
policy and practice

Multidimensional poverty in Kolkata's slums: towards data driven decision making in a medium-sized NGO

Maurice Lange, mauricelange@outlook.com

Calcutta Rescue is based in Kolkata, India. I (Maurice) now live in London, UK

Calcutta Rescue (CR) is a medium-sized NGO based in Kolkata, India that focuses on supporting the residents of the city's slums. In 2019, CR launched its first multidimensional poverty survey seeking to understand the degree to which, and in what ways, the populations they work with were deprived. It was hoped that this would also contribute to the measurement of the impact of their interventions. This piece introduces and discusses the composition of the survey and the data collection method. It then presents some of the results, and discusses how they are informing, and will inform, CR's work.

Key words multidimensional poverty index • urban slums • India • non-governmental organisation

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Introduction

Calcutta Rescue (CR) is a medium-sized NGO based in Kolkata, India. We focus on supporting the residents of slum areas most poorly served by the local and national governments. The organisation employs 150 permanent staff, and, at any one time, also has an additional four to ten, usually western, volunteers working in consultative or hands-on roles. CR works across four fixed primary care clinics, two mobile clinics, two primary and secondary schools, a small employment programme for recovered patients, and the Head Office. CR has also installed drinking water and sanitation improvements in four of the areas in which they work. We currently provide at least basic primary healthcare services to residents of 32 slum areas with a combined population of approximately 30,000 people (Calcutta Rescue, 2020). These slum areas are located across the city (see Figure 1) and vary considerably in size and character.

In 2019, Calcutta Rescue launched their first multidimensional poverty survey. We wanted to understand the degree to which, and in what ways, the populations we work with were deprived. With a multidimensional approach, we hoped to build a picture of overall levels of poverty, while also having detailed data on a range of

individual indicators. We also wanted a more structured way to measure the impact of our interventions. It was hoped that empirical data would complement the wealth of knowledge held by CR's staff, and would, over time, become a significant component in guiding the charity's strategy.

Research on poverty in Kolkata is not uncommon, but it is not systematic. There are a number of recently published academic studies ([Kundu, 2003](#); [UNICEF, 2014](#); [Maitra and Prasada Rao, 2015](#); [Bag and Seth, 2018](#)), but the comparability of results is limited due to a lack of consistency in the populations studied and research methods used. In short, the available secondary data is not of much practical use to NGOs trying to understand the specific communities with whom they work.

When it was first conceived, the primary aim of the survey was to enable CR to construct a multidimensional poverty index (MPI) in the same vein as the UN's Global MPI ([UNDP, 2018](#)) – CR could compare slum areas in the same way the UN compares countries and regions. For a full technical exposition of this method, please see *Multidimensional Poverty Measurement and Analysis*, by [Alkire et al \(2015\)](#).

In this piece, I first introduce and discuss the composition of the survey and our data collection method. I then present some of the results, and discuss how they are informing, and will inform, CR's work.

Calcutta Rescue's multidimensional poverty survey

The survey

The MPI was designed to be a straightforward tool for comparing overall levels of deprivation across the areas in which CR works, which, when repeated, could help measure change over time. We were not wanting to provide an explanation for the deprivation we observed, nor, at least in first instance, were we going to try to understand how different deprivations interact. It was simply a data collection exercise that would provide an overall picture and enable us to pinpoint the specific issues each area faced.

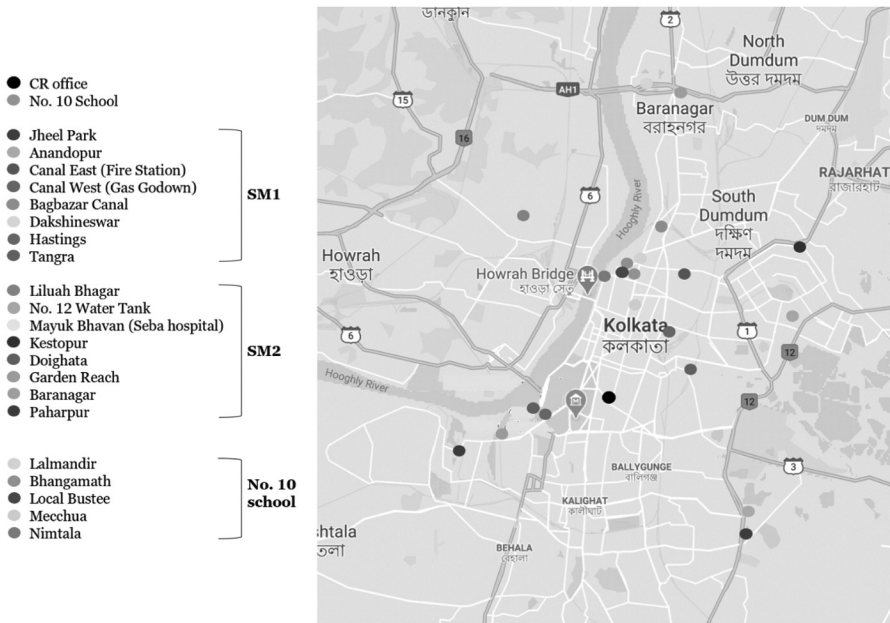
It was important that the summary poverty measure was informed by the Kolkata context, and CR's objectives. We used the now standard [Alkire and Foster \(2011\)](#) 'counting method', and the standard dimensions 'health', 'education' and 'living standards' (each weighted equally), but included a different selection of indicators and changed some deprivation cutoffs (see [Table 1](#)). Data was also collected for some health, education and living standards indicators that were ultimately excluded from the final MPI. We acknowledged that in the selection of dimensions and indicators, there was a tension between our ambition to be multidimensional, and our ability to collect particular types of information ([Ravallion, 2011](#)). Our index therefore fails to represent some important deprivations – some that CR has begun to work with other NGOs to combat, such as the experience of domestic violence, and others which are simply harder to measure, such as social exclusion.

We also collected data at the household level on religion, caste, languages spoken, household size and structure, perceived life quality and previous interactions with CR. We collected data at the level of the individual on sex,¹ age,¹ literacy,¹ years of schooling,¹ addictive habits¹ (for example, regularity of smoking), transience¹ (the number of months in the last year the individual stayed in the slum), and monthly income.¹

Table 1: Dimensions and indicators for Calcutta Rescue's MPI

Dimension	Indicator	Deprivation cutoff (A household is deprived if...)	Weight
Health	Nutrition	The individual measured has an underweight (under 18.5) or obese (over 25) BMI. ²	1/18
	Family planning	The respondent knows about fewer than two safe methods of pregnancy prevention.	1/18
	Antenatal care	Any women pregnant in the last five years failed to see a medical professional within the first three months of pregnancy.	1/18
	Vaccination completion	One or more children aged 5 or below is not up to date with their immunisation schedule.	1/18
	Health education	The respondent has complete understanding of fewer than three of the following prevalent diseases: TB; HIV; Leprosy; Malaria & Dengue fever.	1/18
	Hygiene & diarrhoea response knowledge	The respondent does not wash hands with soap and clean water before eating and after going to the toilet. The respondent does not know that Oral Rehydration Sachets can help with symptoms of diarrhoea.	1/18
Education	School attendance	Any child aged 4–16 is not attending age appropriate school (Classes 1–10).	1/12
	Years of schooling	No household member aged 15–45 has completed at least eight years of school.	1/12
	Child labour	Any child aged 14 and below is in paid labour, or works for over four hours per day.	1/12
	Female literacy	No women aged 15 or over are literate.	1/12
Living standards	Water access	Water is available for fewer than two hours per day. The distance to the source exceeds a 30-minute round trip.	1/21
	Latrine facilities	The household does not use at least 'limited' standard toilet facilities. ³	1/21
	Housing material	The floor is made of dirt; the walls, roof or floor do not protect from rain, wind and sun.	1/21
	Cooking Fuel	The household doesn't cook using a clean fuel. ⁴	1/21
	Electricity	The household has no electricity. The electricity does not meet tier two capacity requirements ⁵ and isn't available for at least eight hours per day.	1/21
	Assets owned	The household does not own three or more of these assets: radio/speaker; TV; landline phone; basic mobile phone; smartphone; computer/tablet*; bicycle; cycle van; motorbike*; car*; or refrigerator*. ⁶	1/21
	Living security	The respondent states that they fear eviction.	1/21

Figure 1: Location of surveyed slum areas^{7, 8, 9}



Data collection

We define slum areas as groups of 25 or more poor-quality dwellings (Kundu, 2003). However, for the purpose of data collection and analysis some compromises had to be made: some slums run for kilometres along the sides of canals and were therefore split into multiple areas according to the location of bridges (as CR does when visiting the areas with its mobile clinics). Other slum areas consist of multiple discrete clusters, but we analysed them as a single area as residents consider them to all be the same community. Unlike some similar studies (Deka, 2018), we made no attempt to select a cross-section of unregistered slums in Kolkata; the 23 areas covered were simply areas that CR works with (see Figure 1). We used a systematic sampling method, interviewing 30 or 15% of households, whichever was larger. We estimate that the populations varied between 132 people in Baranagar and 2514 people in Bagbazar.

Interviews were conducted with one interviewer and one data recorder and lasted between 25 and 50 minutes; 70% were carried out in Bengali, 30% in Hindi. The data was recorded on smartphones, tablets and laptops. We conducted 867 complete interviews – 18.7% of the total number of households in the 23 areas; 16 areas were covered between May and August 2019. Seven more were covered in November and December.

Of the respondents, 81% were women as they were more likely to be at home during the day. Our sample likely underrepresents households in which all members work. It excludes those who were unenthusiastic to take part and those who, through deafness, frailty or inebriation could not be interviewed. While we tried to conduct interviews in private settings, this was often impossible as the slum areas were so densely populated, and respondents would want us to sit outside of their small homes. The possible biasing effect of onlookers, and social desirability biases more generally,

were unquantifiable limitations of the study. It is impossible to know the degree to which these could have generated different effects at different slum areas.

Overview of the results and their applications

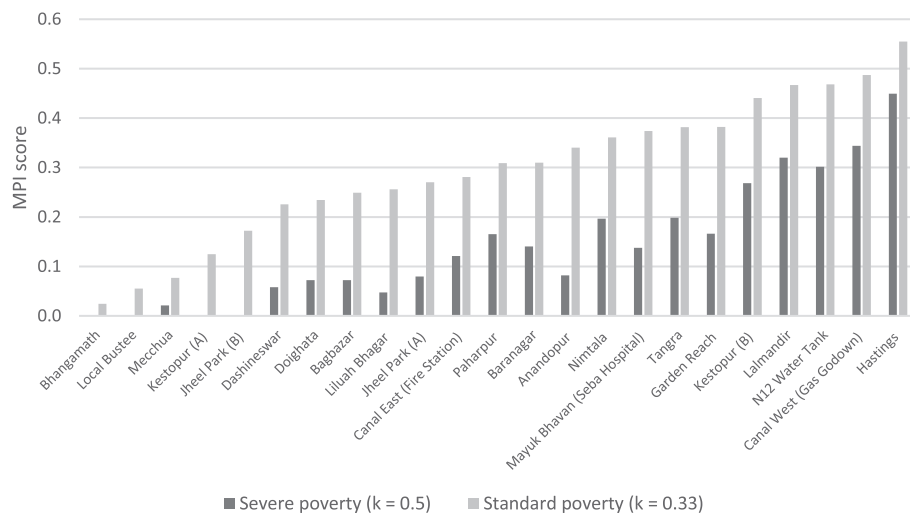
Multidimensional poverty in the 23 slum areas

The initial objective of the research was to provide a way to easily understand where need is greatest. Expressed as concisely as possible, the MPI scores are the product of the proportion of households in the population that are deprived in more than a certain, weight-adjusted proportion (the k threshold) of indicators, and the average number of deprivations experienced by the households that exceed this threshold. More simply, the MPI score is a summary of the overall poverty levels observed in a population. The higher the k threshold, the more the MPI score focuses on only the very poorest households. In line with the Global MPI (UNDP, 2018), we used $k = \frac{1}{3}$ to measure ‘standard’ poverty, and $k = \frac{1}{2}$ to focus on ‘severe’ poverty. It is important to note that we consider even the lower threshold to represent an acute level of deprivation. Being deprived for any single indicator represents a significant problem. Therefore, while we would conclude that a household in an area with a low MPI score is likely to suffer from fewer deprivations than a household in an area with a high MPI score, we wouldn’t conclude that it is not poor.

As Figure 2 shows, for both ‘standard’ and ‘severe’ thresholds, the variation between slum areas is considerable, and perhaps greater expected.

To assure ourselves that conclusions derived from these rankings were meaningful, we calculated 90% confidence intervals for the MPI scores (using the method described by Alkire et al, 2015). Though we cannot be sure that the ‘raw’ MPI scores rank the slum areas 100% correctly, we can conclude that our ranking is in large part significant. For example, when using the standard poverty threshold, Doighata is significantly poorer than the three least deprived slum areas, while Lalmandir is

Figure 2: MPI scores for all slum areas using standard and severe poverty thresholds



significantly more deprived than 11 slum areas, and Hastings, 18. We also compared the rankings produced when using different thresholds for considering a household multiply deprived (different values of k). Reassuringly, the rankings remained broadly similar for all thresholds, except when the threshold was so high that few or zero households were considered multiply deprived and most or all slum areas therefore had an MPI score of 0.

These results have already helped to inform changes to the way CR operates. The ‘Street Medicine’ mobile clinics have always visited some areas more frequently than others, informed by CR’s relationship with the community and our resulting intuitions about which the areas are of greatest need. Now, using both the MPI data and an analysis of the average number of patients at each area, CR has decided to increase the number of visits per month to Garden Reach and Tangra, while it will reduce its visits to Jheel Park, and will end visits to Kestopur A entirely. Additionally, CR can tailor its intervention to ensure that it is using its resources most efficiently. While Jheel Park (B) and Anandopur had relatively few cases of serious disease, the MPI data showed that the communities’ health and hygiene knowledge was lower than average. Improving this knowledge does not require CR’s entire healthcare team; CR can save money by sending only specialist health educators to teach in these areas.

These summary figures are also an easily understood introduction to CR’s research. Donors increasingly ask organisations to measure their impact and demonstrate effectiveness, and graphics such as [Figure 2](#) will therefore be, especially when the survey is repeated, key to CR’s pitch. This is particularly the case for the Indian corporations CR is targeting as a part of their financial sustainability strategy. Our ongoing engagement with academics also be used to enhance CR’s status as a credible and forward-thinking organisation.

Deprivation/slum specific analysis

When walking through Canal West (Gas Godown) it would not be obvious that significantly more deprivation (at least as we measured it) is experienced there than at Nimtala. Both communities are clearly very poor and are in distinctly dangerous locations – one lines a canal-side, the other a train track. However, we know that Canal West (GG) is more multiply deprived than Nimtala because there are some specific deprivations (child education; child labour; toilet access; water access) that are experienced at far higher rates in Canal West (GG).

Further, for many of the indicators, the information collected during the survey is more detailed than the deprived/non-deprived binary. For example, we have exact BMIs, information on knowledge of individual contraception types, detail about electricity sources, and the number of years of education that every individual in each household has.

Using this data, CR has been able to compile a miniature dossier for each slum area. These, compiled in a large internal report, detail the area’s overall level of deprivation and the indicators in which it is most deprived (absolutely, and relative to other slum areas), alongside information about the community’s interactions with our medical and educational programmes.

Health

CR will use its extensive data on health outcomes and health education to direct its interventions to areas of greatest need. For example, we know which slums have the highest obesity and underweight rates and can target these different (though co-occurring) problems accordingly. For contraceptive knowledge, we now know that the combined oral contraceptive pill is fairly well known in most slum areas, but knowledge about IUDs or the contraceptive injection varies significantly between areas – in some areas, over half of respondents knew about them, while in other areas none did. This information will therefore instruct where CR will concentrate its reproductive health and family planning education programmes. A contraception education programme has already been designed and implemented by the Street Medicine team at Nimtala.

Education

CR has data on literacy and years of schooling for 99% of over 10-year-olds in the households interviewed. Some basic analysis of the differences between 10-year age brackets (10–19, 20–29, 30–39, and so on) has enabled us to identify some striking intergenerational trends. We observe an intergenerational improvement in literacy rates from approximately 4% in women aged 60–69, to 23% for women aged 30–39, to 74% for women and girls aged 10–19. While a far greater proportion of older men than older women are literate, with 35% of 60–69-year-olds and 55% of 30–39-year-olds able to read, there is no significant difference in literacy rates in younger age groups (at least when looking at the data as a whole) – 75% of men and boys aged 10–19 are able to read.

Perhaps most useful for CR is the fact we can identify where this trend does not occur. There is no obvious improvement in male literacy rates between generations in five slum areas (Hastings, Tangra, Lalmandir, Mayuk Bhavan (SB), and Garden Reach). All of these areas have literacy rates in 10–20-year-olds below 35%. The trend is not the same for women – the same slum areas (except Mayuk Bhavan) see significantly better literacy rates in the two youngest age groups (10–20 and 20–30). These findings clearly highlight the most educationally deprived areas and are an initial indication that young male illiteracy is a major problem in some areas.

It was pleasing to find that the slum areas whose children are served by Calcutta Rescue's schools performed well for education attainment in recent generations. However, we are not able to establish schools across Kolkata and our ability to improve attainment directly is therefore limited. The data has been, and will be, used as a platform to engage with other organisations that are in a better position to act. For example, at Tangra, CR has engaged with an NGO called Friends of Kolkata that *can* expand its education provision in the area and we will work with them to reach out to families who are currently not sending their children to school. To expand this work, CR plans to build a database of information on NGO and government education services and how they interact with the slum areas. It is hoped that this, combined with the data on education deprivation, will allow the charity to facilitate greater engagement between slum areas and their local education providers.

In almost all slum areas, there remain some families who do not send their children to school or who allow them to drop out early. CR had planned to conduct an in-depth, qualitative research project to investigate the key reasons that children are not being

sent to school. This project ran for six weeks before it was halted by the coronavirus pandemic. It is hoped that, eventually, CR will use the knowledge gained to better engage with these families and advise other organisations about how to do so.

Living standards

For water access, clean sanitation access and electricity access, it is usually the case that nearly all households do or do not have access, and the level of overall deprivation is a poor predictor of whether this is the case. For example, though it is a mid-ranking slum overall, Anandapur has no good sanitation facilities. Conversely, Canal West (GG) is one of the poorest areas overall, but we know that electricity access is not a key issue there. There is a less polar distribution of deprivation rates for the other indicators, but it is nevertheless easy to distinguish between the more and less deprived areas.

Though CR has installed sanitation and water facilities in a few locations, we are not, financially, or legally, in a position to do so in most of the areas. We are also unable to directly change the electricity access, cooking fuels used, housing materials or legal status of the slum areas. For the charity's day to day operations, then, this information is of less relevance, though it is of course useful to understand the broader circumstances in which our service users find themselves. Further, another research project could look at the impact of high levels of deprivation in these living standards indicators on health or educational outcomes.

CR has also shared this data with the state government. The Department of Urban Housing for West Bengal can act to change the living standards situation in the slums in a way that CR cannot, and while the government is aware of all the slum areas, it is deficient in data. We are therefore very pleased that, following a meeting with CR's CEO, the Department has committed to installing sanitation and water facilities in 10 CR-selected locations.

Repeating the survey

CR intends to repeat the project once every few years. Following coronavirus, the following economic disaster, and May's cyclone Amphan, it will be informative to conduct the survey again as soon as it is safe to do so.

It is hoped that, following carefully planned interventions, the health knowledge indicators would show significant improvements in the areas in which CR has intervened. We would expect vaccinations and antenatal care indicators to also be relatively sensitive to interventions. BMI is unlikely to change as quickly. We would hope that indicators for children's schooling could improve dramatically over a ten-year period. Education indicators concerned with adult attainment would be expected to change more slowly. The living standards indicators would also improve if any larger scale project is undertaken to address them, but otherwise wouldn't be expected to change significantly. Not all indicators will change over time in the same way, but the MPI scores are certainly expected to react to meaningful change.

CR hopes that repeats of this survey will demonstrate our ability to improve lives significantly. The survey will hopefully be a tool for understanding the degree to which interventions have been successful. Further, any evidence of improvements that result from our direct intervention or our facilitation of other organisations' work will be useful when trying to secure funding from donors. Evidence of continued

deprivation for indicators that CR has no ability to affect may be used to lobby the government to act. Of course, these comments are all speculative until the survey has been completed for a second time (and third, and fourth time).

Additional comments

As this project developed it became clear that, though it was initially oriented around the construction of the MPI, it is the information on individual indicators that is most instructive for CR's decision making. We can now generate a dashboard of information to allow us to compare rates of deprivation in different indicators at different slums, and it is this detail, rather than the aggregation which instructs most of the discussion about further actions. The MPI will be key for engaging external stakeholders, but the detailed dossiers on each slum area are the project's most important product.

The survey will also only ever be a part of a toolkit for understanding our impact. Much of the work that CR does (treating and referring patients, and our social work and counselling services) is not directly tracked by this survey. This will continue to be monitored by our operations teams. Further, alongside each intervention will run a distinct impact evaluation which will hopefully ensure that we have the most detailed understanding of the usefulness of that intervention.

Finally, we have not generated all of the insights that could be derived from the data set. For example, we have information on occupations and income yet to be fully analysed and compared with our non-monetary MPI. Calcutta Rescue would therefore welcome approaches from any individuals or organisations who would like to work with us to make the most of this resource. Please address enquiries to: info@calcuttarescue.org

You can find out more about Calcutta Rescue on our website: <https://calcuttarescue.org/>

Notes

¹ For these indicators, respondents answered on behalf of other household members (unless they were present). There are therefore likely to be frequent inaccuracies. Both literacy and addictive habits data are likely to be further compromised by social desirability biases.

² We have used a lower obesity threshold than the standard 30, informed by studies which show that increased disease risk occurs at lower BMI scores for Asian adults (Snehalatha, 2003; Verma, 2019). When possible, we measured women aged 18–45, but when no household member in this group was available, we would measure the respondent.

³ As defined by UNICEF.

⁴ Electricity; natural gas; biogas; or kerosene.

⁵ As defined by the World Bank (2015).

⁶ The starred items are counted as two as they represent a distinctly greater value.

⁷ The slum area names are not official names and residents of the slum areas would not refer to them by these names. Most are based on geographic location or landmark.

⁸ Two slum areas were surveyed at the locations marked Jheel Park and Kestopur

⁹ SM1 = Served by Street Medicine Team 1; SM2 = served by Street Medicine Team 2; No 10 school = served by our school known internally as “Number 10 School”.

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Conflict of interest

The author declares no conflict of interest.

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