

Estimating the Excess Demand for Government Schools in Delhi: How much capacity creation is necessary?

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Abstract

The estimation of demand for public schooling remains a neglected field in school planning of Delhi, even though supply trails demand by a huge margin. This paper underlines the very substantial expansions and investments necessary to accommodate the excess demand for government schools in Delhi. The empirical estimation takes into account various sources of demand for expansion: (i) within the existing government schools that are facing supply shortages, often of an acute variety; (ii) arising from children now attending low fee private schools, and, (iii) from children in school age groups, but out of school. Population growth over the next five years representative of future demand in the fringe areas of Delhi is also factored in. The estimates indicate that the expansion required is a mammoth doubling of existing capacities in government schools, 107% increase on existing capacity. Based on estimated excess demand, 632 composite and 275 primary government schools separately need to be established. With the present level of public expenditure on education at 1.4% of GSDP for Delhi, this entails an increase in expenditure on education by 50% of the existing levels. That is, a very significant push in public expenditure is necessary for meeting the excess demand for public schooling.

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I. Background

Since long researchers have drawn attention to the stagnation and slow pace of growth of public schools in cities across India (Juneja, 2018; De et al, 2002; Noronha et al, 2005). The picture in Delhi is no different. The changing metropolis witnessed increased demand for schooling both in quantity and quality. In contrast, the expansion of public schools did not measure up. The (net) annual growth of government schools (including aided) was stagnant and even negative between 2006-7 and 2017-18, the period for which consistent UDISE data is available (Bose et al, 2020b). Private schools grew at the rate of 7.8% over the same period, though change in recognition status from unrecognised to recognised accounts for part of the increase in case of private schools. The share of government schools in total schools fell from 63% in 2006-7 to 49% in 2017-18. When the unrecognised private sector is accounted for, the share of GSs would be smaller. It indicates that the reliance on markets for basic education is widespread in urban areas. It is a huge challenge especially for those who cannot afford an alternative, i.e., those without an exit option.²

Like most other cities, demographic and spatial dimensions of metropolitan growth have been fast changing in Delhi. There is outward spatial expansion and growing density of population in peripheral zones of the city. As scholars studying the various “cities” of Delhi note, “it is a deeply divided city marked by layers of exclusion” (Centre for Policy Research, 2015: p.1) Less than a quarter of the population in Delhi live in “planned colonies”. There are a large number of settlement types, with different access to basic services. Services such as drinking water, sanitation, solid waste disposal are extremely unequally spread across the various settlement types.³ The less privileged areas of the city where the majority of the working class and the marginalised groups live are poorly serviced. Access to these basic services is characterised by a “differentiated citizenship” (rather than an equal one), hampering the development of even the most basic capabilities (Heller and Mukhopadhyay, 2015).

Thus, spatial location, intersecting with socio-economic background, influences access to school education for Delhi’s children (Menon, 2017; Nambissan, 2021). The lack of coverage of the unplanned areas of the city by adequate public schools has added to deprivation and denial of basic rights. The planned versus unplanned, but even across various unplanned settlements, there are differences in access to education.

The failure to equitable provisioning for education has implications at multiple levels. The ‘unequal treatment of schools’, where government schools, which cater to many of the most marginalised children, are so poorly equipped means that the children are forced to experience education in conditions that do not respect their dignity and well-being (Banerji, 2000; De et al, 2005; Bose et al, 2022b). A study by Centre for Social Equity and Inclusion (2013) on the conditions of education of five most deprived communities of children in the city – de-notified and nomadic tribal children, Muslim children, children of waste pickers, construction workers and sewage workers –draws attention to the systemic gaps. They argue

² The notion of exit and voice conceptualised by Hirschman (1970) presents an important analytical frame to understand state, market and the quality question in education.

³ As per data published by Delhi urban Environment and Infrastructure improvement project (2001) the proportion of population in each settlement type are: JJ clusters (14.8%), slum designated areas (19.1%), unauthorised colonies (5.3%), JJ resettlement colonies (12.7%), regularised unauthorised colonies (12.7%), rural villages (5.3%), urban villages (6.4%) planned colonies (23.7%). Refer to Centre for Policy Research (2015) for a mapping of settlement types and access to basic public services.

that “problems in the education system as a whole, have a significant impact on children’s education, though children and parents may frame issues in terms of schools and teachers alone due to their direct contact with these actors in the education system. Supply-side constraints are enormous and pose challenges to students as well as teachers and schools.” All five communities of children studied in extremely congested schools with high pupil-teacher ratios (PTR), far above the norms set under the RTE Act. The implications are inadequate numbers of teachers; teachers who are unable to give adequate attention to each child, especially many of these children who are weaker in their studies as first-generation learners; and teachers who struggle to maintain discipline in classes so that children can learn. Other implications are the lack of adequate classroom space and furniture to cater to the large number of children in the schools, as well as the poor drinking water and toilet facilities in schools. Combined with their home conditions (the demand side), it meant that only one sub-community of children, those whose fathers are permanent sewage workers and thus 4th class government employees, were now completing school education. The school system has simply reproduced the inequalities and hierarchies of the existing social structure. The bureaucratic school system ensures that no compensation is offered for these socioeconomic disadvantages. Instead, there are multiple levels of disadvantage which they suffer at school creating a pale shadow of their potential level of achievement (De et al, 2005).

Given the evidently inadequate provision of government schools and the poor conditions in which such schools function, it is not surprising that a market for private, unrecognised schools has flourished.⁴ It has created a substantially large informal sector of low fee private schools (LFPSs). In an important intervention, the Social Jurist case in the Delhi High Court brought attention to the unrecognised school sector in Delhi and the conditions therein, and the fact that the government is not taking cognizance of its responsibility of (a) regulation of the sector; and thereby (b) the education of children studying therein (High Court of Delhi, 2008).⁵ The order of the High Court (HC) to the state government was to carry out a survey of the unrecognised schools, and provide recognition to the schools that meet the minimum norms in a time bound manner and closedown the remaining schools. The HC in its judgement had stated categorically that the law doesn’t allow/promote two classes of schools, recognised and unrecognised. And the State must regulate *all* schools. This was, however, practically impossible unless there were sufficient places to absorb the children from the LFPSs into government schools (GS). The orders of the HC were not followed by the state government. Any action by the state government against the unrecognised schools without expansion of the GS system would mean a denial of right to education (RTE). Clearly, in the expansion of the GS system lies the key to regulation of the sector.

The demand for LFPSs is usually framed in terms of parental demand for private English medium schools. While English may be a factor, a more appropriate frame, would be to see the demand for LFPS, both in rural and urban contexts, as an outcome of excess demand for properly functioning public schools irrespective of whether it is English medium or other medium public school (Harma, 2009; Baird, 2009; Oketch et al, 2010; Nambissan, 2021). Essentially, *it is the excess demand for public schools which drives poorer parents to low quality private schools*. Cross country evidence establishes that the very large proportion of private schools at the secondary level in developing countries stem from limited public spending, which creates an “excess demand” from people who would prefer to use the public schools

⁴ The terms government schools and public schools are used interchangeably in this paper.

⁵ For an analysis of the regulatory conundrum in the context of school education in Delhi, refer to Bose et al (2021).

but are involuntarily excluded and pushed into the private sector (James, 1993). In the context of urban Kenya, Oketch et al (2010) note that in slums, public spending on education is low and so parents find alternative ways of educating their children, when their preferred route of free state schooling is unavailable to them. The extra spending on LFPS by parents who go far beyond their means to pay the fees, doesn't necessarily secure better quality. Even going by the basic numeracy and literacy tests, the quality of education is only marginally better in the LFPS compared to the GSs (Karopady, 2014). While there are a number of issues with government provided education, LFPS is not a solution (Sarangapani, 2009). LFPS are little more than poorly resourced teaching shops, where children learn little and the schools themselves are ramshackle, and in many areas, unsafe (Ramachandran, 2009; Srivasatava, 2013; Bose et al, 2021).

Against this background, the present paper attempts to quantify the extent of excess demand for government schools in Delhi. While the issue of excess demand (or shortages in supply) has been flagged and ethnographic research has dealt with various aspects of the problem, the objective here is to (i) identify and quantify the various quarters from which excess demand for schooling is emerging, (ii) build a macro-picture of excess demand conditions in Delhi; and (iii) draw up the financial requirements of an investment proposal to meet the excess demand for schooling. Besides the enduring nature of the problem of excess demand for public schools in Delhi, the contemporary relevance of the issue springs from the far-reaching effects of the pandemic. The immiserization it has brought, carries an imminent compulsion to enhance and improve public supply of education.

The rest of the paper is organized as follows. Section II discusses the existing estimates of excess demand (or undersupply) of public schools in Delhi. Section III introduces the conceptual framework for estimation briefly, followed by detailed methodology in Section IV. The results and major findings are discussed in Section V, with Section VI carrying the conclusion.

II. Excess Demand or Undersupply of Public Schools in Delhi: Existing Estimates

There are 5703 recognised schools in Delhi, of which less than half, 2784 are public schools/government-run schools or simply, government schools (GS). GSs at the primary level, 1710, are run by the local government administration or the Municipal Corporation of Delhi (MCD). Primary education is thus mainly provided by MCD in Delhi whereas post-primary school education is managed by the State government in Delhi. The schools run by the state government or the Directorate of education (DoE, GNCTD) start at grade 6 - as children transit from MCD primary schools - and extend up to grade 10/12. Besides, there are Sarvodaya schools, composite schools (Pre-primary to Senior Secondary), run by the DoE. The number of Sarvodaya schools stood at 446 in 2018-19.⁶

We found two references to macro-estimates of excess demand for schools among plan documents over the last decade or so. The first one figures in Delhi's Annual Plan Document, 2013-14. Using the Master Plan-2021(DDA, 2007) norm of one Senior Secondary School for

⁶ Data based on UDISE, 2018-19. Refer to Bose et al (2022b) for a background to planning and development of the public education sector in Delhi over the long-run.

10,000 population, Delhi's Annual Plan Document, 2013-14, calculated the need for 550 new senior secondary schools. "In view of 1350 Senior Secondary Schools in Delhi in 2010 and taking the requirement of projected population of 190 lakh by 2017, 550 new Senior Secondary Schools are required to be set up during 12th Five Year Plan (2012-17)".

Two comments are in order here. Firstly, these are back of the envelope calculations and do not take into account the distribution of people and the various settlement types across the city. The population of Delhi is unevenly spread between the core and the periphery and even within the periphery across various settlement types (Centre for Policy Research, 2015). There are many areas with higher density and higher growth of population together with higher dependence on government schools because of the community that it serves. An accurate estimate must take into account the distributional matrix and not just the overall population.

Secondly, referring to the 12th Plan Approach Paper, the Annual plan suggests that in view of the massive investment required for proposed number of new schools, the magnitude of investment needs to be shared by private sector.⁷ "There is enough scope for private sector participation in education sector provided Delhi Development authority (DDA) may be requested to allocate new school sites to the private sector also at concessional rates." A similar perspective and pro-market stance can be seen in the Shailaja Chandra Committee report (GNCTD, 2012).⁸ "Owing to the superior quality of the private", the Committee recommended various measures to unshackle the private sector and allow private schools to run in double shifts to meet the rising demand for quality education. What this ignores is the fact that the excess demand is located in communities that do not have the purchasing power to afford private schooling of adequate quality, even if it were to be available. So de facto, what the committee was recommending is low fee private schools, as per the need and the affordability of the parents, which goes against the grain of RTE.

Another estimate of excess demand comes from an independent source. The need to increase capacity several-fold in Delhi is acknowledged in Delhi's Human Development Report, 2013 (IHD, 2013). It notes that while Delhi has a high density of primary and upper primary schools per unit area, the number of schools per 1000 child population (aged 6-11 years) is only three, which is one of the lowest in India. It represents the relative shortage of primary and upper primary schools in the city (IHD, 2013: p.81). The report speaks of a norm of 10 years of schooling for the entire people of Delhi, and estimates the necessary expansion in capacity to realise this norm. Assuming a 50% expansion in population by 2021 over 2011, the required capacity expansion is 150% for elementary and 75% and 30% respectively for secondary and tertiary sector. While these are important benchmarks and highlight the massive deficiencies in supply, the contribution of public and private sector to school provisions is left unaddressed. The authors acknowledge that these are rough estimates and more detailed planning exercise would be necessary.

A recent AWP&B of the Samagra Shiksha Abhiyan (2020-1) notes that student classroom ratio (SCR) in Upper Primary at 44 and secondary at 45 are on the higher side and need to be reduced by making a plan for additional classrooms and strengthening of schools. However, neither this nor any other document present any plan on how to overcome it. As CAG (2017)

⁷ The Gol's 12th plan underlines "the need to tap private sector capabilities" and that the "models for PPP in this sector also need to be vigorously explored", along with increases in public investment (p.98). (Gol, 2011)

⁸A committee set up by the GNCTD to suggest amendments in DSEA (1973) in view of the RTE Act and rules

notes, these deficits are indicative of poor planning and execution of projects resulting in failure of the government to ensure requisite infrastructure and to maintain standard SCR in schools.⁹

A comprehensive estimate of excess demand requires school mapping matching demand to supply of schools and ensuring physical accessibility at least at the pre-primary and primary level. Access is often confused with physical availability of schools in the neighbourhood or at a requisite distance. In a densely populated area, the mere presence of a school cannot count as ensuring access if it doesn't have seats for the children in the school's catchment area while remaining within permissible norms. The school mapping exercise should take into account the population density. Unfortunately, the government and its planners have refused to engage in such an exercise. A school mapping exercise, involving the local community, SMC members, government school teachers and ground-level administrative staff is essential. It is mandatory under RTE Act (Section 9(D)). A proper inventory of all schools would help in planning, supervision and to raise awareness among the community about their educational rights, including the right to attend a recognised school that meets the minimum standards. References, in some official documents, reveal that some of these obvious steps have been proposed but not implemented.¹⁰

In the next section we propose a framework and method to estimate the excess demand for schooling for GSs in Delhi and the attendant financial requirement.

III. Method to Estimate Excess Demand and Additional financial requirement

Excess demand for GSs has several components. The first one arises from students who are in GSs that do not fulfil the physical (and most often teacher) norms for schooling. This source of excess demand is easily recognisable and recorded every year in the UDISE database, reported by the schools. The second source of excess demand emanates from students who attend the LFPSs for want of a better alternative. Bose et al (2020b) discuss the wide scale prevalence of the phenomenon of LFPSs in Delhi and estimate the size of the LFPS sector in terms of enrolment of students in the elementary age group. Based on NSS (2017-18) education round, the size of the LFPS is estimated at a massive 50% of the overall students attending private schools in Delhi in the elementary age group. More often than not, these students are in the LFPSs because of lack of GSs or functional GSs (within accessible distance) that do not suffer from the ills of congested GSs in urban fringes.¹¹ It is worth noting that the present surge in enrolments in government schools during the Covid-19 pandemic is due to this component of excess demand, returning to GSs in distress.¹²

⁹ See CAG, 2017

¹⁰ A Committee constituted (January 2012) under the State Project Director of UEEM had decided that municipal ward should be used as a basic unit for school mapping and all schools including private, recognised, unrecognised, shall be reflected in the Ward Map prepared by the Delhi Geospatial Society Limited (DGSL) and census data and habitation shall be super-imposed on it to identify the locations where neighbourhood schools are not available. (CAG, 2017: p.11)

¹¹ See Bose et al (2022b) for more evidence on excess demand for GSs and its distribution across the city.

¹² Delhi: MCD schools add over 150,000 students as enrolments jump, Hindustan Times, Dec 03, 2021. <https://www.hindustantimes.com/cities/delhi-news/delhimcdschools-add-over-150-000-students-as-enrolments-jump-101638470922357.html>

Another source of excess demand emerges from children who are out of school (OSC). The phenomenon of dropout or non-enrolment/ late enrolment is very characteristic of slum clusters and other deprived areas of the city where the poor live and the GSs are heavily congested and non-functional. Finally, there is excess demand arising from the potential rise in enrolment, on account of population growth, especially in the urban fringe areas. This will add to the pressure of enrolments in schools that are already facing excess demand. It needs to be factored in for any planning exercise. Additional capacity is needed not only to meet the deficit of classrooms in the existing GSs, but are key to accommodate these other sources of excess demand. Significantly, the latter are invisibilised and not reflected in existing student-classroom ratio or pupil-teacher ratio.

The specific questions that we address in estimating excess demand for government schooling in Delhi are the following:

- What kind of expansion is required in the existing GSs in Delhi, based on present enrolments? Whether expansion within the premises of the existing schools is enough or new schools are needed?
- How many new schools are required, taking into account excess demand based on present enrolments in existing GSs and the other sources of excess demand? How many of these new schools would be composite schools and how many primary schools?
- How much is the teacher shortage in existing government schools? What is the teacher requirement for the new schools that are proposed?
- What are the financial requirements to meet the excess demand?
- How much more enrolment is possible for children at each level, from investments as per financial requirement?

A norm-based estimate of excess demand (ED) is worked out using a set of desirable norms. The following points define the broad approach used.

1. The RTE norm suggests school as a unit for applying PTR and SCR. While the RTE norms can be referred to as reasonable norms, here we take grade specific norm which may be considered as “desirable” norm. Use of grade as a unit will help in preventing multi-grade teaching and maintaining a healthy SCR in each classroom. At present a normative SCR of 40:1 at the school level is used in Delhi for planning.¹³ We use a more liberal norm of 35:1 and apply it to each grade within a school. The norm is used keeping in mind the importance of individual attention, preservation of teacher motivation, among other things. At the pre-primary level, given the need for greater attention and care, a required PTR of 30:1 is used.
2. Excess demand arising from four sources, as discussed at the beginning of this section, is estimated with some variations in the method used (discussed under detailed methodology), and then aggregated.
3. There are two means of capacity creation - building new GSs and expansion of existing GSs through additional classrooms. Building additional classrooms by adding a floor or by horizontally extending a present building within the premises of the existing GS can meet the ED in schools with moderate deficits. For acute deficit situations, new schools are needed over and above some expansion within the existing schools. Also, a mix of

¹³ As a rule, in MCD schools, with surplus classrooms available, a second section in a grade is considered only if the enrolment is close to 60 children. It means that the PTR of 40 is not a cap, in practice.

primary schools (PS) covering pre-primary to 5th class and composite schools covering nursery to class 12th, are proposed.¹⁴ Primary schools are needed for reasons of proximity; at the same time lower land requirements make it easier to build primary schools (see discussion in Section V).

4. The estimation takes into account the existing structure of the GSs in Delhi, as managed by two separate authorities, MCD and DoE. Our estimates also take into account the fact that many of the existing schools are run in shifts, and will continue to do so, at least in the medium run. The shift system is an expression of supply constraint which is present in both administrative structures. We are not considering a scenario of non-shift schools for all existing GSs as it is entirely untenable under existing supply conditions.¹⁵ Rather, it is important to create conditions to see that there is better coordination and harmony across the two shifts. As part of future planning, introduction of single-shift schools for all new schools is a goal to be pursued, and the same has been adopted for our estimation.
5. Both capital cost, which include classrooms and school buildings, and recurrent costs, comprising of teachers and other non-teacher recurrent costs, are considered in the financial estimates, with investments spread over a medium-term horizon of five years.

Data sources used for estimation include: UDISE unit level data, NSS Education Round (2017-18) unit level data and population data, from Census of India. Budgetary data is taken from state budgets.

IV. Detailed Methodology¹⁶

IV.1 Excess Demand for Classrooms from Existing enrolments in GSs

Classroom deficit is widespread across government school system in Delhi. The number of additional classrooms needed in each existing GS is the difference between the required classrooms and existing classrooms in the GS. The number of classrooms required in each GS is estimated by applying the normative SCR on the enrolment in each grade in the GS (see Section IV.6, assumption used in estimation). The enrolment and the number of existing classrooms in each GS are obtained from UDISE, 2018-19.¹⁷ Based on the additional classrooms required, we classify GSs with deficits in classrooms into two categories - schools with acute deficit and schools with moderate deficit in classrooms.

A variable a_i , denoting the maximum classrooms that can be constructed within the premises of an existing i^{th} MCD school, is used to distinguish between GSs with acute deficit from the GSs with moderate deficit. All GSs with a CR deficit $\leq a_i$ are schools with moderate deficit, whereas classroom deficit of more than a_i classrooms, would contribute to demand for new schools. Such schools are labelled as ones with acute CR deficit. If total deficit classroom is x_i in an existing MCD school with acute deficit, then, a_i additional classrooms can be established in the existing school, and $x_i - a_i$ (for all i , with $x_i > a_i$) classrooms would require additional

¹⁴ Composite schools may be divided into separate primary school and schools with above primary grades as present in many localities, with feeder system connecting them.

¹⁵ In some places moving to a single shift is feasible and that is under process. These will, usually, not be fringe area schools.

¹⁶ Non-technical readers can skip this section without loss of continuity.

¹⁷ Since the estimation is made for 2019-20, we adjusted for around 400 classrooms, that were added each by MCD and DoE during 2018-19.

schools. The same is the case with DoE schools, with b_j representing the threshold capacity possible within the existing DoE schools.

Let, CR^{exist} denote the number of classrooms that can be established in the existing GSs across all GSs.

$$CR^{exist} \equiv CR_MCD^{exist} + CR_DoE^{exist} \quad (1)$$

Here CR_MCD^{exist} and CR_DoE^{exist} are the number of classrooms that can be established in the existing MCD and DoE schools, respectively. Two components, CR_MCD^{exist} and CR_DoE^{exist} are estimated as:

$$\left. \begin{aligned} CR_MCD^{exist} &\equiv \sum_{i=1}^{m_1} DC_MCD_i^{mod} + \sum_{i=m_1+1}^{m_2} a_i \\ CR_DoE^{exist} &\equiv \sum_{j=1}^{n_1} DC_DoE_j^{mod} + \sum_{j=n_1+1}^{n_2} b_j \end{aligned} \right\} (2)$$

Where,

$DC_MCD_i^{mod}$: Number of additional classrooms required in the i^{th} MCD school with moderate deficit

$DC_DoE_j^{mod}$: Number of additional classrooms required in the j^{th} DoE school with moderate deficit

Here, $i = 1, \dots, m_1, m_1+1, \dots, m_2, m_2+1, \dots, m$; and $j = 1, \dots, n_1, n_1+1, \dots, n_2, n_2+1, \dots, n$; i and j represent MCD school and DoE school, respectively.

m_1 : Number of MCD schools with moderate deficit in CR

$m_2 - m_1$: Number of MCD schools with acute deficit in CR

m : Number of MCD schools

n_1 : Number of DoE schools with moderate deficit in CR

$n_2 - n_1$: Number of DoE schools with acute deficit in CR

n : Number of DoE schools

The classrooms that need to be established in new schools (CR_ACUTE^{new}) on account of deficits in GSs with acute CR deficits, is given by

$$CR_ACUTE^{new} \equiv \sum_{i=m_1+1}^{m_2} (DC_MCD_i^{acute} - a_i) + \sum_{j=n_1+1}^{n_2} (DC_DoE_j^{acute} - b_j) \quad (3)$$

Where,

$DC_MCD_i^{acute}$: Number of additional classrooms required in the i^{th} MCD school with acute deficit

$DC_DoE_j^{acute}$: Number of additional classrooms required in the j^{th} DoE school with acute deficit

To estimate classroom deficits by levels, three levels are considered: pre-primary, primary and post-primary. Apart from primary and post-primary schools, which correspond to the present structure of government school system in Delhi, capacity creation for pre-primary sections within GSs is crucial. That is the reason why pre-primary is treated, separately. Note

that how deficit in classrooms are distributed across levels within a school cannot be readily obtained using UDISE data¹⁸. We proceed on the assumption that classroom deficits are spread equally between pre-primary level and the primary level in the existing MCD schools. And, assume that deficits in the DoE schools are entirely at post-primary level (and not primary level). The latter follows from the present structure of composite (K-12) schools run by DoE, which has a reasonable PTR till primary.¹⁹

IV.2 Excess Demand for Classrooms from Other Sources

As noted in Section III, the three other sources of excess demand for GSs can be specified as the classrooms required - to accommodate (i) OSC, (ii) children attending LFPS, and (iii) population induced rise in enrolment. We estimate the excess demand for CRs for each of these three sources. This is done by applying normative SCR on the estimated number of OSC, children attending LFPS and population induced potential incremental enrolment in GSs, respectively. The estimate of OSC is based on NSS (2017-18), which is the latest available NSS education round. The estimate of children attending LFPS in Delhi in elementary age-group is obtained from Bose et al (2020b). To obtain the potential incremental enrolment in the next 5 years, an annual 2 percent growth in enrolment in GSs, in fringe areas is assumed. The operational definition of fringe area schools are those schools with pre-existing deficit in classrooms in 2018-19. Given the substantial proportion of schools with deficits in CRs - acute and moderate - we assume that the present system has no capacity to accommodate these additional sources of demand and new schools would be required for the purpose.

Aggregating across various sources of demand, the number of classrooms to be established in new schools at primary (CR_{prim}^{new}) and at post-primary level ($CR_{post-prim}^{new}$) are estimated, separately.

$$CR_{post-prim}^{new} \equiv \sum_{j=n_1+1}^{n_2} (DC_DoE_j^{acute} - b_j) + CR_{12\ to\ 18}^{OSC} + CR_{post-prim}^{LFPS} + CR_{post-prim}^{popg} \quad (4)$$

$$CR_{prim}^{new} \equiv \sum_{i=m_1+1}^{m_2} (DC_MCD_i^{acute} - a_i) + CR_{6\ to\ 11}^{OSC} + CR_{prim}^{LFPS} + CR_{prim}^{popg}$$

$$CR^{new} \equiv CR_{prim}^{new} + CR_{post-prim}^{new} \quad (5)$$

Here,

$CR_{6\ to\ 11}^{OSC}$ and $CR_{12\ to\ 18}^{OSC}$: Classrooms required to accommodate OSC in the age group 6 to 11+ and 12 to 18+, respectively.

¹⁸ The publicly available unit level UDISE data does not provide information on the number of classrooms by level.

¹⁹ In the primary section, the DoE run Sarvodaya schools do not admit students beyond 40 per class and they generally have a limited number of sections, whereas the MCD schools cannot refuse admissions in principle, as primary education is the primary remit of the local government.

CR_{prim}^{LFPS} and $CR_{post-prim}^{LFPS}$: Classrooms required to accommodate children attending LFPSs at primary and post-primary level, respectively.

CR_{prim}^{popg} and $CR_{post-prim}^{popg}$: Classrooms required to accommodate population induced rise in enrolment in the next 5 years at primary and post-primary level, respectively.

IV.3 New Composite and Primary schools required

Among the new schools some would be new composite schools, and the remaining new primary schools. New composite schools are needed mainly to meet the deficit at the post primary level, and expand the supply of seats at the primary level, to an extent. In addition, new primary schools shall meet the additional deficit at the primary level. The latter emanates in large measure from the children attending LFPSs as we shall see in section V. Thus, there is a difference in the steps involved in estimating the number of primary schools needed versus those for the composite schools (CS), equation (6).

Once the classrooms required in new schools at primary and post primary levels are obtained from equation (4), the number of primary schools ($school^{PS}$) and the number of composite schools ($school^{CS}$) are estimated as follows:

$$\left. \begin{aligned} school^{CS} &\equiv CR_{post-prim}^{new} / size_{post-prim}^{CS} \\ school^{PS} &\equiv [CR_{prim}^{new} - (size_{prim}^{CS} * school^{CS})] / size_{prim}^{PS} \end{aligned} \right\} (6)$$

Let $size_{post-prim}^{CS}$ denote the size of the new composite school at post primary level. It is the number of post primary classrooms in a newly proposed composite school. Since it is mainly the classroom deficit at post-primary level that new composite schools are envisaged to meet, required number of new composite schools is obtained by dividing the number of classrooms required at post-primary level in the new schools ($CR_{post-prim}^{new}$) by size of the new composite school at post primary level. In other words, given the way administrative structure of GS management in Delhi, the primary impetus for expansion of composite government schools is deficit in classrooms at the post primary level. The number of new primary schools to be created is residually obtained by offsetting the capacities created in the new composite schools at the primary level from the desired numbers for additional seats at primary level.²⁰ Thus, the total number of schools required is estimated.

IV.4 Teacher Requirement

A substantial proportion of GSs in Delhi are running with poor PTR (even after considering the contractual teachers). New teachers are needed in these schools to maintain the normative PTR. The number of required teachers is obtained by assuming a grade wise PTR norm (see Section IV.6, assumption used in estimation). The number of new teachers

²⁰ In Equation 6, each new composite school has $size_{prim}^{CS}$ classrooms for students attending primary class, which is subtracted from the number of classrooms required to be established at primary level in the new schools (CR_{prim}^{new}). The subtracted figure is then divided by the number of classrooms that each new primary school will have for students attending primary grades ($size_{prim}^{PS}$).

required in each existing GS is the difference between required teachers and the existing teachers. Just as one categorized the excess demand for classrooms between existing and new schools, the additional teacher requirements are shown in two steps, teachers required for existing and new schools.

Let TR^{exist} denote the number of new teachers to be recruited in the existing GSs, then

$$TR^{exist} \equiv \left(\sum_{i=1}^m DT_MCD_i + \sum_{j=1}^n DT_DoE_j \right) - CR_ACUTE^{new} \quad (7)$$

Here DT_MCD_i and DT_DoE_j are the numbers of deficit teachers in i^{th} MCD school and j^{th} DoE school, respectively. From the sum of the deficit teachers in the GSs, an adjustment is made in the number of required teachers on account of movement of a proportion of children from existing GSs to new schools as part of meeting the SCR norms for GSs with acute deficits. The latter figure is same as the number of additional classrooms to be built in the new schools to meet a proportion of classroom deficit in existing GSs with acute deficit (CR_ACUTE^{new}).

The number of teachers required in new schools is a function of enrolment in new schools and the normative PTR. Let $enrol^{new}$ denote the number of students who will be enrolled in the new schools. Then,

$$enrol^{new} = \left(\frac{1}{T} \right) * \left(OSC_{6\ to\ 16} + q_1 * OSC_{17\ to\ 18} + q_2 * enrol_{LFPS} + enrol_{popg} \right) + \left(p_1 * enrol_MCD^{acute} + p_2 * enrol_DoE^{acute} \right) \quad (8)$$

Here $OSC_{6\ to\ 16}$ and $OSC_{17\ to\ 18}$ denote the out of school children in the age group 6 to 16+ and the age group 17 to 18+, respectively. The students attending LFPS and population induced potential rise in enrolment are denoted as $enrol_{LFPS}$ and $enrol_{popg}$, respectively. q_1 is the proportion of OSC to be brought under the public education system in the age group 17 to 18+. q_2 is the proportion of students attending LFPS who would be accommodated in the new GSs. Since new schools can be established gradually, absorption of OSC, children attending LFPS and population induced addition to enrolment in the GSs can happen in a phased manner, over the next T years. The two variables, $enrol_MCD^{acute}$ and $enrol_DoE^{acute}$ represent enrolment in MCD schools and DoE schools with acute deficit, respectively. p_1 and p_2 are the proportion of students in the existing MCD and DoE schools with acute CR deficit who would be shifted to new schools, respectively.

There are two points on the coverage of excess demand that needs attention. In equation (8), all children who are out of school in the age group 6-16 are considered under new enrolment (whereas q_1 proportion of OSC to be brought under the public education system in the age group 17 to 18+). Thus, instead of 8 years of mandatory schooling, between 6-14 years, we consider 10 years of schooling as mandatory for all children, a norm that is used by several others (De et al, 2005; IHD, 2013). Further, excess demand in the pre-primary age group from other sources is not captured here. This is a limitation of this exercise (see Section V).

IV.5 Financial Resource Requirement in existing schools and new schools

Financial resource requirement comprises of *capital costs* of building classrooms in existing GSs and new schools and *recurrent costs*, teacher salaries being one of the key components. Capital costs are computed based on unit cost of classrooms and new schools, whereas, for the recurrent costs, unit costs of teacher salaries and per student normative recurrent cost, as applicable, are used.²¹

Capital requirement per annum (C) is estimated by costing the physical estimates of additional classrooms required in the existing schools (CR^{exist}) and the new primary and composite schools required ($school^{PS}$ and $school^{CS}$). Let U_{CR} denotes the unit cost per classroom, U_{PS} and U_{CS} denote the unit costs per primary and composite school respectively. Assuming that the total capital requirement to meet the deficit of classrooms and new schools is to be spread uniformly over the next T years, C is estimated as

$$C = (U_{CR} * CR^{exist} + U_{PS} * school^{PS} + U_{CS} * school^{CS})/T \quad (9)$$

Additional recurrent requirement is the sum of additional recurrent requirement for existing schools (R^{exist}) and the additional recurrent requirement for new schools (R^{new}). Recurrent requirement in existing GSs (R^{exist}) is only on account of recruitment of new teachers. The new schools require, besides new teachers, a host of inputs that would count as recurrent costs (see Bose et al, 2020). For instance, new schools would require grants for maintenance and development at the school level, entitlement for students, system level interventions such as management and academic support, etc. Recurrent requirement for new schools (R^{new}) is thus estimated by applying normative per student cost on the estimated number of students to be enrolled in new schools. The normative per student recurrent cost embodies all the recurrent cost required.

Additional recurrent costs for existing schools (R^{exist}) and the recurrent requirement for new schools (R^{new}) are estimated as follows.

$$\left. \begin{aligned} R^{exist} &= U_T * TR^{exist} \\ R^{new} &= U_S * enrol^{new} \end{aligned} \right\} \quad (10)$$

Where U_T and U_S represent the annual unit cost per new teacher and annual unit cost per student respectively. Overall additional recurrent requirement (R) is estimated as

$$R = R^{exist} + R^{new} \quad (11)$$

Thus, the financial requirement (FR) in year t , is the sum of annualised capital requirement (equation 9) and additional recurrent requirement (equation 11).

$$FR = R + C \quad (12)$$

²¹ The methodology of resource requirement estimation is a simplified version of the one followed in Bose et al (2020).

The estimation is done for the year 2019-20 in a time frame of 5 years, 2019-20 to 2023-24. The various assumptions used in the estimation are outlined below.

IV.6 Assumptions used in estimation

1. A grade specific SCR of 30:1 at pre-primary level and 35:1 for the rest is assumed.
2. We assume that a maximum of 6 classrooms in an existing MCD school and 14 classrooms in an existing DoE school can be constructed (i.e., $a_i = a = 6$ and $b_j = b = 14$, in equations (2) to (4)). On an average, it corresponds to 30 to 35 percent addition to the number of classrooms in the existing MCD and DoE school.
3. As per the last information available publicly, roughly 2/3rd of enrolment in GSs were in schools that were running in shifts. We assume that 2/3rd of additional classrooms required in the existing schools are going to be part of schools that are actually running in shifts (and therefore can be used by twice the number of children compared to when it is used in a single shift school) while the rest 1/3rd would be non-shift classrooms. The new schools to be constructed, however, are envisaged as non-shift schools, as per our assumption.
4. Population growth of 2 percent per annum is assumed for Delhi, based on Census population growth between 2001 and 2011. The potential addition to the enrolment on account of population growth will be distributed pro-rata across different levels.
5. Estimates of students attending LFPSs based on NSS (2017-18) are taken from Bose et al (2020b). We assume that the percentage attending LFPSs remained unchanged in the following years. The percentage of OSC is estimated from NSS (2017-18). Assuming that the percentage remains unaltered in the following years, it is applied on the estimated population of 2019-20 to obtain the number of OSC in 2019-20, in the respective age groups. While all OSC in the age group 6 to 16+ will be absorbed in the new GSs, it is assumed that half of the OSC in the age group 17 to 18+ will be absorbed in new GSs (i.e., $q_1 = 0.5$ in equation (8)).
6. The normative PTR is the same as the normative SCR implying one teacher in each classroom. Teachers cannot be transferred across levels within school. In other words, the deficit at one level cannot be met with the surplus at other levels. We assume that there is no deficit teacher at secondary and higher secondary level in the existing schools. The last assumption was made as there is no existing estimate of normative teacher requirement at the high school level and to use a measure such as one teacher per classroom would be erroneous at that stage of schooling.
7. A number of assumptions relate to school size. It is assumed that the new primary school will have 19 classrooms (4 for pre-primary and 15 for primary) and 3 other rooms including staffroom, principal room. The new composite school will have 42 classrooms (4 pre-primary, 2 each for each grade at primary level, 4 each for each grade at post-primary level) and 25 other rooms. Both the new primary and composite school will have a library, separate toilets for boys and girls and drinking water areas. This design is based on existing school structure in most MCD and DoE schools, with some modifications to explicitly accommodate the pre-primary sections.

8. The unit costs are assumed as follows.

Head	Unit cost
Classroom	Rs 20 lakhs*
New primary school	Rs 7 crores**
New composite school	Rs 20 crores**
Annual normative per student cost	Rs 54300 (based on KV)
Monthly salary of a new teacher	Rs 54126#

Note: * based on AWP&B, SSA for NCT of Delhi, 2021-21.

** corroborates with plan document 2020-21 of planning department, GNCT of Delhi

calculated based on level 6 of 7th pay commission with 17% DA and 24% HRA

IV.7 Scenarios

Three scenarios are considered. In the baseline scenario we take into account the excess demand in the existing schools, absorption of OSC, and components of potential demand, namely, the population growth. In the alternate scenarios 1 and 2, which is built upon the baseline, the GS system must also absorb 50% and 100% of the children presently studying in LFPSs, respectively (corresponds to change in q_2 value in equation 8). Scenarios 1 and 2 draw specific attention to the component of excess demand for government schools which in the absence of an adequate supply response is met by LFPSs.

V. Findings and Discussion

We begin by noting the deficits in classrooms and teachers in the GSs, across the two managements (Table 1). There is a classroom deficit in the majority of the existing schools. While 89% of the DoE schools need additional classrooms, among the MCD primary schools 70% need additional classrooms. *The extent of deficit is more in the DoE schools, with 40% having acute deficits. It is 12% for MCD schools.* It is clear that the overwhelming proportion of students studying in GSs in Delhi are in schools that suffer from classroom deficits, often of an acute type. Schools with acute deficits have enrolment share of 23% among MCD schools and 61% for DoE schools.

Going by the grade-wise PTR norm, 94% of MCD schools experience teacher deficits, whereas the similar figure for DoE schools is 65%. As already mentioned, this calculation doesn't separate guest teachers from regular teachers. Thus, even after including guest teachers, teacher deficits are widespread. Majority of students studying in GSs in Delhi are in schools with teacher shortages.

An indicator that needs to be highlighted is the pre-primary enrolment as proportion of enrolment in class 3 and 4 in GSs. This variable can be considered as a proxy indicator for the excess demand at pre-primary level. For Delhi, this figure is 24%. It indicates that the number of children attending GSs at pre-primary level is less than a fourth of the children attending GSs at primary level. At present, GSs lack space to accommodate children of pre-primary age group and most schools have to turn back students in the absence of infrastructure.²² Amongst MCD schools 63.7% and amongst DoE schools 42.2% schools have a nursery section

²² Based on interviews with GS teachers.

(UDISE, 2018-19). Pre-primary age group was left out from the purview of RTE Act. Hence, a large proportion of the children in the age group 3-5 years are either out of school or attending informal schools - anganwadis or private schools. A majority of the private nursery schools are unregistered (Kaul and Sankar, 2017). Expansion in the GS system must take into account the unmet demand at the pre-primary level.

Coming to other sources of excess demand for schooling, we see that a substantially large number of students have shifted to LFPSs on account of unmet demand for public schools. The proportion of students enrolled in the LFPSs in 6-13 age groups is 50% of the overall enrolment in private schools in 2017-18.²³ In comparison to students enrolled in elementary GSs in Delhi, this share of children enrolled at the elementary level in LFPS stands at a significant 38%. If all children attending LFPSs are to be absorbed in the GSs, additional capacity requirement would be around 38% of the existing level. This large LFPS sector mainly caters to the primary age group, and its share becomes sparse at the upper primary level.²⁴ In contrast, the out of school children phenomenon is concentrated at the post-primary level. The proportion of OSC is small (1%) at the primary age group (6 to 10 years), but becomes very significant at the post-primary age group of 11 to 18 years (13%), for Delhi (NSS 2017-18).

²³ See Bose et al (2020b)

²⁴The estimate of students enrolled in LFPS in Bose et al (2020b) is limited to the elementary age group. By all accounts, at the pre-primary level, there would be a significant share of children enrolled in LFPS.

Table 1: Status of Infrastructure, Teachers and other indicators of Excess Demand

		MCD	DOE
I. Classroom Deficit			
Schools with classroom deficit	Number	1199	914
	As Percentage of Schools	70.1	89.4
Schools with acute classroom deficit	Number	210	411
	As Percentage of Schools	12.3	40.2
Enrolment in schools with deficit classrooms	Number	572129	1419612
	As Percentage of Enrolment	75.1	94.8
Enrolment in schools with acute classroom deficit	Number	172000	919030
	As Percentage of Enrolment	22.6	61.4
II. Teacher Deficit			
Schools with teacher deficit	Number	1615	665
	As Percentage of Schools	94.4	65.1
Enrolment in schools with deficit teachers	Number	728743	1137460
	As Percentage of Schools	95.7	75.9
III. Pre-primary, LFPS and OSC			
Pre-primary enrolment as a proportion of enrolment in grades 3 and 4 in GSs (in percentage)		24.2	
Students attending LFPS in the age group 6-13+	Number	553067	
	As Percentage of students in GSs in elementary grades	38.4	
OSC in the age group 6 to 10+ (Primary age group)	Number	12466	
	As Percentage of population	0.8	
OSC in the age group 11 to 18+ (Post-primary age group)	Number	366763	
	As Percentage of population	12.8	

Source: UDISE, 2018-19 and NSS, 2017-18 for the last three rows.

Note: The percentage is drawn within each category.

Table 2 presents the estimates of additional capacities required and corresponding investments for each level across administrations. Estimates are presented for three scenarios: In the baseline scenario, excess demand other than that emanating from the LFPS sector is considered. The latter is added partially (50%), in Scenarios 1 and fully (100%) in Scenario 2.

The three Scenarios

The baseline estimates suggest an additional requirement of 9110 new classrooms in the existing GSs, where deficits are moderate. When the additional classrooms required in the existing GSs is clubbed with the classrooms to be established in the new schools, the demand for additional classrooms is more than 31,700. This is tantamount to 83% expansion over the existing classrooms.²⁵ In terms of new schools required, it calls for about 600 new composite schools (K-12). There are no additional primary schools to be built in the baseline in the baseline scenario. The requirement of additional teachers is again more than 30,700, with 26% of new teachers to be deployed in existing schools, and the rest in new schools to be constructed.

The expansion offered by the investments makes possible 11% and 29% more students at the primary and post-primary level, respectively, in 5 years, as per the baseline scenario. For the pre-primary section the expansion is greater: 119% more students at the pre-primary level. The increase seems higher at the pre-primary level because the present base is small. So, though we have not generated a comprehensive estimate of excess demand for the pre-primary stage, expansion in pre-primary will be substantial because of overall expansion in the school system. This will still not be adequate to meet the large existing deficits at this level, further discussed below.

Scenario 1 and 2 are built on the baseline scenario and provision for students enrolled in the LFPS sector within the GS system. As argued earlier, it is important to take into account the capacity expansion required to replace LFPSs since there has been a systematic neglect in building schools within the public system, and it has contributed to a massive expansion of the LFPS sector. One may point out that to assume that the entire demand for LFPS is because of excess demand for seats in government schools is an oversimplification, and there are valid preferences (e.g. cultural) for private schools, that lie beyond functioning of GSs.²⁶ Scenario (1) thus includes the assumption of 50% students in LFPSs being accommodated in new GSs, whereas scenario (2) sketches the possibility of 100% of LFPSs being replaced by seats in new GSs.

In scenario 1 and 2, there is no change in the estimates of additional classrooms required in the existing GSs (Block 1 in Table 2) as it was assumed that children attending LFPSs cannot be accommodated in the existing GSs. The number of new schools needed has, however, gone up significantly, when compared to the baseline scenario. In scenario 1, the estimates of primary schools needed is 275, and composite schools at 632 (instead of 596 in the baseline scenario). In Scenario 2, corresponding to 100% LFPS absorption in GS, the number of primary schools and composite schools needed have gone up further to 711 and 668, respectively. Notice that it is the absorption of the children in LFPSs alone that needs building new primary schools indicating the contribution of LFPSs in the overall excess demand.

²⁵The existing number of classrooms as per UDISE (2018-19) is 57,479. However, for all shift schools, classrooms are being counted twice. Adjusting for the number of classrooms that are used in double shifts (assuming 2/3rd are shift schools), we get the existing number of “physical” classrooms. The ratio is drawn on the number of physical classrooms.

²⁶ There would also be a small proportion of philanthropic private schools charging low fees and these may provide quality education.

Table 2: Additions to capacity and corresponding investments

		Baseline	Scenario 1 (50% LFPS)	Scenario 2 (100% LFPS)
I	Additional classrooms to be constructed in the existing school	Pre-Primary	1138	1138
		Primary	1896	1896
		Post-primary	6076	6076
	Additional classrooms to be constructed in new Schools	Pre-Primary	2384	3628
		Primary	3551	10450
		Post-primary	16692	17694
	Total no of additional classrooms to be established	31737	40882	50671
	Additional classrooms to establish as % of existing classrooms	82.8	106.7	132.2
II	No. of new primary schools	0	275	711
	No. of new composite schools	596	632	668
III	Additional teachers needed	Existing School	8120	8120
		New School	22627	31772
IV.	No of students who would be accommodated in new schools	864200	1093775	1427195
	Students shifted from the existing school as a proportion of students in the new school	26.4	20.8	16.0
	Additional enrolment as proportion of existing enrolment in GSs	Pre-primary	118.8	160.8
		Primary	11.2	41.0
		Post-primary	28.7	31.3
	Pre-primary classrooms created as % of required	34.3	46.4	64.8
V	Financial Requirements (annualized) in 2019-20 (in Rs Crores)			
	Additional Capital Requirement	2722	3259	4027
	Additional Recurrent Requirement	2310	2610	2911
	Additional Requirement (capital and recurrent)	5032	5869	6937
	Additional Requirement as proportion of GSDP (%)	0.61	0.71	0.83

Source: Our own calculations

One may argue that instead of primary GSs to replace the LFPSs, one could have considered composite schools for all children. The problem with that strategy/ suggestion is that the composite schools being K-12 schools by definition have large sizes. These are more difficult to construct, especially in congested neighbourhoods. In the urban context with such inequalities in planning and provision of civic services, a strategy of opening only composite schools would mean that schools cannot be located where children live. What is likely to happen then is that these schools would be constructed where a sizable piece of land is available. Whereas proximity is a major determining factor in participation and calls for schools being located close to habitations, especially at the primary and pre-primary level (Mousumi and Kusakabe, 2019). For girl children, physical access to schools becomes

difficult, especially when safe passages are not available. Location of schools at a distance also adds to households' out of pocket expenditure on education and might be a deterrent to send girls to schools. It is in view of these considerations that the distance criteria for the primary school varies from the distance criteria for the upper primary school even within the elementary education cycle. Having all schools as composite schools is not a feasible solution. Unfortunately, there are many cases where this common-sense logic is being ignored and behemoth schools are being created - physical school complexes- by moving former schools from within congested neighbourhoods to colonies, where land is available. It increases the time taken and distance to schools for children, with even the rare visit of parents to school becoming difficult. In the absence of locally available GSs, it is highly likely that parents would then prefer to send their children to the local LFPS (than to send a child to a GS distantly located from home).

By design, compared to baseline, scenarios (1) and (2) allow more capacity addition at the primary level, 41% and 71% and pre-primary level, 161% and 225%, respectively. The expansion at pre-primary now accommodates 46% and 65% of the normative enrolment at the pre-primary level.²⁷

The last block of Table 2 presents the financial requirement in terms of capital and recurrent cost. A medium-term plan of 5 years is assumed starting from 2019-20 to complete the required expansion in capacity. Financial estimates presented in Table 2 relate to the first year, 2019-20, of the overall plan period, 2019-20 to 2023-4. The annualised capital cost and recurrent cost of additional investment is in the ratio 56: 44, for 2019-20 (scenario 1). The estimated additional resource requirement ranges between Rs 5,032 crores to Rs 6,937 crores or 0.61% to 0.83% of GSDP of Delhi, depending on the scenario. Thus, the necessary expansion requires very substantial additional investments in new capacity creation in the public school system. In 2018-19, expenditure on education in Delhi as a proportion of GSDP stood at 1.41%. Our estimates indicate that the spending on school education - the predominant part of the education budget, GNCTD - must go up by around 50% or more of the current levels of spending in Delhi.

Across the projection period, while the capital costs are distributed equally, the recurrent cost will rise over the 5-year span as enrolments rise and additional teachers are recruited. As a proportion of GSDP, the additional requirement is likely to go up over the next four years, demanding more resources and expenditure from the government. What this indicates is not only more investments but significant step-up over the next several years. Given that two years have been lost to the pandemic, one needs to adjust the starting point to 2022-3 (see Box 1). These investments are needed now, without delay so as to reduce the risk of perpetuation of the problem further into future.

²⁷ The benchmark / normative used is the enrolment in class 3 and 4 net of pre-primary enrolment in GSs and potential addition to pre-primary enrolment on account of population growth.

Box 1: Need to reset infrastructure expansion for GSs in Delhi

Against the requirement of massive expansion of the GS system, how does one evaluate the recent performance of the state government? It would be fair to say that the present GNCTD recognises the problem of excess demand and the need for higher public investments in capacity creation. Summing up the work on physical expansion of schools, the Budget Speech, GNCTD, 2020-21, reads “The work of modernising GSs and constructing new schools will continue at the same pace next year. During the last term of the government (2015-2020), 8,500 new classrooms were built in schools and construction of 12,000 new classrooms had begun, which is in its final stage now. In addition to this, there is a proposal to start the construction of 17 new school buildings at a cost of Rs 175 crores in 2020-21 so that the scope of access to education could be enlarged.” A significantly higher proportion of capital outlay under the plan schemes is going towards capital expenditure on education.²⁸

Having said that, a few comments are in order. First, the emphasis is on expansion within the existing GSs and less on construction of new schools, though the latter is not altogether absent as is evident from the budget speech cited above. Especially, in the initial years of the state government (2015-), there were visible attempts to expand the GS system through liaising with other authorities for land use.²⁹ However, it didn’t take long for this strategy to metamorphose into emphasis on setting up a few schools of excellence, a model that was not very different from the one existing earlier (e.g. RPVV). Thus, the expansion of the school system in terms of addition of new schools happened at a very slow pace, which cannot be called a break from the past.³⁰

Second, the pandemic has slowed even the progress which was planned. The impetus on capital expenditure has been lost with 2020-1 level being lower than the 2019-20 level by 35%. Faced with a fiscal squeeze, the government prioritised salary payments to other expenditure.³¹ Particularly, expenditure related to capital creation has faced severe cuts (Bose and Sharma, 2022). This needs to be reversed immediately.

Third, while there have been some visible efforts at the level of the Delhi government, the local bodies that are responsible for expansion of primary schools did not make any significant attempt in creating school infrastructure (Figure 1). We have noted that a significant proportion of the excess demand for public schools is concentrated at the primary and pre-primary level. The unmet excess demand of GSs at the primary level has seen LFPSs as a schooling option. The Delhi government does not want to take responsibility for the lack of infrastructure in MCD schools as the latter is run by a separate administration controlled by the rival political organisation. The GNCTD is apathetic at best as far as MCD schools are concerned, and the MCD has moved ahead with mergers. The number of local body schools fell from 1710 to 1670 between 2018-19 and 2020-1. If this is because the enrolments in these specific schools are dwindling, busing children to such schools with requisite safety

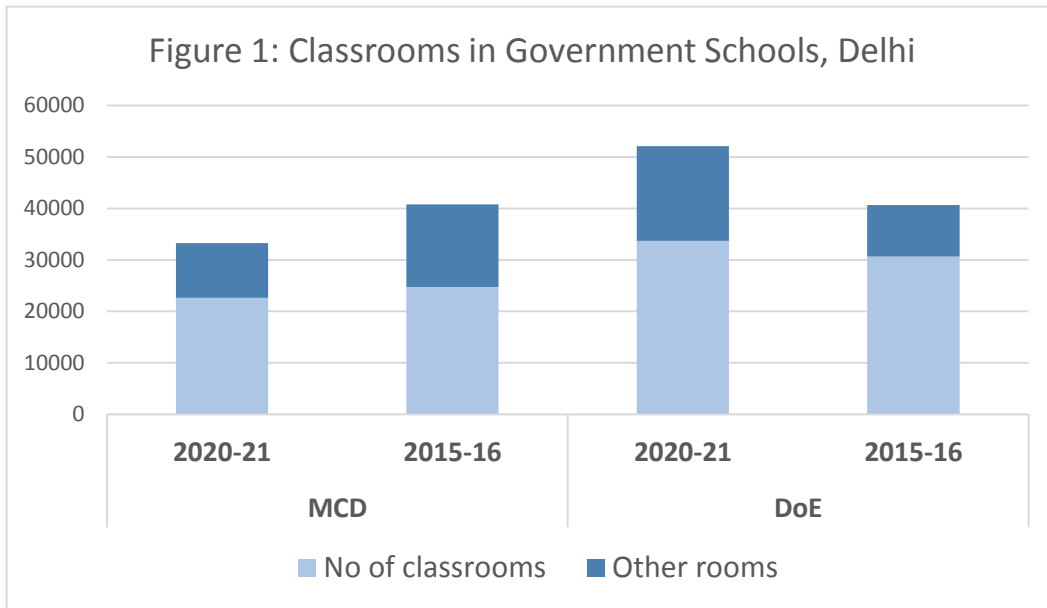
²⁸ The nature of capital expansion could not be ascertained in the absence of a breakup of capital expenditure on school expenditure under individual project/ object heads in the state budget/ plan documents.

²⁹ “DoE has acquired 36 vacant plots/lands for opening of new GS from gram sabha and DDA” (GNCTD, 2018-19:155).

³⁰ Refer to Bose et al (2022b) for a discussion on past policies that have been used to meet growing demand for school education in Delhi.

³¹ The Budget speech acknowledges this slow down (Budget Speech, GNCTD, 2021-2).

precautions can be considered rather than merging schools. The larger point is that *there needs to be better coordination between local bodies and the government.*



Source: UDISE, various years

Note: Change in the total number of classrooms/rooms does not accurately reflect new construction. There are parallel processes of mergers and bifurcations of schools underway.

Overall, a clear roadmap for substantial expansion of new government schools and a quantum jump in investment that was necessary has not materialised. Expansions of new buildings and classrooms have taken place within already saturated supply contexts (adding buildings within existing schools). The latter perhaps is unavoidable to an extent. As for new schools, only a few schools have come up within the elite public sector. Between 2018-19 and 2020-1, the total number of DoE schools increased from 1022 to 1027. What is required is a more radical approach towards public investment directed at creating new public schools.

It is true that historically school planning should have happened simultaneously with the settlement of localities and the construction of schools, especially in densely populated settlements with uncertain land entitlements, is not easy. It is also true that shift schools that were to be a temporary expedient became a permanent strategy for the administration. Shift schools should have signalled the need for many more schools. Encroachments on land have grown in leaps and bounds. It requires a readiness to engage with the issue of land besides requisite investments. Ownership and occupancy of land need to be handled with political and administrative acumen and cooperation, as well as legal means, where required.³² Mega infrastructure projects, commercial and residential use indicates the possibility of finding land even in the city, provided there is political will. The medium-term plan over the next five years, in terms of new schools, needs to be pursued and implemented. It may help to relax infrastructure norms somewhat as done for some elementary private schools recognised under RTE Act in Delhi; use community resources like parks for playground (DSEAR, 1973); build vertically; and create safe passages for children to come to school. The task is difficult but not impossible.

³² Refer to section on political economy of land for schools in Bose et al (2022b)

Can the government(s) afford this expansion? We would argue that this is not only necessary but imminently feasible for a state like Delhi, with one of the highest per capita incomes in India. The state government has been running revenue surpluses for the major part of the 2010s decade, which shows that its fiscal situation was comfortable before the Covid-19 pandemic.³³ Besides, there is further scope of raising revenues. This holds for the local government as well, which has considerable unutilised taxation capacity.³⁴ One major revenue source where Delhi loses out is the share in central taxes. In the absence of full statehood, Delhi does not get the benefit of the dispensations recommended by the successive Central Finance Commissions to the States.³⁵ Correcting such anomalies and a genuine effort at revenue mobilisation would create additional fiscal space that can be used for financing the much-needed expansions in the public school system along with measures for improvement of quality.

Limitations of the Estimates

Most of the limitations of the estimates flow from data limitations.

The assumption of no deficit teacher at secondary and higher secondary level in the existing GSs is restrictive, but was necessary. A simplistic teacher norm of one teacher per classroom will not suffice for secondary and higher secondary classes. We were unable to take account of the different requirements and input norms for different streams of study (science, arts etc.) due to absence of data on subject teachers. Although UDISE collects information on subjects taught by teachers, the data is not publicly available.

We have assumed that a 30-35% addition to the number of classrooms is possible, in the existing GSs. It is the threshold, beyond which if deficits exist, would call for new schools. This parameter crucially influences the number of new schools needed. In practice, the extent of capacity addition that may be possible in each school will not be uniform but vary depending on location, space available within the premises of the school, etc. Again, data limitations forced us to use uniform assumptions.

Box 2: Misleading data on schools running in Shifts

A large proportion of government schools in Delhi are running in shifts. But UDISE data for GSs in Delhi does not reflect the reality. Instead, the number of shift schools as per UDISE is recorded as zero (2012-13 to 2020-1). Interestingly, this was not the case till 2011-12 when the same database would identify and report schools correctly. In 2011-12, 53% of schools were running in shifts. This ratio was 49% in 2009-10. In terms of enrolment, 63% of students were enrolled in shift schools in 2011-12. This number may have gone up, as bifurcation of schools continues as a strategy, but there is no way to know.³⁶ This useful piece of information, which is a direct indicator of excess demand for public education, lies junked and unusable today.

³³State Finance: A study of Budgets, RBI

³⁴Fifth Delhi Finance Commission Report (GNCTD, 2017)

³⁵The grants in lieu of share in central taxes from MHA or grants under provision of Article 275(1) of the Indian Constitution has remained constant for more than a decade. In 2010-11 it was Rs 325 crore, and continues to be the same for 2022-23 (BE)

³⁶ Refer to plan documents, Department of Planning, GNCT of Delhi (GNCTD, Various years).

A number of aspects have been left out in our estimation. Additional requirements of infrastructure items other than classrooms such as library, toilets, drinking water facilities, ramp, and boundary wall in the existing GSs are not considered in the estimation exercise as most of the GSs in Delhi have these facilities (see Bose et al. 2020). The cost of land for schools is not included in these estimates. Inclusion of land costs would raise capital requirements substantially. Many of the teacher vacancies are temporarily filled by guest teachers. We have not considered the adjustment of wages and therefore the financial requirement of filling these teacher positions. The vacancy amongst the non-teaching staff in the GSs are left out, as the data on the non-teaching staff though collected by UDISE is not publicly available.

A more accurate estimation of excess demand could have been made possible by estimating the OSC and the children enrolled in LFPS below 6 years of age.

Finally, one would like to highlight that these estimates – though emerging out of a well-designed framework, method and unit level data – cannot replace the estimate that would emerge out of the actual data on school mapping. There's been great reluctance on the part of different administrations to conduct school mapping in Delhi – a point that we have raised repeatedly (Bose et al, 2020b, 2021).

VI. Conclusion

This paper underlines the very substantial expansions and investments necessary to accommodate the excess demand for GSs in Delhi. We argued that the estimation of demand remains a neglected field in school planning of Delhi, even though supply trails demand by a huge margin. The empirical estimation takes into account various sources of demand for expansion from: (i) within the existing GSs that are facing supply shortages, often of an acute variety; (ii) arising from children now attending LFPSs, and, (iii) from children in school age groups, but out of school. Population growth over the next five years representative of future demand is also factored in. The estimates indicate that the expansion required is a mammoth doubling of existing capacities in GSs, 107% increase on existing capacity.³⁷ Whereas a portion of this demand could be met through building additional classrooms either by adding a floor, by horizontally extending present buildings or even adding a new building in certain cases, *a proper supply response entails a very substantial addition to the existing number of GSs*. Based on estimated excess demand, 632 composite GSs and 275 primary GSs separately need to be established. This would allow adherence to the spirit of RTE norms in terms of a reasonable class size, and provide adequate capacity for additional enrolments of around 30% in post-primary grades, 40% in primary grades. It would also allow a very substantial increase in capacity (160% of the existing enrolments) in pre-primary grades in GS, a sector that has been most neglected within GSs.

Besides expansion in infrastructure, the gaps in teacher availability in existing schools and new schools proposed need to be met. The (additional) financial requirement equivalent as a proportion of GSDP of Delhi, 2019-20, is 0.71%. With the present level of public expenditure on education, school and higher education together at 1.4% of GSDP for Delhi, this entails an increase in expenditure on education by 50% of the existing levels. That is, a very significant push in public expenditure is necessary for meeting the excess demand for public schooling in Delhi.

The long-term returns of a well-functional public education system in terms of private and public benefit, naturally, far outweigh the budgetary costs of such investments. Education –

³⁷Estimates discussed in this and the following paragraph correspond to scenario 1 in Table 2.

particularly basic education - is a public good. Education generates externalities or benefits that spill over to the society at large. This consensus is embodied in historical experience of developed countries as well as that of the high achievers among developing countries. The rising influence of neo-liberal paradigm along with the fiscally constrained position of governments, renders the reality of developing countries different. A natural corollary of the absence of sufficient investments in the public school system is not only privatisation and commercialization, but privatisation at the bottom and the growth of LFPSs. Since the state cannot provide, private schools are allowed, no matter if they operate without recognition and are of substandard quality. Lack of public investments in schools of adequate quality and in sufficient numbers lies at the heart of the privatisation drives, overt and covert. Then, the only way to reverse the unequal system is a proper expansion of the government school system, ensuring access and participation. The pandemic adds an urgency to this imperative of expansion of the GS system. A radical approach towards public investment directed at creating new public schools with a focus on the fringe areas and the disadvantaged groups is the need of the hour.

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