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Does It Matter How We Assess Standard of Living? Evidence from Indian Slums Comparing Monetary and Multidimensional Approaches[*]

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Abstract

As part of Sustainable Development Goals, the United Nations have set targets of upgrading slums and reducing poverty in all its dimensions by 2030. Policies towards improving the living conditions of slum-dwellers require proper assessment of their standard of living as well as understanding the associated characteristics. In this paper, using slum-level primary household survey data from three largest Indian cities, we, first, assess the standard of living of slum dwellers using both monetary and non-monetary approaches and then explore how various household and spatial characteristics are consistently or differently associated with both forms of assessments. We use standard monetary indicators, but to assess non-monetary standard of living, use a counting approach framework and justify the selection of specific indicators in the context of slums. Our analysis yields some interesting observations as some characteristics are differently associated with monetary and non-monetary living standards, which should affect policy designs in slums.

Keywords: Multidimensional Counting Approach; Slums in Indian Metro Cities; Monetary Well-being; Regression Analysis; Standard of living in Slums.

JEL: O10, I3, R2

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1 Introduction

According to United Nations (2015, Table II.8), the global population has increased by 2.9 times between 1950 and 2014 and the population is expected to increase by 3.8 times in a century between 1950 and 2050. This increase however has certainly not been and is not expected to be uniform across rural and urban areas. While the global rural population has increased by 1.9 times between 1950 and 2014 (and is only expected to increase by 1.8 times between 1950 and 2050), the urban population has multiplied by 5.2 times between 1950 and 2014 and is projected to multiply by a massive 8.5 times in a century since 1950. Three geographic regions that are expected to contribute to this enormous increase are Africa, Asia, and Latin America and the Caribbean, mostly low- and middle-income developing countries, where the urban population is projected to increase by 41.8 times, 13.5 times, and 9.8 times, respectively, between 1950 and 2050.

The traditional view on the existence of slums argues that slums are inevitable during the process of modernisation, industrialisation, and urbanisation (Frankenhoff 1967; Turner 1969). This traditional view hinges on the assumptions that slum settlements grow to accommodate cheap labour migrants providing cheap housing, but economic growth should eventually trickle down to those living in slums. The trickle-down effect however has been questioned as some regions experienced decades of urbanization without growth (Fay and Opal, 2000; Fox, 2012), witnessed low degrees of intergenerational socioeconomic mobility among slum dwellers (Buckley and Kalarickal, 2005) and faced rising cost of slum accommodation (Gulyani and Talukdar, 2008). Questioning the traditional view, Fox (2014) puts forward a disjointed modernization hypothesis, which argues the reason for perpetual existence of slums is that 'urban population growth outpaces urban economic and institutional development' as well as infrastructures in these regions.

Whichever hypothesis is true regarding the existence of slums, between 1990 and 2012, the number of slum dwellers in these three regions increased from 650 million to 862 million (UN-HABITAT 2003). Slums within urban areas are considered either as "blight" of erstwhile prosperous area or as "staging areas" for immigrant poor (Frankenhoff, 1967) having distinct and derogatory characteristics, such as worse levels of education, health and other socio-economic indicators, compared to the rest of the urban areas (Martinez et al., 2008; Banerjee et al., 2012; Fink et al., 2014). It is to be noted that although slums are differentiated from non-slum areas by certain common characteristics, yet there exist large inter-city and intra-city differences (Bag et al., 2016; O'Hare et al., 1998).

As the phenomenal surge in slum population is identified as a major challenge for the overall urban development, policies towards improving the lives of slum inhabitants has not been overlooked. It has rather been a crucial part of the global development agenda over the past few decades. To 'achieve a significant improvement in the lives of at least 100 million slum dwellers by 2020' had been an important target within the seventh Millennium Development Goal (MDG). The newly-revised first target of the eleventh Sustainable Development Goal (SDG) proposes to 'ensure access for all to adequate, safe and affordable housing and basic services, and upgrade slums by

2030'.[1] Needless to say, the appropriate policy design is essential to improve the standard of living (SoL hereafter) within slums, but there is still a substantial gap in policy choice (Marx et al., 2013). The policy choice can be strengthened through an appropriate understanding of the type of adversities the slum inhabitants encounter as well as comprehending the correlates of their adversities.

In order to explore the SoL of slum-dwellers, in this paper, we have chosen the three most populous cities in India with largest concentration of slum population and the history of colonial rule: Mumbai, Delhi, and Kolkata.[2] Although our focus remain on three Indian cities, our analysis and understanding may act as a valuable lesson for other developing countries. In this paper, we use a primary household survey dataset as the existing national surveys are not appropriate for obtaining information about slum dwellers (Carr-Hill 2013; Agarawal, 2011). We assess the SoL of slum dwellers by the widely prevalent monetary approach as well as by a complementary non-monetary counting approach framework (Atkinson, 2003; Alkire and Foster, 2011) where each household's SoL is assessed by counting the number of non-monetary deprivations (referred as deprivation score) suffered by the household.[3] We justify the selection of indicators used in the counting framework that are especially crucial in capturing the SoL of slum dwellers.

Our findings reveal that the slum dwellers in Mumbai enjoy a better SoL than those in Kolkata and Delhi in terms of both monetary and non-monetary indicators. Although monetary indicators do not reveal any difference in the SoL between the slum dwellers of Kolkata and Delhi, the slum dwellers in Kolkata suffer a larger number of simultaneous non-monetary deprivations than those in Delhi.

We further explore which of the slum-level and the household-level characteristics are associated with lower monetary and non-monetary SoL within the slums of each city. In order to explore this question, we resort to multivariate regression analyses. We observe that not only certain characteristics are differently associated with the monetary and the non-monetary SoL across cities, but also they are quite differently associated with monetary vis-à-vis non-monetary SoL within cities. The household characteristics that are found to be consistently associated with lower per-capita household income across slums of all three cities are female heads, larger household sizes, higher child dependence, and not having at least one member who is either a government employee/pensioner or have a private contractual job. Similarly, the households that are observed to suffer lower non-monetary SoL in slums of all three cities are households with higher child

[1] The information has been accessed in April 2016 at https://sustainabledevelopment.un.org/sdgsproposal.html.

[2] According to the 2011 Census, the total population and the proportion of slum population of Mumbai, Delhi and Kolkata were 12.5 million and 52%, 11 million and 15.5%, and 4.5 million and 32%, respectively. See Bag et al. (2016) for further discussions about these slums' colonial history.

[3] The need for looking at indicators beyond income to understand and assess living standards has been widely discussed. See, for instance, Stiglitz et al. (2009) and in the Indian context Swaminathan (1995). Whether we should combine monetary and non-monetary indicators into a single SoL measure, is a subject of debate. In this paper, we are interested in comparing monetary SoL with non-monetary SoL and thus we do not pursue that route. For a novel effort to integrate monetary and non-monetary indicators into a single multidimensional measure, see Santos and Villatoro (2017).

dependence, indigenous households (Scheduled Caste (SC) or Scheduled Tribe (ST)) without any caste reservation certificate, and households not having at least one member who is either a government employee/pensioner or have a private contractual job.

Furthermore, we examine the UN's notion of improving the SoL of the slum-dwellers through conferring a secured tenure in Mumbai. Although we observe that the households in slums that are legally protected from eviction earn higher incomes compared to those in non-protected slums, yet the former households are non-monetarily indifferent to the latter households. This observation questions the UN's prevailing notion of improving living standards in slums through tenure security.

The rest of the paper is structured as follows. The second section outlines the broad classification of slums in the three cities, the sampling frame and our survey data collection process. The third section presents the diversified characteristics of the slums in three cities as well as that of their inhabitants. The fourth section outlines how we assess the monetary and non-monetary SoLs and compare across three cities. The fifth section analyses how the characteristics discussed in section three are associated with slum-households' SoL through multivariate regressions. The sixth section concludes.

2 Slum Types, Sampling Frame and Data Collection

UN-HABITAT (2003) defines a slum household as a group of individuals living under the same roof, who are lacking any of the five criteria: (i) access to improved water, (ii) access to improved sanitation facilities, (iii) sufficient-living area, (iv) durable dwellings structure, and (v) secured tenure. This definition is however highly generalised and should be reviewed and broadened in the context of any particular country. In fact, the three metro-cities of India under study house some of the oldest slum settlements tracing back to the colonial period. We first elaborate the slum typology in these cities and then present how the typology has influenced our sampling design for primary survey.

2.1 Slum typology

In the Indian context, the term 'slum' loosely applies to two distinct settlement types: tenement settlement and squatter settlement.[4] Tenement settlements were mostly created during the colonial phase by local landlords or the factory owners to provide shelters to migrant workers on the basis of a long-term lease agreement. However, squatter settlements mainly came into existence in the post-colonial phase and are illegally occupied clusters of quasi-permanent habitation along canals, railway tracts, or roads or on previously vacant degraded lands (i.e. staging area).

Since the mid-ninetieth century in the colonial phase, both Mumbai and Kolkata observed a spurt of large-scale industrialization and urbanization sustained by a large number of migrant labourers.

[4] Locally, a tenement housing settlement is referred to as Basti in Kolkata, Chawl in Mumbai, and Katra in Old Delhi; whereas a squatter settlement is referred to as Jhupri in Kolkata, Zopadpatti in Mumbai, and Jhuggi Jhopri in Delhi. For related discussion on types of slums see Risbud 2003, pp. 2 and O'Hare et al. 1998, pp. 270.

The lack of spatial immobility of these migrants for various reasons led to a unique tenurial structure, resulting in tenement settlements. Tenants were either rented out lands for constructing their own shanties or were directly rented out quasi-permanent shanties on a long term lease, usually with an upfront payment and a small rent. These lease agreements were known as thika in Kolkata and pagri in Mumbai. Similar pattern emerged in the Old City of Delhi during the colonial phase due to the city's historical transformation process linked to the conversion of old mansions to accommodate existing workers and migrants labourers engaged in the construction of the capital city of New Delhi. In the post-colonial phase, this type of tenancy system was adopted by many house owners even in squatter settlement areas.

In the post-colonial phase, various acts and bills were passed towards protecting the shelter rights of the tenement settlements' residents, which however prevented their further proliferation.[5] Especially in Kolkata, an overwhelming majority of present slums are on the lands under thika act of 1981 and are directly under the purview of the local municipal corporation. Tenement settlements in Kolkata and Mumbai, which are quite organized, are integral parts of the cities' legitimate housing stocks. Although the tenure security of the tenants remained protected, tenement settlements in Kolkata and Mumbai face various challenges. Presently, most tenement settlements are under city-specific rent control acts with the aim of freezing the rents at predated times. Moreover, various court rulings and legislations impose status quo over carrying out further developments on existing structures, adversely affecting private investments on already dilapidated structures and property tax collections.

As the tenement settlements were prevented to proliferate in the post-colonial phase, two distinct factors – the deluge of migrant labourers linked to contemporaneously growing industrial bases and spill over from existing tenement settlements due to natural population growth – have caused a rapid increase in squatter settlements mostly through illegal occupation. Besides, Kolkata and Delhi have faced a deluge of refugee migrants, who kept squatting for a long time before settling into refugee ghettoes.

From the legal viewpoint, under the Slum Areas Improvement and Clearance Act (1956) of India, squatter settlements are primarily classified into two categories: registered and unregistered. This typology is important as each has implications in terms of entitlements to basic services. Registered squatter settlements are declared as slums by the local authorities and thus their dwellers deserve basic shelter requirements with some form of tenure security and access to certain civic facilities.

[5] The Slum Area Improvement and Clearance Act of India (a Union Act) was brought in 1956 (accessed in April 2017; web: http://lawmin.nic.in/ld/P-ACT/1956/A1956-96.pdf). In Kolkata, the first Calcutta Thika Tenancy Act was brought in 1949, the Calcutta Slum Clearance Bill was proposed in 1957 offering subsidized flats to evictees, and the Calcutta Thika Tenancy (Acquisition and Regulation) Bill was brought in 1981 to enhance the protection status further by enabling provision of basic amenities to the dwellers. In Mumbai, the Maharashtra Slum Areas (Improvement, Clearance and Redevelopment) Act was passed in 1971, by which most tenements housing settlement constructed before 1956 were censused and declared as slums. In Delhi, the Union Act of 1956 declared the Old City areas as slum designated area, but by a recent order in 2004 these areas were de-notified to be slums ceasing tenement settlements in this area to be legally recognised as slum.

Unregistered squatter settlements are however considered illegal and their dwellers are bereft of any entitlement to basic civic services and are under constant threat of eviction.[6]

In both type of slum-settlements, possessions of houses are classified into two main categories – owned houses and rented tenancy, where rented tenancy is sub-categorised into thika/pagri tenancy, informal tenancy (oral/unspecified tenure) and other tenancies, such as short-lease, shared etc.

2.2 Sampling frame and data collection

We have collected the primary household survey data in 2013-14 through two-stage stratified sampling from the slums of the municipal corporation areas of Kolkata, Mumbai and Delhi as part of the European Union funded global research project "NOPOOR". The reason for conducting a primary survey rather than using the existing secondary national household surveys (e.g., National Sample Surveys (NSS) and Indian Human Development Surveys (IHDS)) is that they do not have any slum identifier. Although National Family Health Surveys (NFHS) contain slum identifiers, they do not collect any information on monetary indicators. Moreover, Agarawal (2011) and Carr-Hill (2013) correctly point out that the nationally representative household surveys are not appropriate for obtaining information about slum populations and other disjoint populations.

Our survey collects individual level as well as household level information in greater details compared to what is collected in census and other nationally representative household surveys, such as National Sample Surveys and Demographic Health Surveys. For designing our survey, we relied on various slum-level information that are either available in the public domain or acquired through different government agencies. For Kolkata, we acquired the slum level information (1,236 slum clusters across 122 of 144 wards housing 360 thousand households) from 'Bustee data' compiled by the Kolkata Municipal Corporation (KMC) in March 2008. For Mumbai, we used the ward-wise population distribution from the 2009 Mumbai Human Development Report (Municipal Corporation of Greater Mumbai 2010), which used the 2001 Indian Census as their basis. For Delhi, we used the list of squatter (Jhuggi Jhopri) clusters available from the Delhi Urban Shelter Improvement Board (DUSIB).

In the first stage of the survey, within each city, the municipal corporation areas were stratified according to the largest possible administrative divisions: at the borough level in Kolkata, at the ward level in Mumbai and at the revenue-district level in Delhi. The number of households to be interviewed from each stratum was determined through proportional sampling, but with the additional requirement that at least thirty households should be interviewed from each stratum.[7] In

[6] According to the local municipal corporation data of 2001, nearly 63% of all slum clusters in Mumbai were protected from eviction threats. The Delhi Urban Shelter Improvement Board (DUSIB) Act (Delhi Act 07 of 2010) although recognizes most of the squatter settlements (and maintains a list of Jhuggi Jhopri Cluster settlements), it does not necessarily confer any protection from eviction.

[7] It is worth noting that pavement dwellers are treated differently from slum dwellers by most civic authorities, census and national surveys. While DUSIB maintains a list of daily attendees at various night shelters, it does not provide

the second stage of the survey, a number of slums were randomly selected from each stratum and then from each selected slum, a collection of households were randomly selected to be interviewed.

Our decision on the sample size to be collected from each city was based on the total slum population size of the city as well as on the degree to which regional or other subsamples representations were required. In Kolkata, from 15 boroughs we randomly selected 63 slums from which we interviewed 808 households. In Mumbai, from 23 wards we randomly selected 77 slums and interviewed 1,086 households, (Ward C in Mumbai does not have any slum). In Delhi, from 11 revenue districts we randomly selected 57 squatter settlements and interviewed 864 households.

We have tried our best to ensure that our sample represents the slum types and land-ownership types of slums. The collected samples in Kolkata and Mumbai include both tenement and squatter settlements. In Mumbai, according to the local municipal corporation data of 2001, of the 1997 slum clusters in 23 of 24 wards, 53.7% were on government lands (of which 42% were protected and 17% are notified) and 43.3% were on private lands (of which only 14% were protected and 54% were notified).[8] Unfortunately, the 'Bustee data' of Kolkata did not have such information. In Delhi, our sample also represents different land-owning agency. According to the 2013 database of DUSIB, 685 slum clusters were spread across 11 revenue districts housing about 400 thousand households and 95% of these clusters were on government or its agency lands.[9] However, due to the unavailability of information about the type of possession of houses in the public domain, we had to rely solely on interviewees' responses in our survey.[10]

We draw the design of the survey questionnaire from the latest round of National Sample Survey (NSS) household questionnaire and slum particulars, and customized to incorporate additional variables capturing further characteristics intrinsic to slums. Our questionnaire captures information both at the household and the individual levels. At the household level, we collected information on religion, caste, various public-assistance-card holding statuses, type of housing, access to basic facilities, access to government schemes, assets, land and house ownership details and related incomes, consumption and expenditure details on basic food items. At the individual level, we collected information on age, gender, marital status, age at marriage, literacy and

any data on pavement dwellers. Ironically, civic bodies of Kolkata and Mumbai fail on both counts. Our survey does not collect data on pavement dwellers.

[8] The Maharashtra Slum Areas Act 1971 classified registered squatter settlements into two further categories: protected and notified (web: http://www.sra.gov.in/data/Maharashtra_Slum_Areas_Improvement_Clearance.pdf; accessed in April 2017). The Slum Rehabilitation Act (1995), passed by the state government to promote the development of slum areas and to protect slum dwellers' rights, protects anyone from eviction who could produce a city-residency status document prior to January 1995, regardless of previously living in that slum. Dwellers in notified slums only deserve basic shelter requirements.

[9] In Delhi, we interviewed households from Resettlement and Relocation colonies and in Mumbai we interviewed households residing in resettlement lands (during 1970s) and in buildings constructed by the Slum rehabilitation authority (SRA) since 1995. Studying these households is out of the scope for this paper. For further details on the sampling design and the entire sample collection process, see Bag et al. (2016).

[10] We acknowledge that many pagri tenants in Mumbai may appear to claim the ownership of the house, perhaps due to the prospect of getting a house under resettlement schemes.

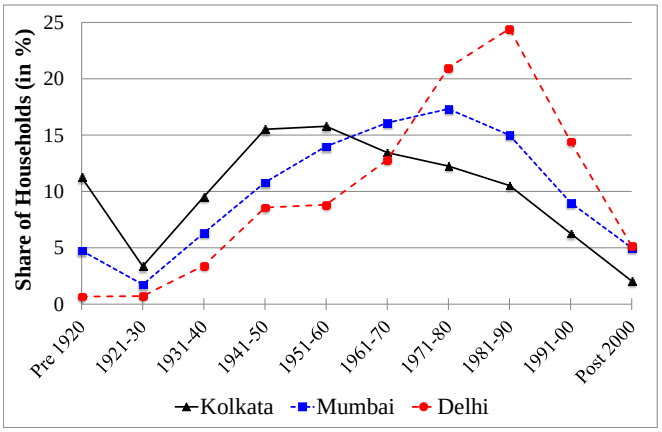
educational details, migration details, employment details including information of earning and past occupations, savings and insurance details, and some health-related information.

3 Diversified characteristics of slums and their dwellers

Although, the term 'slum' generally reflects upon a congested habitation pattern of the poor people being inflicted with suboptimal infrastructures, insufficient facilities, derogatory living conditions and being marginalized by various socio-economic forces, but by no means slums are homogeneous throughout. Their heterogeneities emanate from their historical genesis, location specificity, or even from their legal affiliation or protection status as discussed Section 2. Moreover, slum-dwellers vary widely by their migration pattern, type of tenancy, and ethnic as well as demographic backgrounds both across and within slums.[11] In this section, we present some descriptive statistics that capture the diverse nature of slum dwelling households across three cities.

It follows from our discussion in Section 2 that the historical pattern of migration in Kolkata and Mumbai are somewhat similar, but Delhi follows a different path. Figure 1 presents the decadal migration pattern in the past century of all surveyed households using their response to the survey question: When did the household move to the city including its previous generation? We observe that Kolkata witnesses a relatively larger pre-independence influx of migrants than Mumbai; whereas Delhi witnesses a relatively larger post-independence influx than both.

Figure 1: Decadal Migration Pattern of Surveyed Households in Three Cities



The migration of labourers and the process of slummification primed during 1940-60 in Kolkata and during 1970-80 in Mumbai; both of these are closely linked to respective industrialization peak period in the two cities.[12] Delhi however observed the major spurt roughly during 1980s,

[11] For a detailed discussion of historical migration pattern please refer to Bag et al. (2016).

[12] Kolkata's fortune changed dramatically with the shift of capital to New Delhi in 1921 and with partition in 1947, once thriving industries started to stagnate in post-independence era. However, Kolkata registered a large influx of refugee migration twice: around 1950 due to the partition and during 1970s due to civil conflict in Bangladesh. In Mumbai, World War II introduced a number of incentive schemes for industrial expansion coupled with the diversification of the manufacturing sector and the construction of the port in late 1950s.

which incidentally coincided with the establishment of industrial areas in Okhla and Rohini and a phase of break in the slum eviction and rehabilitation process.[13] Consequently, the share of migration has slowed down at the dawn of the new millennium in these cities. Of the migrated households, 65-80% of household heads migrated to the slums of cities in the 30-year period between 1970 and 2000. This diversity in migration pattern is captured by the household head's migration status presented in Panel I of Table 1. Around three-fifth of households in Kolkata and around two-fifth of households in Mumbai reported the head to be born in the city. The same for Delhi reads less than a fifth.

Irrespective of whether the heads were born or migrated, slums in Kolkata, Mumbai and Delhi comprise population from diverse ethnic, lingual and provincial background. Panel II of Table 1 captures the heterogeneity in the geographical origins of the household heads. We categorise India into six geographical regions: North-Central, North-Western, Central, Western, Southern, and Eastern.[14] The first noteworthy observation is that majority of households within any city are either from the native state (except in Delhi) or from North-Central region of India. An overwhelming three quarters of households in Delhi are from the North-Central states due to Delhi's close proximity to these states. Although Mumbai is far from these states, it still manages to attract migrants from North-Central states owing to the job opportunity it creates. Worth noticing that Kolkata slums are also home to a significant fraction of migrant-heads (8.7%) who trace their root back to places outside of India especially from Bangladesh (erstwhile East Pakistan) owing to refugee migration because of the partition of the country during independence and again during the civil war in Bangladesh reflecting our discussions in Section 2.

We next look at tenancy types in Panel III, linking again to our discussions in Section 2. We find the tenancy types to differ significantly across cities. In Delhi and Mumbai, around 87% and 73% of households report residing in owned houses, respectively; whereas in Kolkata only 37.9% report residing in owned houses and 62% report occupying rented houses (37.5% are in thika tenancy). Residing in owned houses, however, does not transpire to legally secured tenure if the houses are built on encroached public land or lands owned by private entities but not by the slum-dwellers themselves.[15]

In the next four panels of Table 1, we present additional demographic characteristics, such as household heads' gender, households' composition, and households' religion and caste affiliations. The share of female-headed households is less than a fifth of all households in slums

[13] Between 1960 and 1970, Delhi witnessed a substantial drive to evict squatter settlements as well as rehabilitate them into Resettlement colonies. After a break of close to two decades, the rehabilitation programme was resumed in late 1990s.

[14] The six geographical regions consist of the following states. North-Central: Uttar Pradesh, Bihar, Jharkhand and Uttarakhand; North-Western: Rajasthan, Haryana, Punjab, Himachal Pradesh, Jammu and Kashmir and Delhi; Central: Madhya Pradesh, Chhattisgarh; Western: Maharashtra, Gujarat, Goa, and Daman-Diu; Southern: Tamil Nadu, Kerala, Karnataka, Andhra and Telengana; Eastern: West Bengal and Orissa. The native state of Kolkata, Mumbai and Delhi are West Bengal, Maharashtra and Delhi itself, respectively.

[15] Our survey data show that over 98% of Delhi's squatters are on public land and in Mumbai, about half of all houses are on public land, 5% are on private land, and 45% are on land of unknown status.

of every city. Looking at households' compositions in Panel V of the table, we observe that the average household sizes in slums of Mumbai and Kolkata are statistically significantly lower than that in the slums of Delhi. This larger household size in slums of Delhi is a resultant of the presence of larger number of younger dependents, which is consistent with the larger share of migration in recent decades. Caste and religion compositions are also quite different in slums across cities. More than 90% household heads in all cities have identified themselves as either Hindu or Muslim; people from other religions are truly in minority in slums. However, the composition between these two dominant religious communities varies starkly. The share of Muslim households is highest in Kolkata (31.5%) and lowest in Delhi's JJ colonies (15.4%). Looking at the caste composition (self-reported), we find that over half of the households in Delhi identified themselves as scheduled castes. The shares of scheduled caste in other two cities are in the range of 20-26%. The shares of households identifying themselves as other backward classes in slums of Delhi and Mumbai stand at more than a fifth, but the same is quite low in Kolkata.[16]

In the final two panels, we present households' public distribution system card holding status and their job security status. If a household holds any types of public distribution card such as the below poverty line card, Annapurna card or Antyodaya card, the household is entitled to certain public benefits. The households entitled for BPL+ cards are identified using various identifiers such as low income, lack of certain assets etc. For a discussion on the evolution of the BPL identification criteria of the Indian government, see Alkire and Seth (2013a). Households that are categorized as above poverty line (APL) or households that do not hold such cards are not entitled to receive these social benefits. We refer to these types of cards as BPL+ cards. It should be noted that of the surveyed households in Kolkata only 7% hold BPL+ cards, 84% are APL and 8.7% have no card. The picture is slightly different in Mumbai, where 21% households hold BPL+ card, 70% are APL and 9.1% have no card. In Delhi, however, 49% households hold BPL+ cards and only 19% are APL, yet 32% have no card.

The final panel of the table presents the figures showing the job security of the households. Most slum dwellers are employed in the informal sector, where jobs cannot be considered secured. In Delhi slums, more than 80% of surveyed households do not have any member who is either employed in a government job or is a regular pensioner or has any kind of private contractual job. The equivalent figures are around 70% in Kolkata and more than half in Mumbai slums.

[16] The caste composition is created irrespective of the household head's religious affiliation. For example, an OBC (or SC/ST) family could have their religious belief in Hinduism, Islam or any other faith. It should be noted that these scheduled categories are constitutionally mandated categories that are entitled for affirmative action. However, benefits of affirmative action can be availed provided the appropriate state authorities have issued a caste certificate to the individuals. We have noticed two issues while interviewing households belonging to non-general caste categories: (a) many households do not have caste certificates despite belonging to scheduled sub-castes (44-52% for SC/STs, 57-72% for OBCs); (b) many households preferred to represent themselves belonging to the general caste category either because they were not able to get respective caste certificates from their place of origin or because they found it embarrassing to reveal their true caste category.

Table 1: Household Characteristics in Slums of Kolkata, Mumbai and Delhi

	Kolkata	Mumbai	Delhi
I. Household head's migration status			
Migrated to the city	37.4%	62.0%	83.6%
Born in the city	62.6%	38.0%	16.4%
II. Household's region of origin in India			
Native state	33.1%	42.0%	2.3%
North-Central states	56.0%	29.1%	73.8%
North-Western states	0.6%	3.7%	11.8%
Central states	-	0.4%	4.6%
Eastern states	0.9%	1.6%	1.9%
Western states	0.1%	9.3%	2.3%
Southern states	0.7%	13.5%	1.9%
Foreign (outside of India)	8.7%	0.3%	1.3%
III. Household's type of tenancy			
Own house	37.9%	72.7%	87.1%
Rented tenancy (Thika/Pagri)	37.5%	8.7%	1.4%
Informal tenancy	16.0%	7.9%	8.5%
Other form of tenancy	8.5%	10.1%	2.5%
IV. Female headed household	19.7%	19.5%	14.0%
V. Composition of household			
Average household size	5.06	4.89	5.46
Household with dependents ($\leq$ 14 years & $\geq$ 64 years)	25.1%	24.2%	29.1%
… Household with elderly dependents ($\geq$ 64 years)	4.9%	4.6%	1.8%
… Household with young dependents ($\leq$ 14 years)	20.2%	19.6%	27.3%
VI. Household head's religion			
Hindu	65.7%	69.3%	83.5%
Muslim	31.5%	21.4%	15.4%
Christian	2.5%	2.4%	0.5%
Sikh	0.0%	0.1%	0.4%
Other	0.2%	6.8%	0.2%
VII. Household head's caste*			
Scheduled caste (SC)	25.7%	19.9%	53.4%
Scheduled tribe (ST)	0.5%	1.8%	2.4%
Other backward class (OBC)	9.4%	24.5%	22.2%
General & undisclosed	64.5%	53.9%	22.0%
VIII. Household's PDS card holding status			
Below poverty line, Annapurna and Antyodaya (BPL+)	7.1%	21.2%	49.1%
Above poverty line (APL)	84.3%	69.7%	18.8%
No card	8.7%	9.1%	32.1%
IX. Household's job security status			
At least one government employee or regular pensioner	10.7%	11.8%	6.1%
At least one person with a private job contract	21.0%	34.3%	8.4%
All working members have informal employment	68.3%	53.9%	85.6%
Sample size	**808**	**1085**	**868**

Source: Authors' own computations.

* - See footnote 16 for relevant discussion.

4 Assessing standard of living in slums

There are various competing approaches for gauging the standard of living (SoL, hereafter) of any population. It may be reflected either by looking at the well-being of the population or through their deprivations. Typically, the SoL of a household is assessed by different monetary indicators, which are either the maximum possible per-capita monetary resources that can be spent without depleting the assets held (income) or by the per-capita consumption of goods and services valued at current prices, regardless of whether an actual transaction had taken place (consumption expenditure). Monetary approaches are resource-based methods and are criticized conceptually on the ground that they may not necessarily capture the households' capabilities to transform the resources into their well-being (Sen 1999). Additionally, the improvements in monetary indicators in practice do not necessarily appear to go hand in hand with the improvements in their non-monetary counterparts (Bourguignon et al. 2010, Whelan et at. 2004, (Ruggieri-Laderchi et al. 2003). In this section, thus we aim to capture the SoL of slum dwellers through both monetary and non-monetary approaches. In the monetary approach, we look into households' per-capita incomes and per-capita consumption expenditures; whereas, our non-monetary analysis is based on a counting approach framework (Atkinson, 2003; Alkire and Foster, 2011). The two main benefits of using a counting framework are: to respect the ordinal nature of the non-monetary variables and to capture the joint distribution of dimensions because one non-monetary dimension may not necessarily proxy for other important non-monetary dimensions.

4.1 Monetary standard of living

Our survey questionnaire contains a module on households' different sources of self-reported income as well as a brief module on households' self-reported expenditures on major items consumed.[17] The income module contains information on wage earnings, inward remittances and rents received from property ownerships. The expenditure module includes information on consumption and expenses incurred on major food items (such as groceries, major vegetable and non-vegetable items), cooking fuels, intoxicants, students' education fees and conveyance cost, rent payments, electricity bills, and outward remittances.[18] Our survey procedure ensures that the collected income and the consumption expenditure data are comparable across cities, but our results may not be strictly comparable with other major national surveys.[19]

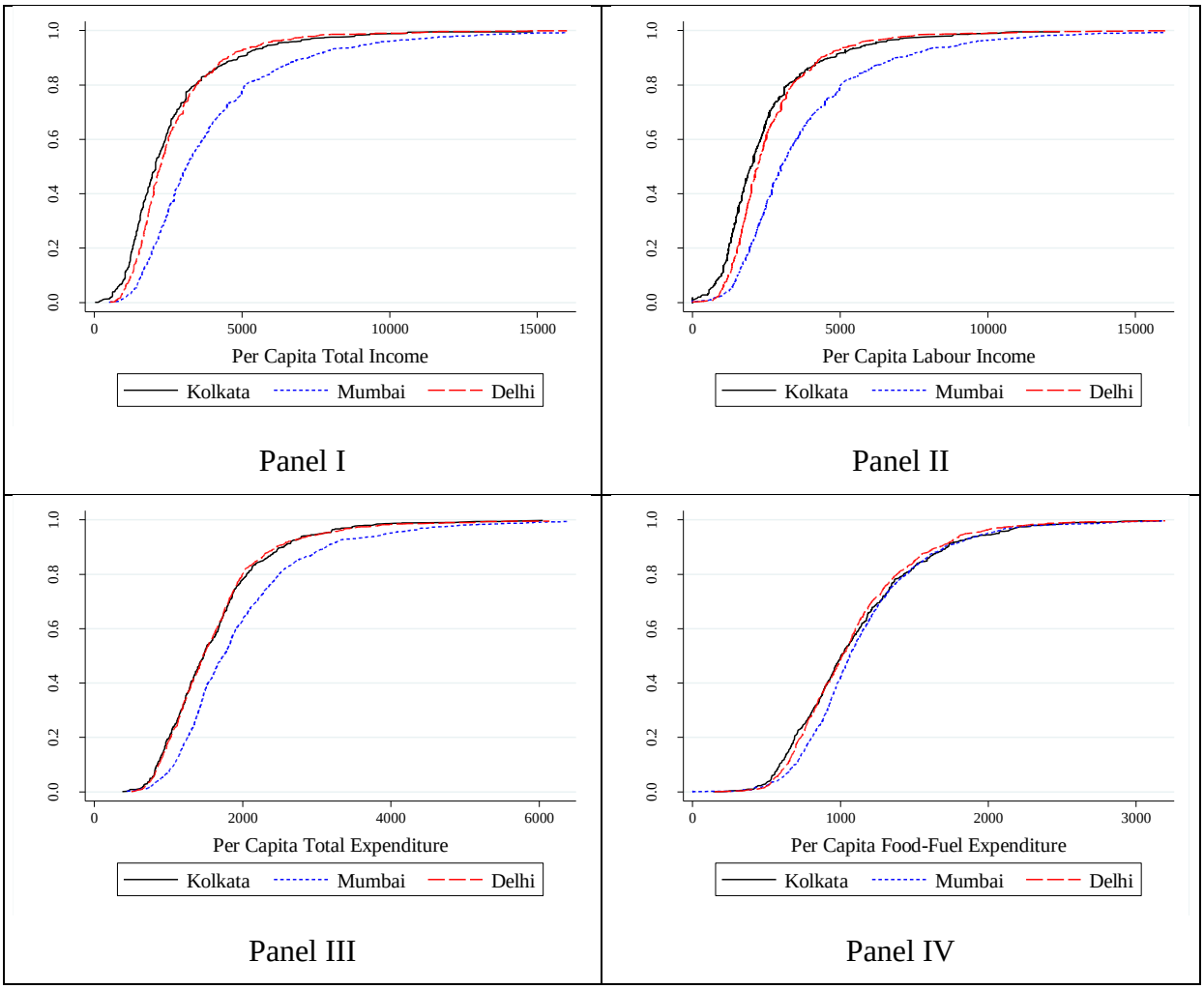
[17] Income data were reported for 98.5% of households in Kolkata and 99.7% of households in Mumbai and Delhi. Income data are difficult to collect, and are likely to be subject to error (possibility of both over- and under- reporting). The figures from these surveys can be considered approximations of incomes earned by households in the month prior to the survey.

[18] Total expenditure of households does not include the cost of clothing, water, and sanitation, the transport cost for the employed persons, cost of Cable TV connection, Mobile and Internet recharges, cost of treatment for illness and chronic diseases, and the expenditure on food consumed outside of the house.

[19] To ensure comparability of monetary aggregates across cities and across the duration of the survey, incomes and expenditures have been adjusted for price differences using consumer price indices obtained from http://labourbureau.nic.in/indtab.html. Delhi's price index for October 2014 (the final month and city of our survey) has been used as the base price.

In four panels of Figure 2, we present the empirical cumulative distribution functions (CDF) for four different monetary indicators and in Table 2 we present their monthly averages and standard errors. The four monetary indicators we look at are: (i) per-capita total income consisting wage earnings, rent incomes and inward remittances, (ii) per-capita labour income consisting of only wage earnings of all household members, (iii) per-capita total expenditure consisting expenses on food items, cooking fuels, intoxicants, students' fees and transport costs, rents paid, electricity bills, and outward remittances, and (iv) per-capita food-fuel expenditure consisting expenses only on food items and cooking fuels. These are CPI adjusted figures (in INR), with November 2014 Delhi prices for industrial workers as base.

Figure 2: Cumulative Distributions of Monthly Per-capita Incomes and Expenditures



How does the slum-dwellers' SoL fare in terms of monetary indicators in three cities? The cumulative distribution functions provide a significant amount of information. Each horizontal axis in Figure 2 presents the per-capita income or expenditure, and each vertical axis presents the proportion of slum dwellers. For any income or expenditure threshold, the height of each CDF denotes the proportion of slum-dwellers (not the proportion of slum-dwelling households), whose

incomes or expenditures is less than that threshold. If the threshold is considered as a poverty line, then the height of a CDF provides the proportion of slum dwellers whose income is below the poverty line or the incidence of poverty or the poverty headcount-ratio. In this sense, each CDF is a poverty incidence curve (Foster and Shorrocks, 1988; Ravallion 1994). If one poverty incidence curve always lies to the right of another curve, then the former has lower headcount-ratio than the latter for all poverty lines. Alternatively, if one CDF always lies to the right of another CDF, then each percentile of the population in the former has higher income or expenditure than that in the latter.

Table 2: Monthly Per-capita Incomes and Expenditures of Slum-dwellers of Three Cities

Per-capita monetary aggregate	Kolkata	Delhi	Mumbai
Total income	2,622.6	2,677.3	3,952.5
	(102.9)	(55.3)	(84.2)
Wage income	2,539.3	2,638.0	3,849.7
	(100.8)	(54.5)	(82.2)
Total expenditure	1,624.7	1,633.4	1,992.1
	(39.1)	(26.4)	(34.3)
Expenditure on food and fuel	1,107.3	1,089.2	1,153.5
	(23.9)	(15.0)	(13.7)

Source: Authors' own computations. Standard errors are reported in the parentheses.

From the first three panels of Figure 2 and from Table 2, we observe that monthly per-capita incomes and expenditures are higher among slum dwellers in Mumbai.[20] The average per-capita total income, per capita labour income and per capita total expenditure in Mumbai slums appear to be higher than that in Delhi and Kolkata slums. Delhi and Kolkata slums appear to be indiscernible in these three monetary indicators. When we look at per-capita food-fuel expenditure in panel IV, slums in all cities appear statistically indistinguishable by their poverty incidence curves.[21] The reason may be low marginal propensity to food consumption expenditure. The bottom-line is that the slum-dwellers in Mumbai enjoy a better SoL based on monetary indicators than the slum dwellers in other two cities.

[20] When we refer to higher or lower average, we imply statistically significantly higher or lower at 95% level of significance. In order to test whether CDFs are statistically distinguishable, we compute 95% confidence interval for each pairwise difference using the Distributive Analysis Stata Package (DASP) (Araar and Duclos 2013). In majority of the cases, pairwise differences are not statistically significant throughout the support.

[21] One may wonder why Mumbai slum dwellers encounter higher non-food expenditure and earn higher income than their counterparts in the other two cities. Regarding non-food expenditure, Mumbai slum dwellers incur much higher expenditure on house rents, electricity and cooking fuel bills, and outward remittances (refer to Tables 10 and 11 of Bag, Seth and Gupta (2016). Regarding income, average education levels among Mumbai slum dwellers are higher than in other two cities for every age group, irrespective of gender (Table 15 of Bag et al. 2016). Moreover, Mumbai slum dwellers have comparatively much higher participation in formal contractual jobs (30%) yielding significantly higher salary than informal jobs (Table 16 of Bag et al. 2016).

4.2 Non-monetary standard of living

Does the non-monetary analysis draw similar conclusions as the ones based on monetary indicators?[22] Given its multifaceted nature, any one non-monetary indicator may not sufficiently capture the slum-dwellers' SoL. In fact, while studying poverty and deprivation among slum dwellers in Mumbai, Swaminathan (1995) proposed understanding poverty through a more comprehensive approach rather than focusing merely on their incomes. Unlike monetary indicators, most non-monetary indicators are ordinal or categorical, requiring an intuitive and meaningful technique to obtain household level SoL aggregates. Among the many available multidimensional techniques, we choose to use a counting approach framework (Atkinson, 2003; Alkire and Foster, 2011) mainly because the approach has intuitive appeal and it respects the ordinal nature of the indicators that we use.[23]

Based on the counting approach, we construct a multiple-disadvantage score or deprivation score to capture each household's SoL.[24] A higher deprivation score represents a lower SoL for that household. The counting framework involves the following steps (Alkire et al., 2015, Ch 4): (i) defining a list of relevant indicators, (ii) assigning a relative weight to each indicator depending on its importance relative to other indicators, (iii) defining a deprivation cut-off for each indicator, (iv) creating a binary deprivation score for each household in each indicator by assigning "1" if the household is deprived in that indicator or by assigning "0" if the household is not deprived, (v) producing a score for each household by taking a weighted sum of deprivations in list of the relevant indicators.

The assessment of SoL in slums requires defining a list of indicators that are relevant in slum settings, and also their deprivation cut-offs.[25] The appropriateness of the particular set of indicators, the set of deprivation cut-offs and the assigned weights that we choose in this paper to construct the non-monetary deprivation score of each household can be questioned and debated. However, so would be any other choices. We thus conduct a number of robustness tests of our findings with respect to alternative specifications in the next section. We start by considering the operational definition of slums according to UN-HABITAT (2003), which defines a slum as an

[22] Mismatches between monetary poverty and non-monetary poverty have been documented in various studies. Across nine European countries, Whelan, Layte, and Maître (2004) found mismatches between income poverty and material deprivation. Using longitudinal data for Vietnam, Tran, Alkire and Klasen (2015) observed that the overlap between income poverty and multidimensional poverty was even less than 50%. For further discussions on relevant studies, see Alkire et al. (2015), Ch 1.

[23] There exist several competing multidimensional approaches, ranging from statistical techniques, such as principal component analysis, factor analysis, and structural equation models to the Fuzzy sets approach to numerous axiomatic approaches. Most of these approaches either do not distinguish well between cardinal and ordinal variables or may not be intuitive for policy purposes. See Chapter 3 of Alkire et al. (2015) for an in-depth discussion on these approaches.

[24] The most well-known application of the counting approach is the global Multidimensional Poverty Index (Alkire and Santos, 2010; 2014), which was created with the purpose of cross-country comparisons. This framework however has been adopted for poverty assessment at the national and regional level in various countries. For an application of the MPI in the Indian context, see Alkire and Seth (2015).

[25] For an attempt to revise the well-known Multidimensional Poverty Index in the urban context, see Lucci et al. (2016).

area combining the following characteristics: (i) inadequate access to safe water, (ii) inadequate access to sanitation and other infrastructure, (iii) poor structural quality of housing, (iv) overcrowding, and (v) insecure residential status.

The first five indicators in Table 3 are motivated by the first four characteristics of the HN-HABITAT definition of slums. We identify a household as deprived of water facility if 'the water source is non-improved' or 'time to fetch water from the source is 30 minutes or more' and additionally 'the duration of the access is less than two hours per day'. Note that if we were to strictly follow UN definition of water indicator, then only the first qualifier (i.e. unimproved source) from our definition remains valid. However, from the inadequacy point of view the additional quantifiers also matter a lot. For example, Bag et al. (2016) finds that when this 'duration of source' is set as an additional requirement, then a further six percent slum households appear to be deprived in Mumbai, who otherwise would have been identified as non-deprived. A household is identified as deprived in sanitation facility if 'the household does not have a personal facility' or 'even if there is a personal facility, it is shared'.[26]

The third indicator, type of house, and the fourth indictor, leakage in house, are related to poor structural quality of housing. It may seem that deprivations in these two indicators are very highly correlated. We however find that it is not necessarily the case. In Delhi slums, for example, 30.8 percent of houses were built with unimproved materials but water was not reported to enter the house through roof or wall; whereas 17.2 percent houses were not built with any unimproved material but water was still reported to enter the house through roof or wall. It may in fact turn out to be a spatial characteristic such as a house being constructed in lowland often gets flooded. The fifth indicator, over-crowding, is directly motivated by the fourth criteria of the UN-HABITAT's slum definition.[27]

Although the first five indicators capture some aspects of SoL within slums in general, the levels of deprivation in the same indicator vary across cities as well as the deprivations within the same city are widely different across these five indicators. We find the collection of five indicators to be insufficient and thus we have decide to include six additional indicators that we argue are important in reflecting the deficient living conditions of the slum dwellers.[28] The first two of the second set of indicators capture two distinct forms of health risk that the slum dwellers face. One is

[26] We acknowledge that the indicator may underestimate the level of deprivation, as the questionnaire does not directly inquire if the sanitation facilities are improved or not. However, barring a few cases of no access to a facility (which is less than 2% in Kolkata and Mumbai but around 10% in Delhi), majority of slum households (67-73%) access shared facilities (these are either improved flush toilets constructed by local bodies or private charitable trusts or mobile toilet vans, as verified during surveys).

[27] According to the Millennium Development Goals "A house is considered to provide a sufficient living area for the household members if not more than three people share the same habitable (minimum of four square meters) room." The website http://mdgs.un.org/unsd/mdg/Metadata.aspx?IndicatorId=0&SeriesId=711 was accessed in August 2016.

[28] Worth noting an important omission from our set of indicators is households' access to electricity, lacking which may cause being deprived of other important facilities. However, we observed that the proportion of sampled slum dwellers not having access to any electricity is barely statistically significantly different from zero. Moreover, more than 95% of slum dwellers had access to electricity for 18-24 hours. We thus decided to not include this indicator in order to avoid redundancy in estimation.

respiratory health risk assessed by the cooking facility used by the households. The link between indoor air-pollution and respiratory health of the household members, especially children, is well documented in the public health literature (see Fuentes-Leonarte et al. (2009) for a review of the literature). We identify a household as deprived if 'for cooking purposes the household uses biomass fuel' or 'cooking in the house takes place inside the sleeping room with no smoke outlet'. In metro cities, where the level of outdoor pollution is already high, the existence of indoor pollution indeed acts as health hazard to the slum dwellers. The other health risk related deprivation we consider is 'the non-availability of any form of *health insurance'* even 'when any member in the household suffers from chronic disease' or 'there is a disabled member in the household'.

Table 3: Indicators, deprivation cut-offs and the percentages of slum-dwellers residing in deprived households

		Incidence of deprivation (%)		
Indicator	**Deprivation cut-off (A household is deprived …)**	**Kolkata**	**Delhi**	**Mumbai**
Water facility	If the water source is non-improved[*] (UN-MDG) **Or,** stand-piped but time to fetch from source is 30 minutes or more **Or,** stand-piped but access duration is less than two hours per day	21.2 (1.9)	29.7 (1.6)	10.6 (1.0)
Sanitation facility	If there is no personal facility **Or,** the personal facility is shared with others	82.4 (1.8)	80.3 (1.5)	84.4 (1.2)
Type of house	If the wall or the roof or the floor of the house is built with unimproved materials;[#] **Or,** there is no house	74.5 (2.2)	52.6 (1.8)	52.6 (1.6)
Leakage in house	If water enters in the house through roof or ground or both	62.6 (2.5)	67.1 (1.7)	51.9 (1.7)
Over-crowding	If more than three persons live per bedroom (UN-HABITAT, 2010)	65.0 (2.2)	64.9 (1.7)	63.2 (1.6)
Respiratory health risk	If biomass fuel is used **Or,** cooking is done inside sleeping room with no smoke outlet	26.8 (2.2)	39.0 (1.8)	19.7 (1.3)
Health insurance	If any member is suffering from chronic disease or there is any disabled member, **And,** no one in household has any health insurance scheme	42.8 (2.5)	24.3 (1.6)	24.8 (1.5)
Savings instrument	If no member in household has any instrument for savings[##]	19.4 (2.0)	15.6 (1.4)	15.7 (1.2)
Asset ownership	If the household does not have any of the assets: washing machine, refrigerator, air conditioning machine, computer, four-wheeler, and additional rent generating property in city	60.7 (2.6)	44.3 (1.9)	34.5 (1.6)
Information instrument	If the household does not have a land-line phone, **And**, the number of mobile phones is less than the number of adults (15 years or more) in a household	83.0 (1.7)	88.6 (1.1)	64.6 (1.6)
Education attainment	If no household member has 10 or more years of schooling	41.7 (2.6)	43.4 (1.9)	17.2 (1.2)
	Equally weighted average of all deprivations	52.7 (0.9)	50.0 (0.7)	39.9 (0.6)

Source: Authors' own computations. Standard errors are reported in parentheses.

[*]- Unimproved sources include tanker truck, small cart, non-mineral bottled water, surface water (river/pond/lake) and other sources.

[#]- Unimproved floor materials: mud, dung, sand, loose brick, stone slab, bamboo, and raw wood planks. Unimproved wall materials: thatch, palm leaf, grass, wood, mud, bamboo, stone slab, rustic mat, tile, un-burnt brick, loosely packed stones, and tin-shed. Unimproved roof materials: thatch, palm leaf, wood, mud, bamboo, stone slab, rustic mat, tile, un-burnt brick, cardboard, and tin.

Indicator	Deprivation cut-off (A household is deprived …)	Incidence of deprivation (%) Kolkata	Delhi	Mumbai

[##]- Savings instruments: savings account or recurring deposit in banks, savings account in post office, life insurance account, private provident fund account or contributory provident fund account.

With the next two indicators, we capture two types of financial risk encountered by slum-dwellers. Most slum dwellers are employed in informal sector, which does not guarantee a steady source of income. In this situation, it is crucial that households are able to save that serves as insurance for future contingencies or to own assets that insure them against liquidity constraints (Deaton 1992, Ch. 6). To capture household's inability to save, we identify a household as deprived if no member has any kind of savings instrument. To capture whether the household is susceptible to liquidity constraints, we identify a household as deprived if the household does not own any major asset.

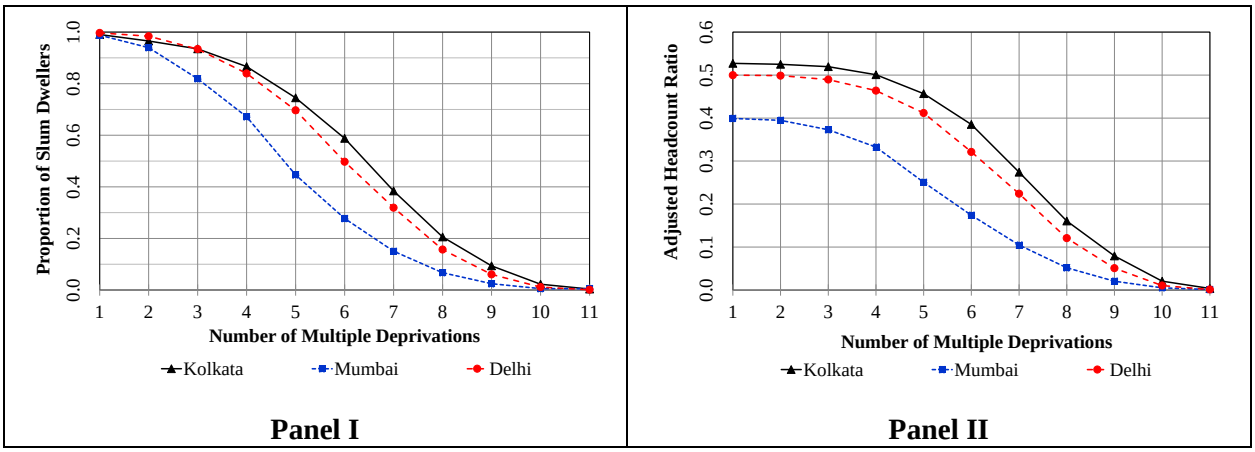
The penultimate indicator is information instrument, which identifies a household as deprived if 'there is no land-line phone' and 'the number of mobile phones is less than the number of adult household members'. The positive effect of the use of mobile phone in economic development has been well researched. For example, Jensen (2007) found that the adoption of mobile phones by fishermen and wholesalers in Kerala was associated with increase in information and improvement in market performance. Muto and Yamano (2009) found that an increase in mobile phone usage in Uganda increased market participation of farmers in remote areas. Access to mobile phone may also help in social and professional networking in urban areas. What justifies our choice of deprivation cut-off for this indicator? The use of mobile phone has increased drastically in developing countries. According to the World Bank, the number of mobile cellular subscriptions per hundred people in India in 2014 was 74, whereas the percentage of adult population (fifteen years or older) in the same year was 71%. The ratio of the number of cell phone to the number of adult population in India is larger than one and the ratio is expected to be much larger in metro cities. Thus, we consider not owning a cell phone by an adult member as a reflection of deprivation in this indicator.

The final indicator that we include in our list is education attainment, which is a crucial SoL dimension. Education is important as human capital and is crucial for enhancing capability (Saito, 2003) as well as having various positive externalities. We identify a household as deprived if no member in the household has completed ten or more years of education. Why is the justification for choosing the cut-off? In 2010, the Right of Children to Free Compulsory Education (RTE) became operative, which entitled every child in the age group of 6-14 the right to elementary education. Thus, completing eight years of education is mandatory by law and due to the competitive nature in metro cities we set a slightly higher deprivation cut-off of ten years of schooling or the completion of secondary education.[29]

[29] In fact, the completion of secondary education or ten years of schooling is the first recognized education 'degree' one may accomplish. The Indian government is trying to improve the quality of secondary education with targets of achieving gross enrolment ratio of 100% by 2017 and universal retention rate by 2020. For further details, see GoI (2015).

The final set of columns in Table 3 report the proportion of slum-dwellers in each city that are residing in households that are deprived in each of the eleven indicators. The incidences of deprivation in all indicators appear to be higher in Kolkata and Delhi slums. The average incidences of deprivations in all eleven indicators are 52.7% in Kolkata slums, 50% in Delhi slums and around 40% in Mumbai slums.[30] An interesting observation is that there exist statistically significant differences across the slums of three cities. Unlike the comparison based on monetary indicators, the average incidence of deprivation in Kolkata slums is observed to be higher than that in Delhi slums.[31] Table 3 only provides a summary of deprivation profiles in different indicators, but it does not provide any information on the extent of multiple disadvantages that slum dwellers face.

Figure 3: Complementary cumulative distribution of multiple deprivations and the Adjusted Headcount Ratio



In order to reflect the joint distribution of deprivations, we present two diagrams in Figure 3, where the Panel I presents the joint distribution of deprivations using a complementary cumulative distribution of multiple deprivations (CDMD, hereafter).[32] The horizontal axis denotes the number of multiple deprivations and the vertical axis represents the percentage of population. The height of a CDMD denotes the proportion of slum dwellers who reside in households that face at least a certain number of multiple deprivations. The Panel II of Figure 3 presents the adjusted headcount ratios (Alkire and Foster, 2011) for the corresponding deprivation counts, which is a product of two components: the proportion of slum dwellers facing multiple deprivations in at least a certain

[30] The average-incidence of deprivations in all indicators is equivalent to the union approach based adjusted-headcount-ratio when all indicators are equally weighted (Alkire and Foster, 2011).
[31] We have also compared cities using unequal weights across indicators and the comparisons are robust to alternative weights.
[32] Pair-wise association between indicators are reported in Appendix B to reflect the bivariate joint distributions. None of the 11 indicators are perfectly associated with any other indicator.

number of indicators (incidence) and the average share of indicators these multiply deprived slum dwellers are deprived in (intensity).[33]

In the slums of all three cities, nearly all slum dwellers reside in households that are deprived in at least one of the eleven indicators. Stark differences across cities are observed, however, when we ask how many slum dwellers reside in households with a larger number of simultaneous deprivations. If we ask how many slum-dwellers reside in households with at least five deprivations, the answer is more than 70% in Kolkata, nearly 70% in Delhi and more than 40% in Mumbai. In Kolkata and Delhi slums, more than a quarter of the slum dwellers reside in household facing at least 7 deprivations. The adjusted headcount ratios across three cities are observed to be statistically significantly different for a large range of multiple deprivations.

From both type of analyses of SoL, we observe that the slums in Mumbai are better off than the slums in Kolkata and Delhi. The slum dwellers in Mumbai, on average, enjoy both higher level of monetary well-being as well as less multiple deprivations. From the descriptive analysis in this section, we observe that although the slums of Kolkata and Delhi are indistinguishable in terms of monetary indicators, the slum-dwellers of Kolkata suffer a larger number of multiple deprivations on average than their Delhi counterparts.

The slums and its dwellers, as we have observed in Section 3, are characteristically quite different across three cities. In fact, the different characteristics may be quite differently associated with the SoL of the slum dwellers of three cities. It may also be the case that these characteristics are differently correlated to the monetary and the non-monetary SoL. Being able to understand how these characteristics are associated with the SoL may be helpful in understanding the living conditions better as well as may provide better policy guidance. With this purpose in mind, in the next section, we use simple linear multivariable regression technique to explore the association between the various characteristics of slums (and its dwellers) and the indicators of both monetary and non-monetary SoL.

5 Correlates of standard of living in Slums

In this section, our aim is two-fold. First, we aim to understand how various observable characteristics of the slums and the dwelling households 'within each city' are similarly or differently associated (or correlated and thus referred as correlates) with monetary vis-à-vis non-monetary indicators of households' SoL. Our second aim is to understand how some of the common characteristics are similarly or differently associated with households' SoL within slums 'across different cities'. For both the purposes, we resort to multivariate linear regression analyses. For regressions, we consider households as our unit of analysis rather than individuals as the characteristics are defined only at the slum-level and at the household-level. In the final part of

[33] For further discussions and interpretations on this poverty measurement methodology, readers are referred to Alkire and Foster (2011) and Chapter 5 of Alkire et al. (2015).

this section, through a decomposition analysis, we explore the indicators that are responsible for differences across correlates and across monetary and non-monetary approaches.

In Table 4-Table 6, we present the regression results for Kolkata, Delhi and Mumbai.[34] In each table, we report five regression models: Model-I1, Model-I2, Model-C1, Model-C2 and Model-M. The left-hand side variables are the household-level monetary and non-monetary indicators presented in Section 4. The left-hand side variable is the logarithm of per-capita total household income in Model-I1, the logarithm of per-capita household wage earning in Model-I2, the logarithm of per-capita total household consumption expenditure in Model-C1, the logarithm of per-capita total household consumption expenditure on food and cooking fuel in Model-C2, and the multidimensional household deprivation score in Model-M. In the top half of each table, we report the common correlates across all three cities and in the bottom half (divided by a separator line), we report the city-specific correlates.

In order to capture the heterogeneity in slums and amongst its dwellers across and within cities, we classify the correlates into two broad categories: household-level characteristics and slum-level characteristics. Household characteristics include intrinsic characteristics (covering head's gender, household's size, age dependence, religious belief, ethnic background or provincial identity, duration of migration), socio-economic identification characteristics (covering PDS cardholding status, caste reservation certificate holding status), and economic contractual characteristics (covering tenancy type, and type of job contracts of the members). Slum level characteristics comprise of slum's spatial location and tenure security (legal protection status). We acknowledge that each regression (that represents some measure of SoL either from monetary or non-monetary sides) may have many other pertinent observable characteristics, but we ensured that the selected correlates are free from potential endogeneity problem.[35] In this section, we are mainly interested in finding out how various characteristics are associated with different measures of SoL.

5.1 Correlates of monetary standard of living

In the first two models (I1 and I2) within each table we present the correlates of households' monetary SoL assessed by the per-capita total household income and the per-capita income from wage earning. Both models within each city yield similar results. In all three cities, the households that consistently reflect lower monetary SoL are characterized with female heads, larger sizes, higher child dependence, and those not having at least one member who is either a government employee/pensioner or have a private contractual job. We observe that the households with higher old-age dependence to have lower monetary SoL in Delhi and Mumbai only.

[34] For the sake of brevity, we only report the coefficients of each correlates and suppress the standard errors.

[35] For example, the years of schooling is expected to increase monetary SoL (say, income) of household, but we refrain from using it as a correlate since this may lead to endogeneity issue in the non-monetary regression model where the left-hand-side variable includes education as an indicator.

Other common characteristics are differently associated across cities. In Delhi, we do not observe any statistically significant differences across the households' caste or religion or whether the household has any caste certificate or not; whereas, the Other General households in Mumbai and OBC households with caste certificates in Kolkata appear to have higher incomes and earnings compared to the Hindu General households. Furthermore, PDS (public distribution system) card holding status of the households does not appear to signify any difference in households' monetary SoL in Delhi and Mumbai; but the APL (above poverty line) households in Kolkata are relatively better off than the BPL (below poverty line) households and the households without cards.[36]

We next look at the correlates in the bottom half of each table. Looking at the households' period of migration (refer to Figure 1 in Section 3), which can alternatively be thought of as duration of stay in city, we observe that those migrated after 1980 in Kolkata appear to have higher per-capita incomes than those that migrated earlier. The period of migration does not seem to matter statistically significantly both in Delhi and Mumbai with regard to per-capita incomes.[37] Delving into the location specificity of slums within each city, we observe no difference in the per-capita incomes of households across different regions within Kolkata.[38] However, the regional differences are quite stark within Delhi, where the slum households in Central Delhi, South Delhi and New Delhi appear to be better off than those in East Delhi (situated in eastern periphery).[39] The spatial differences are also observed across six official zones within Mumbai.[40] The slum households in Inner Island city and Outer Western Suburbs of Mumbai (i.e. heart of the city and its adjacent area) enjoy statistically significantly higher monetary SoL compared to those in Outer Island City (periphery).[41] Furthermore, looking across the tenure security (i.e. protection/notified) status of Mumbai slums, we expectedly observe that the households in the protected slum (protection status conferred between 1970 and 1998) areas enjoy higher per-capita incomes and

[36] It should be noted that of the surveyed households in Kolkata only 7% have BPL+ (i.e. BPL, Annapurna or Antyodaya) cards, 84% are APL and 9% have no card. In Mumbai, 21% households have BPL+ card, 70% are APL and 9% have no card. In Delhi, however, 49% households have BPL+ cards, only 19% are APL and 32% have no card.

[37] However, Marx et al. (2013) noted that in the slums of Kenya, Bangladesh, the living standard of households do not seem to be improving over time (i.e. the number years either spent in slum or the household first leaving the countryside).

[38] In the absence of any official regional categorization for Kolkata, we create six regional divisions consisting of different boroughs and wards as follows. North-West: boroughs 1, 2 and 4; North-East: borough 3 and wards 57 and 58; South-West: boroughs 9, 14 and 13; South-East: boroughs 10, 11 and 12; West: borough 15; Central: rest of the areas.

[39] For Delhi, regrouping 11 revenue districts as follows creates regional divisions. East: districts North-east, Shahdara, and East; Central: district Central; South: district South; South-east: district South-east; New Delhi: district New Delhi; North and West: districts South-west, West, North-West and North. It should be noted that areas in Central, South and New Delhi are either close to or are better integrated to the heart of the city, and are thus expected to be relatively well off areas. We observe slum dwellers in these areas to enjoy better economic prospects.

[40] The city of Mumbai has six official zonal divisions by combining different wards (See, Risbud 2003, pp. 2). Inner island city: A, B, C, D and E; Outer island city: F/S, F/N, G/S and GN; Inner Western Suburbs: H/E, H/W, K/E and K/W; Outer Western Suburbs: P/N, P/S, R/S, R/C and R/N; Inner Eastern Suburbs: L, M/E, M/W; and Outer Eastern Suburbs: T, S and N.

[41] For discussions on rural spatial poverty traps, see Jalan and Ravallion (2002) and Golgher (2012); for discussion on urban slum poverty traps see Marx et al. (2013).

earnings than the rest. Incidentally, we do not observe any significant difference in earnings between the tenement (chawl) dwellers and the squatter (zopadpatti) dwellers. A noticeable difference across cities however arises when we look at the ethnic background of the households: the households' state of origin does not appear to matter in case of income/earnings in Kolkata and Delhi, but in Mumbai, the migrants from North-Central part of the country and the 'rest' earn higher than the natives of Maharashtra.[42]

In the next two models (C1 and C2), we present the correlates of households' monetary SoL when it is assessed by the per-capita total household consumption expenditure and the per-capita total household consumption expenditure on food and cooking fuel. We have already seen in the previous section that the average consumption expenditures and their distributions were not as starkly different from the income counterparts. We however explore now whether per-capita consumption expenditures have different correlates in slums within each city. Like incomes, the households that are consistently associated with lower monetary (consumption) SoL are households with larger sizes, headed by females, and with higher child dependence. Unlike income however the existence of government employees or members with private contract does not matter in slums of Kolkata and Mumbai. In Delhi, having a government employee in the household is associated with significantly higher consumption expenditure. We do not observe any consistent pattern in consumption expenditure across households from different caste or religion background.

Table 4: Correlates of Standard of Living in Kolkata Slums

	Model-I1	Model-I2	Model-C1	Model-C2	Model-M
Female Headed HH	-0.174***	-0.197***	-0.179***	-0.118***	0.044**
Size of HH	-0.141***	-0.125**	-0.170***	-0.146***	0.021*
Square of Size of HH	0.006	0.005	0.008***	0.006***	-0.001
Child dependence	-0.899***	-0.943***	-0.277***	-0.381***	0.125***
Old-age dependence	-0.437*	-0.364	-0.087	-0.016	0.139**
Hindu General (Omitted)					
SC/ST (with caste certificate)	-0.040	-0.074	0.038	0.033	0.015
SC/ST (without caste certificate)	-0.052	-0.024	-0.106*	-0.011	0.083***
OBC (with caste certificate)	0.377*	0.376*	0.240*	0.119	-0.141***
OBC (without caste certificate)	-0.107	-0.049	-0.068	0.028	0.035
Muslim General	0.045	0.032	0.006	0.143***	0.017
Others General	-0.043	-0.042	-0.197	-0.239*	0.026
PDS: BPL+ household (Omitted)					
PDS: APL household	0.219**	0.165*	0.075	0.080	-0.060***
PDS: No Card households	0.028	-0.041	-0.076	-0.055	-0.019
Job: Private contract (Omitted)					
Job: Govt Employee/Pensioner	0.240**	0.241**	0.054	0.072	-0.046
Job: Others	-0.165***	-0.167***	-0.033	0.026	0.033*
Native to West Bengal (Omitted)					
Migrant: North Central India	0.068	0.093	0.061	0.001	-0.020
Migrant: Foreign	0.035	0.108	0.061	0.098*	-0.024

[42] This finding supports the findings of Mohan (1979) in the developing country contexts in general.

	Model-I1	Model-I2	Model-C1	Model-C2	Model-M
Migrant: Rest of India	-0.148	-0.109	-0.091	0.033	0.013
Migrated (1950-80) (Omitted)					
Migrated (before 1950)	-0.029	-0.063	0.016	0.007	-0.037**
Migrated (after 1980)	0.207***	0.143**	0.096*	0.069	-0.051**
Own house (Omitted)					
Rented house (thika/pagdi)	-0.109*	-0.068	-0.103**	-0.141***	0.125***
Rented house (informal)	0.015	0.108	0.149**	-0.023	0.093***
Rented (other arrangements)	-0.076	-0.054	-0.051	-0.116	0.127***
South-East Kolkata (Omitted)					
Central Kolkata	-0.023	0.009	0.002	0.016	-0.063**
West Kolkata	-0.114	-0.080	-0.095	-0.041	-0.037
South-West Kolkata	-0.110	-0.080	0.009	0.035	-0.051**
North-East Kolkata	-0.104	-0.091	0.007	0.022	-0.022
North-West Kolkata	-0.071	-0.025	-0.094	0.024	-0.020
Constant	8.436***	8.373***	8.044***	7.541***	0.435***
Observations	**796**	**787**	**808**	**808**	**808**
R-squared	**0.256**	**0.276**	**0.317**	**0.257**	**0.234**

***-Statistically significant at α = 1%, **-Statistically significant at α = 5%, *-Statistically significant at α = 10%.

Table 5: Correlates of Standard of Living in Delhi Slums

	Model-I1	Model-I2	Model-C1	Model-C2	Model-M
Female Headed HH	-0.184***	-0.202***	-0.146***	-0.084**	-0.008
Size of HH	-0.226***	-0.203***	-0.249***	-0.172***	0.003
Square of Size of HH	0.011***	0.010***	0.012***	0.007***	0.000
Child dependence	-0.687***	-0.740***	-0.180**	-0.083	0.143***
Old-age dependence	-0.618***	-0.737***	-0.268	-0.213	0.107
Hindu General (Omitted)					
SC/ST (with caste certificate)	0.019	-0.007	0.030	0.037	-0.009
SC/ST (without caste certificate)	0.039	0.018	0.011	0.026	0.070***
OBC (with caste certificate)	-0.046	-0.073	0.065	0.018	-0.023
OBC (without caste certificate)	0.009	-0.007	-0.047	0.026	0.016
Muslim General	-0.063	-0.080	-0.010	0.024	0.020
Others General	-0.069	-0.067	0.037	0.172	-0.083***
PDS: BPL+ households (Omitted)					
PDS: APL households	0.047	0.059	0.098***	0.103***	-0.004
PDS: No Card households	0.054	0.075*	0.069**	0.063**	0.031**
Job: Private contract (Omitted)					
Job: Govt Employee/Pensioner	0.360***	0.371***	0.162**	0.143**	-0.064**
Job: Others	-0.201***	-0.200***	-0.080*	-0.050	0.041*
Native to Delhi & North West India (Omitted)					
Migrant: North Central India	0.086	0.071	0.054	0.012	-0.026
Migrant: Rest	0.029	0.027	0.047	0.070	-0.001
Migrated (1970-80) (Omitted)					
Migrated (before 1970)	0.025	0.012	0.029	0.061	-0.008
Migrated (1980-90)	0.013	-0.006	0.069*	0.087***	0.000
Migrated (after 1990)	0.011	0.020	0.065	0.037	0.006
Owned House (Omitted)					
Not own house	-0.012	-0.002	0.132***	-0.064	0.006
Zone: East Delhi (Omitted)					
Zone: Central Delhi	0.170**	0.166**	0.233***	0.193***	-0.028
Zone: South Delhi	0.143***	0.153***	0.112**	0.016	0.028
Zone: South-East Delhi	0.089	0.074	0.077	0.115**	0.079***
Zone: New Delhi	0.148**	0.148**	0.180***	0.114**	0.089***
Zone: North and West Delhi	0.044	0.036	0.010	0.029	0.038**
Constant	8.861***	8.799***	8.266***	7.583***	0.357***
Observations (households)	**862**	**860**	**864**	**864**	**864**
R-squared	**0.374**	**0.350**	**0.406**	**0.282**	**0.168**

***-Statistically significant at α = 1%, **-Statistically significant at α = 5%, *-Statistically significant at α = 10%.

Table 6: Correlates of Standard of Living in Mumbai Slums

	Model-I1	Model-I2	Model-C1	Model-C2	Model-M
Female Headed household	-0.183***	-0.200***	-0.108***	-0.050*	0.033**
Size of household	-0.192***	-0.176***	-0.196***	-0.205***	0.019**
Square of Size of Household	0.010***	0.009***	0.009***	0.010***	-0.001
Child dependence	-0.789***	-0.780***	-0.298***	-0.298***	0.098***
Old-age dependence	-0.462***	-0.651***	-0.452***	-0.248*	0.049
Hindu General (Omitted)					
SC/ST (with caste certificate)	-0.007	-0.004	0.074*	0.068**	0.032*
SC/ST (without caste certificate)	-0.031	-0.038	0.016	0.033	0.059***
OBC (with caste certificate)	-0.005	-0.023	0.011	0.017	-0.040**
OBC (without caste certificate)	-0.043	-0.011	0.041	0.054	0.010
Muslim General	-0.048	-0.080	0.014	0.091**	0.028*
Others General	0.298**	0.264*	0.082	0.112*	-0.005
PDS: BPL+ household (Omitted)					
PDS: APL household	-0.014	-0.021	0.054*	0.008	0.001
PDS: No Card households	0.126*	0.124*	-0.026	0.005	0.034
Job (private contract) (Omitted)					
Job (Govt Employee/Pensioner)	0.291***	0.291***	0.048	0.059*	-0.064***
Job (Others)	-0.163***	-0.174***	0.005	-0.003	0.044***
Native to Maharashtra (Omitted)					
Migrants: North-Central India	0.173***	0.169***	0.180***	0.129***	0.008
Migrants: Western India	-0.007	0.003	0.021	-0.008	-0.037*
Migrants: Southern India	0.014	0.014	0.140***	0.087**	0.008
Migrants: Rest	0.127*	0.138*	0.160***	0.109**	0.013
Migrated (before 1950) (Omitted)					
Migrated (1950-70)	-0.008	-0.027	-0.013	-0.001	0.016
Migrated (1970-90)	-0.041	-0.052	-0.023	-0.054*	0.027*
Migrated (after 1990)	-0.135**	-0.142**	0.023	-0.049	0.033*
Owned House (omitted)					
Rented (Thika/Pagdi)	0.082	0.112**	0.194***	0.000	0.035**
Rented (Informal)	-0.110*	-0.105*	0.262***	-0.009	0.050**
Rented (Other arrangements)	0.012	0.016	0.361***	0.007	0.016
Tenement (Chawl) Houses (Omitted)					
Squatter (Zopadpatti) Houses	0.087	0.077	0.020	0.058	-0.026
Protected Slums till 1998 (Omitted)					
Declared/Notified Slums (post 1998)	-0.103**	-0.114***	-0.031	-0.047*	-0.004
Non-notified (but censused)	-0.104*	-0.115*	0.034	0.031	-0.023
Protection status not available	0.052	0.061	0.044	-0.013	-0.059***
Zone: Outer Island City (Omitted)					
Zone: Inner Island City	0.157*	0.138	0.101*	0.030	0.008
Zone: Inner Western Suburbs	0.092	0.110*	0.057	0.029	-0.008
Zone: Outer Western Suburbs	0.154**	0.180***	0.061	0.058	0.041*
Zone: Inner Eastern Suburbs	-0.066	-0.067	-0.063	0.005	0.031
Zone: Outer Eastern Suburbs	0.103	0.106	0.009	0.052	0.018
Constant	8.996***	8.944***	8.123***	7.711***	0.252***
Observations	**1089**	**1080**	**1093**	**1088**	**1093**
R-squared	**0.302**	**0.296**	**0.364**	**0.326**	**0.164**

***-Statistically significant at α = 1%, **-Statistically significant at α = 5%, *-Statistically significant at α = 10%.

We next look at the correlates in the bottom half of each table. Like income, we observe the slum households in Kolkata migrating after 1980 have higher per-capita consumption expenditure in both indicators. Similar results are observed in Delhi. In Mumbai, however we do not observe any difference across the households migrated at different point of time. As expected, not having own house is associated with higher overall expenditure due to rent payment. In Kolkata, however, the finding is mixed, may be due to the fact that a significant number of households are in tenement houses paying a very minimal rent (see, Bag et al. 2016) owing to various rent controls as discussed in section 2. Finally, we observe similar regional pattern across geographic regions within each city as we have observed in case of incomes. We thus did not observe any surprising differences between the correlates of per-capita incomes/earnings and consumption expenditures.[43]

5.2 Non-monetary correlates vis-à-vis monetary correlates

In model-M in each table, we present the correlates of household's non-monetary SoL, where the dependent variable is the multidimensional deprivation score obtained from counting the deprivations in the eleven indicators presented in Table 3. In order to avoid the loss of information on any deprivation and to avoid the choice of any arbitrary poverty cut-off, we choose to use households' uncensored deprivation scores as the dependent variable. It should be noted that in contrast to the monetary indicators, a larger deprivation score is associated with a worse SoL and so an opposite sign of each corresponding regression coefficient lead to the same effect.

Although we observe some correlates to be similarly and consistently related to the non-monetary context as in the monetary context, yet there are some crucial differences that are worth noting and call for policy attention. Similar to monetary SoL, the households headed by females and households with larger sizes reflect lower SoL in Kolkata and Mumbai and households with higher child dependence are worse off in all three cities. Another consistent result between Model-M and Model-I's is observed across households' primary job categories. A striking difference among the common set of variables is that the SC/ST households that do not hold any caste certificate appear to be consistently worse of within slums in all three cities in terms of non-monetary SoL. Such consistency across cities was not observed for any monetary indicator.[44]

We now explore the set of city-specific indicators. Looking at the Kolkata slums, we observe three major differences on how the correlates are associated with monetary vis-à-vis non-monetary SoL. First, the households (or their earlier generations) that migrated to the city before 1950 as well as after 1980 appear to be non-monetarily better off compared to those that migrated between 1950 and 1980. In case of monetary SoL, we observe the older generation of migrants to have lower incomes and earnings (not always statistically significantly though). Those who migrated after

[43] Our findings based on per-capita expenditures for Delhi partially supports Mitra's (2005) findings in terms of intra-city spatial differences, female-headed households, and castes, but contradicts Mitra's findings related to household size or child dependence (the proportion of children). We observe households with large size and higher child dependence to have lower per-capita consumption expenditure.

[44] Mitra (2005) observed SC/ST households usually resided in poor quality houses in Delhi slums. We however do not observe SC/ST households to be usually worse off non-monetarily than general Hindu households but SC/ST households without caste certificates are non-monetarily worse off than general Hindu households.

1980 are statistically significantly better off on average than the rest in terms of incomes, earnings as well as per-capita total expenditures. Second, those owning houses are statistically significantly better off non-monetarily than those who are renting. Third, the slum-households in Kolkata's Central and South-west regions appear to be statistically significantly better off non-monetarily compared to those in Kolkata's South-east region.

In the case of Mumbai, we observe four differences. First, the slums of Mumbai house the most diversified communities from different regions of India. We observe that the migrant households from Western and Southern India are non-monetarily better off compared to the natives, but, it is interesting to note that although the households from North-central India are monetarily better off than the natives, but their monetary advantages are not translated into better non-monetary SoL. Second, those who migrated more recently, i.e. after 1970, appear to be statistically significantly worse off non-monetarily than those that migrated before 1950. It may be of interest to point out that those migrating after 1990 are not only worse off non-monetarily, but also have lower incomes and earnings. Third, the households owning houses, as observed in Kolkata, appear to have higher non-monetary SoL than those residing under Pagri tenancy system or with informal tenancy. Fourth, we observe that in Mumbai higher incomes and earnings of the households in protected (pre-1998) slums compared to those in notified and non-notified slum areas, does not transpire to higher non-monetary SoL. In fact, the households in slums that are legally protected from eviction (protected/notified/declared) are non-monetarily indifferent to those living in non-notified slums.[45] This observation questions UN's idea towards improving living standards in slums through tenure security. Finally, the households in slums of Outer Western suburbs are non-monetarily worse off vis-à-vis those in Outer island city, despite higher incomes and earnings.

In case of Delhi, we observe two striking differences. First, although like Kolkata and Mumbai, we observe similar effects of heads' gender or households' sizes on monetary SoL, such effects, unlike Kolkata and Mumbai, are not observed in the non-monetary context. Second, we observe the households in New Delhi to be less non-monetarily well-off compared to those in East Delhi, despite being monetarily better off. Similarly, we observe higher monetary SoL among households in Central Delhi compared to East Delhi, but no statistically significantly difference in non-monetary SoL is observed.[46]

5.3 Why are these differences? A decomposition analysis

From our discussions in the previous sub-section, we have observed that characteristics are often differently associated across monetary and non-monetary approaches in different cities. Since the

[45] We should also point that the households in legally protected slums are non-monetarily worse off than those whose tenure status is unavailable. Note that those slums for which the legal status is unavailable are quite diversified collection, some of which are on central government land and thus are not covered in any slum development program under the Slum Act. One important factor, commonly noticed across these slums, is that there's hardly any deprivation in water facility indicator.

[46] To test the robustness of our main findings in non-monetary regressions, we reconstruct the deprivation scores using other weighting schemes and for different combinations of deprivation cut-offs of indicators. Our main findings discussed above are mostly robust to these changes.

non-monetary counting deprivation scores consist of deprivations in eleven indicators, it is not readily visible why and how certain characteristics are significantly associated with the non-monetary deprivation score. From policy perspective, it is important to understand which particular indicators are dictating these associations, which can be accomplished by exploring the decomposition of deprivations across certain characteristics using spider diagrams presented in Figure 4.

In Panels I and II of the Figure 4, we present two cases from Delhi and Mumbai where one region in each city has higher monetary SoL but lower non-monetary SoL. In Delhi, as we have observed from Table 5, households in New Delhi appear to have higher monetary SoL but lower non-monetary SoL. Are there particular indicators where households, on average, are more deprived than the household in East Delhi? Panel I shows, in fact, that in none of the eleven indicators the households in New Delhi are less deprived than those in East Delhi. Rather, in three indicators – sanitation facility, over-crowding, and the type of house, the households in New Delhi are significantly worse off. By further decomposing the sanitation facility indicator, we find that the 93% of the surveyed households in New Delhi area do not have personal toilets, whereas the corresponding figure is 64% for East Delhi region. Despite having higher incomes, the slum-dwellers in New Delhi area are more deprived in the 'type of house' indicator. This is mainly because a majority of New Delhi slums falls in the highly-regulated zone, where the city council does not allow further construction activities by the slum dwellers. Moreover, as economic activity at the centre of a city potentially fetches more income, the houses in the slums of New Delhi are relative more over-crowded.

In Panel II, we compare the Outer Island region (one of the biggest contiguous slums, Dharavi, is situated here) and the Outer Western suburb (Andheri area and beyond) of Mumbai. The households in Outer Western suburb are less deprived in water sources, but they are significantly more deprived in two housing related indicators – type of house and leakage in house. The larger deprivation in water facility is mainly due to inadequate water supply per day. The decomposition of the leakage indicator reveals that the households in the Outer Western suburb zone mainly suffer much higher leakage (43.7%) through roof vis-à-vis those in Outer Island region (31%). Higher leakages through roof is expected when 60% of the Outer Western Suburb households reside in non-improved houses, but surprisingly higher per-capita incomes of these households on average did not translate into better housing and lower roof-leakage rate. The underlying reason may be that 75% of the households of Outer Western Suburb reside in 'declared' slums; whereas only 39% in Outer Island city reside in 'protected' slums. The 'declared slum' status under slum acts, although prevent households from eviction (without an alternative housing), does not confer property rights of the plot of the houses to the owner/ occupier, but imposes a status quo on further constructions and repairs works of the existing structures.[47]

[47] The relationship between tenure security and investments in housing/land has been not been empirically well explored in slums. However, Field (2005) and Galiani and Schargrodsky (2010) showed that formal titling could encourage investments in poor urban areas.

In Panels III-IV, an interesting pattern is observed when we compare the households with own houses to households living in rented houses in slums of Mumbai and Kolkata. The households residing in rented houses do not necessarily appear to have lower monetary SoL, but strictly lower non-monetary SoL. The households in rented accommodations do not appear to have lower deprivation in any non-monetary indicator. In Mumbai rather they are more deprived in education, savings instrument, respiratory health risk, and asset ownership. In Kolkata, the households in rented houses are additionally deprived in three indicators – sanitation facility, over-crowding, and type of house. The situation is particularly deplorable for the thika tenants in Kolkata as their earning is significantly less than those owning their dwellings.

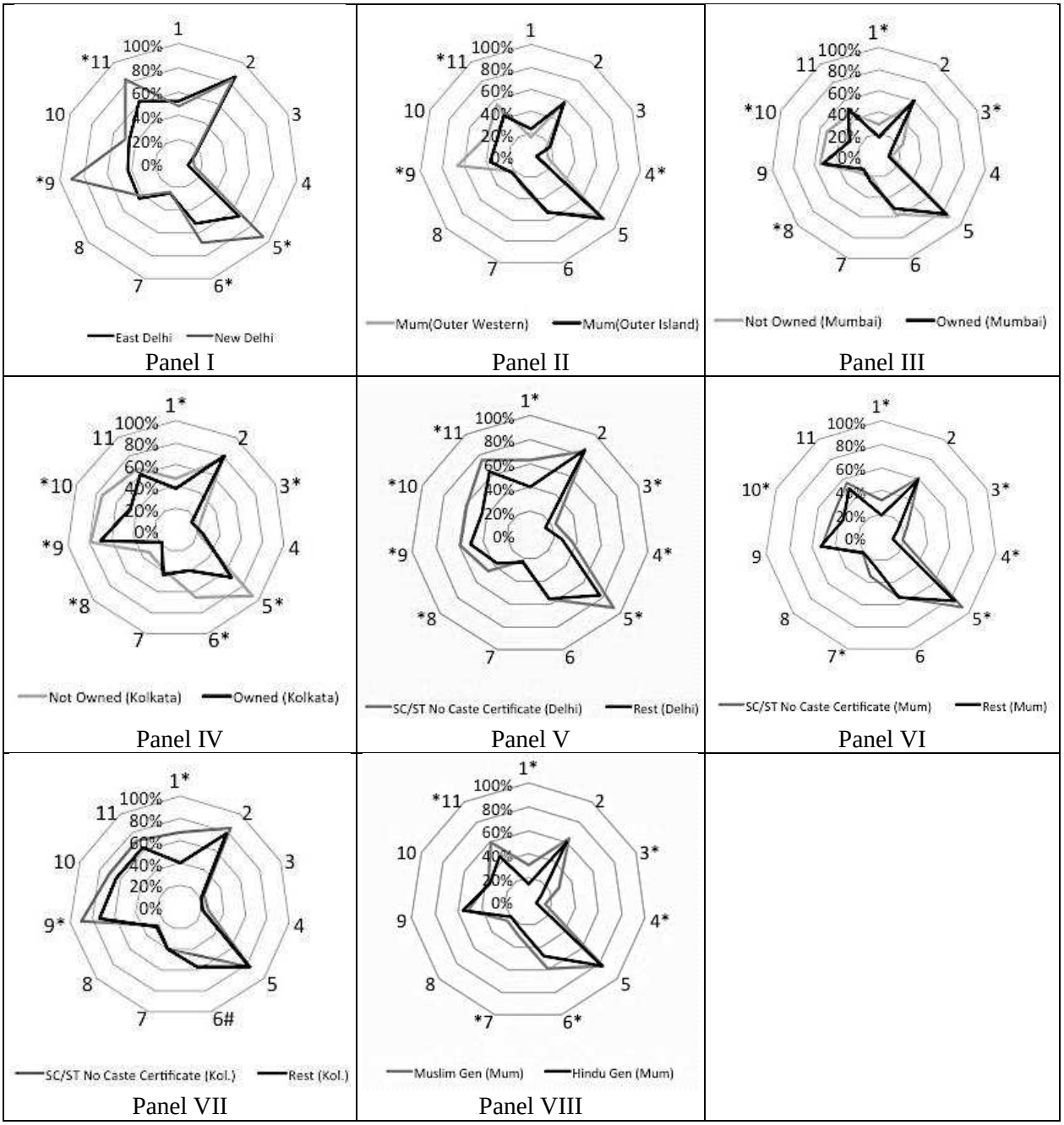
In the next three panels (V-VII), we present the striking case comparing the SC/ST households with no caste certificate to the rest of the city's slum households in each of the three cities. This group does not appear to be statistically significantly monetarily less well-off compared to the Hindu General households in any city, but is non-monetarily less well-off consistently in all three cities as evident from the regressions presented in the previous section. In which indicators are they more deprived compared to the rest? We find that in Delhi and Mumbai, the SC/ST households with no caste certificates are more deprived in six or more of the eleven indicators. This group consistently lags behind in the education and asset holding indicators compared to the rest. In fact, strikingly we find that the SC/ST households without caste certificate are significantly and consistently more deprived in two indicators (education and savings) vis-à-vis SC/ST households with caste certificates in all cities. Further, it is noted that their situation is even worse in Delhi as they are more deprived in five additional indicators (water, toilet, leakage, asset and respiratory health).

Lastly, in Panel VIII of Figure 4, we show how Muslim (General) households in Mumbai fare vis-à-vis Hindu (general) households. It can be seen from Table 6 that Muslim (general) households earn lower incomes on average (albeit not statistically significant), but incur significantly higher expenditure on food and fuel (mainly due to their preference for non-vegetarian food items). However, general Muslim households in Mumbai are not better off in any of the eleven non-monetary indicators than their general Hindu counterparts, but rather significantly worse off in six indicators – education, savings instrument, health insurance, over-crowding and also in water facility and leakages. Higher deprivations for Muslim households in water and leakage indicators may be due to their particular spatial concentration. It is worth noting that in the Inner Eastern suburb area 58% of surveyed households reported leakage issues and a third of all households here are Muslims.[48] Further, it is worth mentioning that general Muslim households in Mumbai slums

[48] In the Inner Eastern suburb (wards L, MW and ME) area of Mumbai has relatively higher non-monetary SoL. There are two striking features of this zone. First, 30% of households are Muslim and 29% are SC/ST. This is the largest concentration of these two communities here among all zones of Mumbai., Notably, one third of Mumbai's general Muslim households reside here. Secondly, in this area, almost 84% of surveyed households reside in either protected or declared slums and many of these slums were created by resettling the households from various parts of the city. Almost 56% of the surveyed households reside in non-pucca houses and about 43% of households report some kind of leaking (mostly through roof).

are non-monetarily no different in any of the eleven indicators from the SC/ST households without caste certificates.

Figure 4: Comparison of the compositions of deprivations in eleven non-monetary indicators across correlates



Index: 1: Education; 2: Information instrument; 3: Savings instrument; 4: Water facility; 5: Sanitation facility; 6: Over-crowding; 7: Health Insurance; 8: Respiratory health risk; 9: Type of house; 10: Asset ownership; 11: Leakage in house.

* - The difference is statistically significant at 90% level of significance;

\# - The (negative of) difference is statistically significant at 90% level of significance.

Source: Author's own computations.

6 Concluding remarks

The growth of slums appears to be an inevitable urban phenomenon in developing countries. National policy makers often continue to visualize and interpret slums as informal dwelling lots of one vulnerable group of people without making any serious attempt to analyse various aspects of slum lives, such as livelihoods, evictions, health, and environmental hazards. There is need for recognizing the fact that slums are not at all homogenous and vary both within and across cities by types, geographies, histories as well as by residents. There are also inimitable social hierarchies that determine the dwellers' SoL within slums, where caste, religion, ethnicity and gender play a major role. These are overlapping, cross-cutting categories and there is no uniform way of deciphering the relationship between this hierarchy and the level of SoL across slums of three cities. We attempt to measure the SoL through a more holistic approach covering housing needs, issues related to health and access to basic services.

In this paper, we contribute to the literature in two ways. First, through our analysis based on three largest cities in India, we show that in practice it matters whether the slum-dwellers' living standards are assessed by using a monetary approach vis-à-vis a non-monetary counting approach. For example, in the context of Delhi and Mumbai, we observe that higher regional monetary SoL does not go hand-in-hand with better non-monetary SoL. Such analysis is not common in the literature for studying SoL in slums. Second, we conduct a comparative study on how various slum-level (local governance, land market institutions etc.) and household-level characteristics or correlates are associated with households' monetary and non-monetary SoL within and across cities. We observe that the correlates are often differently (or in some cases similarly) associated with two different measures of SoL. A key message conveyed by this observation is that policy choices and designs for improving slum-dwellers' SoL need to be adequately tempered. Additionally, our findings may question the efficacy of the usual policy choices, such as cash transfers, in automatically improving the slum-dwellers' non-monetary multifaceted living conditions.

To improve monetary and non-monetary living conditions in slums, a set of policies can be construed at three different levels: (a) at the household level, targeting the poor households with specific schemes to ameliorate key deprivations; (b) at the community level, targeting and improving infrastructural inadequacies (e.g. water, sanitation, drainage, electricity etc.); and (c) dealing with the legal aspects related to tenure security in slums through political will. Detailed discussion on probable public-policy choices is out of the scope of the current paper, but it is worth highlighting certain interesting points from our findings in the Indian context that however may be applicable in the context of other developing countries.

First, we observe that indigenous SC/ST households without any caste certificates consistently appear to be non-monetarily less well-off in slums of all three cities. Due to the lack of their caste identity proofs in cities, which is normally linked to their residency status back in the state domicile, these SC/ST households in slums are left out of affirmative action initiatives of the local urban governments, which, along with several types of social exclusion, perhaps lead

to perpetuating deprivation in non-monetary indicators. This particular finding calls for a review of the strategies relating to the issuing of caste certificates by government agencies and ways of implementing affirmative actions in Indian urban areas.

Second, female-headed households – mainly comprising of elderly, widowed, and deserted women – are worse off both monetarily and non-monetarily in Kolkata and Mumbai. Although the local governments have special monetary assistance scheme for women with widowed status, the disbursement of endowments is not only scanty (INR 300-600 or around US$5-10 per month), but also quite irregular. Moreover, the disbursements are often routed through local councillor's office, which is inherently inefficient – making the entire scheme highly discretionary and prone to corruption and creating the scope for additional delay and undue discrimination. A better scheme may be envisaged through direct cash transfer mechanism by involving self-certification and bypassing the office local representatives. The monetary deprivation of the female-headed households may perhaps be tackled through better financial assistance schemes, but to improve upon their non-monetary deprivation calls for a more holistic approach.

Third, we draw attention to legal factors related to tenancy and slum notification. In Kolkata and Mumbai, we observe that the households in tenements settlements are consistently non-monetarily worse off than those who own their houses. The former continues to remain in a backward state largely due to obsolete land tenure arrangements, institutionalized neglect and discrimination. Adding to their woes, many tenement settlements in Mumbai and Kolkata are recently facing a status quo under different tenancy acts and are also under 'rent control' (owing to property rights disputes). These distresses call for new laws to confer some property rights to those living in tenement settlements. We further observe in Mumbai that the households in the slums that are protected from eviction are non-monetarily no different than those in unrecognized slums. This observation contests the UN's notion of improving living standards through tenure security. In India, the Rajiv Awas Yojna (RAY) scheme for assisting the poor households in urban slums to construct or renovate their houses is in existence for a decade now. This scheme however can be availed only by those with legal ownership status over their dwelling plots, but Indian slum Acts do not confer the ownership right to the slum habitants. Modernization of slum acts in India by conferring legally recognized foothold (through land titling) of the slum-dwellers may bring stability in their life – securing both their pecuniary and non-pecuniary prosperity.

Finally, there are a number of available national and state government schemes for dealing with monetary and non-monetary deprivations.[49] While the potential accessibility of these schemes depends on the identification strategies for targeting beneficiaries, their tangibility depends on the efficient implementation and on the quantum of pecuniary emoluments and profound legal entitlements. For example, restricting various schemes – such as, Pradhan Mantri Ujjwala Yojna

[49] Various state and central governments' schemes are available at the following sources, accessed in September 2016:
http://www.wbdma.gov.in/HTM/MUNI_AtaGlance.htm (tab: programmes)
http://www.mhupa.gov.in/User_Panel/UserView.aspx?TypeID=1405
http://performance.gov.in/?q=flagship-programmes

(PMUY) for LPG connections and Rashtriya Swasth Bima Yojna (RSBY) for family health insurance, merely to below-the-poverty-line (BPL) households would exclude many other potential beneficiaries in slums, especially when the BPL identification methodologies have been criticized, debated and amended so many times in the last two decades (Alkire and Seth, 2013a,b). There is thus serious need for reevaluating and broadening the implementability of the available programs in order to improve the living conditions in slums.

Our approach in this paper may be replicated for slums in other countries and regions for understanding the specific characteristics of these slums for designing better policies to improve the living conditions of slum-dwellers in UN-SDG framework. Even in order to understand the efficacy of various public policies, it is important that the living conditions are not only assessed by monetary indicators but also through a non-monetary approach capturing the joint distribution of achievements in different indicators. We strongly hope our study would stimulate serious academic interest and contribute to the relevant public policy debates.

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Appendix A: List of sampled slums in Kolkata, Delhi and Mumbai

Kolkata	
Borough No.	**Slum Name**
1	Chiria More, Dumdum Road
	Churipara, Ghosh Bagan
	Seth Pukur Road
2	27, Munshi Para Lane, Canal West Road
	93\1a, 440, Masjid Bari Street, Hatibagan
	Krishna Ram Bose Street
3	1 No Dr. Panchanan Mitra Lane, Narkeldanga
	1-6, 67-71, Surah 2nd Lane, Narkeldanga
	15\H\6\1 8\A, 8\C 7\7 Chamru Singh Lane
	89,93,94,95,97,98,99,100 Narkeldanga
4	1, Ramesh Dutta Street, Rabindra Sarani
	2,3a, 3b, 3c, 3d Gas Street
	2b, Brojo Kumar (B.K.) Seth Street
5	1 No Srinath Babu Lane
	3 & 12 Gour Dey Lane
	3,3\1,3\4,15,16,14, Beliaghata Rd
6	1-4, Chhatu Babu Lane
	14 Elliot Rd, Ripon Street
	14, Niyogi Pukur Lane
	15 Convent Lane. 114-120 Ananda Palit Rd.
	29\2, 51\1, Doctor (Durga Charan) Lane
	Islam St; 1-3,29,30,47 Phool Bagan Rd.
7	1,2,5-14, Tiljala Road
	12\4\7,12\4, Gobind Khatick Raod
	13, Mahendra Chatterjee Road
	13-14, Paymental Garden Lane
	15-16, Gobra Road
	17,19, 21, 105, Beck Bagan Rd.
	17, New Tangra Road
	2, New Tangra Road
	28-30, Christopher Road
	4-9, Ram Mohan Bera Lane
	41, Pulin Khatik Road
	6-16, Guri Para
	Muslim Camp, 69 D.C. Dey Road
	Swinhoe Lane
8	19, Ashutosh Mukherjee Road
	39, Beltala Road. Pyara Bagan Basti
	Kali Lane
9	16, Ibrahim Road
	Bhut Ghat
	Jayananda Mistri Lane
10	Chetla Rd., Mandal's Temple
	Dr. Deodar Rahman Road
	Kumor Para Bustee
11	Atabagan, Sheikh Para
	H.L. Sarkar Road
	Pratapgarh Manashatala
12	EM Bypass, Purba Rajdanga
	Safui Road, Naskar Para
	Shahid Smriti Colony
	Uttar Purba Panchanna Gram
13	Agarwal Garden Road, Behala
	Manjhi Para Road, Behala
	Motilal Gupta Road, Behala
14	33, Pathak Para Road
	Dr.A.K. Paul Road
	Ram Narayan Mukherjee Rd
15	Fatehpur Village Road
	Gazipara, Akra Road
	Paharpur Road I
	Paharpur Road Ii
	Panch Para Basti

Delhi	
Revenue District	**Slum Name**
Central	Ambedkar Basti
	Dhobi Ghat, Press Road
	LNJP Hospital
	Malikpur
	Shakoor Ki Dandi
East	Indira Camp Trilok Puri
	Pandit Bismil Camp
	Ravidas Camp
North East	CPJ Block, New Seelam Pur
	Imbira Pushtha Basti
New Delhi	Indira Gandhi Camp
	Saraswati Camp RK Puram
	Sewa Camp Vasant Vihar
	Shaheed Arjun Das Camp
	Shri Ram JJC
North	Block- EE, Ring Bund Huts
	CD Block- Sabzi Mandi
	Ekta Camp
	Hanuman Mandir, Model Town
	Kabir Nagar
	Samaypur Badli
	Sanjay Sudhar Samiti Camp
North West	Chandra Shekhar Azad Colony
	Dhobi Ghat, Y Block, Mangolpuri
	Kanhaiya Nagar Crossing
	Meera Bagh
	Shakti Nagar Extension
South East	Bhoomiheen Camp Kalkaji
	Harijan Camp, Lodhi Road
	Pratap Camp
	Sanjay Colony Tilak Bridge
Shahdara	Deepak Colony Dilshad Garden
	Kalender Colony
	Rajiv Gandhi Camp
	Sundar Nagari
	Sunder Nagri

South	Grah Kalyan Samiti
	Harijan Camp and Banjara Camp
	JJC in Front Of B4/B5, Vasant Kunj
	Jeewan Jyoti Rajeev Camp
	Kusumpur Pahari
	Mini Subhash Camp
	Motilal Nehru Camp Jnu
	Sanjay Colony, Okhla
South West	Behind Police Station Vasant Kunj
	East Sagarpur, Nallapar
	Sonia Gandhi Camp
West	5/35 Industrial Area Kirti Nagar
	Chara Mandi Jhakira Flyover
	Harijan Basti, Chuna Bhatti
	Jagannath Camp
	Mayapuri Railway Line
	Natraj Cinema, Sudama Puri
	Peeli Kothi,Hari Nagar
	Raghubir Nagar
	Sanjay Camp, Chuna Bhatti

Mumbai

Ward Name	**Slum Name**
A	Dhobi Ghat
	Dr. Babasahed Ambedkar Nagar
B	Bibijan Street
D	Banganga
	Shivaji Nagar, Malabar Hills
E	Nava Nagar
	Patra Chawl
FN	Dinbandhu Nagar
	Ganesh Nagar
	Sangam Nagar
	Sion Koliwada (+Sra)
FS	Shivdi Cross Road
GN	Janta Naya Nagar
	Kashinath Dhrurubhai Patra Chawl
	Kumbharwadi
	Palwadi (+Sra)
GS	Mahatma Phule Nagar, Ward G/S
	Rajiv Gandhi Transit Campus
HE	Behram Pada
	Jaku Club Santacruz
	Jawahar Nagar, Ward H/E
	Shastri Nagar, Santacruze
	Valmiki Nagar
HW	Navjeevan Society
	Sidhivinayak Chawl
KE	Ambewadi
	Malapa Dongri-2
	Railwayline Service Road
	Shiv Tekdi
KW	Gaon Devi Dongri (+Sra)
	Gilbert Hill
	Jeevan Nagar
	Umar Bhai Chawl, Behrambagh (+Sra)
L	Ambedkar Nagar, Ward-L
	Mahatma Phule Nagar, Ward L
	Nehru Nagar Kurla
	Shivaji Kutir Jhoparpatti
	Vasant Nagar
	Vinoba Bhave Nagar
ME	Borla Kamawadi Zopadpatti
	Indira Nagar
	Kamala Raman Nagar
	Nirankari Nagar
	Raman Mama Nagar
	Shivaji Nagar, Chembur
MW	Ayodhaya Nagar
	Bhai Bhai Nagar
	Chhatrapati Shivaji Nagar
N	Hanuman Nagar
	Pant Nagar Ghatkopar (East)
	Pitamaha Ramji Nagar
	Siddharth Nagar
PN	Irani Wadi (+Sra)
	Makrani Pada
	Nivedita Compound
	Pathan Wadi
	Shivaji Nagar-Malad
	Valni Jhopadpatti
PS	Govind Nagar
	Jawahar Nagar, Ward P/S
	Sundar Nagar
RC	Holy Cross Road
	Kasturba Road, 8/9 Kaheri
RN	Ketaki Pada
	Maratha Colony
RS	Ganesh Nagar Govt.
	Ganesh Nagar Kandivali
	Ganesh Nagar Pvt.
	Ratna Bai Chawl
S	Ambedkar Nagar, S-Ward
	Anand Nagar
	Kamble Compound
	Sambhaji Nagar
	Shah Colony
	Shree Datta Mandir
T	Gavan Pada
	Ghati Pada

Appendix B: Pairwise association between indicators in Kolkata, Delhi and Mumbai

The following table reports the percentage of slum dwellers deprived in each indicator as well as the percentage of slum dwellers that are deprived in every pair of indicators simultaneously, reflecting the pair-wise association between indicators' deprivations.

Kolkata

Ind		Wa	Sn	Ho	Le	Ov	Co	He	Sv	At	Ce
	Depr	**21.2%**	**82.4%**	**74.5%**	**62.6%**	**65.0%**	**26.8%**	**42.8%**	**19.4%**	**60.7%**	**83.0%**
		Percentage of slum dwellers simultaneously deprived in row and column indicators									
Sn	**82.4%**	16.4%									
Ho	**74.5%**	16.7%	65.6%								
Le	**62.6%**	16.4%	55.0%	53.9%							
Oc	**65.0%**	12.8%	59.0%	50.4%	42.9%						
Co	**26.8%**	7.3%	23.9%	20.4%	19.6%	19.4%					
He	**42.8%**	7.6%	37.9%	31.6%	28.9%	28.5%	13.5%				
Sv	**19.4%**	4.2%	17.8%	14.2%	13.4%	15.0%	8.2%	9.0%			
At	**60.7%**	14.4%	53.1%	48.3%	41.2%	42.0%	20.1%	25.8%	14.4%		
Ce	**83.0%**	18.0%	70.2%	61.8%	55.2%	56.5%	24.7%	39.4%	17.0%	53.1%	
Ed	**41.7%**	9.7%	37.1%	32.4%	28.4%	29.0%	14.3%	18.0%	11.0%	28.2%	36.2%

Delhi

Ind		Wa	Sn	Ho	Le	Ov	Co	He	Sv	At	Ce
	Depr	**29.7%**	**80.3%**	**52.6%**	**67.1%**	**64.9%**	**39.0%**	**24.3%**	**15.6%**	**44.3%**	**88.6%**
		Percentage of slum dwellers simultaneously deprived in row and column indicators									
Sn	**80.3%**	25.2%									
Ho	**52.6%**	15.7%	45.1%								
Le	**67.1%**	20.5%	57.4%	40.6%							
Oc	**64.9%**	18.1%	52.5%	36.9%	46.0%						
Co	**39.0%**	11.8%	34.2%	24.9%	29.3%	27.9%					
He	**24.3%**	7.4%	19.2%	13.8%	17.5%	15.2%	9.3%				
Sv	**15.6%**	3.9%	13.1%	9.7%	11.8%	11.0%	7.3%	3.5%			
At	**44.3%**	13.0%	40.0%	25.3%	31.1%	30.1%	22.4%	11.5%	8.9%		
Ce	**88.6%**	26.4%	72.0%	46.9%	60.7%	59.0%	36.2%	22.6%	14.2%	39.3%	
Ed	**43.4%**	12.8%	35.2%	24.1%	30.8%	30.5%	21.0%	11.1%	9.4%	23.8%	38.8%

Mumbai

Ind		Wa	Sn	Ho	Le	Ov	Co	He	Sv	At	Ce
	Depr	**10.6%**	**84.4%**	**52.6%**	**51.9%**	**63.2%**	**19.7%**	**24.8%**	**15.7%**	**34.5%**	**64.6%**
		Percentage of slum dwellers simultaneously deprived in row and column indicators									
Sn	**84.4%**	9.6%									
Ho	**52.6%**	7.6%	46.7%								
Le	**51.9%**	6.2%	45.2%	30.0%							
Oc	**63.2%**	7.7%	54.8%	34.4%	34.1%						
Co	**19.7%**	3.0%	17.5%	13.6%	11.6%	12.8%					
He	**24.8%**	3.8%	21.4%	12.4%	16.4%	15.3%	5.9%				
Sv	**15.7%**	2.8%	13.8%	9.3%	10.0%	11.3%	5.4%	5.4%			
At	**34.5%**	5.3%	31.9%	21.5%	20.0%	24.3%	9.7%	9.2%	8.7%		
Ce	**64.6%**	7.5%	57.1%	34.9%	35.6%	44.9%	14.0%	19.1%	11.5%	25.8%	
Ed	**17.2%**	3.6%	15.9%	11.0%	10.4%	11.5%	5.2%	5.1%	5.0%	10.6%	12.4%

Ind: Indicator; **Depr:** Percentage of population deprived in each indicator; **Wa:** Water Facility; **Sn:** Sanitation Facility; **Ho:** Type of house; **Le:** Leakage in house; **Ov:** Over-crowding; **Re:** Respiratory health risk; **He:** Health insurance; **Sv:** Savings instrument; **At:** Asset ownership; **Ce:** Information instrument; **Ed:** Education attainment.