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Integrating Biometric Authentication in India's Welfare Programs: Lessons from a Decade of Reforms[§]

ABSTRACT India's biometric unique ID Aadhaar has been at the forefront of the global revolution in digital identification, and India's most significant investment in state capacity over the past decade. Yet, its application to social protection programs has been controversial. Proponents claim that the use of Aadhaar to identify and authenticate beneficiaries in these programs has led to considerable fiscal savings, while critics claim that it has led to denial of benefits to the marginalized and caused substantial harm. We review research on the use and impact of Aadhaar in social programs in India over the last decade. Our main takeaway from the review is that biometric authentication has reduced leakage in multiple settings, but its impact on beneficiaries depends crucially on the protocols and details of implementation. We conclude with a list of policy suggestions for obtaining the benefits of Aadhaar while minimizing the risk of harm to beneficiaries.

Keywords: Aadhaar, India, Service Delivery, Biometric Authentication

JEL Classification: D73, H53, O30, O31, Q18

1. Introduction

The United Nations Sustainable Development Target 16.9 states: "By 2030, provide legal identity for all, including birth registration."¹ Meanwhile, the World Bank's ID4D initiative estimates that a billion people globally, or

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1. <https://sdgs.un.org/goals/goal16>, accessed June 30, 2021.

40 percent of people in low-income countries, do not have official proof of identity. Moreover, this lack of access is especially concentrated amongst the poor and the marginalized. Having an ID helps individuals obtain government transfers and services, access the legal system, and gain economic opportunities, amongst many other benefits. ID4D notes that “trusted and inclusive identification (ID) systems can serve as a powerful tool for development, accelerating progress in a number of areas, such as women’s empowerment and gender equality, financial inclusion, and health.”²

Around the world, developing countries have been heavily investing in ID systems. Overall, 161 countries have ID systems using digital technologies.³ Of course, IDs do not need to be digital: the United States, for example, has unique Social Security Numbers for individuals. But digital, and especially biometric IDs, can provide considerable advantages in security as well as ease of use, given the lack of literacy and numeracy in developing countries. Recognizing these, the Global ID4D initiative helps “countries realise the transformational potential of digital identification systems.”

India has been at the forefront of the digital identification revolution, starting with the 2010 roll out of its Unique ID, Aadhaar. At the time of writing, over 1.296 billion Aadhaar cards have been issued. The use of Aadhaar has been integrated into numerous government-provided services. For 8 percent of individuals, Aadhaar was their first ID ever, and further, 49 percent of respondents in a large national survey noted that they had used Aadhaar to access a service for the first time (Totapally et al. 2019).

The growing requirement to use Aadhaar to avail of a number of government and even privately-provided services has been controversial, to say the least. The argument reached the Supreme Court, which in 2018 set out specific criteria for its usage. While providing clarity, the judgment does not resolve controversy over the costs and benefits of using Aadhaar in delivering public programs. Proponents claim that the use of Aadhaar to identify and authenticate beneficiaries in these programs has led to enormous fiscal savings, while critics claim that it has led to denial of benefits to the marginalized and caused substantial harm.

In this article, we first provide a generic framework for thinking about the challenges that a government faces when trying to transfer value to remote beneficiaries, and how biometric authentication might plausibly affect these. We next describe Aadhaar use cases in Indian social protection programming, using our framework to categorize whether the use is *a priori* reasonable. We then review evidence on the impact of Aadhaar integration on leakage and exclusion, including causal evaluations as well as high-quality descriptive work. We summarize two of our own studies: the use of biometric Smartcards to make payments to the

2. <https://documents1.worldbank.org/curated/en/953621531854471275/Global-ID-Coverage-Barriers-and-Use-by-the-Numbers-Insights-from-the-ID4D-Index-Survey.pdf>, accessed June 30, 2021.

3. <https://id4d.worldbank.org/global-dataset>, accessed June 30, 2021.

Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS or NREGS) workers and pensioners in Andhra Pradesh, and the integration of Aadhaar in the Public Distribution System (PDS) in Jharkhand.

We conclude with five policy suggestions based on over a decade of research on the use of biometric authentication in social programs in India. These are: (i) build in safeguards against exclusion, including offline fallback options; (ii) focus on using Aadhaar-based authentication to improve the beneficiary experience rather than prioritizing fiscal savings; (iii) implement solutions for real-time measurement of beneficiary experiences to quickly detect problems of exclusion and address them promptly; (iv) incorporate questions about Aadhaar in representative household surveys like the National Sample Survey (NSS) [as well as private surveys like that of the Centre for Monitoring Indian Economy (CMIE)]; and (v) build trust between the government and civil society in order to manage the trade-off between benefits from fiscal savings and the costs from increased exclusion.

2. Framework

The Supreme Court's 2018 judgment allows the government to mandate the use of Aadhaar for transactions that involve the transfer of resources between governments and citizens (reflecting the legacy of the enabling legislation for Aadhaar being introduced in Parliament as a "money bill"). These include obtaining welfare benefits, as well as filing income taxes and obtaining a Permanent Account Number, or PAN (tax ID) card. The judgment makes exceptions for children accessing benefits, and also explicitly prohibits private companies from requiring the use of Aadhaar for providing services such as bank accounts (though this has not prevented some cases of "Aadhaar-creep," where either public or private sector entities require Aadhaar in contravention of the SC judgment).⁴

Where it is legal, is mandatory Aadhaar also desirable? In order to organize our thinking about the potential benefits, we begin with a simple conceptual framework. We focus on situations in which the government wishes to transfer something of value to people who meet certain criteria. For example, it wishes to transfer PDS rations to households that meet a certain definition of poverty, or issue caste certificates to people from specified castes. The government manages these processes through its agents, the front-line bureaucrats who interact directly with citizens. Broadly speaking, the main steps in processes like these usually involve the following:

- (a) Testing the *eligibility* of the applicant—whether a household is poor, whether a person is from a given caste, and so on;

4. See, for example, this article in the *Huffington Post*: https://www.huffpost.com/archive/in/entry/a-year-after-supreme-court-aadhaar-verdict-its-business-as-usual_in_5d8c69a8e4b0ac3cdda340cc.

- (b) Testing the *identity* of the applicant (i.e., authentication)—whether the person who appears before the agent is in fact who they claim to be.
- (c) Authorizing the agent to issue transfers. This authorization happens in real time in some cases, but can also happen asynchronously as, for example, when the government advances money or food to an agent and then subsequently *reconciles* his balances with records of transactions.

Notice that authentication, such as using Aadhaar, can play two logically distinct roles in these processes. The first is to create a reliable link across interactions. For example, in order to ensure that PDS benefits go to priority households, it is important to confirm that the person showing up to claim PDS rations today is from a household that was classified as a Priority Household last year. In order to ensure that people do not collect the same benefit twice, it is important to check whether the person claiming a benefit today did not claim the same one somewhere else yesterday. This role for authentication is *not* relevant, on the other hand, in one-shot interactions where the government can test eligibility and authorize transfers in the same interaction. For example, if the goal is to provide medical care to people sick with COVID, the government can simply immediately admit anyone who tests positive.

The second function of authentication is to ensure that the people with whom the agent interacts are real, and not “ghosts.” For example, Barnwal (2019) suggests that diversion of Liquefied Petroleum Gas (LPG) to the commercial black market arises chiefly through the creation of fake accounts, which was substantially reduced (by 15 to 19 percent) after the introduction of authenticated direct transfers.

Notice that there are also aspects of the transfer process that authentication does *not* improve. It does not, *per se*, improve the quality of eligibility tests. If the government conducts a survey to determine which households are Priority Households, for example, this determination does not become more accurate if it also collects their Aadhaar numbers. This is counter to the casual rhetoric about Aadhaar preventing the leakage of benefits to the non-poor. Where authentication *can* improve eligibility tests is by making it easier to link multiple records, as for example, by cross-referencing household surveys with government payroll records to ensure that government employees are not enrolled in programs they are not entitled to.

Authentication also does not *per se* prevent government agents responsible for delivering transfers from taking some of these transfers, or charging bribes for them. The PDS is a good example of this: PDS dealers may well keep part of the beneficiaries’ rations for themselves, regardless of whether or not the beneficiaries scan their fingerprints in a Point of Sale (PoS) device. (In other words, authentication may help to reduce “identity fraud” but does not obviously prevent “quantity fraud.”) Authentication might in theory help indirectly by improving the beneficiaries’ negotiation position, as they can threaten to

withhold authentication, but whether this is the case in practice is an open question (more on this below).

In short, authentication can plausibly help to address some forms of fraud and leakage from transfer programs, but not others. To understand the potential benefits of mandating an authentication technology such as Aadhaar in a transfer scheme, a central question is thus:

(1) *Are there substantial issues facing the scheme that Aadhaar is well-suited to solve?*

For example, if most of the leakage from the PDS in a State takes the form of “ghost” ration cards, there is a strong case that requiring Aadhaar (at least for enrollment, if not for transactions) will help reduce it. If, on the other hand, most of the leakage takes the form of under-delivery of benefits to the enrolled households, it is not clear whether authentication will help. And if the main issue is simply that non-poor households have been classified as Priority Households (or poor households have not been able to obtain ration cards), then authenticating them more strictly will not help at all.

Understanding the details of leakage and fraud is important for deciding not only *whether* to use Aadhaar but also *how* to use it—in particular, what form and frequency authentication should take. For example, if the main issue is “ghost” beneficiaries, then it may be enough to require beneficiaries to link (“seed”) their accounts to Aadhaar once, or to re-verify their identity every few years. If, on the other hand, the long-run goal is to enable beneficiaries to access their benefits from anywhere, then it is important that each transaction be authenticated so that the government can check what remaining balance the person requesting rations is entitled to, “linking” the current request with any other related transactions conducted earlier.

Note that in some cases schemes do transfer benefits to the “wrong” people, but this is not particularly consequential for the scheme’s overall goals. In certain types of vaccinations, for example, it may be critical to simply get as many “shots in arms” as possible, without being concerned about the specific identity of the individual. It is worthwhile to distinguish cases like these from those where the identity of the recipient is critically important—*who* receives a caste certificate, for example, or payment for a particular MGNREGS work spell.

The benefits of limiting fraud also depend on the nature of the benefit being provided, and in particular, whether or not it is “rival,” in the sense that one person’s consumption of it precludes another’s. Individually consumed goods and services such as rations provided via the PDS are rival in this sense, which is why it is important to prevent them from falling into the wrong hands. But some other benefits, such as slots in adult education classes or agricultural clinics, are less so. For this latter category, preventing the “wrong” people from benefiting has little value *per se*; the question is rather whether there is value in obtaining

an accurate count of the number of people benefiting, as for example, when instructors are compensated on this basis.

The information needed to assess these issues empirically—how much of various types of leakage and fraud exists in the status quo—generally cannot be found in administrative records alone. Records of the amount of grain sent to a Fair Price Shop (FPS), for example, do not tell us how much was diverted, how much of this was due to “ghost” ration cards, and so on. The key is to *match* the administrative data to independent, representative data on what is actually happening on the ground, as for example, in an audit study. The quality and availability of administrative data on India’s major social programs has been increasing substantially, as for example, the detailed records of payments issued to workers through the MGNREGS. But comparable ground-truth data have, if anything, become harder to obtain, particularly now that the National Sample Survey Office (NSSO) has stopped conducting rounds of the National Sample Survey (NSS) (and chosen not to release data from the 2017–2018 Round). We return to the importance of better ground-truth data in discussing policy implications below

(2) ***How serious are the risks of exclusion, and of higher transaction costs, to the population being served?***

Understanding how much scope exists for Aadhaar authentication to improve a scheme is important because requiring authentication will usually come at some cost.

The first category of cost is exclusion: some people may be eligible, but unable to establish their identity at some step in the process, and so lose access to benefits. This may occur for a number of reasons—because they do not have an Aadhaar number, because they are not able to link one to other government records, because authentication at the point of interaction fails, and so on. The potential costs of exclusion have been graphically illustrated by the press coverage of starvation deaths in households that lost access to PDS rations because they were unable to seed an Aadhaar number to their ration card.

The second is transaction costs: some people may successfully obtain benefits, but incur much higher costs in terms of time, money, and frustration to get them. The authentication process can be costly and/or time-consuming; for example, authentication failures might necessitate multiple trips to collect benefits. For example, in Jharkhand, both our own work and that of Dreze et al. (2017) suggests that beneficiaries needed multiple trips to collect PDS rations after the introduction of online Aadhaar authentication.

The severity of these risks depends both on how *likely* they are and on how *harmful* they would be.

In order to assess likelihood, it is useful to examine the usual information about the share of the target population that already has an Aadhaar number, as well as determine how difficult obtaining an Aadhaar number (and, where

relevant, seeding it) would be for those that do not. Knowing the population being served can also give us a decent sense of the potential costs. The costs for obtaining and seeding Aadhaar are known to be high for remote and more marginalized populations (Totapally et al. 2019); cases where these populations make up a high proportion of beneficiaries might, therefore, see higher costs. The age of the beneficiary population can be an easy predictor of costs. It is clear that obtaining Aadhaar cards and being present for transaction authentication might pose particular challenges for the very young or the very old. Yet while being useful, this information cannot tell us how much exclusion will, in fact, take place *as a result of* Aadhaar, as that requires knowing what rates of exclusion would be like under the alternative—a point we return to below.

In order to assess harm, it is important to consider the type of benefit being transferred and its value from the point of view of the beneficiaries. Some benefits, such as food for vulnerable populations, can be matters of life or death. Other types of subsidies, for example, technological and quality upgradation subsidies for Micro, Small and Medium Enterprises (MSMEs) are less essential in comparison.

(3) *What mechanisms are or can be put in place to mitigate these risks?*

The Supreme Court judgment explicitly recognized that making Aadhaar mandatory involved real risks of exclusion, and that it would be important to have fallback mechanisms in place to mitigate this risk. Yet such mechanisms are not always existent, or easy to access. In the case of the PDS, for example, a fallback option to Aadhaar authentication was supposed to exist in the form of one-time passwords (OTPs) sent to beneficiary cell phone numbers. But few PDS beneficiaries have consistently available phone numbers that are accurately linked to their Aadhaar accounts. For making MGNREGS payments in Andhra Pradesh, on the other hand, the use of simple offline fallback mechanisms—collecting fingerprints on paper, rather than scanning them, or having trusted local officials verify transfers—appears to have significantly reduced exclusion (Aadil et al. 2019; Muralidharan et al. 2016).

3. Aadhaar in Action

We next review and discuss the ways in which Aadhaar is being used by the government in practice.

We take as our point of departure the catalogue of government schemes making use of Aadhaar contained in the State of Aadhaar Report 2016–2017” (Abraham et al. 2017). At that point, 1.14 billion people (85 percent of the population) had an Aadhaar card and 139 million used it to authenticate themselves every month on average. Aadhaar was used for payments in Pratyaksh Hanstantrit Labh (PAHAL) Scheme (LPG), MGNREGS, PDS, and pensions

(with 82 percent, 79 percent, 72 percent, and 51 percent seeded, respectively). Since this dataset is now several years old, and in particular was created before the 2018 Supreme Court judgment on Aadhaar, we have also updated it. We first verified for each scheme in the original report whether Aadhaar is still required in the wake of the court judgment. We then augmented the list by examining the websites of all 51 Central Government ministries to identify additional Central Sector or Centrally Sponsored Schemes that request Aadhaar numbers from beneficiaries. We also examined all official State government websites to determine State-level schemes that request Aadhaar numbers. In doing so, we referred to the operational guidelines of various schemes and, in some cases, to application forms available online. Tables A1 and A2 report the use cases we identified, noting the specific scheme, whether it is national or particular to a State, what government or private agency is responsible, the sector, and a brief description.

The first fact that stands out is a simple one: Aadhaar usage is ubiquitous. By usage, we mean the employment of Aadhaar in one or more of the following ways: linking to beneficiary rolls (“seeding”) for de-duplication, authenticating transactions, or making Direct Benefit Transfers (DBTs) using the Aadhaar Payment Bridge. We document usage by governments in all States, and across more than twenty Central Government ministries and departments. Aadhaar is used in schemes ranging from flagship anti-poverty programs such as the MGNREGS, PDS, and the Integrated Child Development Services Scheme (ICDS), to extremely specialized schemes related to horticulture or homeopathy.

Overall, we document 183 Central-level schemes that use Aadhaar. In addition, we document 301 State-level use cases, spanning financial assistance in various schemes, requirements for permits, licenses, and certificates, as well as a number of additional identity cards (for example, family ID cards). One special case is that of online citizen service portals, such as *MeeSeva* in Andhra Pradesh, *Jharsewa* in Jharkhand, and *Seva Sindhu* in Karnataka, which provide a single window for accessing welfare schemes, citizen services, grievance redressal, and even business registration.

Usage is widespread in terms of not only the number of schemes, but also the number of beneficiaries affected. The State of Aadhaar 2019 report (Totapally et al. 2019) reveals that of the 1.2 billion people who have Aadhaar (including 95 percent of adults and 75 percent of children), 330 million use it regularly for rations, 145 million have used it at least once for LPG subsidy, 102 million have used it for MGNREGS wages, 96 million farmers have used it to receive fertilizer subsidies, and 9 million older adults use it to receive pensions. In addition, 609 million have linked it to their bank accounts, 125 million children have enrolled in school using theirs or their parents’ Aadhaar, and 345 million people used Aadhaar to get a SIM card.⁵

5. Note that the State of Aadhaar 2019 report, though more up-to-date and with a much larger survey sample, does not have a comprehensive treatment of use cases; hence, we rely on the 2016–2017 report and our own updates to describe use cases.

Second, there is some evidence that the prevalence of Aadhaar usage has risen since the Supreme Court judgment. Of the 117 schemes documented in the State of Aadhaar 2016–2017 report (Abraham et al. 2017), we document a total of 97 cases that are still actively using Aadhaar, 5 cases which are no longer active or use Aadhaar, and 15 cases that we cannot verify; meanwhile, we found 86 *new* Aadhaar use cases, for a net increase of at least 66. In relative terms, the State of Aadhaar report estimated that 77 percent of social protection spending (\$36B out of \$47B per year) passed through schemes that used Aadhaar; while we do not have budgetary figures for all schemes, that number seems likely to have increased as well.

Third, a majority of use cases involve authentication to receive a material benefit. These include both in-kind transfers (for example, PDS grains) and cash transfers (for example, DBT payments of various subsidies), and include subsidy and scholarship programs in addition to the familiar social welfare schemes. Because these use cases involve the transfer of material benefits from governments to beneficiaries, it is *a priori* reasonable to worry about duplicate or “ghost” beneficiaries, or about fraud by non-beneficiaries. Yet the costs of exclusion can also be very high (in the PDS, for example) and the burden of transaction costs substantial, especially for transfers that are repeated. It is generally thus best to examine these on a case-by-case basis, considering for each the questions posed above.

That said, there are also a number of examples where Aadhaar authentication is required to access benefits that are likely non-rival.⁶ These include, for example, coaching classes for underprivileged students or agricultural clinics for farmers that are administered at the group level. As mentioned above, the case for Aadhaar use in these cases may not be as strong, since allowing an additional person to participate does not preclude participation by anyone else. There seems little downside to having unexpected guests at agricultural clinics, for example. The main argument for authentication here is likely to accurately track the number of people who benefit, as for example, when instructors are paid on that basis. The open questions are whether Aadhaar authentication does this more effectively than other simpler methods of tracking participation, and how susceptible it is to obvious scams such as registering passers-by as participants.

There are also cases in which the government issues documents to specific people—such as caste, residence, or education certificates—that are of value only to the person named on them. Here there is some risk of identity theft, as for example, if person A obtains person B’s residence certificate and then uses it to pose as B, and also some risk of fraud, as for example, if A obtains a residence certificate specifying an address at which he does not live. Aadhaar authentication can help prevent identity theft if A is required to authenticate when he

6. At least five schemes, as per Table A1.

obtains or uses a certificate. It is less clear how it can help prevent fraud, except as a means of cross-referencing claims across administrative data sources.

In short, there are regularities in the ways Aadhaar has been deployed (despite the enormous number of use cases) that we can use to form some *a priori* sense of the likely benefits and costs of Aadhaar authentication in each. Yet what the *actual* benefits and costs are is almost always an empirical question. In addition to understanding the specific mechanisms, risks of exclusion, and so forth, one needs to match administrative data to a source of “ground-truth” in order to quantify leakage and exclusion, and to do this in representative samples to ensure that isolated anecdotes are not given undue prominence. We next turn to a review of the available evidence on these points.

4. Descriptive Evidence on Aadhaar

For a technology that now plays such a pervasive role in the life of the nation, it is striking how little rigorous research on Aadhaar is available. For instance, a Google scholar search of the terms NREGS or MGNREGS yields several times as many hits as a search for the term Aadhaar, despite MGNREGS being just a single welfare program whereas Aadhaar affects the delivery of *hundreds* of government services. One reason for the relative lack of evidence is that primary data has been difficult to obtain over the last decade, with the NSS either not releasing collected data or not conducting scheduled rounds.⁷ It is critical that the NSS resume and that it should include questions that capture the impact Aadhaar is having on people’s lives—a point to which we return in the conclusion.

Given the shortage of data it is not possible to paint a comprehensive picture of Aadhaar’s impacts—yet several individual studies do give us useful insights. We begin in this section with insights from studies that are *descriptive* in nature, meaning that they capture what is happening but do not attempt to compare this to what *would have* happened in the absence of Aadhaar, at least not using methods of causal inference generally accepted in social science research. We then proceed in the following section to studies that conduct credible causal inference to try to assess how outcomes are *different* as a result of Aadhaar’s use. We restrict ourselves, throughout, to studies that collected and analyzed primary data and that made some attempt to do so in samples that are representative of

7. Many authors have written about recent problems with data collection in India, including Pronab Sen, India’s first Chief Statistician (<https://www.indiatoday.in/magazine/up-front/story/20200323-the-unfolding-tragedy-of-indian-data-statistics-1654709-2020-03-13>), Abhijit Banerjee, Pranab Bardhan, Rohini Somanathan, and T.N. Srinivasan (<https://economictimes.indiatimes.com/blogs/et-commentary/from-being-world-leader-in-surveys-india-is-now-facing-a-serious-data-problem>), and Prमित Bhattacharya (<https://www.livemint.com/news/india/how-india-s-statistical-system-was-crippled-1557250292753.html>).

a broader population of interest. Based on these criteria, we focus here on the following five studies:

- Two State of Aadhaar reports: The 2017–2018 report (Abraham et al. 2018) is based on individual surveys with 3,000 households across Andhra Pradesh, Rajasthan, and West Bengal; and the 2019 report, which has broad coverage, with a quick survey with 145,000 households across 28 States, and an in-depth survey with 19,000 households in 16 States and one Union Territory.
- Two distinct studies conducted by the Center for Global Development. The first (Gelb et al. 2018) examines the case of introducing *Bhamashah*, a digital platform for service delivery, in Rajasthan in 2018. It relies on surveys with 633 households across 7 districts of Rajasthan. *Bhamashah*, introduced in 2014, gives households a card and a unique *Bhamashah* family number; each household member’s Aadhaar number is linked to the card, and it is needed to avail of any of the 150 schemes either wholly or partially funded by the State government. The second (Aadil et al. 2019) was conducted in Krishna district in Andhra Pradesh in 2018–2019, with surveys of 556 beneficiaries of one of three welfare programs, 53 FPS owners, and 45 business correspondents.⁸
- Dreze et al. (2017), who examine the use of Aadhaar in the PDS in Jharkhand. They surveyed 890 households attached to 32 FPSs across eight districts, with 18 of these FPSs using online Aadhaar authentication, 7 using offline Aadhaar authentication, and the remaining not using Aadhaar authentication.⁹

In examining these studies, we focus on outcomes that we described in Sections 2 and 3 as important for judging the appropriateness of Aadhaar integration: fiscal savings and leakage, exclusion, transactions costs, and beneficiary preferences.

4.1. Fiscal Savings and Leakage

Measuring leakage in transfer programs requires both administrative records on the amounts disbursed and a source of “ground truth” on the amounts received by beneficiaries. Claims about leakage reduction due to Aadhaar have often ignored this point, citing reductions in fiscal outlay as if they were *per se* evidence of reduced leakage. For example, the State of Aadhaar 2016–2017 report

8. Krishna is the richest district in Andhra Pradesh, so the results must be viewed in this light.

9. Three types of PDS outlets were discarded from the sample: (i) those serving more than one village; (ii) those with more than 250 ration cards on their list; and (iii) those operating under the “partial online” mode. The sample should thus be viewed as skewed towards smaller and more rural villages.

(Abraham et al. 2017) cites the DBT website in claiming that \$2.1 billion in food subsidies and \$3.9 billion in LPG subsidies were saved by removing 23 million and 35 million duplicates, respectively. However, without matched data on actual beneficiaries, it is difficult to know whether the removal also mistakenly included genuine beneficiaries. Of the studies we review in this section, only Dreze et al. make a more concerted effort attempt to examine leakage: they report that the average PDS purchase-entitlement ratio was the same in online and offline FPSs at approximately 93 percent, suggesting that online Aadhaar usage did not change leakage. This is correct to the extent that the ratio of entitlements to actual disbursements was also the same across these types of shops, but the analysis is incomplete because the authors do not have data on disbursements from the government to PDS shops to verify this.

4.2. Exclusion

Most of the studies do have something to say about exclusion. The State of Aadhaar Report 2017–2018 notes that 0.8 percent of the respondents in Andhra Pradesh and West Bengal and 2.2 percent in Rajasthan reported exclusion in the case of PDS (which they estimate as being equal to 2 million people every month). However, they also note that in the latter two states, non-Aadhaar related problems contributed substantially more to exclusion than Aadhaar-related problems (0.3 percent, 6.5 percent, and 5.2 percent, respectively).

The 2019 report notes that individuals from minority religions (Muslims and Christians), historically disadvantaged castes, and homeless and third gender people are less likely to have Aadhaar than the national average. Turning to exclusion, 2.5 percent of the respondents experienced exclusion from a key welfare service because of Aadhaar (which disproportionately affects the homeless and third gender people), and 0.5 percent of children could not enroll in school because of Aadhaar-related problems. However, for the major social programs, the rate of exclusion because of Aadhaar-related errors is lower than exclusion because of non-Aadhaar related errors (1 percent versus 31 percent in NREGA, 0.5 percent versus 5.7 percent in pensions, and 1.5 percent versus 3.2 percent in PDS). The general picture that emerges is that Aadhaar authentication is one among several hurdles that disadvantaged people face when trying to access public benefits, but not necessarily the most common.¹⁰

In Krishna district, 2 percent of the beneficiaries reported being denied rations because of technology failure, though the authors report that these issues were resolved quickly. In addition, 5 percent of the pensions were temporarily stopped during the transition. The study notes that Andhra Pradesh officials did

10. With respect to private programs, it is notable that 3.3 percent of the people were denied bank accounts and 0.8 percent were denied SIM cards because of Aadhaar-related problems. Along with denial of access to education, these are denials that are illegal under the 2018 Supreme Court judgment.

not seek to remove bogus beneficiaries at the time of digitization. Further, they implemented strong fail-safes to deal with technological failures. For example, the State has entrusted village revenue officers (VROs) with the authority to authenticate transactions in cases of technology failure.

In Jharkhand, Dreze et al. report that 7 percent of the households did not have a single member with Aadhaar, including mainly small households with elderly couples or widows living alone. This would make it near impossible for them to obtain rations in the online-only system with no fallbacks, but there is no comparison with exclusion in villages that do not have Aadhaar.

4.3. Transactions Costs

Many reports point out the existence of authentication failures, although serious attempts at quantifying transactions costs in Rupee terms are lacking. In Rajasthan, less than a quarter of all program beneficiaries could authenticate in the first attempt (~96 percent could authenticate in four attempts or fewer). Meanwhile, 70 percent of those who were denied PDS rations because of authentication failures had to return the next day (sometimes with another family member) to reattempt authentication. Dreze et al. (2017) note that transaction costs were significantly higher in online villages (1.5 trips per month compared to 1.1 in offline villages), although they do not report whether these numbers are statistically distinguishable.

4.4. Preferences

All reports elicit beneficiary opinions on the integration of Aadhaar. The SOA 2017–2018 report notes that a large number of schemes (252) required beneficiaries to authenticate themselves to receive benefits, but that nevertheless 87 percent of respondents approved of the government’s mandatory use of Aadhaar (and 77 percent approved of the private sector’s use of mandatory Aadhaar). This may be related to the fact that, for example, over 60 percent of people preferred Aadhaar enabled PDS as they believed it reduced fraud. This number had increased further by SOA 2019: 92 percent of people say they are very or somewhat satisfied with Aadhaar. Strikingly, even among those who have been excluded from a service because of Aadhaar, 67 percent still say that they are satisfied with it.

In Krishna, which has a strong grievance redress mechanism to deal with exceptions or cases of technology failure, 70 percent of PDS beneficiaries viewed the new system (with Aadhaar) as better and 28 percent as worse, with few differences across gender, age, and other demographics. Interestingly, 80 percent of those who thought the new system was better, and 46 percent of those who thought it was not, believed that rations were no longer diverted. Conversely, 100 percent of those who thought the new system was not better, and 42 percent of those who thought it was better, agreed that authentication failures were frequent. Meanwhile, pensioners strongly favored the panchayat

office system of payment delivery using Aadhaar. Very few report skimming by officials, which was quite common in the manual system before Aadhaar. Note that all comparisons are simply with the system as it existed prior to Aadhaar; there is no contemporaneous counterfactual.

In Rajasthan, 40 percent of PDS beneficiaries found the new system to be better and 12 percent found it to be worse, with the rest remaining neutral between the two. The main reason for approval of the new system was that people felt their entitlement could no longer be diverted. Those who disliked the new system cited authentication failures as their main reason. In the case of pensions, nearly two-thirds of pensioners said they preferred the new system. Among respondents who were not below the poverty line about 45 percent said they preferred the new system, but among below poverty line respondents, over 75 percent did, indicating that the reforms benefited those who are most reliant on pensions. The most important reason seems to be that pensions had become more regular under the new system.

The picture was worse in Jharkhand. In online villages, 64 percent of transacting households said the ePoS should be discontinued, while only four out of eighteen dealers in online villages said the ePoS system should continue. Surprisingly, 70 percent of transacting households in offline villages—more than those in online villages—said that the ePoS should be discontinued, but again it is not clear if these numbers are statistically distinguishable.

We summarize the available descriptive evidence as follows. There is no credible data on leakage at all, a serious lacuna given that one of the main arguments for integrating Aadhaar into transfer programs in the first place was to reduce leakage. Exclusion risk may be small but it is real, and appears to disproportionately affect the most vulnerable. However, non-Aadhaar exclusion risk is also significant, in most cases higher than that attributable to Aadhaar. Transactions costs are again small but non-trivial, coming largely from authentication failures that result in beneficiaries having to make additional trips to obtain ration. In most cases, it seems reasonable to attribute these to Aadhaar. Opinions seem positive overall, but depend on context. Aadhaar seems like something that most people seem willing to accept even when it has caused them problems. The picture is of a population that is used to having a hard time getting things out of government that they are entitled to, and doesn't see Aadhaar as a major change-maker in that regard.

We next review studies that conduct causal analysis of the impact of using biometric authentication to deliver welfare programs.

5. Evidence of Impact of Biometric Authentication and Aadhaar

In addition to the descriptive work above, there are three studies on the impact of using biometric identification to deliver welfare programs that also have

a credible comparison group against which to assess impacts. These include Barnwal (2019) who studies the impact of Aadhaar-based DBT on leakage in LPG subsidies (using a natural experiment), and two of our own studies spanning MGNREGS, pensions, and the PDS (with randomised experiments). We summarize the findings and insights from each of these studies below.

5.1. Aadhaar-based DBT in LPG Subsidies

Barnwal (2019) uses the fact that DBT was rolled out across 89 districts in six phases, and then unexpectedly terminated, as a natural experiment. The paper has two main findings. First, it finds that the reform led to a significant reduction in LPG sales to households, and a corresponding reduction in the distributor-level sales data (using administrative data on distribution of LPG cylinders). It also finds that these reductions were reversed when the reform was rolled back. Second, the paper finds compelling evidence of diversion of subsidized LPG into the (illegal) private “black” market through an innovative approach of measuring black market prices during the reform and after the reform was repealed, which finds a significant reduction in these black market prices when the reform was stopped.

Quantitatively, the paper finds that after DBT is introduced in the treated districts, LPG purchases by eligible households go down by 11–14 percent, then converge back to the level in untreated districts once DBT is withdrawn. After DBT is removed, fuel prices in the black market go down by 13–19 percent (consistent with the supply of LPG cylinders and the resulting ability to divert to the open market having gone up again), while firms’ purchases in the formal market go down by 9 percent. The evidence suggests that there is significant divergence of LPG from households to firms that buy in black in the old system (before Aadhaar). Finally, the paper analyzes the heterogeneity of impacts by the pre-program incidence of usage, and finds that the reductions in LPG purchase are concentrated among larger buyers, suggesting that the fiscal savings were less likely to be driven by the exclusion of genuine beneficiaries and more by reductions in “ghost” beneficiaries.

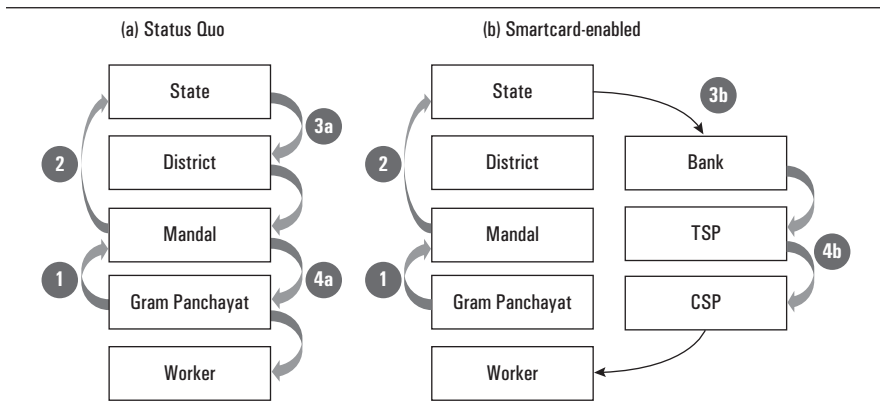
Put together, Barnwal (2019) provides compelling evidence that the use of Aadhaar to reform the way in which LPG subsidies were delivered led to meaningful reductions in leakage. However, there are two limitations in the study. The first is the lack of a contemporaneous control group (the study used a natural as opposed to a randomized experiment). Second, and more important, is the lack of matched data between administrative records of disbursement and household records of receipts. Thus, while there is compelling evidence of reduction in government spending and indirectly of reduced leakage (through the effects on black market prices), it is difficult to rule out the possibility that some part of this reduction may have come at the cost of increased exclusion error of households, especially those with low frequencies of purchases.

5.2. Biometric Smartcard-based Payments in MGNREGS and Pensions in (unified) Andhra Pradesh

The next two studies are based on our own work. Both feature: (i) large-scale randomized experiments of the rollout of linking biometric authentication to welfare payments, and (ii) *matched* data between disbursements and receipts to measure the extent to which these reforms affected *both* of these items of interest.

The first one studied the impact of biometric authentication and payments through local Customer Service Providers (CSPs) in MGNREGS and social security pensions across 8 districts in (unified) Andhra Pradesh between 2010 and 2012. This reform opened no-frills bank accounts for beneficiaries, which were accessed through biometric Smartcards. CSPs partnered with banks to make last-mile cash disbursements; accounts could only be accessed through the local CSP because they were offline and there was no portability, after biometric authentication through local PoS machines. Figure 1 describes the Andhra Pradesh Smartcards (APSC) reform for the case of MGNREGS payments; while the flow of information from the field to the State did not change, payments now

FIGURE 1. Status Quo versus Smartcard-enabled Payment Systems in Andhra Pradesh



Source: Reproduced from Muralidharan et al. (2016).

Note: This figure shows the flow of information (1 and 2) and funds (3a, 3b, 4a and 4b) for MGNREGS payments, pre- and post-Smartcards. "TSP" is a Technology Service Provider, a firm contracted by the bank to handle details of electronic transfers. "CSP" is a Customer Service Provider, from whom beneficiaries receive cash payments after authentication. The upward flow of information about work done is the same in both systems: (1) Paper muster rolls are maintained by the Gram Panchayat and sent to the *mandal* computer center, and (2) the digitized muster roll data is sent to the state financial system. However, the downward flow of funds is different. In the status quo model (3a), the money is transferred electronically from the State to the district to the *mandal*, and (4a) the paper money is delivered to the Gram Panchayat (typically via the post office) and then to the workers. In the Smartcard-enabled system (3b), the money is transferred electronically from the State to the bank to the TSP, and (4b) the TSP transfers cash to the CSP, who delivers the cash and receipts to the beneficiaries (both with and without Smartcards). Beneficiaries with Smartcards were required to biometrically authenticate identity before getting paid. Beneficiaries without Smartcards were issued "manual payments" with status quo forms of authentication and acknowledgment of payment receipt.

flowed through the Bank and CSP, as opposed to flowing through the same agent (field assistant) who reported the amount of work done.

In order to evaluate the impact of rolling out Smartcards in MGNREGS and pension programs, we worked with the Government of (unified) Andhra Pradesh (GoAP) to conduct a staggered roll-out of the programs in three phases in eight districts with a total rural population of ~20 million. We used a randomized lottery to allocate *mandals* (blocks) to each phase between 2010 and 2012. Thus, Phase 1 *mandals*, which got the program first, were the treatment group and Phase 3 *mandals* (which only got the program two years later) served as the control group.¹¹ We conducted nearly 16,000 baseline and endline household surveys that allowed us to match administrative data on payments and disbursements to rich beneficiary-level data on receipts, time delays in getting paid, and wages and employment (on both NREGS and other work). The combination of randomization of the rollout of Smartcards and matched data between administrative records and household data (across treatment and control areas) allows us to estimate the causal impact of the Smartcards program.

We found strikingly large positive impacts of Smartcards on almost every dimension of beneficiary experience. First, the payments process improved sharply. The Smartcard system reduced the lag between working on an NREGS project and collecting payment by 29 percent, and reduced the unpredictability in this lag by 39 percent. Further, it reduced the time workers spent collecting MGNREGS payments by 19 percent. Second, leakage fell significantly. NREGS beneficiaries in the treated *mandals* reported a 24 percent increase in weekly earnings, while fiscal outlays did not change, resulting in a 41 percent reduction in leakage (a 12.7 percentage point reduction relative to the average leakage of 30.8 percent in the control areas). Similarly, reported earnings on pensions went up by 5 percent, while official disbursements did not, leading to a 49 percent decline in leakage (a 2.9 percentage point reduction relative to average leakage of 6 percent in the control areas).

The APSC program was a bundle of two components: using biometrics for authentication, and moving payments closer to beneficiaries by hiring business correspondents (BCs) to have a payment point (through local customer service providers or CSPs). We find using a non-experimental decomposition of effects that the use of local BCs/CSPs was the key to improving the payments process, whereas the biometrics were the key to reducing leakage. Specifically, the benefits of faster, more convenient, and more predictable payments were seen even for those who had not obtained a Smartcard, as long as the village had hit the threshold of enrollment (typically 40–50 percent of the beneficiaries) at which point *all* payments in the village were “converted” to going through the BC/CSP

11. We included a Phase 2 of “buffer” *mandals* so that the GoAP could continue rolling out Smartcards there after Phase 1 but before Phase 3. These buffer *mandals* were not included in the study and we did not collect survey data there.

(even for those without Smartcards). However, we only found leakage reduction in the cases of beneficiaries who had enrolled for Smartcards. This leakage reduction was driven mainly by reduced over-reporting of work by intermediaries, since the money went directly into beneficiary bank accounts and could not be siphoned away by intermediaries.

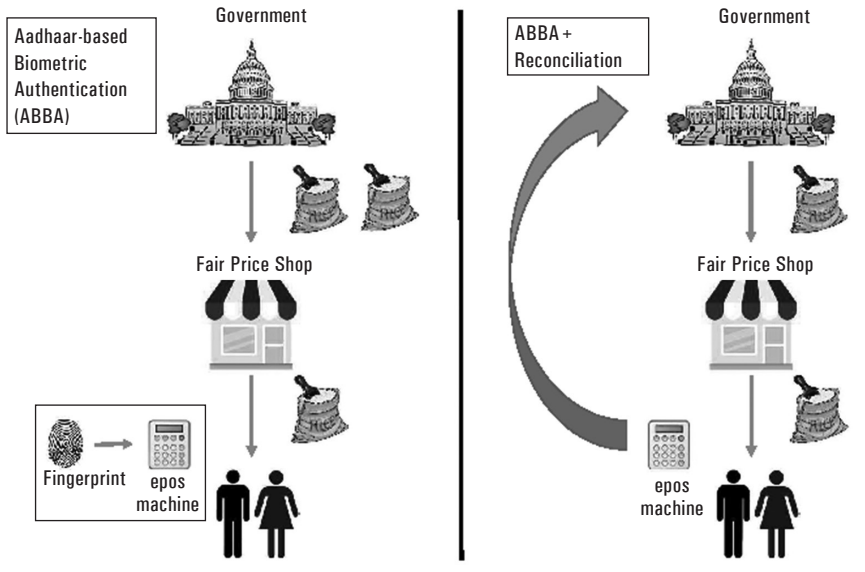
Finally, we find that Smartcards were very cost-effective. The monetized value of time savings to beneficiaries (₹26 crores) alone was greater than the cost of the new system (₹24 crores) for NREGS. The reduction in NREGS leakage was nine times the cost of the program. Put together the returns from time saving and leakage reduction were nearly ten times the cost of the program. All estimates are only for the eight study districts, and would be higher if extended to all of Andhra Pradesh. Overall, the evidence suggests that Smartcards improved beneficiary experiences in collecting payments, increased payments received by program participants, reduced corruption, broadened access to program benefits, and achieved all these benefits without substantially altering fiscal burdens on the State. Consistent with these results, we find that 90 percent of the NREGS beneficiaries and 93 percent of the Social Security Pensions (SSP) recipients who were exposed to the Smartcard initiative reported that they prefer the new system to the old. Combined with the evidence of high cost-effectiveness, this was clearly a reform that made sense all around.

5.3. Aadhaar-based Biometric Authentication in the PDS in Jharkhand

Our second study was in partnership with the Government of Jharkhand (GoJH) to evaluate the impact of introducing Aadhaar-based Biometric Authentication (ABBA) in the PDS starting in 2016. This allowed us to test the impacts of biometric authentication in a different context (Jharkhand), with a different program (PDS), using a different technology (Aadhaar versus Smartcards-based authentication), and in a setting of weaker State capacity than unified Andhra Pradesh, which had made strong investments in technology-driven governance over the years.

The evaluation was carried out using a similar design to the Andhra Pradesh Smartcard study and featured a large-scale randomized evaluation. The roll-out of the biometric ePoS machines was done in a phased manner across 132 blocks in 10 districts where the blocks were allocated to treatment (receiving ePoS machines first) and control (receiving them last) groups using a random lottery. In order to measure impacts, we conducted over 14,000 household surveys (matched to ration cards) and collected data on PDS commodities received (quality and quantity), transaction costs of collecting benefits (time, number of trips), and beneficiary opinions of the program.

The intervention was similar to APSC in that biometric authentication was required to obtain grains at the last mile from the PDS dealer. However, one important difference was that the reform was rolled out in two stages. The first

FIGURE 2. PDS Reforms in Jharkhand

Source: Reproduced from Muralidharan et al. (2021).

Note: This figure shows the two phases of the reform studied in Muralidharan et al. (2021). The left panel shows the first stage, ABBA, which requires beneficiaries to authenticate transactions at the FPS in order to receive rations. The right panel demonstrates that transaction records from the ePOS machine are used to provide information in the “reconciliation” phase to adjust future disbursements of grain from the Government to the FPSs.

stage, which was randomized, involved the rollout of ePoS machines which enabled ABBA of beneficiaries attempting to collect food. In the second stage (“reconciliation”),¹² GoJH used data from ePoS devices to determine monthly food distribution to the FPSs, by adjusting the amount of new grain disbursed based on electronic records of authenticated transactions. This was introduced in all blocks at the same time, so we evaluate this using a pre-specified event study framework, a placebo group of PDS commodities not subject to reconciliation, and experimental variation in the duration of exposure to ABBA prior to reconciliation. Figure 2 describes the two stages of reform.

The results in Jharkhand were different from those in Andhra Pradesh in important ways. We found that the first phase of the reform (requiring biometric authentication to collect PDS benefits) did not lead to any increase or decrease in either the value of benefits received or leakage. Further, there was a significant decline in the benefits received (of around 10 percent) for those beneficiaries who had not seeded their Aadhaar numbers into their ration cards. Finally, there

12. Note that in Andhra Pradesh, reconciliation was much more straightforward since bank accounts were automatically settled upon uploading of the transactions records from the electronic point of sale (ePoS) machine. Moreover, payments were sent out only upon receiving information of what was due based on the work done that was uploaded by the *mandal*.

was also an increase in transaction costs for beneficiaries in the treated areas with a significant increase in the number of unsuccessful trips made to the FPS for collecting rations. We also found that leakage (defined as the gap between the value a beneficiary was entitled to and the value they received) continued to be high, at around 20 percent in both the treatment and control areas. This was likely because Aadhaar only solves the problem of identity fraud and not the problem of quantity fraud, where the dealer takes beneficiary fingerprints but provides them with less than the value to which they were entitled. Overall, these results are consistent with the critique that biometrically authenticating transactions caused at least some “pain without gain” (Dreze et al. 2017).

Yet, there were reductions in leakage in the second phase of the reform, when the government started to reconcile its monthly shipments of grain to each FPS against transaction data for the previous month. Roughly speaking, this meant that a ration shop owner responsible for distributing 100 kg of grain each month who distributed 70 kg in July would receive only 70 kg from the government in August rather than the full 100 kg he would previously have received. Our data suggest that reconciliation had a meaningful impact on fiscal savings for the government.

In particular, the ABBA data from the electronic point of sale (ePoS) machines during the months prior to reconciliation allowed GoJH to see the undisbursed balance of grain for each dealer, and correspondingly reduce disbursements under reconciliation. When reconciliation started, we saw a 31 percent drop in the value of grains disbursed by the government for the reconciled commodities (rice and wheat) in the first month of reconciliation (July 2017). Combined with matched household survey data, we estimate that around 70 percent of this drop in value was a reduction in leakage. Another striking piece of evidence of lower leakage is that FPS dealers in treated areas reported a 72 percent lower expected future bribe price for FPS licenses, suggesting that they expected a substantial fall in the potential for making money from diverting PDS grains.

However, this reduction in leakage came at the cost of increased errors of exclusion: the remaining 30 percent of the reduction in value disbursed represents value lost by legitimate beneficiaries. The probability that a household received no rice or wheat increased by 10 percentage points after reconciliation. This sharp decline in benefits also had political costs and the government temporarily rescinded the reconciliation policy entirely, citing complaints from both dealers and beneficiaries. As we discuss further, the exclusion was likely exacerbated by GoJH’s decision to hold dealers responsible for undisbursed stock over several (8–10) months, corresponding to the period of ABBA but before the onset of reconciliation. In practice, some or much of this grain would have already been diverted (or spoiled). Thus, when GoJH sharply reduced disbursements in July 2017, many dealers likely did not have the grains in stock that they were supposed to have (based on ABBA records). The reduction in disbursement thus also led to a reduction in grain to beneficiaries.

Over time, GoJH has brought back the reconciliation process with improvements (such as reconciling stocks every 1–2 months as opposed to doing a one-shot cumulative reconciliation for several months). However, the discussion above highlights a deeper structural problem.

In an ideal world, the government would like to reduce leakage (by reducing dealer corruption) without increasing exclusion. However, the structural problem is that while the government can reduce disbursements by only replenishing stocks for authenticated transactions, it is much more difficult to prevent the dealers from passing on some of their pain (of having lower stocks) to the beneficiaries. These results highlight that efforts to control corruption can have negative consequences, too. Overall, the results from Jharkhand suggest that while there may have been reductions in leakage in the PDS due to ABBA, some of this reduction came at the cost of increased exclusion errors.

5.4. Discussion

Methodologically, the discussion above highlights the centrality of matched data (between administrative records and beneficiary receipts) and a credible control group for quantifying and understanding what is actually going on. In the Andhra Pradesh Smartcards case, it would have been easy to think that there was no impact on leakage because there was no change in government expenditure on MGNREGS and pensions. It was only with the matched data between administrative records and household surveys (and the existence of a control group) that we could see that leakage had fallen sharply and that more benefits were reaching people. Conversely, in the case of ABBA in Jharkhand, it would have been easy to interpret the reduction in disbursements as evidence of reduced leakage (and indeed, officials often claim this exact point). However, it was the matched data using household surveys which clarified that at least some of the reductions in disbursement were coming at the cost of exclusion errors.

Such visibility is also essential for political economy reasons. It is very difficult for senior policymakers to distinguish between genuine issues and vested interests. In the Andhra Pradesh case, despite the strong evidence of positive impact, the feedback on the program through political channels was often negative, to the extent that the political leadership of GoAP almost considered scrapping the Smartcard program. This is because the lower-level officials, who could no longer make money from MGNREGS as easily as before, would try to highlight cases of system malfunction and beneficiary inconvenience to get the program scrapped (since they could not publicly complain that “they were no longer able to make money”). Thus, in this case, the opposition to the program was being driven by vested interests that the political leaders almost listened to, nearly scrapping a highly effective program because they could not be sure that the beneficiaries were not genuinely worse off.

Conversely, in Jharkhand, Right-to-Food activists routinely highlighted the exclusion errors from imposing Aadhaar-based authentication. But many officials

believed that a few cases of adverse effects were being exaggerated by activists because of ideological opposition to Aadhaar and did not take these concerns as seriously as they perhaps should have. Ground-level data like the one we collected in our studies allows officials and citizens to have better visibility on multiple crucial aspects of the program and enable them to make better informed decisions.

Substantively, in understanding why the outcomes were different between the two studies, it might be helpful to consider the structural differences in the two contexts. The technology itself was, of course, different, with Andhra Pradesh relying on offline Smartcards, while the Jharkhand reform used (mostly) online authentication via Aadhaar. Another that ex-ante a lot of people thought was important was state capacity—Andhra Pradesh usually performs well on measures of governance (third out of 19 in one such indicator), while Jharkhand does not (17th out of 19).¹³ Indeed, understanding whether biometric technology would work in a context with low state capacity was one of our own motivations while undertaking the ABBA evaluation in Jharkhand.

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However, neither of these factors appears to be the main reason for the differences in outcomes. For instance, in Jharkhand, we found no significant differences between FPSs that were fully online and fully offline (in contrast to the results of Dreze et al. 2017). In addition, Jharkhand ended up implementing the reform more comprehensively and faster, managing to converge to more than 90 percent implementation in less than six months, suggesting that the capacity to implement *per se* was not necessarily a constraint. Andhra Pradesh deployed Smartcards incrementally, having previously piloted them for four years in other districts, and also rolled them out slowly in treatment *mandals*.

Rather, our experience of evaluating the two programs suggests that the main reason for the differences in impacts was the *difference in political priorities* around the use of biometric authentication technology. Specifically, the Andhra Pradesh Smartcards program focused on improving the beneficiary experience, while ABBA in Jharkhand focused on fiscal savings.

A key point to note is that *both* programs (Smartcards in Andhra Pradesh and ABBA/reconciliation in Jharkhand) reduced leakage. However, in the case of the NREGS and pensions in Andhra Pradesh, the benefits of reduced leakage were passed on to the beneficiaries in terms of more money received (displaced from corrupt intermediaries), while there were no savings with the government. In contrast, in the case of Jharkhand, the reduced leakage in the PDS led to reduced disbursements from the government but did not improve the beneficiary experience in any way (and worsened it in some ways).

13. The index of governance was compiled by Mundle et al. (2012), and includes indicators of performance of the executive, judiciary, and legislature, with particular emphasis on the delivery of infrastructure, social services, fiscal performance, and maintenance of law and order by the executive branch.

In other words, the technology of biometric authentication “worked” in both settings, in terms of reducing leakage. But the question of how the benefits of this leakage reduction should be shared between the government and beneficiaries is ultimately a design question, as well as a political one. Thus, the biggest reason for the difference in results (in our assessment) was not because of the technology (Smartcards versus Aadhaar) or the context (Andhra Pradesh versus Jharkhand) but because of differences in program design and priorities. Andhra Pradesh focused on the beneficiary experience, while Jharkhand (implementing the policy decision of the Government of India) emphasized fiscal savings.

This difference in emphasis was also reflected in the speed of rollout, which itself may have mattered for outcomes. GoAP rolled out Smartcards gradually, over 3–5 years during which GoAP had a lot of time to learn, adjust, and improve field protocols. Importantly, at no point during this period did GoAP *mandate* the use of Smartcards to receive payments. Rather, GoAP aimed to encourage Smartcard adoption by making it more convenient to do so. On a related note, GoAP also provided liberal override mechanisms even for those who did have Smartcards and were not able to authenticate. The combination of gradual rollout, and generous override mechanisms all reflected the focus on beneficiary experience as opposed to fiscal savings, and likely led to lower exclusion.

In contrast, GoJH (reflecting the priorities and push from the Government of India) aimed to implement ABBA rapidly and did so, achieving over 90 percent coverage of ePoS devices within six months of the program rollout. While on one hand, this is a sign of “successful” implementation, the speed may have also contributed to the increased exclusion we find, including decisions such as mandating ABBA at a time when around 23 percent of the beneficiaries had not yet seeded their PDS ration cards with Aadhaar, and not having effective manual override systems to protect the most vulnerable. For instance, mechanisms like OTPs sent via text message were in place as a back-up against authentication failure, but were likely inaccessible to those without cell phones. More generally, relying on technology-based backup procedures for Aadhaar-related challenges may not work as well for the most marginalized and vulnerable members of society.¹⁴

Many of the challenges we documented with ABBA in Jharkhand were likely to be transitory and not permanent. For instance, Aadhaar-seeding rates are now over 98 percent as compared to 77 percent at the start of the ABBA rollout. Similarly, our estimates suggest that much of the exclusion at the onset of reconciliation can be attributed to GoJH’s decision to hold dealers

14. For a recent example, see this article which discusses how a poor widow in Bihar was unable to access her benefits because she had lost her Aadhaar card and could not easily recover her Aadhaar number because most of the procedures for retrieving her Aadhaar number required a registered e-mail or phone number, which she did not have: <https://indianexpress.com/article/opinion/columns/flip-in-aadhaar-architecture-uidai-card-enrolment-7389133/>

accountable for *cumulative opening balances* of grains as recorded on the ePoS machine and sharply reducing disbursements in line with this. Since much of this grain may have been already diverted or spoiled, increased exclusion was much more likely since the dealers did not have the grains that the ePoS records suggested that they did. Our estimates suggest that starting with a “clean slate” zero opening balance and using ePoS and ABBA to reconcile stocks on a monthly basis would likely have reduced leakage (albeit by less) and also avoided the increased exclusion. Yet, our results also suggest that nearly two million beneficiaries were denied access to their PDS benefits at some point during ABBA and reconciliation in Jharkhand, and the discussion above suggests that *the focus on fiscal savings and speed of implementation may have contributed to the increase in exclusion.*

Note that the decision to focus on fiscal savings as opposed to beneficiary experience is a legitimate political choice. Consistent with political orientation around the world, the Centre-Left UPA Government (at the Centre and in Andhra Pradesh, in 2006–2012) chose to emphasize the beneficiary experiences, while the Centre-Right NDA Government (at the Centre and in Jharkhand, in 2015–2018) chose to emphasize the fiscal savings in both their policy choices and their public messaging regarding the benefits of the program. After all, fiscal savings to the “government” also belong to the people in that it frees up the budget for other programs that would also be implemented by a democratically elected government. Conversely, focusing only on the beneficiary experience without regard to fiscal costs is likely to limit the budget for other productive investments.

Citizen and voter support for this idea is seen in both our data and in the State of Aadhaar reports where respondents report favorable opinions on Aadhaar despite having been personally inconvenienced by it, reflecting their view that it is good for the government to curb fraud and leakage even if it comes at the cost of some inconvenience. Thus, going forward, a key question to ask is how can we as a society realize the benefits of Aadhaar, while minimizing the risk and damage from exclusion? In the conclusion below, we discuss practical steps for doing so.

6. Conclusion and Recommendations

While the use of Aadhaar in various welfare schemes has been controversial, in practice, all indications are that Aadhaar is here to stay. Its use is widespread and representative data from the State of Aadhaar reports suggest that the overall incidence of exclusion is low. At the same time, given the large population of India, even a 2 percent exclusion rate (as documented in the State of Aadhaar reports) affects over 20 million people. As a society, this number ought to be considered unacceptably high, especially since those excluded are disproportionately more

likely to be vulnerable and most in need of their welfare benefits. Further, even governments that focus on fiscal savings would not wish to impose harm on genuine beneficiaries, and officials we met in both Andhra Pradesh and Jharkhand were quite sensitive to wanting to avoid genuine exclusion errors. Based on our decade-long field research on the impact of biometric authentication in welfare programs in India, we have five broad recommendations for the way forward.¹⁵

First, it is essential to build in safeguards against exclusion in the cases of authentication failure, including providing options for offline authentication in the local POS machine. Such offline options were likely an important reason as to why we find no evidence of exclusion in our study of the impact of biometric Smartcards on NREGS and Pensions in (unified) Andhra Pradesh. In cases where beneficiaries do not expect to travel outside their assigned PDS shop (and opt to not avail of the portability of benefits), it may even be enough to conduct online authentication only once a year to verify the continued existence of beneficiaries, and allow offline authentication during the year with the dealer being required to upload records of offline authentication on a monthly basis. Finally, the burden of proof on the government for card deletions should be high and should ideally be conducted with a combination of field verification, as well as ABBA records of continuous non-use of a seeded card for at least 12 months in a row.

Second, the larger goal of improving the design and delivery of welfare programs in India will be better served by focusing on using ABBA to improve the beneficiary experience rather than fiscal savings *per se*. Examples of such ABBA-enabled reforms include portability of benefits across the country, and potentially even offering beneficiaries a *choice* between receiving subsidized PDS grains versus a direct transfer of the subsidy amount into their bank accounts. Such reforms can meaningfully empower beneficiaries by giving them additional options for holding dealers accountable and accommodate diversity of preferences better. However, this would not be possible without ABBA, because portability and choice of benefits require a connected technological backend combined with authentication to keep track of where and how benefits have been collected each month. Thus, it would be both politically and ethically prudent to focus on such empowerment instead of fiscal savings *per se*. The fiscal savings will come over time, but putting the beneficiary experience at the center of the design of reforms will provide sounder and more broad-based support for such reforms.

Third, it is essential to implement solutions for real-time measurement of beneficiary experiences to quickly detect problems of exclusion and address them promptly. One promising way of doing this may be to use outbound call

15. The discussion here draws on material and language used by Karthik Muralidharan in this interview in *The Indian Express*: <https://indianexpress.com/article/governance/karthik-muralidharan-to-an-extent-both-supporters-and-critics-of-aadhaar-for-service-delivery-are-correct-6283226/>.

centers to make thousands of short calls each day and directly measure beneficiary experiences in accessing their benefits. We tried this approach recently in Telangana and found that such improved measurement significantly raised the quality of service delivery. Regardless of whether such measurement is based on field surveys, phone surveys, or analysis of Management Information Systems (MIS) data, the government should invest in the technical capacity (in-house or through partnerships) to be able to do so.

Fourth, we recommend that representative household surveys like the NSS start including questions about Aadhaar use, in general and, also, regarding specific applications. In addition, given the non-release of NSS data from the 2017–2018 Round, and the risk of relying on a single source of representative data, we also recommend that alternative sources of regular data like the CMIE consumer pyramids survey consider including a few questions on Aadhaar. Of course, space is short in these surveys and choices have to be made; but the ubiquity of Aadhaar use across India and the importance of protecting the vulnerable from being excluded from their legally-entitled benefits makes it essential to track the incidence of exclusion in representative data and use both the aggregate data and case studies of exclusion to design protocols to minimize such risks.

Fifth, and more broadly, navigating the complex issue of trading-off the benefits from improving state capacity for program delivery and the resultant fiscal saving and the costs of the risk of increased exclusion requires more trust between the government and civil society. If critics are seen as wanting to shut down Aadhaar regardless of its benefits (including a meaningful reduction in leakage), the government may tune out legitimate concerns as being “motivated.” Critics need to recognize that reducing corruption and leakage is especially important, given India’s low tax/GDP ratio, and resource constraints make cost-effectiveness in service delivery as much a moral imperative as reducing exclusion. On the other hand, the government is ill-served by simply asserting that all reduction in program spending is leakage reduction, without recognizing the possibility of exclusion, which our data suggest is very real. Publicly acknowledging this concern and making consistent and visible efforts to mitigate exclusion can help bridge a trust deficit. Transparently collecting and reporting data on beneficiary experiences in representative samples, and acting on this data, is an important first step in this process.

More generally, the discussion above highlights that a lot of genuine disagreement regarding policies in India (and around the world) comes from people arguing from different parts of the distribution of outcomes. The same reform can have positive impacts on some and negative impacts on others, and it is impossible to assess the overall impact without understanding the magnitudes of these effects (and how different groups are affected). One promising way to improve public discourse and reduce disagreement is to ask: “What data do we need to narrow down the range of disagreement?” Having visibility into the beneficiary experiences with public programs and policies in a regular and transparent way

can thus play an important role, not just in policymaking but in improving public trust and “public reason” that is so essential to a well-functioning democracy.¹⁶

Finally, we note that the focus of this paper has been limited to the specific case of studying the impacts of integrating Aadhaar into welfare programs. This is by design, since the Aadhaar Act was passed by Parliament as a “money bill,” with the primary justification being that the use of Aadhaar would reduce leakage to the exchequer in the delivery of welfare programs. However, as we document in Section 3, the use cases of Aadhaar have increased dramatically and extend well beyond the delivery of welfare schemes. This increases the importance of additional and ongoing research and evaluations regarding the impacts of Aadhaar use in other use cases. It may also make sense to debate and modify the legislative framework for Aadhaar to reflect both the opportunities and risks from the increased use of Aadhaar in the daily lives of Indian citizens. We hope that the evidence and principles presented in this paper can contribute to this discussion.

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16. The importance of “public reason” for the health of a democracy has been highlighted on multiple occasions by Pratap Bhanu Mehta. See for example this op-ed: <https://indianexpress.com/article/opinion/columns/public-reason-indian-style/>

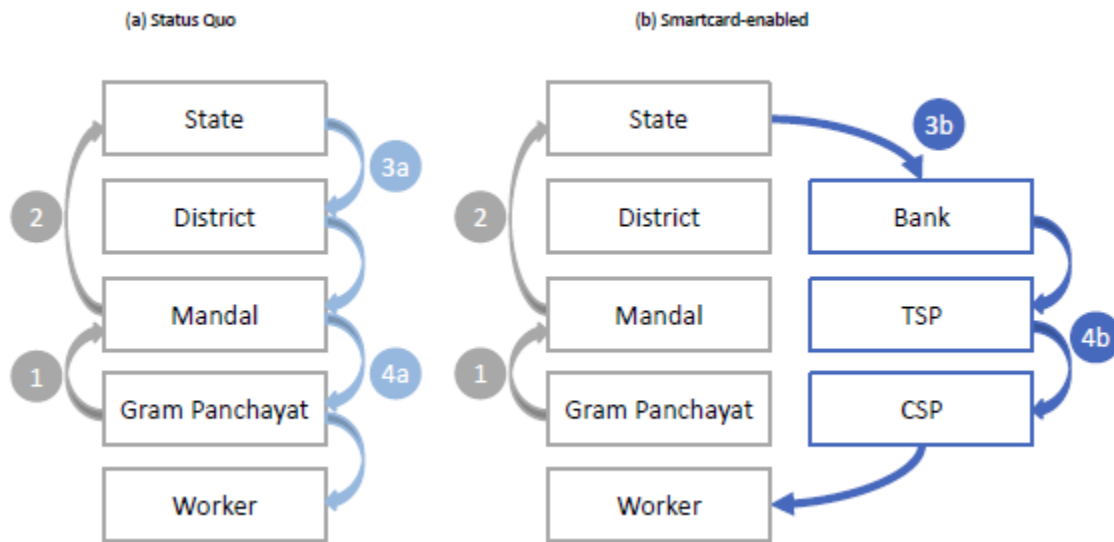
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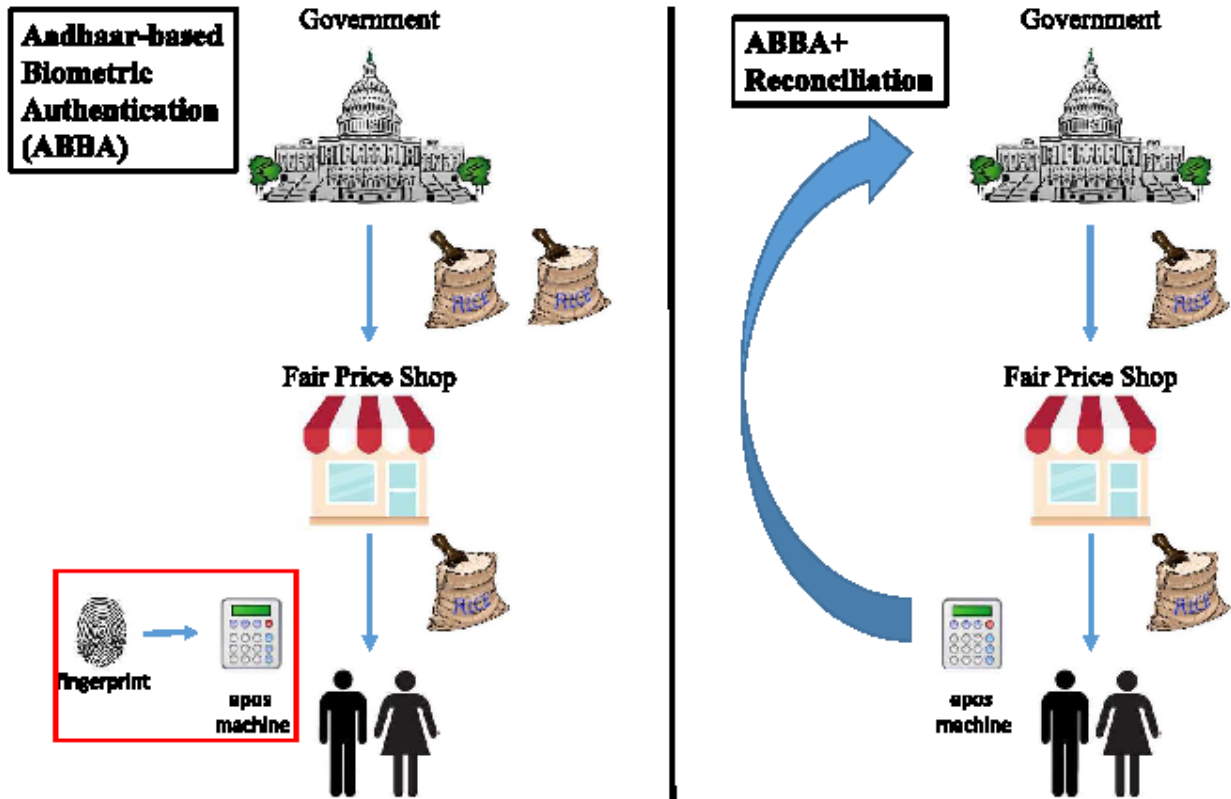
Figure 1: Status quo versus Smartcard-enabled payment systems in AP



Notes:

Reproduced from MNS 2016. This figure shows the flow of information and funds for MGNREGS payments, pre- and post-Smartcards. ``TSP'' is a Technology Service Provider, a firm contracted by the bank to handle details of electronic transfers. ``CSP'' is a Customer Service Provider, from whom beneficiaries receive cash payments after authentication. The upward flow of information about work done is the same in both systems: (1) Paper muster rolls are maintained by the GP and sent to the mandal computer center, and (2) the digitized muster roll data is sent to the state financial system. However, the downward flow of funds is different. In the status quo model, (3a) the money is transferred electronically from state to district to mandal, and (4a) the paper money is delivered to the GP (typically via post office) and then to the workers. In the Smartcard-enabled system, (3b) the money is transferred electronically from the state to the bank to the TSP, and (4b) the TSP transfers cash to the CSP, who delivers the cash and receipts to beneficiaries (both with and without Smartcards). Beneficiaries with Smartcards were required to biometrically authenticate identity before getting paid. Beneficiaries without Smartcards were issued ``manual payments'' with status quo forms of authentication and acknowledgment of payment receipt.

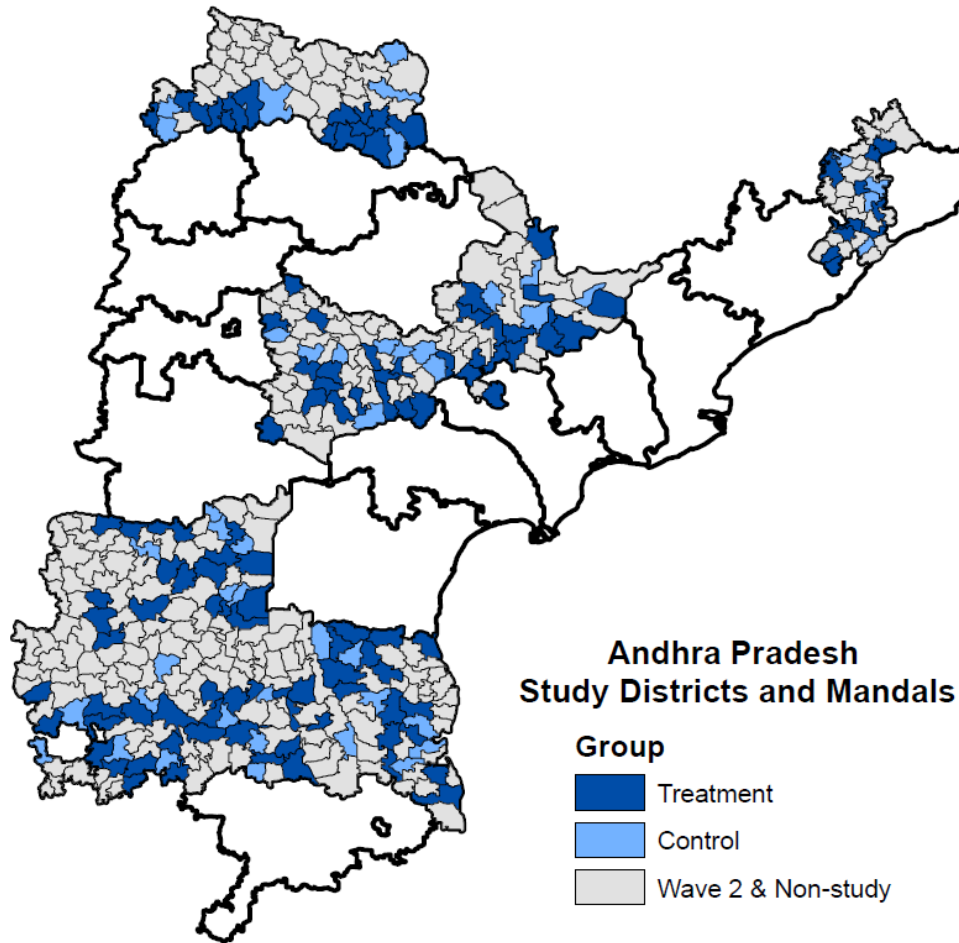
Figure 2: PDS Reforms in Jharkhand



Notes:

This figure shows the two phases of the reform studied in MNS 2021. The left shows the first stage, Aadhaar based biometric authentication (ABBA), which requires beneficiaries to authenticate transactions at the Fair Price Shop in order to receive rations. The right panel demonstrates that transaction records from the ePOS machine are used to provide information in the “reconciliation” phase to adjust future disbursements of grain from the Government to Fair Price Shops.

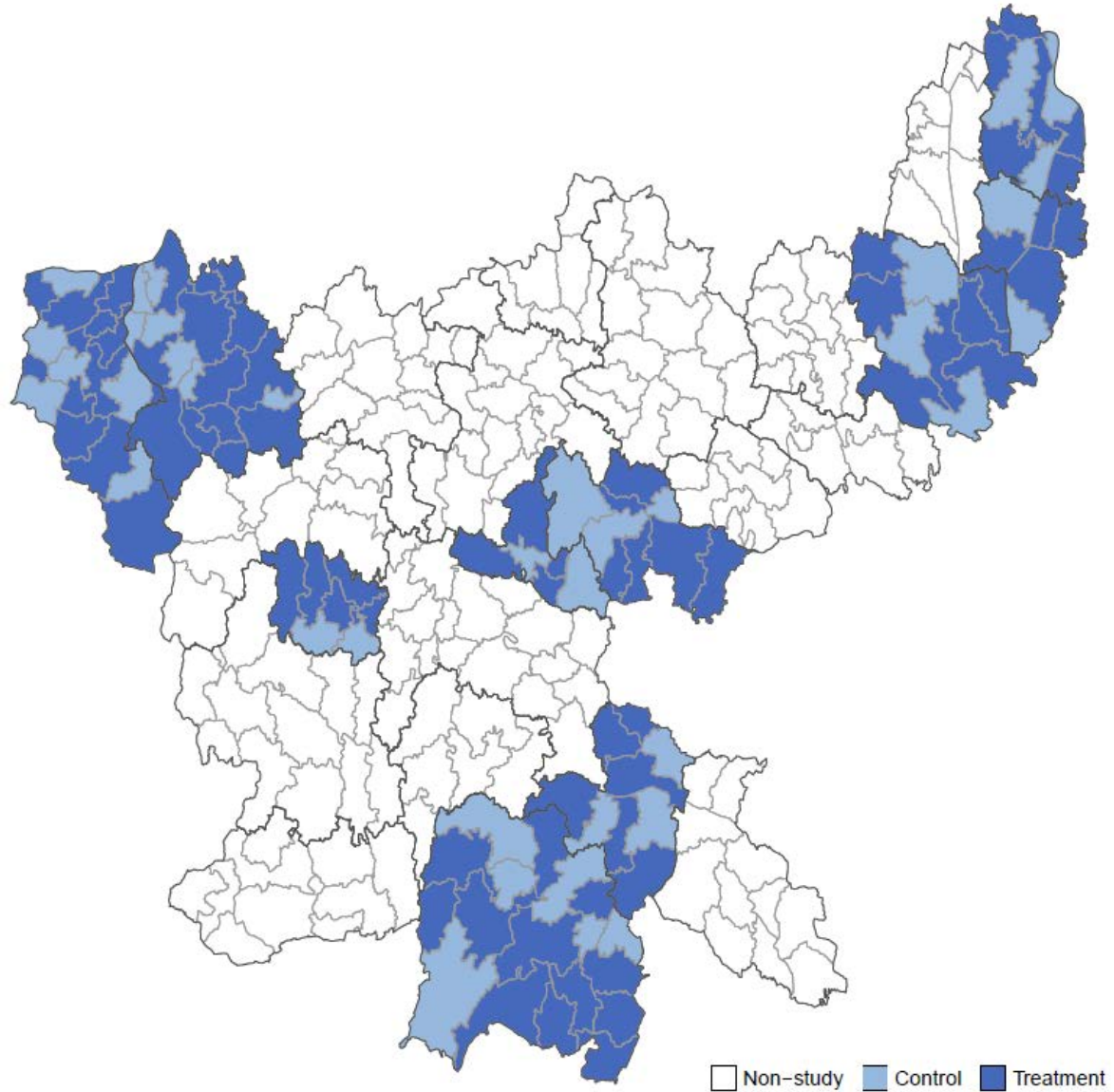
Figure 3: Map of treatment and control blocks in Jharkhand



Notes:

Reproduced from MNS 2016. This map shows the 8 study districts - Adilabad, Anantapur, Kadapa, Khammam, Kurnool, Nalgonda, Nellore, and Vizianagaram - and the assignment of mandals (sub-districts) within those districts to one of four study conditions. Mandals were randomly assigned to one of three waves: 112 to wave 1 (treatment), 139 to wave 2, and 45 to wave 3 (control). Wave 2 was created as a buffer to maximize the time between program rollout in treatment and control waves; our study did not collect data on these mandals. A "non-study mandal" is a mandal that did not enter the randomization process because the Smartcards initiative had already started in those mandals (109 out of 405). Randomization was stratified by district and by a principal component of mandal characteristics including population, literacy, Scheduled Caste and Tribe proportion, NREGS jobcards, NREGS peak employment rate, proportion of SSP disability recipients, and proportion of other SSP pension recipients.

Figure 4: Map of treatment and control blocks in Jharkhand



Notes:

Reproduced from MNS 2021. This map shows the assignment of districts within Jharkhand to study (10) and non-study (14) status, and the assignment of blocks within these districts to treatment and control. Note that four of the census blocks depicted here are further sub-divided for the purposes of PDS administration into an urban and a rural ‘‘PDS block;’ in these cases we give the entire census block the color corresponding to the treatment status of its larger, rural PDS block.

Table 1: Aadhaar use cases

S no	Scheme	Agency	Sector	Type of use	Description/Notes	Status
1	Aadhaar Enabled Biometric Attendance System (AEBAS)	N/A	Governance	Authentication	Aadhaar-Enabled Biometric Attendance System (AEBAS) authenticates and records attendance of registered employees on system. AEBAS uses Aadhaar biometric authentication to verify the identify the employees on the system.	In SOA 2017 - still active
2	Aadhaar Enabled Payment System (AEPS)	Multiple private sector banks	Finance	AEPS	Banks are registered with the National Payments Corporation of India (NPCI) to facilitate transactions using Aadhaar-enabled microATMs under the AEPS programme, and to provide Aadhaar Pay services, which allows merchants to accept payments from customers after the customer completes an Aadhaar authentication	In SOA 2017 - still active
3	Affordable Housing Rental Complexes	Ministry of Housing and Urban Affairs	Housing	Seeding	The scheme aims to provide affordable rental housing in urban areas for Economically Weaker Sections who are urban migrants/poor. Aadhaar or any other Government issued ID is required for availing the benefits.	Not in SOA 2017
4	Agri-Clinics and Agri-Business Centres (AC&ABC)	Ministry of Agriculture and Farmers Welfare	Agriculture	Authentication	The Agri-Clinics and Agri-Business Centres scheme was launched with the objective of disseminating knowledge and providing inputs associated with better farming practices. Agri-Clinics provide advice to farmers on farming practices while Agri-Business centres provide farmers with necessary inputs and tools to implement best practices.	In SOA 2017 - still active
5	Anganwadi Services Scheme	Ministry of Women and Child Development	Women and Child Development	Authentication, DBT	Beneficiaries under Anganwadi Services Scheme are identified on the basis of Aadhaar which is used as identity document for delivery of services or benefits. Beneficiaries not possessing Aadhaar card are assisted by field functionaries to obtain an Aadhaar card; until then services are provided on the basis of alternative identification document.	Not in SOA 2017
6	Army, Navy, Air Force Pensions	Department of Ex-Servicemen Welfare	Social protection	Authentication	The Department of Ex-Servicemen Welfare under the Defence Ministry provides pensions to retired pensioners from the defence forces. The scheme uses Aadhaar Seeding to enrol and authenticate beneficiaries in the program database.	In SOA 2017 - still active
7	Artists Pension Scheme and Welfare Fund	Ministry of Culture	Social protection	Authentication	The scheme aims to provide assistance to Artists. Under the scheme artists receive a monthly allowance from the government. The scheme uses Aadhaar Seeding to enrol and authenticate beneficiaries in the program database.	In SOA 2017 - no longer active
8	Atal Pension Yojana	Ministry of Finance	Finance	Authentication	The scheme provides pension for workers in the unorganized sector. Workers receive benefits at the age of 60. Aadhaar is required to enrol into the scheme.	Not in SOA 2017
9	Atal Vayo Abhyuday Yojana	Ministry of Social Justice and Empowerment	Social Justice	Authentication	The scheme aims to provide financial security, health Care and nutrition, shelter and welfare, protection of senior citizens. The scheme uses Aadhaar Seeding to enrol and authenticate beneficiaries in the program database.	Not in SOA 2017
10	Ayushman Bharat - PM Jan Arogya Yojana (PM-JAY)	Ministry of Health and Family Welfare	Health	Authentication	The scheme provides health insurance for treatment, diagnostics and hospitalization. The beneficiary is insured for Rs 5 lakh. Aadhaar is used to link beneficiaries to programme database and authenticate them when receiving benefits.	Not in SOA 2017
11	Banking eKYC	Multiple private sector banks	Finance	eKYC	Banks are registered with the National Payments Corporation of India (NPCI) to provide Aadhaar eKYC services to facilitate opening an account.	In SOA 2017 - still active
12	Bonded Labour Rehabilitation Scheme	Ministry of Labour and Employment	Social protection	Authentication	The Ministry of Labour and Employment has instituted the scheme for the protection and rehabilitation of bonded labourers. The scheme uses Aadhaar Seeding to enrol and authenticate beneficiaries in the program database.	In SOA 2017 - still active
13	BSR Doctoral Fellowship in Sciences	University Grants Commission	Education	Seeding	The BSR scheme was launched with the objective of providing students with research opportunities that will assist them on progressing to a PhD. Under the scheme students are entitled to a stipend for the two year period of the fellowship. The scheme uses Aadhaar Seeding to remove duplicates and fake beneficiaries from the beneficiary lists.	In SOA 2017 - still active

Table 1: Aadhaar use cases

S no	Scheme	Agency	Sector	Type of use	Description/Notes	Status
14	CAMS	CAMS	Finance	eKYC	CAMS is a mutual funds transfer agency, and allows its clients to implement Aadhaar eKYC to facilitate the opening of mutual funds accounts. CAMS is a registered with the Unique Identification Authority of India (UIDAI) as an Authentication User Agency (AUA) and as an eKYC User Agency (KUA).	In SOA 2017 - still active
15	Central Sector Scheme of Extra Mural Research	Ministry of AYUSH	Ayurveda	DBT and Seeding	The Ministry of AYUSH supports scientists in the country to conduct research in Homoeopathy. The scheme encourages research in high priority areas to ascertain efficacy of treatment, better understanding of homoeopathic principles and respond to various public health concerns.	Not in SOA 2017
16	Central Sector Scholarship Scheme for college and university students	Ministry of Rural Development	Education	Seeding, Authentication	The Ministry of Rural Development launched the scheme in the Financial Year 2008-09 with the objective of providing scholarships to students from vulnerable backgrounds wishing to attend college. In 2013, the scheme was transitioned to the system of Direct Benefit Transfers.	In SOA 2017 - still active
17	Centrally Sponsored Scholarship Schemes for SC/OBC	Ministry of Social Justice and Empowerment	Education	Authentication, Seeding, DBT	The Ministry of Social Justice and Empowerment provides a large number of scholarships for students belonging to SC and OBC backgrounds. The scheme uses Aadhaar linked bank accounts to transfer the benefits directly to the beneficiary.	In SOA 2017 - still active
18	Coal Mines Provident Fund Life Certificate/Jeevan Praman	Ministry of Coal	Coal	Authentication, Seeding	The Coal Mines Provident Fund Organisation provides social security benefits to coal industry workers with provident fund and pension disbursement. Aadhaar number is the Coalmine PF number.	Not in SOA 2017
19	Compensation for Bhopal Gas victims	N/A	Compensation	Authentication	The scheme "Ex-Gratia to Bhopal gas victims" provides compensation to victims of the Bhopal gas tragedy that occurred in 1984.	In SOA 2017 - unable to verify
20	Comprehensive Handloom Cluster Development Scheme (CHCDS)	Ministry of Textiles	Textiles	Authentication, DBT	The objective is to develop Mega Handloom Clusters that are located in clearly identifiable geographical locations that specialize in specific products. Provides subsidies for improving the infrastructure facilities, etc	Not in SOA 2017
21	Credit Enhancement Guarantee Scheme for Young and Start-Up Entrepreneurs belonging to Scheduled Castes	Ministry of Social Justice and Empowerment	Social Justice	Authentication	The Ministry of Social Justice and Empowerment provides assistance to entrepreneurs from an SC background through a credit enhancement scheme for startups.	In SOA 2017 - no longer active
22	Dastkar Shashktikaran Yojana	Ministry of Textiles	Textiles	Authentication	Empowerment programme for handicrafts sector/ cooperative/ SHGs to empower artisans by making them active entrepreneurs-cum-primary stake holders of development.	Not in SOA 2017
23	DBT in Fertilizer	Ministry of Chemicals and Fertilizers	Fertilizer	Authentication	fertilizer companies on the basis of actual sales made by retailers to beneficiaries. Sale of subsidized fertilizers to farmers/buyers is made through Point of Sale (PoS) devices installed at retailer shop; beneficiaries are identified through Aadhaar Card, KCC, Voter Identity Card etc.	Not in SOA 2017
24	DBT in LPG (PAHAL)	Ministry of Petroleum and Natural Gas	Social protection	Seeding/DBT	Scheme launched in 2013 but due to lack of Aadhaar seeding, scheme suspended and relaunched in 2014 with secondary options of receiving subsidy	In SOA 2017 - still active
25	DBT-JRF Program	Ministry of Science and Technology	Science and Tech	Authentication	For award of fellowships under the DBT-JRF Programme, national qualifying examination - Biotechnology Eligibility Test (BET) - is held once every year across the country. Based on the performance in BET, two categories of merit list are prepared (Category-I and Category-II) for shortlisting of qualifying candidates under DBT-JRF Programme.	Not in SOA 2017
26	Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY)	Ministry of Rural Development	Labour	Authentication	The Deen Dayal Upadhyaya Grameen Kaushalya Yojana, managed by the Ministry of Rural Development, aims to provide opportunities for skill development and placement services to unemployed youth in rural areas. The scheme uses Aadhaar Seeding to enrol and authenticate beneficiaries in the program database.	In SOA 2017 - still active

Table 1: Aadhaar use cases

S no	Scheme	Agency	Sector	Type of use	Description/Notes	Status
27	Design Clinic Scheme for Design Expertise to Micro Small and Medium Enterprises	Ministry of MSME	MSME/Industry	DBT and Seeding	The scheme was launched by the Ministry of MSME with the objective of providing design expertise to MSMEs in order to improve competitiveness and productivity. The scheme uses Aadhaar linked bank accounts to transfer the benefits directly to the beneficiary.	In SOA 2017 - still active
28	Development Schemes under Spice Board	Spice Board, Ministry of Commerce and Industry	Commerce and Industry	DBT and Seeding	The scheme includes many sub-components aimed at providing financial assistance to beneficiaries for activities related to production, replantation, welfare of workers, etc. Beneficiaries receive subsidy services through Aadhaar linked bank accounts	Not in SOA 2017
29	Digilocker & e-sign (India stack APIs)	Ministry of Electronics & IT (MeitY)	e-governance	Verification/Authentication	DigiLocker is a flagship initiative of Ministry of Electronics & IT (MeitY) under Digital India Corporation (DIC). DigiLocker aims at 'Digital Empowerment' of citizen by providing access to authentic digital documents to citizen's digital document wallet. The issued documents in DigiLocker system are deemed to be at par with original physical documents	In SOA 2017 - still active
30	Dr. Ambedkar Post-Matric Scholarship Scheme for Economically Backward Classes (EBC) Students	Ministry of Social Justice and Empowerment	Education	Seeding	The Ministry of Social Justice and Empowerment launched the scheme with the objective of encouraging parents to send their students to school and reduce the financial burden on them. The scheme is for students of Classes 11 and 12 that belong to Economically Backward Classes (EBC). Aadhaar is used to enrol into the scheme.	In SOA 2017 - still active
31	Dr. Ambedkar Pre-Matric and Post-Matric Scholarship for De-notified, Nomadic and Semi-Nomadic Tribes (DNT) Students	Ministry of Social Justice and Empowerment	Education	Authentication	The Ministry of Social Justice and Empowerment launched the scheme with the objective of encouraging parents to send their students to school and reduce the financial burden on them. The scheme is for students of Classes 11 and 12 that belong to De-notified, Nomadic and Semi-Nomadic Tribes. Aadhaar is used to enrol beneficiaries into the scheme.	In SOA 2017 - still active
32	Dr. S. Radharkrishnan Post Doctoral Fellowship In Humanities And Social Sciences	University Grants Commission	Education	Seeding	The objective of the scheme is to provide students an opportunity to conduct post doctoral research in the humanities and social sciences. Aadhaar is used to enrol beneficiaries into the scheme.	In SOA 2017 - still active
33	e-Panchayat	Ministry of Panchayati Raj	Governance	Authentication	The e-Panchayat platform is an e-governance initiative by the Ministry of Panchayati Raj that aims to improve efficiency and transparency in the system. Aadhaar is used to enrol beneficiaries into the scheme.	In SOA 2017 - still active
34	Emeritus Fellowship	University Grants Commission	Education	Seeding	The scheme is managed by the University Grants Commission with the objective of providing research opportunities to interested teachers irrespective of their position. Aadhaar is used to enrol beneficiaries into the scheme.	In SOA 2017 - still active
35	Emeritus Professor (ICAR)	Department of Agricultural Research and Education	Agriculture	DBT and Seeding	Scholarship provided by the Indian Council of Agriculture Research to encourage agricultural scientists to undertake teaching, student research guidance and developing instructional material. Honorarium is paid through the University using DBT mode with bank account of student linked with Aadhaar number.	Not in SOA 2017
36	Emeritus Scientist (ICAR)	Department of Agricultural Research and Education	Agriculture	DBT and Seeding	The scholarship is provided by the Indian Council of Agriculture Research to encourage agricultural scientists to take or continue research projects and improve specialized courses. The honorarium is paid to the scientist through the University using DBT mode with bank account of student will be linked with Aadhaar number.	Not in SOA 2017
37	Employees' Pension Scheme (EPS)	Ministry of Labour and Employment	Social protection/Pensions	Authentication	The EPS Pensions scheme of 1995, managed by the Ministry of Labour and Employment, provides pensions for all employees working in the organised sector that are not otherwise entitled to a pension scheme. Aadhaar is used to enrol beneficiaries into the scheme.	In SOA 2017 - still active
38	Entrepreneurship Development Employment Generation of National Livestock Mission	Department of Animal Husbandry and Dairying	Animal husbandry	DBT and Seeding	Subsidies under this scheme are reimbursed for credit-cum-subsidy linked activities for the different sub components	Not in SOA 2017
39	Financial Assistance for building grants including studio theatres	Ministry of Culture	Arts and Culture	DBT and Seeding	The scheme provides grants to cultural organizations to build performance spaces for artists.	Not in SOA 2017

Table 1: Aadhaar use cases

S no	Scheme	Agency	Sector	Type of use	Description/Notes	Status
40	Financial Assistance for Tagore cultural complexes	Ministry of Culture	Arts and Culture	DBT and Seeding	The scheme provides grants to cultural organizations to build cultural complexes.	Not in SOA 2017
41	Financial Assistance for the Cultural Function and Production Grant	Ministry of Culture	Arts and Culture	DBT and Seeding	The scheme provides financial assistance to not-for profit organizations for supporting the seminars, research, workshops, festivals, production and exhibitions etc. organized by them on different aspects of Indian Culture.	Not in SOA 2017
42	Financial Assistance to Cultural Organizations with National Presence	Ministry of Culture	Arts and Culture	DBT and Seeding	The scheme provides grants to cultural organizations with a national presence. Grants are transferred to Aadhaar linked bank accounts of beneficiaries	Not in SOA 2017
43	Financial Assistance under Armed Forces Flag Day Fund	Department of Ex-Servicemen welfare	Defence	DBT and Seeding	The scheme is managed by the Department of Ex-Servicemen welfare. Under the scheme financial assistance is provided for procurement of mobility equipment to disabled ESM, Financial assistance for treatment of serious diseases to non-pensioner ESM (All ranks)/Widows. Benefits are transferred to the beneficiary's Aadhaar linked bank account.	In SOA 2017 - still active
44	Financial assistance under Raksha Mantri Ex-servicemen Welfare Fund (RMEWF)	Department of Ex-Servicemen welfare	Defence	DBT and Seeding	The fund provides financial assistance for ex-service people in penury, education of children/widows, children with disability, marriage of daughters or remarriage of widows, assistance to non-pensioners for medical treatment, repairs to house, orphans of ex-service people, funeral, vocational training for widows, and Financial Incentive to wards of ESM/Widows undergoing cadet's training at NDA	Not in SOA 2017
45	Formation and Promotion of Farmer Producer Organizations	Ministry of Agriculture and Farmers Welfare	Agriculture	Seeding	Board members of FPOs can use Aadhaar as one of the many proofs of identity when applying for Equity Grants under this scheme	Not in SOA 2017
46	Free Coaching and Allied Schemes for Minority Community Students	Ministry of Minority Affairs	Education	DBT and Seeding	The scheme aims to empower the students belonging to minority communities and prepare them for competitive examinations. The scheme provides financial support for free coaching to notified minority students in selected coaching institutions.	Not in SOA 2017
47	Free Coaching for Students with Disabilities	Department of Empowerment of Persons with Disabilities	Education	Authentication	The Department of Empowerment of Persons with Disabilities aims to provide tutoring opportunities to students under the Free Coaching for Students with Disabilities. Aadhaar is used to enrol beneficiaries into the scheme.	In SOA 2017 - still active
48	Free Coaching Scheme for Scheduled Caste (SC) and Other Backward Classes (OBC) Students	Ministry of Social Justice and Empowerment	Education	Authentication	The Ministry of Social Justice and Empowerment launched the scheme with the objective of providing students from SC and OBC background students with assistance in their education. Under the scheme, students are entitled to free coaching for certain subjects. Aadhaar is used to enrol beneficiaries into the scheme.	In SOA 2017 - still active
49	Grih Kala Kendras for beneficiaries and service providers	N/A	N/A	Authentication	N/A	In SOA 2017 - unable to verify
50	GST Exemption Certificate Scheme	Ministry of Heavy Industries and Public Enterprises	Industry	Seeding	The scheme aims to help persons with orthopaedic disabilities avail GST exemption for purchase of vehicles. It uses Aadhaar to enrol beneficiaries into the program.	Not in SOA 2017
51	Housing Subsidy To Beedi Workers	Ministry of Labour and Employment	Housing	DBT and Seeding	The Ministry of Labour and Employment aims to provide assistance to Beedi workers by giving financial assistance for construction of houses. Benefits are transferred to the beneficiary's Aadhaar linked bank account.	In SOA 2017 - still active
52	Housing Subsidy To Iron/Manganese/Chrome Ore Workers	Ministry of Labour and Employment	Housing	DBT and Seeding	The Ministry of Labour and Employment aims to provide assistance to Iron/Manganese/Chrome Ore workers by giving financial assistance for construction of houses. Benefits are transferred to the beneficiary's Aadhaar linked bank account.	Not in SOA 2017
53	Housing Subsidy To Lime Stone and Dolomite LSDM Workers	Ministry of Labour and Employment	Housing	DBT and Seeding	The Ministry of Labour and Employment aims to provide assistance to Lime Stone and Dolomite LSDM workers by giving financial assistance for construction of houses. Benefits are transferred to the beneficiary's Aadhaar linked bank account.	Not in SOA 2017

Table 1: Aadhaar use cases

S no	Scheme	Agency	Sector	Type of use	Description/Notes	Status
54	Incentive for construction of Individual Household Latrine (IHHL)	Swachh Bharat Mission	Sanitation	Authentication	The IHHL scheme aims to provide incentives to vulnerable populations such as BPL households, SC/ST households, differently abled headed households and women headed households for the purposes of construction of latrines. The scheme falls under the Swachh Bharat Mission.	In SOA 2017 - still active
55	Inclusive Development of Disabled at the Secondary Stage under Rashtriya Madhyamik Shiksha Abhiyan	Ministry of Education	Education	DBT and Seeding	The initiative falls under the Rashtriya Madhyamik Shiksha Abhiyan and focusses on assisting differently-abled students that belong to classes 11 and 12.	In SOA 2017 - unable to verify
56	Indira Gandhi Matritva Sahyog Yojana (IGMSY)	Ministry of Women and Child Development	Social protection/Women and Child	DBT and Seeding	The scheme was launched by the Ministry of Women and Child Development with the objective of creating a maternity benefit programme. Conditional transfers are provided to pregnant and lactating mothers as a part of the scheme. Benefits are transferred to the beneficiary's Aadhaar linked bank account.	In SOA 2017 - still active
57	Insurance services	Multiple insurance companies	Finance	eKYC	Insurance companies registered with the National Payments Corporation of India (NPCI) to provide Aadhaar eKYC services to facilitate opening an account. However, the Supreme Court has set aside rules which had previously made Aadhaar linkage mandatory for insurance policies.	In SOA 2017 - still active
58	Integrated Child Development Services (ICDS) Scheme - Training	Ministry of Women and Child Development	Social protection/Women and Child	Authentication	ICDS. a flagship programme of the Indian Government aims to provide educational, nutritional and healthcare support to children below the age of six and their mothers. Beneficiaries, Anganwadi workers and staff under the programme will need to submit Aadhaar to enrol into the scheme.	In SOA 2017 - unable to verify
59	Integrated Coffee Development Project Scheme	Coffee Board, Ministry of Commerce and Industry	Commerce and Industry	DBT and Seeding	The scheme includes many sub-components aimed at providing financial assistance to beneficiaries for activities related to production, replantation, welfare of workers, etc. Beneficiaries receive subsidy services through Aadhaar linked bank accounts	Not in SOA 2017
60	Integrated Scheme for Agricultural Marketing	Ministry of Agriculture and Farmers Welfare	Agriculture	Seeding	The scheme includes multiple sub-schemes related to agricultural marketing	Not in SOA 2017
61	Interest Subvention Scheme for Kisan Credit Card (KCC) to Fisheries and Animal Husbandry farmers	Department of Animal Husbandry and Dairying	Animal husbandry	DBT and Seeding	Provides all dairy farmers of Milk Cooperatives and Milk Producer Companies with Kisan Credit Cards (KCC), and short-term loans for Animal Husbandry and Fisheries in 2018-19 and 2019-20	Not in SOA 2017
62	Janani Suraksha Yojana (JSY)	Ministry of Health and Family Welfare	Health	Seeding/DBT	Janani Suraksha Yojana (JSY) provides cash assistance to pregnant mothers to encourage delivery of children at government hospitals or an accredited facility. JSY cash transfers can be made through the Aadhaar Payment Bridge System (APBS)	In SOA 2017 - still active
63	Jiyo Parsi	Ministry of Minority Affairs		DBT and Seeding	The objective of the scheme is to reverse the declining trend of Parsi population by adopting a scientific protocol and structured interventions, stabilize their population and increase the population of Parsis in India. Married couples will get financial support for fertility treatments	Not in SOA 2017
64	Journalist Welfare Scheme through Press Information Bureau	Ministry of Information and Broadcasting	Labour	Authentication	The Ministry of Information and Broadcasting has created a provision for Journalists to receive relief on a one-time basis for either themselves or their family members. Aadhaar is used to enrol beneficiaries in the scheme.	In SOA 2017 - still active
65	Junior Research Fellowship	Department of Agricultural Research and Education	Agriculture	DBT and Seeding	The scholarship is provided by the Indian Council of Agriculture Research. The scholarship is paid to the scientist through the University using DBT mode with bank account of student will be linked with Aadhaar number.	Not in SOA 2017
66	Kisan Vikas Patra	India Post	Finance	Authentication, Seeding	India Post introduced the Kisan Vikas Patra as a small saving certificate scheme. Initially, it was meant for farmers to enable them to save for long-term, now it is available for all. It is required to submit Aadhaar number as proof of identity of account holder.	Not in SOA 2017

Table 1: Aadhaar use cases

S no	Scheme	Agency	Sector	Type of use	Description/Notes	Status
67	Kothari PDF in Sciences	Ministry of Education	Education	Seeding	Promotes post doctoral research in science fields by providing students with a monthly stipend and an annual grant. The scheme uses Aadhaar Seeding to remove duplicates and fake beneficiaries from the beneficiary lists. This is a central scheme applicable across India but the exact list of states in which Aadhaar usage has been initiated is still undetermined.	Not in SOA 2017
68	Maulana Azad National Fellowship	Ministry of Minority Affairs	Education	DBT and Seeding	The objective of the Fellowship is to provide five year fellowships in the form of financial assistance to students from minority communities, notified by the Central Government, to pursue M. Phil and Ph.D.	Not in SOA 2017
69	Mechanism for Marketing of Minor Forest Produce Through Minimum Support Price & Development of Value Chain for MFP	Ministry of Tribal Affairs	Tribal Affairs	DBT, Seeding	Providing MSP to gatherers of forest produces and introducing value addition and marketing through tribal groups and clusters. District Implementing Units work to ensure that Aadhar numbers are seeded in the beneficiary account at the earliest.	Not in SOA 2017
70	Merit-cum-Means Scholarship Scheme (ICAR)	Department of Agricultural Research and Education	Agriculture	DBT and Seeding	The scholarship is provided by the Indian Council of Agriculture Research to promote the study of under-graduate students in Agriculture, Agricultural Engineering, Home Science, Dairy & Animal Husbandry. The scholarship are paid to the student through the University using DBT mode with bank account of student will be linked with Aadhaar number.	Not in SOA 2017
71	Merit-cum-Means Scholarship Scheme for Minorities	Ministry of Minority Affairs	Education	DBT and Seeding	The objective of the Scheme is to provide financial assistance to the poor and meritorious students belonging to minority communities to enable them to pursue professional and technical courses.	Not in SOA 2017
72	MGNREGS	Ministry of Rural Development	Social protection	Authentication, DBT, Seeding	ensures employment in rural areas at minimum wages for 100 days per year to anyone who opts in. The scheme uses Aadhaar to authenticate beneficiaries at point of disbursement of wages, for DBT through Aadhaar linked bank accounts and to enrol beneficiaries in the program.	In SOA 2017 - still active
73	Ministry of Social Justice and Empowerment Schemes Operated by NGOs	Ministry of Social Justice and Empowerment	Social protection	Authentication	The Ministry of Social Justice and Empowerment partners with NGOs for certain programmes aimed at assisting individuals belonging to Scheduled Caste or OBC category. Aadhaar is used to enrol beneficiaries in the scheme	In SOA 2017 - unable to verify
74	Mission for Integrated Development of Horticulture (NHM, HMNEH, NABM) (NHB, CDB, CIH)	Ministry of Agriculture and Farmers Welfare	Agriculture	Authentication	The Mission for Integrated Development of Horticulture is a centrally sponsored scheme that aims to combine multiple Horticulture related schemes under a singular umbrella.	In SOA 2017 - still active
75	Mutual Funds services	Multiple private sector financial firms	Finance	eKYC	Mutual funds services use Aadhaar eKYC to help customers open new mutual funds accounts.	In SOA 2017 - still active
76	Nai Roshni	Ministry of Minority Affairs	Minority Affairs	Authentication	The NGO availing the grant requires a unique ID of NGO Darpan. In order to obtain a Unique Identity Number (UIN), an NGO has to first sign-up on the NGO-DARPAN portal by furnishing the required details like registration number of the organization, PAN of the organization, PAN and Aadhar details of the office bearers/trustees etc.	Not in SOA 2017
77	Nai Udaan	Ministry of Minority Affairs	Education/Exam	DBT and Seeding	The scheme provides support for minority students clearing prelims conducted by Union Public Service Commission, State Public Service Commissions and Staff Selection Commission.	Not in SOA 2017
78	National AIDS Control Organization (NACO)	National AIDS Control Organization (NACO)	Health	Seeding	National AIDS Control Organization (NACO) is piloting linking the existing database of People Living with HIV (PLHIV) to Aadhaar to facilitate password reduction and for future direct benefit transfers to Aadhaar-linked bank accounts.	In SOA 2017 - still active
79	National Apprenticeship Promotion Scheme (NAPS)	Ministry of Skill Development and Entrepreneurship	Labour	Authentication	The National Apprenticeship Promotion Scheme provides apprenticeship opportunities to young professionals. The Government reimburses upto 50% of the costs incurred by private enterprises. Aadhaar is used to enrol beneficiaries in the scheme.	In SOA 2017 - still active

Table 1: Aadhaar use cases

S no	Scheme	Agency	Sector	Type of use	Description/Notes	Status
80	National Career Services	Ministry of Labour and Employment	Labour	Authentication	The Ministry of Labour and Employment established the National Career Services with the objective of providing assistance to vulnerable communities in terms of training to improve employability and in searching for job opportunities. Aadhaar is used to enrol beneficiaries in the scheme.	In SOA 2017 - still active
81	National Creche Scheme	Ministry of Women and Child Development	Women and Child Development	Authentication, DBT	While registering NGOs/Voluntary Organisation, State Government will ensure that the NGO/Voluntary Organisations have sufficient facilities for safety & security of children in the crèche and they should also have the Aadhaar Number of Key Functionaries of the Crèche and beneficiaries ie children.	Not in SOA 2017
82	National Eligibility cum Entrance Test (NEET)	Central Board of Secondary Education	Education/Examination	Authentication	National Eligibility cum Entrance Test (NEET) is examination administered by the Central Board of Secondary Education (CBSE).	In SOA 2017 - still active
83	National Fellowship for Higher Education for Scheduled Caste (SC) Students	Ministry of Social Justice and Empowerment	Education	Authentication	The scheme caters to 2000 students from SC background and provides them opportunities to go on to a PhD or to work as a Lecturer. Aadhaar is used to enrol beneficiaries in the scheme.	In SOA 2017 - still active
84	National Fellowship for Other Backward Classes (OBC) Students	Ministry of Social Justice and Empowerment	Education	Authentication	The scheme caters to students from OBC background and provides them opportunities to go on to a PhD or to work as a Lecturer. Aadhaar is used to enrol beneficiaries in the scheme.	In SOA 2017 - still active
85	National Fellowship for Persons with Disabilities	Department of Empowerment of Persons with Disabilities	Education	Authentication	The Department of Empowerment of Persons with Disabilities aims to provide fellowship opportunities to students under the National Fellowship for Persons with Disabilities. Aadhaar is used to enrol beneficiaries in the scheme.	In SOA 2017 - still active
86	National Fellowship Scheme For Higher Education of ST Students	Ministry of Tribal Affairs	Tribal Affairs, Education	DBT	Students who have entered Aadhaar in their online application and if their Aadhaar is linked to their bank account, in such cases the amount of fellowship will be credited to that Aadhaar linked bank account only.	Not in SOA 2017
87	National Food Security Mission	Ministry of Agriculture and Farmers Welfare	Agriculture	DBT and Seeding	The National Food Security Mission uses Aadhaar linked DBT as a mode of benefit transfer to beneficiaries	Not in SOA 2017
88	National Handicrafts Development Programme (NHDP)	Ministry of Textiles	MSME/Industry	Authentication	The National Handicrafts Development Programme is an umbrella scheme that aims to promote handicrafts. A number of programmes provide financial assistance and training to artisans. Aadhaar is used to enrol beneficiaries in the scheme and authenticate them.	In SOA 2017 - still active
89	National Health Mission	Ministry of Health and Family Welfare	Health	Authentication	The programme aims to improve performance of the health sector through the provision of financial support to State Governments. Accredited Social Health Activists and other staff under the mission need to submit Aadhaar for enrolment and authenticate themselves.	In SOA 2017 - still active
90	National Means-cum-Merit Scholarship Scheme (NMMSS)	Ministry of Human Resource Development	Education	DBT, Seeding, Authentication	The National Means-cum-Merit Scholarship Scheme provides scholarships to eligible students from classes 9 to 12 that belong to economically weaker sections of society. The scheme transfers benefits using Aadhaar linked bank accounts.	In SOA 2017 - still active
91	National Mission for Sustainable Agriculture	Ministry of Agriculture and Farmers Welfare	Agriculture	Authentication	Individuals availing services under the Soil Health Management Scheme and the Soil Health Card Scheme need to provide proof of Aadhaar Enrolment or authenticate using Aadhaar.	In SOA 2017 - unable to verify
92	National Mission of Empowerment of Women (NMEW)	Ministry of Women and Child Development	Social Justice	Authentication	As of February 2017, all staff under the programme need to provide proof of Aadhaar Enrolment or authenticate using Aadhaar in order to get their honorarium.	In SOA 2017 - unable to verify
93	National Overseas Scholarship for ST Students	Ministry of Tribal Affairs	Tribal Affairs, Education	Authentication	This scheme is open for all ST students who are currently pursuing or wish to opt for higher studies abroad for Masters, PhD & Post-Doctoral research programme. Aadhaar required while applying for the scheme.	Not in SOA 2017

Table 1: Aadhaar use cases

S no	Scheme	Agency	Sector	Type of use	Description/Notes	Status
94	National Overseas Scholarship for Students with Disabilities	Department of Empowerment of Persons with Disabilities	Education	Authentication	Cash based benefits to students under the National Overseas Scholarship for Students with Disabilities. Beneficiaries need to provide proof of Aadhaar enrolment or authenticate using Aadhaar in order to access benefits.	In SOA 2017 - still active
95	National Professor/National Fellow	Department of Agricultural Research and Education	Agriculture	DBT and Seeding	The scholarship is provided by the Indian Council of Agriculture Research. The scholarship is paid to the scholar through the University using DBT mode with bank account of student will be linked with Aadhaar number.	Not in SOA 2017
96	National Programme of Mid Day Meal in Schools	Ministry of Education	Health	Authentication	National Programme of Mid Day Meal in Schools is a programme by the central government to provide meals to school children.	In SOA 2017 - still active
97	National Safai Karamcharis Finance & Development Corporation (NSKFDC) - Loan Scheme	Ministry of Social Justice and Empowerment	Social Justice	Authentication	Loans are provided to the Safai Karamcharis, Scavengers and their dependants to enable them break away from the traditional occupation of scavenging and take up alternative and dignified occupations.	Not in SOA 2017
98	National Scheme For Incentive For The Girl Child For Secondary Education	Ministry of Human Resource Development	Education	DBT and Seeding	The scheme focuses on girls between the ages of 14-18 and provides them with financial incentives in the form of a fixed deposit. The scheme transfers benefits using Aadhaar-seeded bank accounts.	In SOA 2017 - still active
99	National Scholarship (Top Class) for Higher Education of ST Students	Ministry of Tribal Affairs	Tribal Affairs,	Authentication, DBT	Aadhaar number/enrollment ID required while applying for scholarship. It could also be used for crediting the scholarship amount in the bank account linked to the Aadhaar number in fast track mode.	Not in SOA 2017
100	National Social Assistance Programme (NSAP)	Ministry of Rural Development	Social protecti	Authentication, Seeding, DBT	The National Social Assistance Programme (NSAP) aims to provide social assistance benefits to the aged, BPL households in the case of death of the primary breadwinner and for maternity. Beneficiaries have to authenticate themselves at points of transaction before cash-based disbursement of pensions.	In SOA 2017 - still active
101	National Talent Scholarship UG and PG	Department of Agricultural Research and Education	Agriculture	DBT and Seeding	The National Talent Scholarship is provided by the Indian Council of Agriculture Research to Bachelor and Master degree students admitted to agricultural universities outside their domicile state. The scholarship are paid to the student through the University using DBT mode with bank account of student will be linked with Aadhaar number.	Not in SOA 2017
102	National TB Elimination Programme	Ministry of Health and Family Welfare	Health	DBT and Seeding	The scheme is targeted at eliminating TB by improving nutritional support to Tuberculosis patients through incentives to patients themselves, transport support for TB patients in Tribal areas, incentive for private sector providers and informants, etc. It uses Aadhaar based DBT to transfer incentives into the beneficiary's bank account.	Not in SOA 2017
103	National Water Mission	Ministry of Jal Shakti	Environment	Authentication	The National Water Mission was established with the aim of improving the status of water conservation, reducing water wastage and ensuring equitable distribution of resources. Aadhaar is used to enrol and authenticate beneficiaries.	In SOA 2017 - unable to verify
104	National Youth Development Fund	Ministry of Youth Affairs and Sports	Youth Affairs	Authentication	In order to obtain a Unique Identity Number (UIN), an NGO has to first sign-up on the NGO-DARPAN portal by furnishing the required details like registration number of the organization, PAN of the organization, PAN and Aadhar details of the office bearers/trustees etc.	Not in SOA 2017
105	National Youth Parliament Festival	Ministry of Youth Affairs and Sports	Youth Affairs	Authentication	Forum for youth to engage with public issues, and to obtain and document their opinions on Vision of New India in 2022. Age proof is required in the screening process, for which Aadhaar may be used.	Not in SOA 2017
106	NETJRF Fellowship	University Grants Commission	Education	Seeding	The Junior Fellowship is provided by the University Grants Commission to students who clear the National Eligibility Test (NET). The fellowship is to provide research opportunities in the field of humanities to help candidates proceed to a PhD. Aadhaar is used to enrol beneficiaries.	In SOA 2017 - still active

Table 1: Aadhaar use cases

S no	Scheme	Agency	Sector	Type of use	Description/Notes	Status
107	Online Registration System	Ministry of Electronics & IT (MeitY)	Health	eKYC	Online Registration System (ORS) for medical appointment allows for users to book for health appointments online. Patients can create an account after providing an Aadhaar eKYC verification using a one time password (OTP) sent to the associated mobile number. New patients using ORS will be provided a new Unique Health ID (UHID).	In SOA 2017 - still active
108	Online Training Nomination System	Ministry of Heavy Industries and Public Enterprises	Industry	Seeding	The online nomination system is a web platform developed for nominating trainees to trainings conducted by the Department of Public Enterprises. All new users on the web platform are required to submit Aadhaar number at the time of registration.	Not in SOA 2017
109	P.G. Indira Gandhi Scholarship for Single Girl Child for PG Programs	University Grants Commission	Education	Seeding	The scheme is managed by the University Grants Commission and provides support for post graduate education to girls who are the only girl child in the household. Aadhaar is used to enrol beneficiaries.	In SOA 2017 - still active
110	P.G. Scholarship for Professional Courses for SC or ST candidates	University Grants Commission	Education	Seeding	The scheme is managed by the University Grants Commission and provides financial support to students from SC/ST background who wish to pursue post graduate education. Aadhaar is used to enrol beneficiaries.	In SOA 2017 - still active
111	P.G. Scholarship for University Rank Holders	University Grants Commission	Education	DBT and Seeding	The scheme is managed by the University Grants Commission and provides financial support to students who wish to pursue a post graduate degree. Students who secure a top rank in their undergraduate programme are eligible for the scheme. The schemes transfers benefits to beneficiaries to their Aadhaar linked bank accounts.	In SOA 2017 - still active
112	Padhna Likhna Abhiyan	Ministry of Education	Education	Authentication	The primary objective of Padhna Likhna Abhiyan is to impart functional literacy to 57 lakh adult illiterates aged 15 and above under a Basic Literacy Programme for a period of one year - 2020 to 2021. Aadhaar details are collected to enrol beneficiary into the program.	Not in SOA 2017
113	Padho Pradesh	Ministry of Minority Affairs	Education	DBT and Seeding	The objective of the scheme is to award interest subsidy to meritorious students belonging to economically weaker sections of notified minority communities so as to provide them better opportunities for higher education abroad and enhance their employability.	Not in SOA 2017
114	Pandit Deendayal Upadhyay National Welfare Fund For Sportspersons (PDUNWFS)	Ministry of Youth Affairs and Sports	Sports	Authentication	The scheme as revised in September, 2017 provides lump sum ex-gratia assistance to outstanding Sportspersons of yesteryears.	Not in SOA 2017
115	Passport	Ministry of External Affairs	External Affairs	Authentication	Passport Seva enables simple, efficient and transparent processes for delivery of passport and related services. Online application for a passport requires Aadhaar as a proof of identity.	Not in SOA 2017
116	Payment solutions	Multiple private sector payment firms	Finance	eKYC	Payment solution providers are registered with the National Payments Corporation of India (NPCI) to provide Aadhaar eKYC services to facilitate opening an account.	In SOA 2017 - still active
117	Permanent Account Number (PAN)	Income Tax Department	Finance	Authentication	The PAN number is a ten digit number issued by the Income Tax Department. All individuals who wish to file income tax returns need to link their PAN to their Aadhaar number.	In SOA 2017 - still active
118	PG Scholarship for GATE qualified PG Students	Ministry of Education	Education	DBT and Seeding	The scheme is open for students who clear the GATE exam for M. Tech Programmes. It uses the Aadhaar Payment Bridge System for Direct Benefit Transfers directly into the bank account of the beneficiary. This is a central scheme applicable across India but the exact list of states in which Aadhaar usage has been initiated is still undetermined.	In SOA 2017 - still active
119	PM Kisan Samman Nidhi	Ministry of Agriculture and Farmers Welfare	Agriculture	DBT and Seeding	The scheme aims to supplement the financial needs of all landholding farmers' families in procuring various inputs. The scheme uses Aadhaar linked DBT to transfer funds electronically to beneficiaries.	Not in SOA 2017

Table 1: Aadhaar use cases

S no	Scheme	Agency	Sector	Type of use	Description/Notes	Status
120	Post Doctoral.Fellowship for Women	University Grants Commission	Education	Seeding	The scheme provides financial support to female students who wish to pursue post doctoral research in humanities and social sciences. It uses Aadhaar Seeding to remove duplicates and fake beneficiaries from the beneficiary lists. This is a central scheme but the exact list of states in which Aadhaar usage has been initiated is still undetermined.	In SOA 2017 - still active
121	Post- Doctoral Fellowship for SC or ST Candidates	University Grants Commission	Education	Seeding	Provides financial support to SC/ST students who wish to pursue post doctoral research in humanities and social sciences. It uses Aadhaar Seeding to remove duplicates and fake beneficiaries from the beneficiary lists. This is a central scheme but the exact list of states in which Aadhaar usage has been initiated is still undetermined.	In SOA 2017 - still active
122	Post-matric scholarship for SC/ST students (ICAR)	Department of Agricultural Research and Education	Agriculture	DBT and Seeding	The scholarship is provided by the Indian Council of Agriculture Research to promote the study of SC/ST under-graduate students in various brachnes of agriculture. The scholarship are paid to the student through the University using DBT mode with bank account of student will be linked with Aadhaar number.	Not in SOA 2017
123	Post-Matric Scholarship for Scheduled Caste (SC) Students	Ministry of Social Justice and Empowerment	Education	Authentication	The scheme is for students of Classes 11 and 12 that come from a Scheduled Caste background. It is also applicable for vocational courses that students might want to pursue. As of February 2017, all individuals under the scheme need to provide proof of Aadhaar enrolment or authenticate using Aadhaar.	In SOA 2017 - still active
124	Post-Matric Scholarship for Students with Disabilities	Department of Empowerment of Persons with Disabilities	Education	Authentication	Cash based benefits to students under the Post-Matric Scholarship for Students with Disabilities. As of March 2017, all beneficiaries need to provide proof of Aadhaar enrolment or authenticate using Aadhaar in order to access benefits.	In SOA 2017 - still active
125	Post-matric scholarships for minorities	Ministry of Minority Affairs	Education	DBT and Seeding	Minority students from classes 11 and 12 are eligible for the scholarship. The scheme uses the Aadhaar Payment Bridge System for Direct Benefit Transfers directly into the bank account of the beneficiary. This is a central scheme but the exact list of states in which Aadhaar usage has been initiated is still undetermined.	In SOA 2017 - still active
126	Pradhan Mantri Awaas Yojana Urban and Rural	Ministries of Housing and Urban Affairs and Rural Development	Housing	Authenticaton	The Pradhan Mantri Awaas Yojana aims to provide housing to vulnerable sections of society by the year 2022. Beneficiaries applying online need to submit Aadhaar to authenticate themselves and apply for benefits under the scheme.	In SOA 2017 - still active
127	Pradhan Mantri Jan Dhan Yojana (PMJDY)	Ministry of Finance	Finance	Seeding, eKYC, AEPS	Pradhan Mantri Jan Dhan Yojana (PMJDY) programme uses Aadhaar authentication for banking transactions using an Aadhaar Enabled Payment System (AEPS) interoperable microATMs, uses Aadhaar eKYC for bank account openings and allows for customers access an overdraft facility, if their Jan Dhan account has been linked to Aadhaar.	In SOA 2017 - still active
128	Pradhan Mantri Jeevan Jyoti Bima Yojana	Ministry of Finance	Social Protecti	Authentication	The Pradhan Mantri Jeevan Jyoti Bima Yojana was launched in May 2015. The scheme provides life insurance cover of Rs. 2 lakh to individuals. As an Aadhaar enabled service, it provides individuals the provision to authenticate themselves using Aadhaar.	In SOA 2017 - still active
129	Pradhan Mantri Kaushal Kendra (PMKKs)	Ministry of Skill Development and Entrepreneurship	Skill Developm	Authentication	PMKK are equipped to run industry-driven courses of high quality with focus on employability and create an aspirational value for skill development training. Recording attendance for all trainees and trainers using an Aadhar enabled biometric machine shall be mandatory for all PMKKs.	Not in SOA 2017
130	Pradhan Mantri Kaushal Vikas Yojana (PMKVY)	Ministry of Skill Development and Entrepreneurship	Labour	Authentication	The Ministry of Skill Development and Entrepreneurship provides skill development opportunities to the youth through training centres under the National Skill Development Corporation.	In SOA 2017 - still active
131	Pradhan Mantri Mathru Vandana Yojana (PMMVY)	Ministry of Women and Child Development	Social protecti	DBT and Seeding	Conditional cash transfers to pregnant women and lactating mothers under the Maternity Benefit Programme. According to the operational guidelines and FAQ booklet, Aadhaar ID of beneficiary and her husband is mandatory to receive the third installment of the benefits	Not in SOA 2017
132	Pradhan Mantri Mudra Yojana	Micro Units Development and Refinance Agency	Finance	Authentication	Allows small borrowers loans of up to Rs. 10 lakhs without collateral. As an Aadhaar enabled service, it provides individuals the provision to authenticate themselves using Aadhaar.	In SOA 2017 - still active