Policy Brief

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The Impact of Interface Design on Aadhaar Authentication for 'Non-Dominant' Name Patterns

Lessons from SARAL policy of Maharashtra

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Introduction

Background on Project Aadhaar

The Government of India launched the project Aadhaar in 2009 with the aim of providing all its residents with a unique Identity number, as the lack of efficient and reliable means of identification in the welfare system was considered one of the major reasons for leakages and exclusion. As of March 2023, more than 1,670 Union and State-level social welfare, DBT, and good governance schemes have incorporated Aadhaar (PIB, 2023), with the government attributing huge amounts of savings due to curbing of leakages (PIB, 2024). Furthermore, The World Bank through its initiatives like Identification for Development (ID4D) has undertaken efforts to help developing and underdeveloped countries launch their own unique ID (Identity Document) projects. With more than 22 low-income countries (LIC) and 46 lower-middle-income countries (LMC) have already initiated national digital IDs, with 37 of these countries having biometric-based digital IDs (World Bank, 2018).

However, Digital ID (identification) based authentication in some cases is also subject to failure and results in exclusion when such authentication is mandatory for receiving benefits. Studies have also pointed out that the mandatory use of Aadhaar in welfare policies results in the denial of services to genuine beneficiaries in some cases due to technical problems, which again disproportionately excludes the most vulnerable beneficiaries (Khera, 2017). Another large-scale study, investigating the use of Aadhaar for removing fake beneficiaries in the Public Distribution System (PDS), conducted in coordination with the government of Jharkhand, found that while mandatory Aadhaar linking did result in savings to the state, 24% of these savings were due to the exclusion of genuine beneficiaries (Muralidharan et al., 2020).

In the context of this evolving discussion on the use of Aadhaar-based authentication in welfare delivery, this policy brief illustrates how Aadhaar-based demographic authentication can fail for certain demographic groups due to the design of the portal of the authentication requesting agency. To do so, this policy brief analyses the working of Aadhaar-based demographic authentication in the SARAL (Systematic Administrative Reforms for Achieving Learning by Students) portal of Maharashtra state's school education department, where Aadhaar-based authentication is used to curb the phenomenon of fake students in schools.

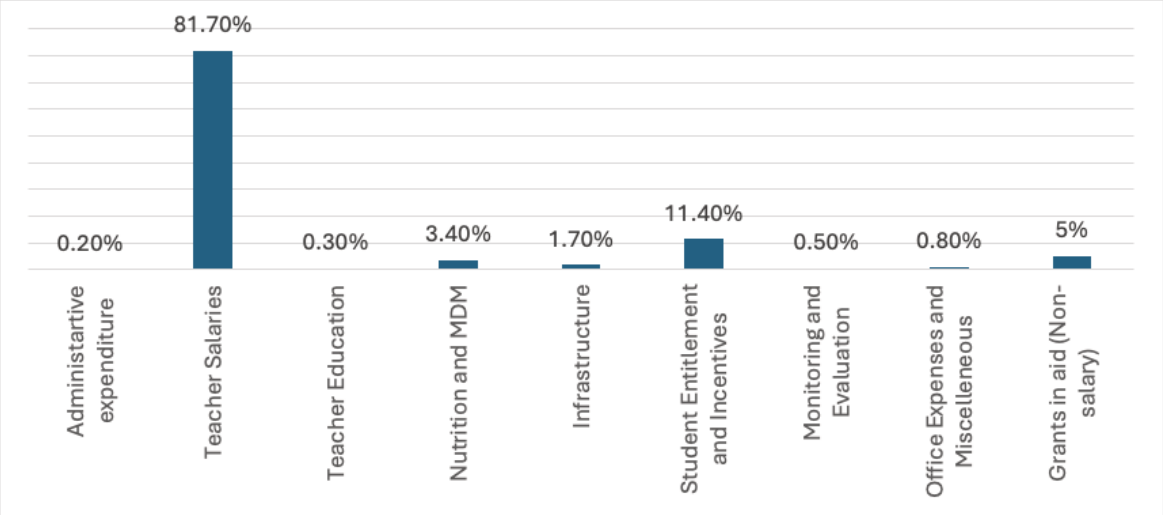
The Phenomenon of fake Students in Schools in Maharashtra

Maharashtra state provided salaried positions (teaching and non-teaching) and educational grants to schools in proportion to the number of students enrolled. In private aided schools, where almost half of the students in the state study, privately managed local school bodies conducted the hiring process. Despite these jobs being public employment with salaries paid by the state treasury and customary public service benefits, the selection of candidates was done by these private bodies. It was widely known that aspiring teachers needed to pay amounts ranging from 20 to 40 lakhs to such private school bodies as bribes to get appointed, and this was also reported in local media (Bose, 2021). This created an incentive for schools to create fake students to get more funds and teaching positions allocated from the state.

To identify the extent of this phenomenon of fake students, Maharashtra first conducted a pilot survey in the District of Nanded and then undertook a state-wide survey from the 3rd to 5th of October 2011. The public employees of the state, from departments other than the school education department, were deployed for this survey. School education department employees were not involved in the exercise in an attempt to isolate officers visiting schools from pressure from schools engaged in the practice of creating fake students (Government of Maharashtra, 2012).

The teams counted present students, verified their names against the list of enrolled students, and marked their fingers with ink to ensure that no student was counted more than once. Inspection teams conducted visits to a total of 100,887 schools in the state. These schools had previously reported a total student enrollment of 2,03,69,638. However, during the inspection, it was found that only 1,82,99,118 students were present on the day of the visit. This represents an absentee rate of 10.16%, with 20,70,520 students absent. The inspection teams identified 9,687 schools in which the absentee rate was between 20% and 49.99%, while for the other

Figure 1: Component-wise distribution of expenditure on School Education in Maharashtra for year 2017-2018.



Source: Budgeting for School Education in Maharashtra (Kundu, 2018).

2,659 schools, it was above 50% (Government of Maharashtra, 2012).

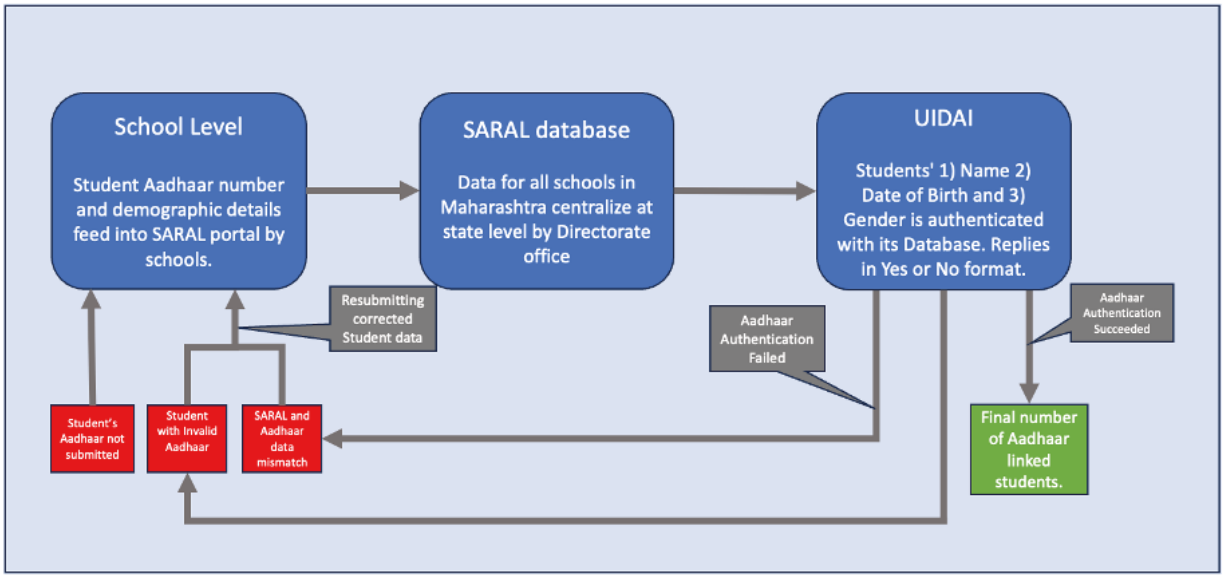
Leakages to the State

Maharashtra state spends between 16% and 18% of its total budget on school education. For FY 2019-20, the state budget allocation for school education was 61,000 crore rupees (Bordoloi et al., 2020). As shown in Figure 1, 81.7% 81.7% of the school education department's budget was spent on teacher salaries and pensions. Hence, fake students created by schools to get more state-salaried teaching positions caused a considerable financial burden on the state exchequer.

Aadhaar based Authentication in SARAL

To curb the phenomenon of fake students, the Government of Maharashtra launched the SARAL portal in 2015 as a centralised database of students with provisions to link students' Aadhaar. From 2017 onwards, the state made the number of teaching and non-teaching positions allocated to schools proportional to the total number of Aadhaar-validated students in the school (Government of Maharashtra, 2017). SARAL employs Aadhaar-based demographic authentication whereby students' demographic information such as name, date of birth, and gender, along with Aadhaar number, is sent to UIDAI (Unique Identification Authority of India) for authentication. Figure 2 depicts the flowchart of the Aadhaar authentication process in SARAL. Table 1 shows the Aadhaar authentication status of students in the state as of December 31, 2023. While nearly 92.96% of all students' Aadhaar were validated, around 1,490,736 students or 7.03% (highlighted in red text) of the total students in the state were not validated with Aadhaar. While it is possible that a section of these 7.03% students are fake or duplicate students, our fieldwork shows that there are significant cases of genuine students being unable to validate their Aadhaar despite multiple attempts. This policy brief will cover one type of error which emerged due to the design of the SARAL portal which results in data-filling errors for some non-dominant name patterns.

Figure 2: Flowchart of Aadhaar-based demographic authentication in the SARAL portal.



Source: Authors

Table 1: Students' Aadhaar authentication status in the state of Maharashtra as on December 31, 2023.

Student Category	Number of Students
Total Students in the State (A)	2,11,88,728 (100%)
Students with Aadhaar Details (B)	2,07,20,923 (97.79%)
Students without Aadhaar Details (C = A – B)	4,76,805 (2.20%)
Students Aadhaar processed with UIDAI (D = E +F)	2,01,57,707 (95.13%)
Valid Students Aadhaar as per UIDAI (E)	1,96,97,992 (92.96%)
Invalid Students Aadhaar as per UIDAI (F)	4,59,715 (2.16%)
SARAL – Aadhaar data mismatch (G = C – D)	5,63,216 (2.11%)

Data Source: SARAL database

Methodology

Fieldwork for this study was conducted at 15 randomly selected schools in the Chhatrapati Sambhajinagar subdistrict of Maharashtra. The Aadhaar validation status along with demographic data of all 3,591 students from selected schools was obtained from the school education department. During visits to schools, we enquired about each student whose Aadhaar authentication was pending and documented reasons behind the inability to validate their Aadhaar. We also conducted interviews with teachers and parents to document and categorise 'points of failure'. As teachers were closely involved in the students' Aadhaar validation process in SARAL, these interviews also allowed us to capture the challenges faced in resolving problems in students' Aadhaar. In a few cases, parents were interviewed to understand the nature of the problem better.

'Exact match' Demographic Authentication in Aadhaar

As explained in Figure 2, students' demographic data (name, gender and date of birth) along with Aadhaar number is sent to UIDAI for authentication. UIDAI verifies this information against its own dataset and responds either "yes" or "no"—"yes" in case of a successful match of demographic information, and "no" in case of a mismatch. Prior to November 2017, UIDAI had provided Authentication User Agencies (AUAs) with an option to choose whether they wanted to conduct authentication in case of a partial match or only in case of an exact match of demographic information. Partial match is when Aadhaar is authenticated even if there are small

spelling errors in the demographic data submitted. However, post-2017, UIDAI changed its rules and allowed Aadhaar authentication only in the case of an exact match of all demographic attributes, with the reasoning that allowing authentication with partial match could result in "wrongful identity verification" (UIDAI, 2017).

Demographic Authentication Failure in case of Non-Dominant Name Patterns

Our study shows that out of our sample of 3,591 students, 55 students (1.53%) were not able to validate their Aadhaar due to various Aadhaar-related reasons such as inability to enrol in Aadhaar, cases of lost Aadhaar or demographic errors in Aadhaar. This policy brief will underline the issue of demographic authentication failure which resulted from the design of the SARAL portal. Figure 3 shows the SARAL portal where schools need to input students' Aadhaar information. The portal divides students' names into "First Name - Middle Name - Last Name" format. We found that authentication failed for four students whose names did not follow this format as there were errors in data entry.

Three words format of "First Name - Middle Name - Last Name" is common naming format used in Maharashtra state. Table 2 shows analysis of name pattens of all 2,56,340 students from Ch. Sambhajinagar city area accessed by researcher[1]. While 73.17% students had their names in three words formats, around 21.83% had more than three words in their name and 8.50% had less than three words. In terms of demographic groups, students following three words format were mostly Maharashtrian Hindus. Those having more than three words in their names were predominantly Muslim. And students with less than three words in their name had significant population of non-Maharashtrian and Muslim students. Refer to Figure 4 for illustration.

[1] The first author did not access sensitive information like Aadhaar number of these 2,56,340 students. And only demographic data like name, gender and date of birth of these students was provided to the researcher for this analysis. However, at school level while studying the reasons behind failure of Aadhaar authentication, researcher attempted refilling of Aadhaar data in the SARAL portal. Aadhaar information in such cases was provided to the researcher. To ensure privacy of data, all sensitive information like Aadhaar number of students has been deleted.

Figure 3: Screenshot of SARAL portal where student's name as per Aadhaar needs to feed in.

Table 2: Analysis of student names in Chhatrapati Sambhajinagar subdistrict based on total words.

Student names in SARAL portal as per name pattern	Number of Students
Student names with three words	1,87,568 (73.17%)
Student names with more than three words	55,971 (21.83%)
Student names with less than three words	12,801 (8.50%)
Total Students	2,56,340

Data Source: SARAL data provided to the researcher.

Authentication errors in case of Non-Dominant Names

We will explain this issue of authentication failure for non-standard naming pattern using sample Aadhaar from Figure 4. As SARAL portal prompts name input in three words format (refer to Figure 3), example of which is shown in Sample A of Figure 4, schools conducting Aadhaar authentication struggle to understand the correct way to input data when a student's name did not follow the three-word format. In the case of Sample B, for authentication to succeed, the school needed to input the student's name exactly as per Aadhaar. That is, input 'Sunil' in the first column, 'Solanki' in the next column and leave one column blank. But as the SARAL portal asks for "middle name", this created confusion in such scenarios as schools also input the student's middle name (i.e. the father's name in most cases) even when there is no middle name written on the student's Aadhaar, hence resulting in invalid Aadhaar authentication as the name input on SARAL does not match the name as per Aadhaar.

In cases when there were more than three words in a student's name on Aadhaar, as shown in Sample C, schools struggled to input this name into the SARAL portal. Adding to the confusion, the student's surname in the school records was "Sayyed". Aadhaar authentication failed in the case of this student because the school, taking "Sayyed" as the surname, added it at the end of the name, resulting in invalid Aadhaar authentication as demographic Aadhaar authentication required an exact string match.

It is important to note that a non-dominant name does not necessarily result in invalid Aadhaar authentication, as schools can put more than one word in one box or keep any of the boxes empty (refer to Figure 3). However, we found some schools were unaware of the steps needed for valid authentication when a student's name on Aadhaar did not match the three-word format, resulting in invalid Aadhaar authentication. The researcher, during visits to schools, explained the correct way to input names in the SARAL portal in such cases of non-dominant name patterns. Once this know-how gap was filled by the researchers, schools were able to validate these students.

Discussion and Policy Recommendations

Considering the widespread use of Aadhaar as an online identification tool in India by both public and private entities, failure in Aadhaar authentication could result in serious exclusion of genuine beneficiaries and reduce the efficiency of state policies. While the absolute number of cases where Aadhaar authentication failed due to non-dominant name patterns was small in SARAL, it is significant considering the number of policies where Aadhaar-based demographic authentication is used and the size of the population affected by it.

Moreover, it is likely that the Aadhaar authentication failure rate in the case of 'non-dominant' naming patterns is likely to be higher in other policies as compared to SARAL. This is because in the implementation of SARAL, schools were conducting the work of data input, and in most cases this task was done by school-teachers. We found teachers taking considerable effort, many times even visiting Aadhaar centres with students, to conduct Aadhaar authentication, as the lack of Aadhaar-authenticated students affected teachers most negatively. Hence, high involvement of teachers in data input increased the likelihood of successful data entry. Also, there were high levels of knowledge exchange and know-how sharing, vertically

Figure 4: Sample of names on a student's Aadhaar.

Note: 'Sample-A' illustrate name patten mostly used by Maharashtrian Hindu students, 'Sample-B' by non-Maharashtrian migrants as well as by Muslim students, and 'Sample-C' by predominantly Muslim students.

between the education department and teachers, and horizontally among teachers from various schools regarding conducting students' Aadhaar authentication, increasing Aadhaar authentication rates. Hence, the Aadhaar authentication failure rate due to such portal design catering to specific naming patterns is likely to be higher in policies where individuals themselves undertake data entry in the portal.

Specific Policy Recommendation

In case of SARAL, portal design expects a name input in three words format of 'First Name'-'Middle Name'- 'Last Name', and fails to account for names which do not follow this format. We recommend that when various government departments in India create Aadhaar Authentication portals, there should be a single text box to input name as per Aadhaar. Without any specifications like 'First Name' or 'Last Name'.

The policy brief recommends that departments using Aadhaar authentication should acknowledge that in a few cases, an Individual's Aadhaar authentication can fail with no fault of their own. Hence, making Aadhaar mandatory for receiving services could result in cases of denial. In the case of SARAL, the total number of teachers allocated to schools was dependent on the number of Aadhaar-Authenticated students. Students were not denied any rights/services like school admission, mid-day meal, free uniforms, etc., in case of inability to authenticate Aadhaar. This avoided cases of exclusion. Other departments that use Aadhaar authentication in their policies should acknowledge such occasional failures and refrain from making Aadhaar mandatory to prevent wrongful exclusion cases.

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