slums used in this analysis may be skewed towards the population of notified slums in Mumbai, though the extent to which this is the case is unclear.

IV. RELATIVE DEFICIENCIES IN HEALTH AND SOCIAL OUTCOMES IN KAULA BANDAR

Tables 3, 4, and 5 present a comparison of demographic information, basic household information, basic services, educational status, and child health indicators between KB and the NFHS slums.

Table 3 shows that the age distribution and mean household size in KB are very similar to those for the NFHS slums. KB has a higher proportion of migrants, a higher proportion of Muslims, a higher proportion of homes built with poor quality materials, a lower rate of home ownership, and a lower rate of ownership of assets such as a refrigerator and television.⁽¹²⁾

Table 3 also highlights a significant gap in access to basic services. Access to piped water (through community or home water taps) is almost universal in the NFHS slums, while virtually no KB households have access to piped water. KB residents have a lower rate of access to a non-shared toilet and a higher rate of open defecation among adults. A higher proportion of KB households use biomass fuels for cooking, which is associated with an increased risk of lung disease.

Table 4 shows that the proportion of women who are illiterate and who have no education is twice as high in KB as compared to NFHS slums. The education gap for men is even more dramatic, with the proportion of men who are illiterate or who have no education being more than three times higher in KB.

Table 5 shows that nearly every child health indicator in KB is worse than those for the NFHS slums. Infant mortality is more than twice as high in KB. The rate of fully immunized children is substantially lower in KB. The percent of children who are moderately or severely underweight is higher in KB. The percentage of children born in a health care facility (i.e., institutional delivery) is lower in KB. The institutional delivery rate is a key indicator not only for child health but also for maternal health, since it is associated with decreased maternal mortality.

With regard to adult nutrition, KB has a relatively higher proportion of men who are underweight (32% versus 25.6% for the NFHS slums). Interestingly, nutritional status in women has a different pattern, with KB having a slightly lower proportion of women who are underweight (20.3% versus 23.1%) and a higher proportion of women who are overweight or obese (37.1 versus 25.1%). This differential may partly be explained by differences in employment. Women in other slums are often employed as domestic workers. KB has a low rate of female employment outside of the home, which may lead to a more sedentary lifestyle and increased obesity.

V. THE CONNECTION BETWEEN LACK OF GOVERNMENT RECOGNITION AND HEALTH OUTCOMES

The comparative analysis above highlights just how large inter-slum health disparities can be. What accounts for KB's disparate health outcomes? In this section, using data and observations from our studies, we argue that KB's non-notified status is a major contributing factor to its relatively poor health and social indicators. Our argument focuses on the

¹²As opposed notified slum residents who are ensured security of tenure, no one in KB technically "owns" his or her own home. Rather, "ownership" in KB refers to someone having built his or her own living structure and therefore having the informal right to rent out the space.

following issues: access to water, access to sanitation and solid waste removal, access to electricity, access to municipal schools, access to official documents, access to compensation after disasters, and forced eviction.

a. Lack of access to the municipal water supply

KB's non-notified status precludes it from accessing the municipal water supply or taps (Table 3). Residents must instead purchase water through an informal distribution system managed by private vendors living in KB. Using motorized pumps, vendors extract water from underground water pipes that were originally placed by the fire brigade for emergency use in case of fires. This water is pumped through rubber hoses that travel hundreds of meters to reach community lanes, where residents pay monthly (and sometimes weekly) fees to vendors to receive and store water in their homes. Due to inconsistent supply, the majority of residents only access water every three or more days. A few times a year, government officials raid vendors' motors, cutting off water access to all of KB's residents. During these episodes of "system failure," residents obtain water by rolling 300-liter drums up to two kilometers to a nearby community with functioning water taps (see Figure 2).

In the 2011 Seasonal water assessment (Table 1), we performed an extensive study of the consequences of this informal water distribution system, the full results of which are described elsewhere.⁽¹³⁾ In every season and during an episode of "system failure," researchers collected water samples from several points along the water distribution system while also administering a survey to, and testing water samples from, 21 KB households. Our findings reveal that this informal distribution system fails to fulfill the most basic standards for key health and social equity indicators: water quality, quantity, cost, accessibility, and reliability.

In terms of water quality, we found that half of point-of-source water samples from vendors' motors were contaminated with coliform bacteria in the monsoon. With regard to quantity, 95% of households do not get enough water to meet the World Health Organization's (WHO's) recommended minimum usage of 50 liters per capita per day (LPCD), and 48% of households do not even get 20 LPCD, a usage level associated with "high" health risk per the WHO.⁽¹⁴⁾

Poor quality and use of inadequate water quantity are independently associated with poor health outcomes, especially with regard to diarrheal illness.⁽¹⁵⁾ Studies of slums globally have found diarrhea to be one of the top two causes of mortality for children under five years.^(16, 17) Recurrent diarrhea is a major contributor to child malnutrition and poor cognitive function, which result in decreased educational attainment.^(18, 19) Improvements in water quality and quantity have each been shown to reduce diarrhea rates by as much as 25–33%.⁽²⁰⁾

¹³Subbaraman R, Shitole S, Sawant K, Shitole T, Bloom DE, Patil-Deshmukh A. Failures in the quality, quantity, and reliability of water provided through an informal distribution system in Mumbai, India [Abstract OS40.6]. Oral Presentation. Paper presented at: 10th International Conference on Urban Health; November 2–4, 2011, 2011; Belo Horizonte, Brazil.

¹⁴Howard, G and J Bartram (2003), *Domestic water quantity, service level, and health*, World Health Organization, Geneva, 33 pages.

¹⁵Hunter, PR, AM MacDonald, and RC Carter (2010), "Water supply and health", *PLoS Medicine* Vol 7, No 11, e1000361, pages 1–9.

¹⁶Kyobutungi, C, AK Ziraba, A Ezeh, and Y Ye (2008), "The burden of disease profile of residents of Nairobi's slums: Results from a Demographic Surveillance System", *Population Health Metrics*, Vol 6, page 1.

¹⁷Marsh, D, K Husein, M Lobo, M Shah, and S Luby (1995), "Verbal autopsy in Karachi slums: comparing single and multiple cause of child deaths", *Health Policy and Planning*, Vol 10, No 4, pages 395–403.

¹⁸Guerrant, RL, RB Oria, SR Moore, MO Oria, and AA Lima (2008), "Malnutrition as an enteric infectious disease with long-term effects on child development", *Nutrition Reviews* Vol 66, No 9, pages 487–505.

¹⁹Lorntz, B, AM Soares, SR Moore, R Pinkerton, B Gansneder, VE Bovbjerg, H Guyatt, AM Lima, and RL Guerrant (2006), "Early childhood diarrhea predicts impaired school performance", *Pediatric Infectious Disease Journal*, Vol 25, No 6, pages 513–520.

²⁰See reference 15.

Water insecurity may also indirectly impact health by negatively affecting income, livelihood, and education. In different seasons, the fee that KB residents pay to water vendors is 52 to 206 times the standard municipal water charge of 2.25 rupees per 1000 liters of water paid by residents of notified slums. This represents 6–16% of the average monthly household income, a spending level that in some cases could be catastrophic. Due to highly unpredictable water timings, 39% of adults report that the water situation adversely affects their or their family members' ability to go to work.

Livelihood is more severely affected during episodes of “system failure,” as is described below by a 20-year-old North Indian male focus group discussion participant:

“Last week, I was in Goa for my job. My parents called me and told me to urgently come back because there was no water in KB. So I immediately left that job and came back home. I found that there was absolutely no water available. One of my friends in another community has a well near his home. I told him, ‘I am sending you a tanker to fill with water from your well. Then I will distribute that water’ ... On the third trip, the police stopped me ... They fined me 1800 rupees. They told me that it is illegal to bring water to this community ... So the only remaining option is to pay 400 rupees and purchase water from the water vendors.”⁽²¹⁾

In the absence of a formal municipal water supply, the criminalization of alternative modes of water access by local authorities reinforces a cycle of poverty that may have several less immediately obvious long-term health consequences.

b. Lack of access to sanitation

KB's non-notified status precludes it from receiving government-built toilet blocks. Four small pay-for-use toilet blocks exist in KB, three of which were built by slum residents themselves with informal support from local politicians (though without formal government sanction). However, given the lack of a reliable water supply, excessive use (due to high population density), and lack of maintenance, many of the toilets in these blocks rapidly become dysfunctional. There are theoretically a total of 19 toilets seats, but fewer functioning seats, in these pay-for-use toilet blocks for the entire population. As a result, KB has a relatively high rate of open defecation among adults (Table 3). Open defecation is universally practiced among children. Adults who regularly use toilets, especially women, often travel great distances to access pay-for-use toilets outside of KB.

Non-notified status also prevents the development of sewer infrastructure in KB. As a result, the excreta from the pay-for-use toilet blocks in KB empties directly into the adjacent ocean. KB's ocean water has high fecal bacteria counts in all seasons.⁽¹⁰⁾ Given that 31% of residents report flooding of their homes with ocean water during the monsoon, much of the community is exposed to this excreta. The direct health consequences of inadequate sanitation are similar to those resulting from poor water access—increased diarrheal illness, child death, malnutrition, and poor cognitive function.⁽²²⁾

Our qualitative interviews highlight other indirect impacts of the lack of toilets on livelihood and income. Households report spending as much as 20 to 30 rupees per day and waiting in queues for up to 60 minutes at the pay-for-use toilets. For those who choose to defecate in the open due to these difficulties with these toilets, the criminalization of open defecation by

²¹Partners for Urban Knowledge, Action, and Research (2011), *Mental health study Phase 1: slum adversity qualitative interviews*, PUKAR, Mumbai, unpublished. *All of the quotations from KB residents that follow throughout the remainder of this paper also come from this study.*

²²See references 16–19.

local authorities serves as a source of chronic stress. As described in this interview with a 30-year-old Tamilian male resident, the police harass adults who engage in open defecation:

“Sometimes the police arrest people who defecate by the sea. Recently, they arrested more than 150 people ... They took 50 to 150 rupees from each person and then let them go free. My children defecate by the sea, so each time they go there, I’m scared they will get arrested. But my children go there because there is no other option. There are too many people at the toilets, and it also costs too much money.”

As with water, criminalization of open defecation places additional financial constraints on already impoverished populations.

c. Inadequate collection of solid waste

Lack of government recognition also compromises solid waste collection. As per our qualitative interviews, solid waste collection in KB by the city government was minimal until a few years ago. As a result, residents have disposed of garbage in the surrounding ocean for the past few decades. KB is now encompassed by a giant agglomeration of refuse extending out several meters into the ocean during low tide (Figure 3). Over the last four years, a local corporator (an elected official) encouraged regular garbage removal through the Jawaharlal Nehru National Urban Renewal Mission, a central government initiative that provides external funding for social improvements.⁽²³⁾

Despite this new effort, limitations remain in KB’s garbage collection services. Municipal trucks do not enter the main road to collect waste from dumpsters located inside of KB; instead, they only collect garbage from a single dumpster located immediately outside of the slum.⁽²⁴⁾ Whether this failure is due to legal barriers to entering the slum or general unwillingness on the part of garbage collectors, the result has been that dumpsters in KB are persistently overloaded. Most residents therefore continue to dispose of waste in the ocean.

Solid waste dumps negatively impact health by encouraging the proliferation of disease vectors such as rats, flies, and mosquitoes. Proximity to garbage dumps in slums has been associated with increased rates of child diarrhea, helminth infection, dengue fever, and leptospirosis.^(25, 26, 27)

d. Barriers to accessing the municipal electricity supply

The Brihanmumbai Electricity Supply and Transport (BEST), a company managed by the city, provides electricity to many areas of Mumbai. In the past, BEST was more liberal about providing electricity meters to KB residents. As a result, some households established a reliable electrical supply for which they regularly pay the city. In recent years, however, BEST has refused to provide new electricity meters, citing legal barriers to providing this service on central government land. One 36-year-old Tamilian male resident describes the consequences of these legal barriers as follows:

²³Personal communication from Corporator Mangesh Bansod to PUKAR researchers.

²⁴See reference 23.

²⁵Rego, RF, ML Barreto, R Santos, NF de Oliveira, and S Oliveira (2007), “Rubbish index and diarrhoea in Salvador, Brazil”, *Transactions of the Royal Society of Tropical Medicine and Hygiene*, Vol 101, No 7, pages 722–729.

²⁶Hayes, JM, E Garcia-Rivera, R Flores-Reyna, G Suarez-Rangel, T Rodriguez-Mata, R Coto-Portillo, et al. (2003), “Risk factors for infection during a severe dengue outbreak in El Salvador in 2000”, *American Journal of Tropical Medicine and Hygiene*, Vol 69, No 6, pages 629–633.

²⁷Reis, RB, GS Ribeiro, RD Felzemburgh, FS Santana, S Mohr, AX Melendez, A Queiroz, AC Santos, RR Ravines, WS Tassinari, MS Carvalho, MG Reis, AI Ko (2008), “Impact of environment and social gradient on Leptospira infection in urban slums”, *PLoS Neglected Tropical Diseases*, Vol 2, No 4, e228, pages 1–10.

“We applied to BEST for a proper electricity connection, but BEST told us that [KB] is [on MbPT] land. They told us that we first have to go to the [MbPT] officials to get a No Objection Certificate (NOC) before they will provide us with electricity. In the past, a few people were able to get official meters ... Now people are forced to steal electricity from whoever already has a meter. No one gets proper electricity in their homes, because so many people are stealing electricity. Every month, BEST officials come just to cut [illegal] electricity connections and then leave. They never consider why people are forced to steal electricity in the first place.”

The health consequences of the electricity situation largely result from the risks of illegal electricity wires, which cause electrocutions and overload fuse boxes, resulting in fires. In our interviews, residents report overloaded fuse boxes as being the most common cause of fires. One 42-year-old North Indian male resident describes the situation as follows:

“Many people who steal electricity often use a single meter and fuse box. There is too much load on that single fuse box. All my documents are ready, and I keep them in a plastic bag. I am always ready at any time to run out with that bag if a fire breaks out.”

Another 30-year-old Tamilian male resident said, “We also fear that we will get shocked by these open connections. If you put your hand in the wrong place, that’s it, you’re finished.” This fear is not unfounded: at least two children died from electrocution in KB in 2011. In addition to the direct health consequences, poor electricity access may indirectly affect health by adversely impacting livelihood opportunities and educational attainment, as lack of light inhibits studying.

e. Barriers to accessing municipal schools

In 1995, the Government of India created guidelines stating that government-run primary schools should be located within one kilometer for all children and that there should be at least one primary school per every 3000–4000 people.⁽²⁸⁾ These basic education standards have not been fulfilled in KB. The nearest municipal primary school is more than two kilometers away. Given the population size of KB and other slums in its immediate vicinity, ideally there would be at least five primary schools within one kilometer of KB, per government guidelines. The absence of a primary school within KB’s vicinity is odd even in the context of India as a whole: as of 1993, even 94% of India’s *rural* population lived within one kilometer of a primary school.⁽²⁹⁾

We argue that this gap in access to schools is largely a result of KB’s status as a non-notified slum. A UNESCO report evaluating primary education in Mumbai notes that the municipality has faced extensive difficulty in finding legal spaces to set up schools in slums on land owned by central government agencies, such as the MbPT:

“[A] number of land-owning agencies of the central government in big cities, such as the Port Trust ... allow slums to come up on their vacant lands, [but] are reluctant to permit the provision of basic services ... The implication for locating schools near slum dwellings is obvious. If schools cannot be put where slums come up, the children of these colonies will be deprived of access to primary education. This is indeed the case in many areas of Mumbai, and parents and children have to fight hard to arrange for expensive transportation to the nearest schools.”⁽³⁰⁾

²⁸Mathur, M, R Chandra, S Singh, and B Chattopadhyaya (2007), *Norms and standards of municipal basic services in India*, National Institute of Urban Affairs, New Delhi, 38 pages.

²⁹De, Anuradha and Jean Dreze (1999), *Public Report on Basic Education in India*, Oxford University Press, New York, 168 pages.

Our interviews highlight the impact of inaccessibility of both schools and transportation to schools in KB. One 48-year-old Tamilian female resident said:

“Every day we have to wake up at 5AM to get [our child] out of here at 6AM, so he can be at school at 7AM. If the children show up more than five minutes late, they beat them and send them back home ... If the schools were close by, we could at least walk there and easily make it on time. To get to this school, he has to travel by train, and in the rainy season the train is often late. But they don’t listen to any of those excuses.”

The gap in school access may be one reason for the dramatic difference in literacy and educational attainment between KB and the NFHS slums (Table 4). Other resource limitations resulting from non-notified status may indirectly impact education. Nine percent of households report that the water situation significantly impacts their children’s ability to go to school. This is especially true when the informal water distribution system fails, since many children must miss school to roll drums back and forth to taps in other communities to fetch water (Figure 2).

Poor access to education has significant downstream health consequences. Studies from India, including an analysis of data from urban areas, have found a mother’s educational attainment to be one of the most important predictors of infant mortality, under five child mortality, child nutritional status, immunization rates, and institutional delivery rates.^(31,32)

f. Difficulty in accessing official documents

Due to KB’s non-notified status, residents have difficulty accessing official documents that facilitate full civic rights. In contrast to residents of notified slums, KB residents have no possibility of obtaining home ownership documents that would establish security of tenure. Such exclusion from formal property rights may reinforce poverty by making people hesitant to upgrade their homes in the absence of legal protection against property loss.⁽³³⁾

An even more fundamental document that KB residents have difficulty obtaining is a ration card. A ration card facilitates access to subsidized goods such as wheat, rice, sugar, oil, and kerosene through the government’s Public Distribution System, especially for families below the official poverty line. A ration card also serves as the most widely recognized form of identity proof, which is sometimes required to access basic services, obtain formal employment, and facilitate school enrollment.

In the 2008 Baseline needs assessment (Table 1), we found that 33% of households did not have a ration card. Vulnerable groups such as tenants (those renting living spaces) were significantly less likely to have a ration card. There is no specific regulation that prevents residents of non-notified slums from getting a ration card; however, the ration card application states that an applicant must supply some form of “residential proof.” Since KB’s residents live in a situation of informality, without official residential documents such as home ownership papers or rental agreements, providing appropriate paperwork is frequently prohibitive.

³⁰Juneja, N (2001), *Primary education for all in the city of Mumbai, India: the challenge set by local actors*, UNESCO International Institute for Educational Planning, Paris, 165 pages.

³¹Agarwal, S and A Srivastava (2009), “Social determinants of children’s health in urban areas in India”, *Journal of Health Care for the Poor and Underserved* Vol 20, Suppl 4, pages 68–89.

³²Singh, A, PK Pathak, RK Chauhan, and W Pan (2011), “Infant and child mortality in India in the last two decades: a geospatial analysis”, *PLoS One*, Vol 6, No 11, e26856, pages 1–19.

³³De Soto, Hernando (2000), *The mystery of capital: why capitalism triumphs in the West and fails everywhere else*, Basic Books, New York, 276 pages.

Lack of a ration card may affect child and adult nutrition indicators, due to inability to access subsidized food. Inability to get subsidized kerosene without a ration card may help explain the higher use of unhealthy biomass fuel in KB (Table 3). Also, as obtaining basic services and formal employment may be more difficult, not having a ration card may indirectly impact health by limiting livelihood options and deepening income poverty.

g. Discrimination in compensation provided after disasters and calamities

In February 2010, a fire broke out in KB that burnt down approximately 9% of homes in the slum (Figure 4). The government response to the fire shows how non-notified slum residents can be excluded from receiving meaningful compensation after a calamity. Since the central government does not have a policy of providing compensation to slum dwellers after disasters, the only monetary assistance that KB fire victims received was provided from the personal funds of local elected representatives. Every fire-affected family was supposed to be given 1000 rupees per individual, up to a maximum of 5000 rupees per household.

We subsequently evaluated the restitution process through interviews and an analysis of government records. Despite the fact that 251 households were affected (according to a census by PUKAR and community leaders), the government documents only listed 164 fire-affected homes. Of these, the records only note providing compensation to 88 households (35% of the fire-affected population). For the 164 households reported in the government documents, the total value of property lost by those residents was estimated to be 8,729,500 rupees; however, only approximately 400,000 rupees was disbursed as compensation, which constitutes 4.6% of the total estimated loss. Fire-affected families received no additional support for rebuilding their homes.⁽³⁴⁾

The government response to a fire in the notified Mumbai slum of Behrampada contrasts greatly to the response in KB. In 2009, more than 1,100 shanties burned down in Behrampada. The Maharashtra state government approved 65,000,000 rupees for rehabilitation, an amount per fire-affected household that is 37 times what was provided to KB households.⁽³⁵⁾ In addition, the state government initiated reconstruction of their homes on the same site within two weeks.⁽³⁶⁾ By contrast, fire-affected residents in KB had to muster the resources to rebuild their homes themselves. Many of the tenants migrated out of the slum soon after the fire, as they no longer had a place to live in KB.

Non-notified slums may be at increased risk for fires due to the presence of illegal electricity connections (see above), and the lack of a legal water supply, which makes fires difficult to control once they have started. Slum fires may have direct health consequences, including loss of life, burns, and respiratory complications. Such calamities may have profound indirect impacts on health, by deepening asset poverty and negatively impacting mental health. Such consequences are likely more severe in non-notified slums such as KB, where government compensation after such calamities is minimal.

h. Forced eviction and loss of home

Residents of notified slums in Mumbai are protected from forced eviction. If displacement becomes necessary for redevelopment purposes, the government provide residents of

³⁴Sawant, K, S Shitole, T Shitole, DE Bloom, and A Patil-Deshmukh (2011), "Lean on me -- inequities of formal support systems during disasters for the most vulnerable residents of an unregistered slum [Abstract OS1.4]", Oral Presentation at: *the 10th International Conference on Urban Health*, 2–4 November 2011, Belo Horizonte.

³⁵Hameed, A (2009), "Rs. 6.50 crore approved for rehabilitation of Behrampada fire victims", *Indian Muslim* 21 July 2009, accessible at <http://twocircles.net/node/156273>.

³⁶Ashar, Sandeep (2009), "Behrampada hutments rise from the ashes", *DNA* 29 July 2009, accessible at <http://www.dnasyndication.com/dna/article/DNMUM142198>.

notified slums with rehabilitation in formal housing. In contrast, KB residents have no legal protection against eviction or home demolition, and they have no right to rehabilitation in the event of displacement.

In our interviews, KB residents note that the MbPT was more aggressive in demolishing homes in the past. In the last two decades, most residents have not experienced forced eviction; however, many fear the possibility of this happening in the future, as they realize that they are unlikely to receive restitution. A small minority of residents who arrived recently and built homes on the few remaining open grounds in KB have faced recurrent demolition of their homes. At the time PUKAR researchers interviewed the following 42-year-old North Indian man, the MbPT had demolished his home only four days before:

“[T]he [MbPT] broke down my home ... In the past, they would come here and give us notice. They would tell us, ‘Leave your home in the next 40 days, otherwise we will break it down.’ This time, they came suddenly and just started breaking down my home ... The [MbPT] took all our belongings ... They told me that, since my home was on Port Trust land, all the property inside of it belongs to the Port Trust. So they said, ‘We will give nothing back to you’ ... I told them, ‘I am ready to pay you money to get my belongings back.’ But they refused.”

Such recurrent dispossession brutally reinforces poverty. People become unwilling to make long-term investments to upgrade the quality of their homes, since they fear that any such investment will be transient.⁽³⁷⁾ This logic may partly explain the dramatic difference in the proportion of homes built with poor quality materials in KB as compared to the NFHS slums (Table 3). The KB resident eloquently related this concern, when describing his thoughts after the demolition:

“When they left, we immediately built our home once again on the same spot, using plastic. My home is still not completely proper. I have arranged four bamboo shoots and covered them with a plastic sheet. I spent 35,000 rupees to build that original home, for flooring and proper walls ... I face great tension now. Do I make a new home or not? If I make a new home, I have no guarantee that they will not come again and break it down.”

Forced eviction likely has impacts on several health indicators, even though the precise associations may be difficult to measure. The effects on mental health may be profound, and the phenomenon of “root shock” in response to recurrent displacement has been described in the U.S. setting.⁽³⁸⁾ After the demolition, the KB resident described his feelings of trauma and disillusionment:

“When my home was broken down it was traumatic. A home is a very beautiful place in our lives. I have a dream that one day I will eventually own my own home. I am an illiterate person, but I know the importance of a good home. I lost everything. I will never forget that moment. It had an extremely difficult impact on my life.”

VI. THE STRUCTURAL VIOLENCE OF LEGAL EXCLUSION IN INDIAN CITIES

“*Structural violence* ... describes social structures—economic, political, legal, religious, and cultural—that stop individuals, groups, and societies from reaching their full potential ... [and result in] the impairment of human life ... Structural violence is often embedded in longstanding ‘ubiquitous social structures,

³⁷See reference 33.

³⁸Fullilove, MT (2001), “Root shock: the consequences of African American dispossession”, *Journal of Urban Health* Vol 78, No 1, pages 72–80.

normalized by stable institutions and regular experience' ... Disparate access to resources, political power, education, and health are just a few examples.”⁽³⁹⁾

In this paper, we have provided an explanatory framework for KB's numerous health deficiencies relative to other Mumbai slums by illuminating the larger social context of its status as a non-notified slum (Table 6). Based on four years of community-based research, we highlight the health consequences of widespread failures of basic entitlements that occur due to a legal vacuum. We also describe the way that activities required to fulfill basic human needs—water, toileting, and shelter—are sometimes actively criminalized.

We believe that our argument, though circumstantial, is persuasive. Residents of non-notified slums such as KB are subject to extensive structural violence from governance failures. Social and legal exclusion become embodied in poor health outcomes; indeed, this structural violence takes its toll on the very lives and bodies of the urban poor.

In our argument, we focus on “proximal” causes of health outcomes (such as lack of access to water, solid waste collection, and educational facilities), rather than on specific diseases (such as diarrhea, leptospirosis, and vaccine-preventable infections), which represent the “distal” end causes of morbidity and mortality. Even more proximal to these failures of basic services is the policy framework that sanctions this system of exclusion. While provision of medical outreach services is crucial to address KB's immediate health crisis, interventions focused on the proximal causes (e.g., provision of equitable water access) are equally crucial for a more comprehensive transformation of health.⁽⁴⁰⁾

By focusing on the consequences of non-notified status, we do not intend to completely exclude other possible explanations for KB's relative deficiencies in health outcomes. Since the NFHS-3 does not include income data, we were unable to compare the average household income in KB to that of the NFHS slums. However, differences in asset data (including the proportion of homes built with poor quality materials and ownership of a refrigerator, television, or home) suggest that KB may be poorer on average than the NFHS slums.

While asset poverty may seem to be a simple alternative explanation for KB's poor health indicators, we would argue that such an explanation does not minimize the influence of non-notified status on health. Our explanatory framework suggests that *income and asset poverty in KB are themselves significantly influenced by lack of government recognition*. For example, the threat and reality of home demolition may result in KB residents being hesitant to upgrade the quality of their homes; high spending on water as a proportion of monthly income reinforces income poverty; and a massive education gap resulting from a lack of schools in the vicinity may adversely impact livelihood opportunities and income. Therefore, relative poverty alone is not a sufficient explanation for KB's poor health status, given that income and asset poverty are also partly, if not largely, shaped by the slum's non-notified status.

Another alternative explanation is that cultural differences between KB and other Mumbai slums may result in different health care seeking behavior. For example, KB's low immunization rate could be due to cultural beliefs that inhibit mothers from seeking this care rather than being due to a resource gap in vaccine provision. In 2011, PUKAR advocated for outreach from the city government to provide immunizations through health camps in KB. These camps have witnessed a consistently strong response from mothers. This suggests that

³⁹Farmer, PE, B Nizeye, S Stulac, and S Keshavjee (2006), “Structural violence and clinical medicine”, *PLoS Medicine* Vol 3, No 10, e449, pages 1686–1691.

⁴⁰See reference 39.

the primary barrier to child immunization was a resource gap, rather than cultural barriers. Indeed, overly focusing on “cultural difference” as a cause of ill health in disadvantaged groups may cause us to overlook more glaring structural inequalities.⁽⁴¹⁾

VII. CONCLUSION

Kaula Bandar has very clearly been *on the physical map* of the city of Mumbai for more than 50 years. Indeed, it is located a mere 20 minutes away from India’s stock exchange, the literal epicenter of wealth for the country. Over decades, KB residents have made meaningful contributions to the social and economic life of the city, often by serving in physically demanding occupations such as garbage collecting and disassembly of decommissioned ships. KB also has thriving informal home industries producing low-cost goods that are largely consumed by more affluent Mumbai residents.

Despite their undeniable presence in the city, KB residents simultaneously occupy a legal “no man’s land”—a zone absent of policies that address their existence as human beings and citizens of the city. In a conceptual and ethical sense, KB is therefore “off the map” of government officials, which results in the denial and criminalization of access to basic services and entitlements. We argue that this legal vacuum results in structural violence that manifests itself in health indicators that are disproportionately worse than those of other slums in Mumbai. Our work highlights the problem of significant inter-slum variability in health outcomes within cities. Given the scale of the global slum population, the creation of methods for identifying the most vulnerable slums within cities will be critical for equitably defining public health priorities.⁽⁴²⁾

We also believe that our findings emphasize the need to establish minimum humanitarian standards for non-notified slums with regard to access to basic services such as water, sanitation, solid waste collection, and restitution after calamities. International guidelines, such as the Sphere charter that outlines minimum standards in disaster-affected areas, could provide a starting point for developing these criteria.⁽⁴³⁾ Until such an underlying policy framework is created, the health and livelihood of residents of KB and other non-notified slums will continue to be “off the map.”

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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⁴¹See reference 39.

⁴²See reference 3.

⁴³The Sphere Project (2004), *Humanitarian charter and minimum standards in disaster response*, The Sphere Project, Geneva, 339 pages.

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Figure 1.
Aerial view of Kaula Bandar; 10,000–12,000 people live on a wharf on Mumbai's eastern waterfront. (Source: Image captured by GeoEye-1 in 2010. Image provided by eMap International.)

Figure 2. Girls roll a barrel down the road to fill with water from a tap in the next community during a failure of the informal water distribution system. Residents cite the lack of a formal water supply as a barrier that sometimes prevents children from attending school. (Source: PUKAR, 2010.)

Figure 3.

A child plays with a kite on the trash dump in the ocean surrounding Kaula Bandar at low tide. Water hoses also run through the dump and open defecation takes place in the area. (Source: PUKAR, 2010.)

Figure 4.

A family sits in the ruins of their home after the 2010 fire in Kaula Bandar. (Source: PUKAR, 2010.)

TABLE 1

Quantitative and survey-based studies performed in Kaula Bandar by the PUKAR–HSPH–NYU collaboration

Study	Year	Sample size	Indicators captured
Baseline needs assessment	2008	959 households	Demographics; civic services; water; sanitation; solid waste
Child health and immunization survey	2009	226 households with children <5 years old	Infant mortality rate; immunization rate
Anthropometrics survey	2010	6,063 people, including 811 children <5 years old	Demographics; educational attainment; immunization rate; malnutrition indicators; prevalence of hypertension; substance abuse rate
Geographic information systems (GIS) mapping of health resources	2010	56 maps created	Geographic distribution of health, water and sanitation resources
Seasonal water assessment	2011	229 water samples; 21 households surveyed every season	Water quality, quantity, reliability and cost
Economics of diarrhoea survey	2011	400 households with active diarrhoea cases	Costs associated with diarrhoeal illness
Mental health survey	2012	521 individuals	Prevalence of common mental disorders, disability and slum- related chronic stressors

TABLE 2

Qualitative studies performed in Kaula Bandar by the PUKAR–HSPH–NYU collaboration

Study	Year	Sample size	Data captured
Environmental health	2009	Four focus group discussions; 25 semi-structured interviews	Residents' opinions regarding water, sanitation and solid waste problems
Child health and immunizations	2009	A few focus group discussions	Reasons for poor child health indicators
Evaluation of medical providers and pharmaceutical representatives	2010	20 semi-structured interviews	Health care practices of doctors, pharmacists and pharmaceutical representatives
Maternal health: migration during Pregnancy	2010	Four focus group discussions; 11 semi-structured interviews	Reasons for rural and non- institutional deliveries
Evaluation of social support systems after a slum fire	2011	30 semi-structured interviews	Evaluation of formal and informal support systems
Evaluation of slum-related adversities and chronic stressors	2011	Four focus group discussions; 40 semi-structured interviews	Identification of common causes of psychological trauma and chronic stress

TABLE 3

Demographic information, basic household information and access to basic services for residents in Kaula Bandar vs. Mumbai slums in the NFHS-3⁽¹⁾

	Kaula Bandar (PUKAR data)	Mumbai slums (NFHS-3)
Sample size		
Total households recruited	1,701	1,104
Gender		
Sex ratio (females per 1,000 males) ⁽²⁾	926	875
Age distribution of the population (%)		
15–24	37.9	37.8
25–39	47.9	44.7
40–49	14.3	17.5
Migration status (includes individuals aged 15–49 years)		
Migration status of women (%)		
Always in the current slum	26.6	47.4
Migrant from another area	73.4	52.6
Migration status of men (%) ⁽³⁾		
Always in the current slum	26.3	52.6
Migrant from another area	73.6	46.5
Religion of household (%)		
Hindu	40.9	70.6
Muslim	54.3	18.1
Christian	3.7	4.4
Other	1.1	6.9
General household characteristics (%)		
Average household size	4.8	4.7
Homes built with poor quality materials ⁽⁴⁾ (<i>kachha</i> or “semi-pucca” structures)	71.2	2.5
Household has a “below the poverty line” card ⁽⁴⁾	7.2	2.5
Home ownership status (%)⁽⁵⁾		
Owner	65.6	72.0
Renter or other arrangement	34.4	28.0
Household assets (%)⁽⁵⁾		
Television	65.9	77.9
Refrigerator	10.6	36.5
Mobile phone	51.3	45.3
Motorized vehicle	15.8	12.0
Water (%)⁽⁵⁾		
Households with piped drinking water (includes legal public community taps)	0.1	99.7

	Kaula Bandar (PUKAR data)	Mumbai slums (NFHS-3)
Sanitation (%)⁽⁵⁾		
Access to a non-shared toilet	3.0	21.4
No toilet facility (open defecation)	14.0	1.6
Indoor air pollution (%)⁽⁵⁾		
Kerosene or charcoal	83.8	95.0
Use of biomass fuel (including wood and dung)	16.2	5.0

NOTE:

⁽¹⁾ Data from Kaula Bandar in this table are from the 2011 anthropometrics survey unless otherwise noted, and the dataset for the NFHS-3 is available from the International Institute for Population Sciences (IIPS) and Macro International (2007), *National Family Health Survey 2005–2006 Key Findings*, IIPS, Mumbai.;

⁽²⁾ crude sex ratios;

⁽³⁾ “migration status of men” for NFHS-3 does not add up to 100% as one percent of men were classified as “visitors” and are not included here;

⁽⁴⁾ from the 2012 mental health survey;

⁽⁵⁾ from the 2008 baseline needs assessment.

TABLE 4Literacy and educational attainment for residents of Kaula Bandar vs. Mumbai slums in the NFHS-3⁽¹⁾

	Kaula Bandar (PUKAR data)	Mumbai slums (NFHS-3)
Literacy		
Self-reported female literacy (%)		
Yes	60.9	80.4
No	39.1	19.6
Self-reported male literacy (%)		
Yes	76.0	93.5
No	24.0	6.5
Education		
Educational attainment of women %(includes all females older than 5 years)		
No education	42.6	19.3
<5 years completed	18.0	17.7
5–9 years completed	31.9	38.7
10 or more years completed	6.9	24.0
Missing	0.7	0.4
Educational attainment of men %(includes all males older than 5 years)		
No education	26.7	6.7
<5 years complete	19.7	15.6
5–9 years complete	39.1	40.3
10 or more years complete	13.8	37.1
Missing	0.7	0.3

NOTE:

⁽¹⁾ Data for Kaula Bandar are from the 2011 anthropometrics survey.

TABLE 5Child health indicators in Kaula Bandar vs. Mumbai slums in the NFHS-3⁽¹⁾

	Kaula Bandar (PUKAR data)	Mumbai slums (NFHS-3)
Mortality		
Infant mortality rate (per 1,000 live births) ⁽²⁾	58.1	24.9
Birth location for children <5 years of age		
Delivered in a health care facility	75.0	83.3
Child immunization status		
All basic vaccinations ⁽³⁾	47.4	68.7
No vaccinations	2.2	1.3
BCG	82.1	97.5
DPT – all three doses	56.5	75.0
Polio – all three doses	90.0	81.3
Measles	61.9	87.5
Nutritional indicators for children <5 years of age		
Moderately or severely underweight ⁽⁴⁾ (weight-for-age below -2 SD)	45.9	36.1

NOTE:

⁽¹⁾ Data for Kaula Bandar are from the 2011 anthropometrics survey unless otherwise noted;⁽²⁾ infant mortality rate for Kaula Bandar is from the 2009 child health and immunization survey;⁽³⁾ defined as having received BCG, measles and three doses each of DPT and polio vaccine;⁽⁴⁾ determined by manually plotting weight-for-age on a UNICEF chart based on WHO growth norms.

TABLE 6

An explanatory framework for the relationship between non-notified slum status and poor health outcomes

Disadvantages of non-notified status	Related health and social outcomes
Lack of access to the municipal water supply	Diarrhoeal illness; undernutrition; infant mortality rate; educational attainment; employment; income poverty
Lack of municipal toilet blocks and sewer connections	Diarrhoeal illness; undernutrition; infant mortality rate; educational attainment; employment; income poverty
Inadequate solid waste collection	Diarrhoeal illness; vector-borne diseases
Barriers to accessing the municipal electricity supply	Fires; electrocution deaths; employment; educational attainment; income poverty
Barriers to accessing municipal schools	Educational attainment; undernutrition; infant mortality rate; immunization rate; institutional delivery rate
Difficulty in accessing official documents	Undernutrition; employment; income poverty
Discrimination in compensation for disasters	Income poverty; poor mental health outcomes
Forced eviction and loss of home	Income poverty; poor mental health outcomes