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Measuring the Effectiveness of Service Delivery

Delivery of Government Provided Goods and Services in India

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Abstract

This paper uses new survey data to measure the government's capacity to deliver goods and services in a manner that includes: high coverage of the population; equal access; and high quality of service delivery. The paper finds variation in these indicators across and within Indian states. Overall: (i) access to government provided goods and services is low—about 60 percent of the surveyed population are unable to apply for goods and services they self-report needing; (ii) inequality in access is high—women and poor adults are more likely to report an inability to apply for goods and services they need; and (iii) less than a third of the respondents who did manage to apply for a government delivered good or service found the application process to be easy. Access can be improved by reducing application costs and processing times, simplifying the application process, and providing alternative channels to receive applications.

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Measuring the Effectiveness of Service Delivery:
Delivery of Government Provided Goods and Services in India

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1. Introduction

Spending on goods and services such as education and health is linked to economic growth, higher social mobility and lower economic inequality (Barro 1996, Owen and Weil 1998, Alesina and La Ferrara 2005). However, that spending can produce outcomes only when the state can deliver these goods and services (Filmer, Hammer, and Pritchett 2000, Rajkumar and Swaroop 2008, Muralidharan, Niehaus, and Sukhtankar 2016). Otherwise, much of the money is lost to inefficiencies and/or corruption (Rotberg 2003, World Bank 2004, Bertrand et al. 2007, Rothstein and Stolle 2008, Arbache, Habyarimana, and Molini 2010). The desire to reduce the gap between spending and outcomes has generated considerable research into measuring a state's ability to deliver goods and services, and steps that can be taken to improve the delivery (see World Bank 2016, Woolcock 2017). Our paper contributes to this literature using data collected by surveying 13,000 adults in India, using a new questionnaire that was designed to measure individual states' capacity to deliver goods and services.

This paper is organized as follows: Section 2 discusses existing measures of state capacity, their shortcomings, and the need for a new measure. Section 3 analyzes access to government provided goods and services. Section 4 measures inequality in access to government provided goods and services. Section 5 analyzes the quality of service delivery and Section 6 concludes.

2. The Need to Measure State Capacity to Deliver Goods and Services

Many of the current measures proxy a state's capacity to deliver goods and services with broader definitions of state capacity (Besley and Persson, 2009). For example, state capacity is broadly defined as the ability of a state to collect taxes (Lieberman 2002, Persson 2008), exercise control within its borders and enforce domestic laws (McAdam, Tarrow, and Tilly 2001, Wang 2003), and deliver public goods and services to residents (Rotberg, 2003). However, the ability to tax, exercise

control, or enforce laws may not necessarily match up with an ability to provide public goods and services like quality healthcare and education. Thus, broader measures of state capacity are weak substitutes for directly measuring a state's ability to deliver public goods and services[1].

Measures of state capacity to deliver public goods are also often contained within measures of governance. For example, the World Bank uses six indicators to measure governance: voice and accountability; political instability and violence; government effectiveness; regulatory quality; rule of law; and control of corruption (Kaufmann, Kraay, and Mastruzzi, 2005.) But while weak governance might be linked to a lower capacity to deliver public goods and services, it is not always the case. For example, some authoritarian states are ranked low on governance but have a high capacity to deliver public goods and services.

Furthermore, governance is generally measured at the national level by observing, among others, the regime type, political institutions and legal systems. Thus, these measures cannot explain state-by-state/within-country variations in the ability to deliver public goods. For example, the infant mortality rate in the Indian state of Kerala is comparable to countries within the Organization for Economic Co-operation and Development (OECD), while the infant mortality rate in the Indian state of Madhya Pradesh equals that of poor and less developed countries such as Haiti and Liberia (Bellinger 2016). These differences within India cannot be attributed to most existing measures of governance because they seldom demonstrate variations within the country[2].

[1] An alternate view focuses on incentives to deliver public goods as against capacity to deliver public goods. Capacity, under this framework, results from available incentives. For example, effective monitoring and incentives might result in lower doctor/nurse absenteeism. Lower absenteeism, in turn, might result in higher capacity to provide universal healthcare. For more examples refer; Das et al. 2007, Banerjee, Duflo, and Glennerster 2008, Muralidharan and Sundararaman 2011, Callen et al. 2016, Duflo, Hanna, and Ryan 2012, Duflo, Dupas, and Kremer 2015, Dhaliwal and Hanna 2017.

[2] For more examples, see "Spotlight on Kerala and Uttar Pradesh: One Nation, Worlds Apart", Page 44, World Bank (2004); Dreze and Sen (2002); and World Bank (2006).

Capacity to deliver public goods has also been measured using proxies for governance, such as "absenteeism." Chaudhary et al. (2006) reported from surveys in which enumerators made unannounced visits to primary schools and health clinics in Bangladesh, Ecuador, India, Indonesia, Peru and Uganda. On average, they found that across countries about 19 percent of the teachers and 35 percent of the health workers were absent. Within India, Muralidharan et al. (2011) estimated that doctor absenteeism rates ranged from 30 percent in Madhya Pradesh to over 67 percent in Bihar. Kremer et al. (2005) estimated teacher absenteeism rates varied from 15 percent in Maharashtra to 42 percent in Jharkhand, with higher absenteeism in poor states. Muralidharan et al (2017) surveyed schools across 1297 villages in India. They found that 23.6% of teachers were absent during unannounced school visits; they estimate the salary cost of unauthorized teacher absence to be $1.5 billion per year. The link between absenteeism and governance was found to be strong, with Kremer et al. (2005, p. 664) stating that "moving from a district with no inspections in the past three months to one where every school has been inspected in the past three months was associated with a seven-percentage point lower level of teacher absence (equivalent to nearly 30 percent of the level of absence observed in the data)." Muralidharan et al (2017) found that increases in the frequency of schools monitoring was strongly correlated with lower teacher absence.

The link between attendance and outcomes (student performance and health indicators) was also found to be strong.[3] For example, Duflo, Hana, and Ryan (2012) show that through the use of effective monitoring (time-stamped photos) and monetary incentives, teacher attendance can be improved. Furthermore, improved teacher attendance results in improved student performance.

[3] The causal chain connecting "incentives" to "lower absenteeism" to "better outcomes" also relies on the competence of the service delivery agent. For example, the mere presence of an untrained (or otherwise incompetent) teacher may not translate into better grades. See for example, Das, Hammer, and Leonard (2008) and Pandey, Goyal, and Sundararaman (2010).

Banerjee, Duflo, and Glennerster (2008) found that monitoring combined with financial incentives improved attendance and performance of government nurses at government-run public health facilities in India.[4]

However, absenteeism measures governance at the institutional (school or hospital), district, state, or national level. Thus, it can only explain between-unit (or between-institutions) differences in outcomes: For example, why does student performance differ across schools, or districts, or states? It cannot explain within-unit differences in outcomes: For example, why do girls have lower access to public schools?

Figure 1 demonstrates two kinds of gaps: 1A shows the gap between spending on education and education outcomes (the literacy rate); and 1B shows the gap in outcomes (the literacy rate) between men and women. A study of governance — such as absenteeism in schools — can explain Chhattisgarh's inability to translate high spending on education into high literacy rates (Figure 1A).[5] However, it cannot explain why women in Maharashtra — a relatively rich and well governed state — have lower literacy rates than men in Chhattisgarh or Jharkhand, which are relatively poor and less developed states. In other words, the stark difference in outcomes mean that women living in relatively "well governed" states have lower access to education versus men living in states that are less developed. But how can a state be "well governed" or deemed to have "high state capacity" if women do not have access to education[6]? This observation suggests that

[4] However, when the program to monitor and incentivize was transferred from an NGO to the government, vested interests subverted the monitoring program. As such, the program produced little improvements in attendance or performance over the long-run.

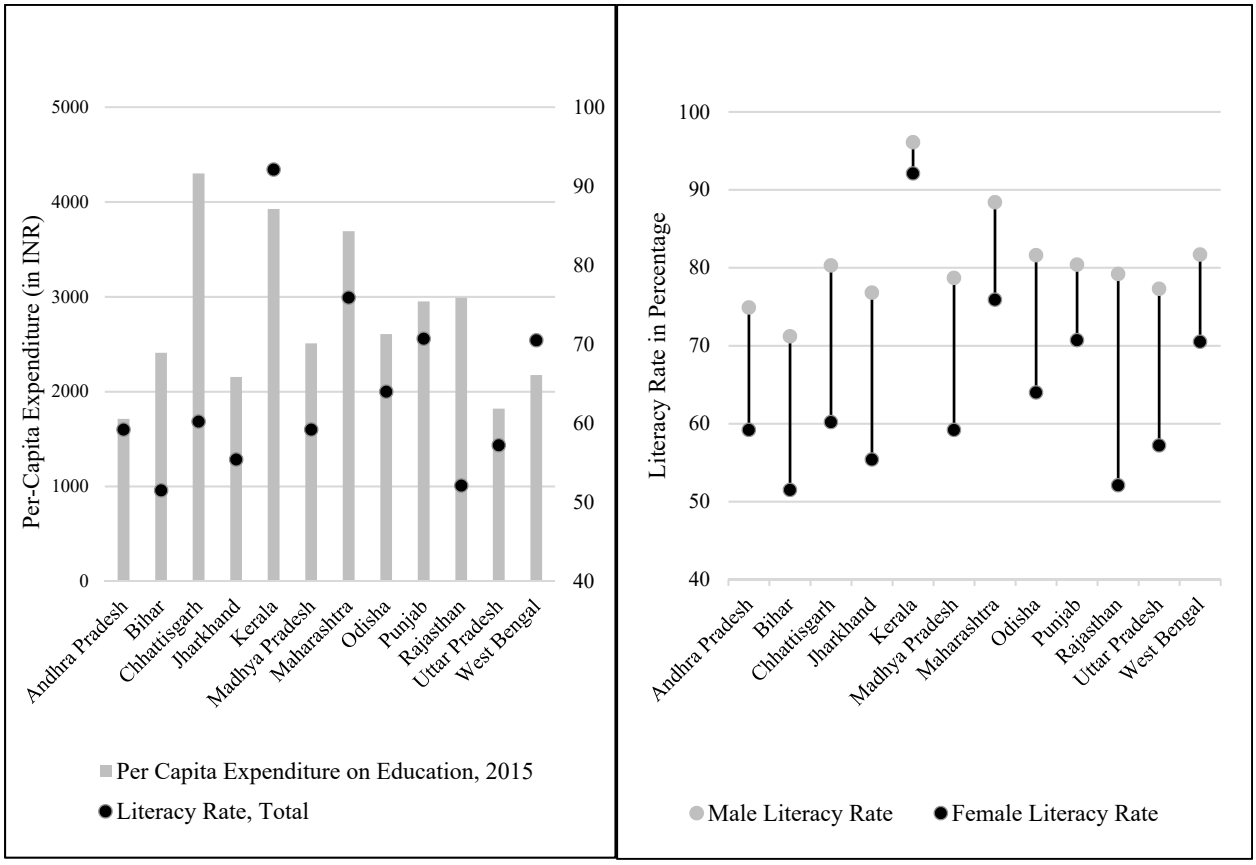
[5] Devarajan and Reinikka (2004) list the following to explain why public expenditures have limited impact on health and education outcomes: 1) Governments may be spending on the wrong goods or the wrong people. 2) Money fails to reach frontline service providers. 3) Frontline service providers, such as teachers, doctors, or nurses, do not have adequate incentives to provide the service. 4) Even when services are provided, households may not take advantage of them.

[6] The difference could be due to lack of demand (or uptake) of public education for girls (Devarajan and Reinikka, 2004)

state capacity to deliver goods and services should also be measured based on the ability to provide equal access to all citizens.

Figure 1: Gaps in Outcomes

1A: Gap Between Spending and Outcome ***1B: Gap Between Outcomes by Gender***



Note: Literacy data is from the Planning Commission (India); Expenditure Data is from Reserve Bank of India.

This paper seeks to improve the measurement of a state's capacity to deliver goods and services by broadening the definition from the 'ability to deliver goods and services' to the 'ability to deliver quality goods and services while ensuring equal access to all citizens — men/women, rich/poor. By doing so, the measure will not only account for state-by-state variations but also differences in outcomes within a state.

One could argue that universal coverage should imply equal access. In other words, universal coverage will ensure equality in access. In theory, maybe, but in practice it is seldom true. In poor and developing countries, where coverage is low, governments can easily increase "coverage" but exacerbate inequality. For example, consider a hypothetical society of 100, with 10 educated men, 40 uneducated men, 5 educated women, and 45 uneducated women. A government can increase literacy rates from 15 percent to 40 percent by educating 25 of the 40 uneducated men. In this hypothetical scenario coverage of public education would have increased from 15 percent to 40 percent while exacerbating the literacy gap between men and women from 5 percent to 35 percent.

In developed countries, where literacy often reaches saturation levels (near 100 percent of the population), unequal access may be less relevant but inequality in quality remains salient. For example, within the United States — where literacy rates are almost 100 percent — one could argue that access to public education is nearly 100%. But given the large variation in outcomes across regions and across racial or ethnic groups, unequal access to quality public schools among groups remains salient and notable (Hero, 1998).

This paper uses data from a new module of questions—*Measuring User Experience with Service Delivery*[7]—added to the "Gallup 2016 India State Survey". The survey measures: access to government provided goods and services; inequality in access to goods and services; and quality of service delivery. The survey—conducted by Gallup, Inc. on behalf of the World Bank—provides the first detailed portrait of service delivery at the local level in India. The indicators are based on survey responses for a sample of 13,000 adults in 13 Indian states: Andhra Pradesh (including Telangana), Bihar, Chhattisgarh, Himachal Pradesh, Jharkhand, Kerala, Madhya

[7] The questionnaire is shown in Appendix 1.

Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Uttar Pradesh, and West Bengal.[8] Although the survey is not nationally representative, it is representative for these states, which make up about 70 percent of the country's population according to the latest government census conducted in 2011. Gallup conducted the survey between January-March of 2016. It included our module, plus a wide range of questions regarding demographic, employment, and income characteristics. The target population is the entire civilian, noninstitutionalized adult population (age 15 and above) living in the 13 states.[9]

We include four dimensions of public delivery. The first three services are administered at the state level:

- "Goods" refers to government run schools and health services.
- "Services" refers to registration of land/property and issuance of driver's licenses.
- "Utilities" refers to utilities such as electricity, gas and water.

The fourth category, "identity cards" — voter ID cards and Aadhaar biometric identification cards — are provided by the federal government. For the sake of brevity, "goods and services" is used to refer to all state and federal services collectively.

3. Access to Government Delivered Goods and Services

This paper begins by measuring "access" — the percentage of the population that have access to government provided goods and services that they need.

[8] The state of Karnataka is excluded from the analysis in this paper due to data inconsistencies.
[9] To ensure that the sample is representative of the adult population of the 13 states surveyed in India, weights based on available population demographics were used. Final weights consist of the base sampling weight, which corrects for unequal probability of selection based on household size, and the post-stratification weights which corrects for age, gender, education, caste and urban/rural to correct for nonresponse error. Additional information on survey methodology is shown in Appendix 2.

3.1 Measuring Access

To ascertain "access," it is essential to account for needs. "Needs" change over a lifetime. For example, parents with young kids may "need" access to schools, while others may not. Moreover, some "needs" are not continual. For example, a person may not need to apply for a driver's license every year, or one may not need to visit a hospital in any given year. To draw inferences based on actual user experience, this paper measures access only among those who self-report a "need" for a government provided good or service. Self-reported needs may differ from actual needs. For example, illiterate subsistence farmers with little knowledge of the labor market may not express a need for schooling for their children. However, if the farmer does not express a need for a school, and hence does not apply for enrollment in a government school, one cannot really measure access — had he decided to apply, would he have had access? By contrast, if the farmer were to self-report a need for a school, and also report an inability to apply and enroll in a government run school, one can conclude that the farmer does not have access to government run schools. Therefore, it is still worth measuring access from "self-reported" needs rather than "estimated" needs.

The survey asked respondents if they applied for a government-provided good or service—for example: Did you apply for a driver's license? Those who replied "yes" were coded as "*Needed and Applied for a Driving License*."

Those who did not apply were further asked if they did not apply because they did not need a driver's license. To the second question, those who replied "yes" —they did not apply for a driver's license because they did not need a driver's license— were provisionally[10] coded as "*Did Not Need*

[10] Additional criteria were also applied; See forthcoming discussion on reasons for not applying (next page).

and Did Not Apply for a Driving License" and those who replied "no" were coded as "*Needed and Did Not Apply for a Driving License*".

The survey goes on to explore other reasons why respondents did not apply for a good or service and asked those who did apply for a good or service three additional possible reasons for not applying:

- Affordability — could not afford to apply
- Lack of documentation — did not have the necessary documents to apply; and
- Know-how — did not know how to apply

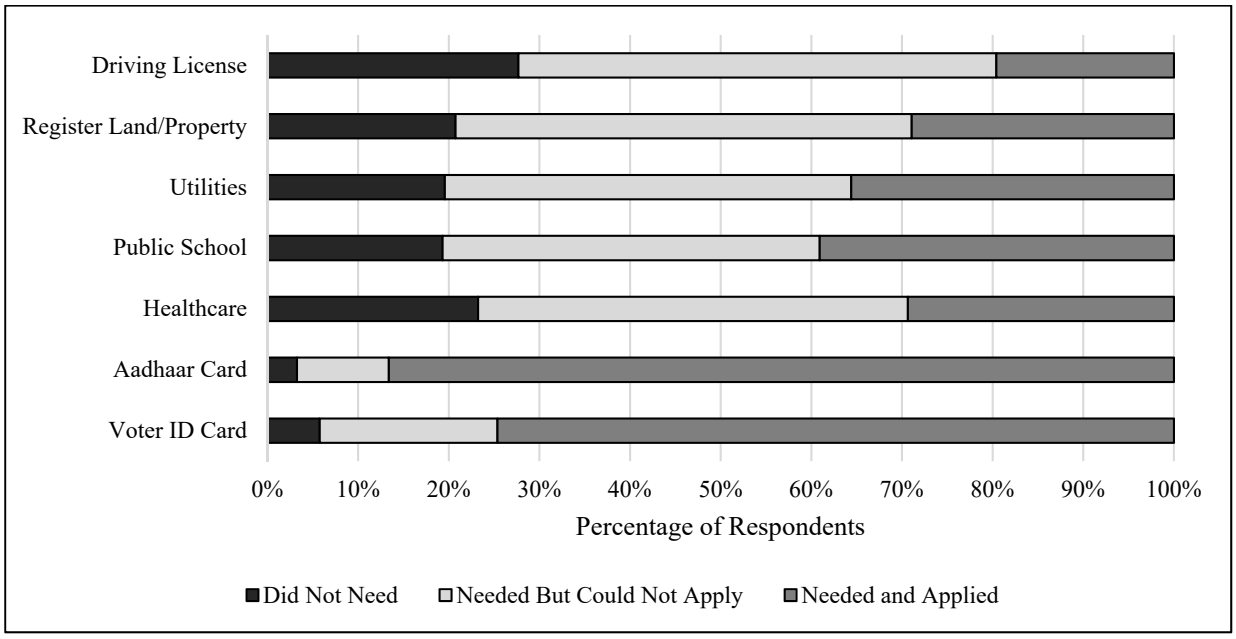
Respondents could cite more than one of the above three reasons — or none —for not applying.

Given that we measure only "self-reported" needs, we established a stronger criterion to code "*Did Not Need*": Only adults who reported "No" to all three reasons—affordability, documents, or know-how—were coded as "*Did not need and Did Not Apply for a Driving License*." These additional constraints were added to distinguish between those who say they did not need a driver's license and those who said they did not need a license because they could not obtain one. In other words, if one were to say that he or she did not need a driver's license because he or she could not afford to apply for a license, the response would be coded as "*Needed and Did Not Apply for a Driving License*."

Figure 2 shows that 52 percent of the respondents reported they needed but could not apply for a driver's license; 21 percent reported they needed and applied for a license; and 27 percent reported they did not need a license. It would be erroneous to report that access was limited to the 21 percent of the respondents, because as many as 27 percent did not need a driving license. In other words, "access" is measured as: Among those who needed a government provided good or a service, the percentage who could apply for the good or service. Thus, access to a driver's license is: Among

those who needed a license, (52+21=) 73 percent, the percentage that could apply for a license is (21/73 =) 29 percent.

Figure 2: Percentage of Respondents Who Needed and Applied for a Government Provided Good or Service
Percentage of All Adults



That 70 percent of respondents needed a driver's license appears high, but we have a strong criterion for coding "*Did not need and Did Not Apply*." Furthermore, India is a young country where more than half the population is younger than 25 and two-thirds are less than 35. This creates more demand for such services as compared to the demand observed in more mature and wealthy economies.

In the case of driver's licenses, employment opportunities are also a significant factor. The total commercial goods transported in India has grown by 10 percent year-on-year over the last decade. More than half of the commercial goods transport is done by road. Additionally, motor vehicle ownership has increased by more than 10 percent year-on-year, and in India many car owners employ chauffeurs. A job seeker needs a driver's license to be employed as a truck driver or a car

chauffeur. Less than 10 percent of Indians have a license. Thus, many would apply for a license either because they purchased a motorcycle or a car, or because they seek to be employed as a driver/chauffeur.

From Figure 2, identity cards are more accessible than other government provided goods and services. About 87 percent of respondents were able to apply for an Aadhaar card[11] and 75 percent were able to apply for a voter ID card. Relatively few people are denied these cards compared with services such as issuance of a driver's license or registration of land or property. There are several reasons why ID cards are more accessible than other goods and services. Because they are provided by the federal government, ID cards are not affected by a state government's lack of ability to deliver this service.[12] Furthermore, voter ID cards issued by the Election Commission of India are required to vote in national, state and local elections. Competing political parties have a strong incentive to ensure that their constituents have voter ID cards. As a result, political parties help citizens procure voter ID cards. The government's Aadhaar policy was launched in 2014 with the goal of providing all citizens with biometric identification cards. As of 2016, more than 92 percent of adults had an Aadhaar card.[13]

Among state government provided goods and services, access is relatively higher for government run schools, where 48 percent of those in need could apply for access. By contrast, access is lower for issuance of driver's licenses[14] (26 percent), registration of land or property (36 percent),

[11] While here access to Aadhaar Card is used as a measure of state capacity; successful implementation of the Aadhaar card program, can itself lead to improvement in state capacity (see for eg. Muralidharan, Niehaus, Sukhtankar 2016: *"Aadhaar cards have improved the efficiency and governance of social programs such as the National Rural Employment Guarantee Scheme and the Social Security Pensions."*)

[12] See Iyer (2010) and Banerjee and Iyer (2005) for some insights to variation in state capacity in India.

[13] *The Times of India*. 2016. "92% of India's Adult Population Has Aadhaar Card - Times of India."

[14] The difficulty in procuring a driver's license is consistent with Bertrand et al. (2007) who make the following observation (Page 1669): *"To summarize, there are two main tracks to procuring a driver's license in Delhi. The formal track involves directly applying through the RTO and no bribery. Some of our results, however, suggest that this track might be fraught with extralegal hurdles. The informal channel, on the other hand, is operated by agents,*

government run hospitals and health care (38 percent), and public utilities such as connection to piped water, gas or electricity (44 percent).

3.2 Interstate Variation in Access

Table 1 lists by state and by type of good or service the percentage of respondents who expressed a need for a good or service. For example, 72 percent of the respondents in Andhra Pradesh said they needed a good or service. Next, given the "need", Table 1 shows the percentage of respondents who could apply and receive a good or service. For example, of those who expressed a need for a good or a service, 42 percent of the respondents in Andhra Pradesh could apply and receive the good or service. In other words, in Andhra Pradesh, across all goods and services, about 42 percent of those in need could apply for a government-provided good or service.

Overall about a third of the respondents had access to government provided services (such as issuance of driving license, registration of land or property) and roughly 45 percent had access to goods (such as enrollment in government run schools or access to government provided healthcare) and utilities (such as connection to water supply, electricity, or gas). Interstate variation is significantly large. When all government delivered goods and services are aggregated, only one in five have access to government provided goods and services in states such as Bihar and West Bengal. By contrast, one in two had access to the needed goods and services in states such as Maharashtra, Kerala, Punjab and Rajasthan. Aggregated across all goods and services, more than two-thirds of respondents in the 13 states listed in the table expressed a need for a good or service.[15]

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who account for nearly all the extralegal payments in our sample. These agents not only help to secure a license—which they do at nearly a 100% success rate—but also help to circumvent the testing requirement. Applicants with high willingness to pay get their licenses by paying fees to agents and not taking the driving test, resulting in unqualified (yet licensed) drivers."

[15] Our measures of access are consistent with Paul et al's (2004) finding that, in India: 55% had access to piped water supply; 40% had access to government healthcare; 50% had access to public transport (government bus); 72% had

Table 1: Measuring Access at the State Level

"Needed (%)" is the percentage of all adults

"Of whom: Applied (%)" is among the subsample of adults that needed the corresponding good or service

State	Services		Goods		Utilities		All Goods & Services		State GDP (INR Million)
	Needed (%)	Of whom: Applied (%)	Needed (%)	Of whom: Applied (%)	Needed (%)	Of whom: Applied (%)	Needed (%)	Of whom: Applied (%)	
Andhra Pradesh	62	17	85	62	67	40	72	42	464,200
Bihar	92	12	73	22	70	19	80	17	343,700
Chhattisgarh	94	18	99	40	99	35	97	31	185,700
Himachal Pradesh	89	49	91	40	93	48	91	45	82,590
Jharkhand	85	36	87	34	87	36	86	35	172,800
Kerala	85	54	91	49	91	64	89	54	396,300
Madhya Pradesh	55	43	55	44	65	58	57	47	434,700
Maharashtra	55	44	66	42	67	56	62	46	1,510,000
Odisha	70	33	77	62	64	38	72	47	273,000
Punjab	82	42	73	50	95	85	81	55	317,600
Rajasthan	64	45	76	54	79	55	72	51	517,600
Uttar Pradesh	63	24	74	33	70	26	69	28	862,700
West Bengal	88	8	76	30	100	13	86	17	706,600
Average		**33**		**43**		**44**		**40**	

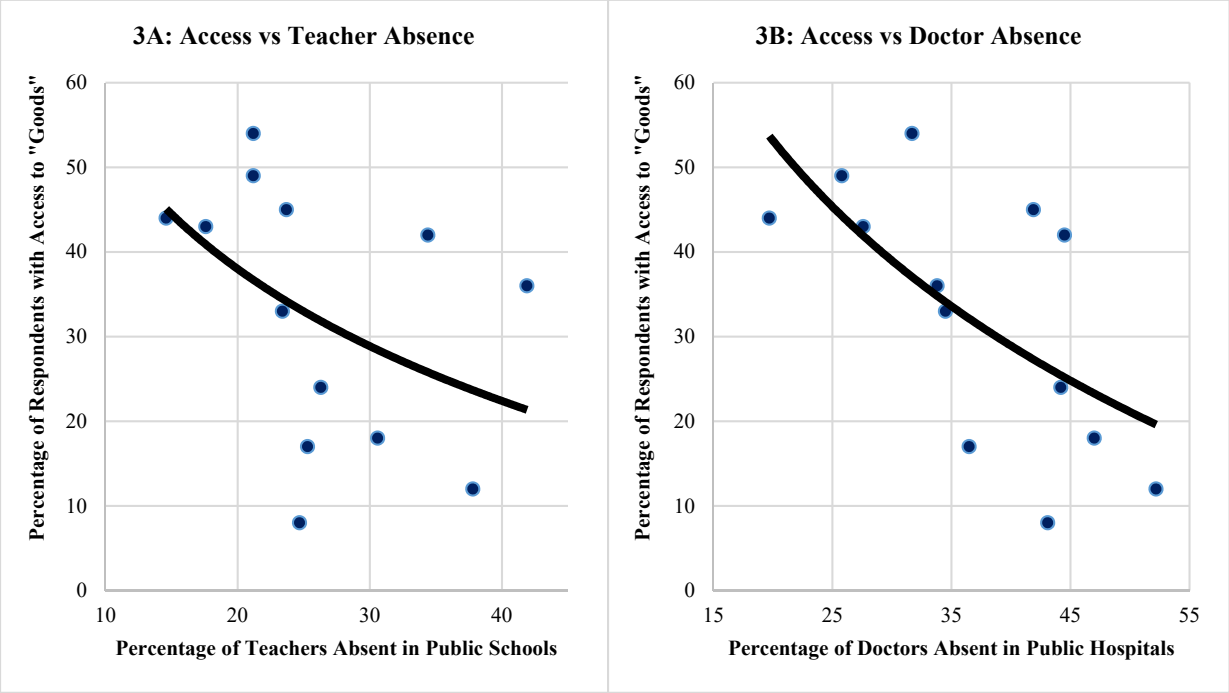
Note: "Of Whom: Applied" is used to measure 'Access'—e.g. 42% of respondents in Andhra Pradesh have 'Access' to the goods and services they 'Needed'.

Access measured at the state level indicates a state's capacity to deliver goods and services. Governance and state capacity to deliver public goods and services have been measured in terms of teacher absenteeism in public schools (Kremer et al. 2005) and absenteeism among medical workers in public hospitals (Muralidharan et al. 2011). Absenteeism measures governance and state capacity from the supply side—whether delivery agents such as medical workers and teachers report to work or not. Access measures governance and state capacity from the demand side—whether or not citizens who need goods and service are able to procure them. Nonetheless, our aggregate measure of access to government provided goods (which includes access to government run schools and hospitals) follow trends similar to those observed for absenteeism in public schools and public hospitals. One would expect that if absenteeism is high, then access would be low—in

access to the Public Distribution System; and 59% had access to public schools (access to public schools in urban areas was estimated to be 42%.)

other words, absenteeism should be negatively correlated with access. Figure 3 plots for each state the percentage of citizens who had access to goods (government run school and health care) on the vertical axis, and absenteeism on the horizontal axis. As expected, the two measures are negatively correlated.

Figure 3: Correlation Between Access to Public Schools, Healthcare and Absenteeism



Source: Absenteeism data for teachers is from Kremer et al. (2005, p.660) and for doctors is from Muralidharan et al. (2011, Table 2).

Table 2 converts the absolute measure of access (from Table 1) to a relative ranking. This conversion is done to enable the combination and comparison of measures of access with measures of inequality in access (From Section 4.3). To develop the relative score, a value of zero is assigned to the state with the lowest access and a value of 1 is assigned to the state with the highest access. For example, from Table 1 Column 4, a score of 1 was assigned to Andhra Pradesh for goods (with 62 percent access) and a score of 0 was assigned to Bihar (with 22 percent access). All other states are assigned a value between 0 and 1 using the following formula:

$$Relative\ Ranking\ of\ State\ 'i' = \frac{Access\ in\ State\ 'i' - \ Access\ in\ Lowest\ Ranked\ State}{Access\ in\ Highest\ Ranked\ State - Access\ in\ Lowest\ Ranked\ State}$$

The same process was repeated for "services" and "utilities". The results are reported in Columns 2, 3 and 4 of Table 2. The overall access index is the arithmetic mean of the relative scores for access to government provided services, goods, and utilities.

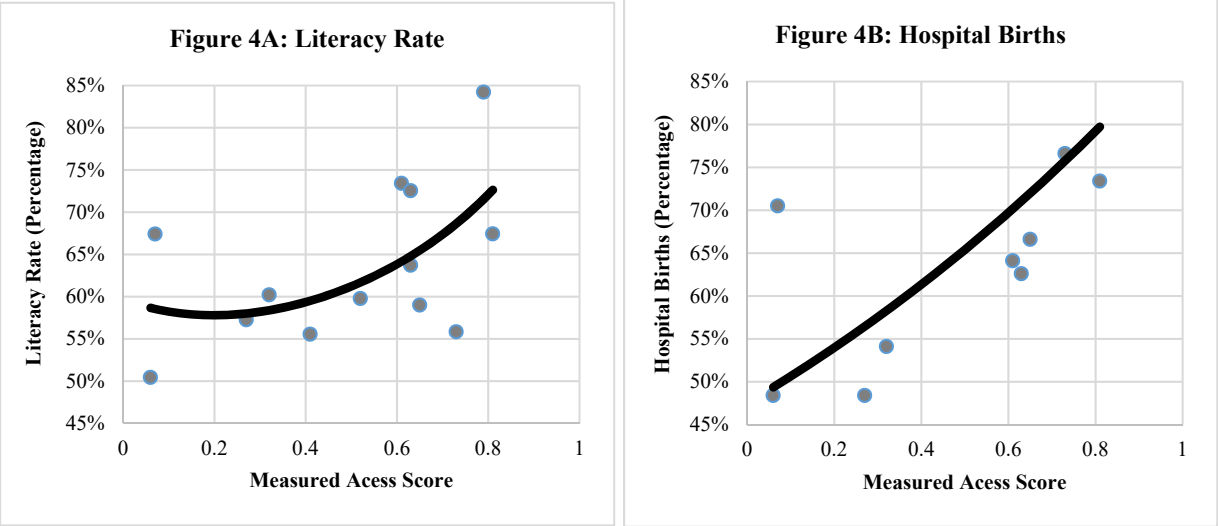
Table 2: Access Score for Government Provision of Goods and Services

States	Services	Goods	Utilities	Access Score
Andhra Pradesh	0.20	1.00	0.38	0.52
Bihar	0.09	0.00	0.08	0.06
Chhattisgarh	0.22	0.45	0.31	0.32
Himachal Pradesh	0.89	0.45	0.49	0.61
Jharkhand	0.61	0.30	0.32	0.41
Kerala	1.00	0.68	0.71	0.79
Madhya Pradesh	0.76	0.55	0.63	0.65
Maharashtra	0.78	0.50	0.60	0.63
Odisha	0.54	1.00	0.35	0.63
Punjab	0.74	0.70	1.00	0.81
Rajasthan	0.80	0.80	0.58	0.73
Uttar Pradesh	0.35	0.28	0.18	0.27
West Bengal	0.00	0.20	0.00	0.07

Note: Table 2 converts absolute scores from Table 1 to relative scores.

Figure 4 compares "access" (a demand-side metric) to "absenteeism" (a supply-side metric). In Figure 5, we compare the state-level access score (from Table 2, Column 5) to two outcomes: state-level literacy rates and the percentage of hospital births in a state. We expect, all else equal, the higher is the access to government provided goods and services (which includes access to government run schools and government provided healthcare): the higher will be the literacy rate in the state; and the higher will be the percentage of hospital births. Figure 5 confirm the expected relation to be true. Access Scores (From Table 2, Column 5) are positively correlated with literacy rate (an education related outcome) and hospital births (a health related outcome).

Figure 4: Comparing Access Scores to Health and Education Outcomes



Source: Data on Literacy rates and Hospital births are from India Planning Commission (2014).

3.3 Barriers to Access

In this section, we review the self-reported barriers to applying for government provided goods and services that we use to construct our "access" measure.

Figure 5 outlines how these barriers affect access to government delivered goods and services. Affordability is the biggest barrier to access to goods and services administered by state governments. Thirty-three percent of those who needed to register land/property or needed a driver's license could not afford the cost of filing an application. Twenty-five percent could not access public utilities and health care for the same reason, while 20 percent could not use government run schools. Some services are paid — such as electricity, gas or water — while some are supposed to be free, including government-provided health care or government run public schools.[16] Presumably, governments do not charge a "usage fee" or "tuition" for public hospitals

[16] Paul et al. (2004, Page 925): *"Healthcare facilities provided by the government are expected to cater to the needs of the poor and underprivileged by being free or subsidized. Around 40 percent of inpatients and 18 percent of outpatients paid a fee for the healthcare service. About 16 percent of inpatients reported payment of bribes."*

or public schools in order to maximize coverage. However, when a high application cost deters people from accessing otherwise free schools or hospitals, a review of service delivery is warranted. Lack of affordability may result from the direct financial burden of applying — such as application fees[17], travel costs[18] and processing fees[19] — and/or from indirect costs, including a loss of wages caused by multiple trips to government offices[20].

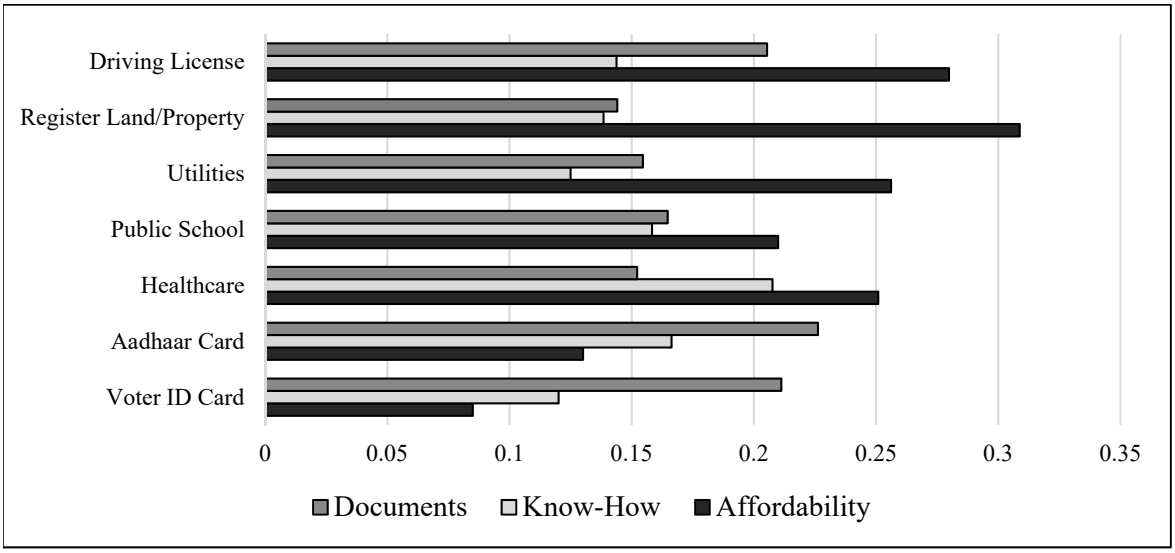
Similarly, nonmonetary barriers can also restrict access to government provided goods and services. For example, if the application process requires too many documents—or too many trips to a government office—it imposes nonmonetary barriers. These barriers disproportionately affect women, the poor and uneducated citizens. One out of every five respondents who could not gain access to health care reported they could not apply because they did not know how to apply. Such issues in service delivery could be improved through a combination of awareness programs and an easier application process.

The findings suggest that reducing the cost of applying may yield the biggest increase in access. However, there is always a cost associated with reducing the application fee. Another option would be to simplify the application process. For example, in the case of health care, spreading awareness about the application process could potentially result in 20 percent higher access (21 percent of the respondents did not apply for access to government provided healthcare because they did not know how to apply). This would perhaps be a cheaper option, as compared to reducing the cost of application. This observation is consistent with Muralidharan et al (2017) who estimate that, in

[17] See Section 5.3
[18] See Section 5.4
[19] See Section 5.1
[20] See Sections 5

India, improving teacher attendance by increasing the frequency of school monitoring is ten times more effective at increasing the effective teacher-student ratio, as compared to hiring new teachers.

Figure 5: Barriers to Access
Percentage of respondents that "*Needed and Did Not Apply*" for a Government delivered good or service



Note: The variable "*Needed and Did Not Apply*" is defined in Section 3.1.

4. Inequality in Access to Government Provided Goods and Services

Unequal access may be unintentional, resulting from poor service design or weak state capacity. Or it may be intentional, resulting from deliberate and thus discriminatory practices. Exclusion resulting from poor service design can be remedied by tweaking policies or strengthening service delivery systems. Discriminatory exclusion, however, requires a more involved approach. More importantly, exclusion, discriminatory or not, is seldom random — the weakest sections of society are often excluded at a higher rate versus the rest of the population. For example, the poor and the uneducated are less likely to have access to government run schools or hospitals. Thus, unequal access may not only contribute to socio-economic inequality, but may also reinforce or exacerbate inequality. Governance measures, such as absenteeism, or outcome measures, such literacy rates, are agnostic to horizontal inequalities in the provision of public goods and services. Good

governance or a high capacity to deliver goods and services should not only translate into more access and better quality of service but also into equal access for all citizens.

Having measured absolute level of access, we will now measure inequality in access. In the earlier section, the underlying question was, for example: Do the citizens of Bihar have lower access to government provided goods and services as compared to the citizens of Maharashtra? By contrast, the underlying question in this section is: Do women in the state of Bihar have lower access to government provided goods and services as compared to the men in the state of Bihar?

To measure access, we first identified need and then measured access as a percentage of those who expressed a need for a government provided good or service. Similarly, to determine whether access varies by gender or income level we must first ascertain if needs vary by gender or income level. Accordingly, we will adopt a two-stage process: In the first stage, we will measure inequality in needs; and in the second we will measure inequality in access.

In Stage 1 we estimate "need" for a good or service. Need is coded "1" if an individual expresses a need for a good or service, and "0" if that person does not express a need[21]. To estimate needs, the paper uses a combination of individual-level and state-level characteristics. Individual-level characteristics include: gender, educational attainment, income level, age, and residence (rural or urban). Education consists of three levels of educational attainment: illiterate, primary school, and secondary school or higher. Income level consists of two groups, rich and poor. The bottom 40 percent by reported income are coded as "poor", while the top 60 percent are coded as "rich". State-level characteristics include: the state's per capita gross domestic product (GDP), the state's ratio of development expenditure to GDP, and the share of agriculture in a state's GDP.

[21] Refer Section 3.1 for a detailed discussion on coding "Did Not Need".

In Stage 1, we estimate if needs vary by income level or gender. The null hypothesis is that needs do not vary by either. To test the hypothesis, an indicator variable for gender (women) and for income level (poor) is included. If the null hypothesis is true — needs do not vary by gender or by income level — the coefficients for "women" and "poor" would be zero. If, however, the coefficients for "women" and "poor" are statistically different from zero, it implies that "needs" vary by gender and income level.

In Stage 2 we estimate "access" to a government provided good or service varies byb gender or by income-level. Access is coded "1" if an individual could apply for a good or service, and "0" if that person could not. Access (1 or 0) is observed only when a need is expressed (need = 1). In other words, only if "need" equals 1 in the first stage do we observe "access" (1 or 0) in the second stage. To estimate "access", the paper uses a combination of individual-level and state-level characteristics that are similar to those used in Stage 1. The null hypothesis is that "access" does not vary by gender or income level. To test the hypothesis, an indicator variable for gender ("women") and for income level ("poor") is included. If the hypothesis is true ("access" does not vary by gender or by income level), the coefficients for "women" and "poor" would be zero. If, however, the coefficients for "women" and "poor" are statistically different from zero, it implies that "access" varies by gender and by income. The two stages allow the use of a Heckman Two Stage Selection Model.[22] Mathematically, the two stages can be represented as given below:

$$y_j = \beta_0 + \beta_1' State - Level\ Characterisitics_j + +\Upsilon_2' Individual - Level\ Characteristics + \mu_{1,j}$$

Where y_j is observed only if:

[22] Heckman, James J. 1976. "The Common Structure of Statistical Models of Truncation, Sample Selection and Limited Dependent Variables and a Simple Estimator for Such Models." *Annals of Economic and Social Measurement* 5 (4): 475–92.

$$z_j\Upsilon + \mu_{2,j} > 0$$

where the vector z_j includes individual-level characteristics such as gender, income, educational attainment and age.

4.1 The First Stage: Measuring Gaps in Need by Gender and Income Level

Table 3 presents the Stage 1 results of the Heckman Two Stage Regression. Stage 1 measures if "need" for government provided goods vary across gender or income level.

Table 3: Stage 1 of Heckman Regression (Selection Equation)

Stage 1: Estimating Differences in Need for Government Provided Goods and Services					
	Driving License	**Register Land**	**Utilities**	**Public School**	**Healthcare**
Women	-0.081***	-0.112***	-0.170***	0.036	0.057**
	(0.030)	(-0.026)	(-0.026)	(-0.026)	(-0.027)
Illiterate	0.007	-0.137***	-0.108**	-0.125***	-0.163***
	(0.053)	(-0.046)	(-0.047)	(-0.047)	(-0.046)
Primary	0.028*	-0.107***	-0.058	-0.082**	-0.223***
	(0.045)	(-0.040)	(-0.041)	(-0.040)	(-0.040)
Poor	0.051*	0.116***	0.075***	0.216***	0.125***
	(0.031)	(-0.028)	(-0.028)	(-0.029)	(-0.028)
Age	0.013	6.12E-05	0.012***	0.03***	0.003
	(0.005)	(-0.004)	(-0.004)	(-0.004)	(-0.004)
Age2	-0.0001*	0.0001**	-7.79e-05*	-0.0003***	-1.97E-05
	(6.27e-05)	(-4.92E-05)	(-4.71E-05)	(-4.58E-05)	(-4.48E-05)
Rural	0.067**	0.088***	-0.084***	-0.058**	0.059**
	(0.033)	(-0.029)	(-0.030)	(-0.030)	(-0.028)
Development Spending / State GDP	0.073**	0.035***	0.005	0.073***	0.022***
	(0.005)	(-0.004)	(-0.004)	(-0.004)	(-0.004)
State Per-capita GSDP	-2.83e-05***	3.07e-05***	7.64e-05***	7.48e-05***	1.20e-05*
	(7.78e-06)	(-6.52E-06)	(-6.81E-06)	(-6.80E-06)	(-6.31E-06)
Share of Agriculture in State GSDP	-0.022***	-0.025***	0.012***	-0.018***	-0.042***
	(-0.003)	(-0.003)	(-0.003)	(-0.003)	(-0.003)
Lambda	-0.445***	0.144**	-2.343***	0.483***	-0.236***
	(-0.054)	(-0.071)	(-0.863)	(-0.055)	(-0.064)
Total	13000	13000	13000	13000	13000
Censored	2467	2697	2543	2511	3020

Note: This table shows the results for the first stage of the Heckman Two Stage regression. Sage 1consists of the selection equation and shows the probability that an individual will express a "need" for a good or service given his/her individual characteristics and state-level characteristics. Base categories are male, above primary school, richest 60 percent, urban. The selection equation uses three state-level variables: development spending by state GDP, state GDP per capita, and share of agriculture in state GDP.

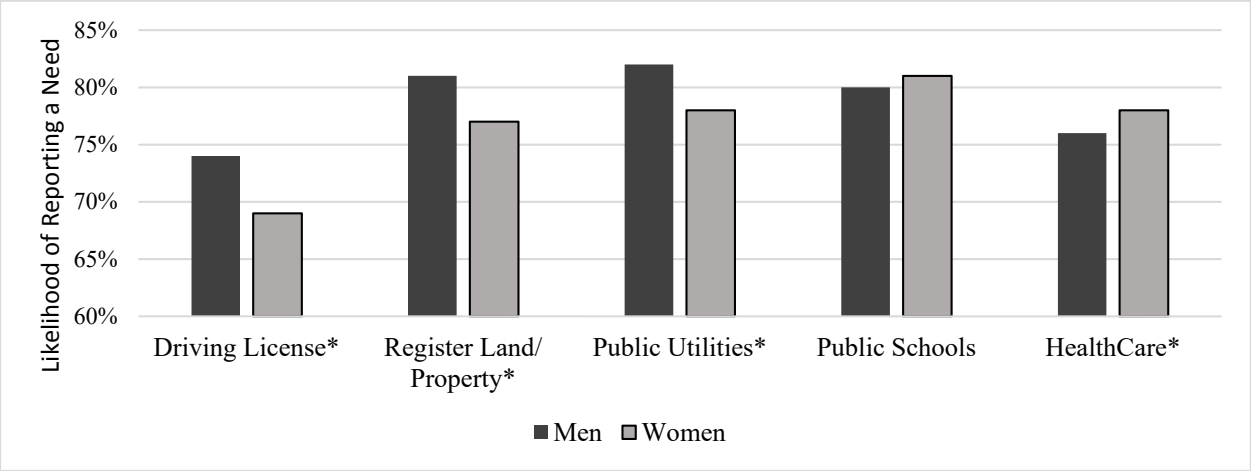
The coefficients for "women" are statistically significant and not equal to zero for all government provided goods and services except for government run schools. The coefficients for "poor" are statistically significant and not equal to zero for all government provided goods and services except for issuance of driving license. This implies that "reported needs" do vary by gender and by income level.

The results demonstrate ways in which societal norms shape needs. From Table 3, the coefficients for "Women" are negative and statistically significant for driving license, land registration, and utilities. In contrast, the coefficients are positive for access to healthcare (statistically significant) and government run school (statistically not significant). Theoretically, both men and women should have an equal need for a connection to water or electricity or for access to public schools or identity cards such as a driver's license. Yet the survey reveals that women and men differ significantly in their "expressed" or "perceived" needs. These differences are illustrated in Figure 6 which shows, for every 100 men (and women), the percentage who are likely to express a "need" for a government provided good or services. The likelihoods are estimated from the first stage of the Heckman regression (called the selection stage), reported in Table 3. It measures the probability of selection, or in other words: the probability that "need" equals 1. Men are more likely than women to express a need for a service connected to the labor market — such as a driver's license — or for services connected to property ownership, such as registration of land or property. For example, men are 5 percentage points more likely than women to express a need to register land or property. We report this gap, 5 percentage points, as the "Gender Gap" in expressed needs for government provided goods and services. By contrast, women are more likely than men to express a need for goods and services associated with children and care, such as access to government run schools or health care. Social norms could help explain these differences. Women's need for public

education may reflect their role as the primary caregiver of children. Men, on the other hand, may be more likely to need to register land or property since men typically control and inherit wealth. Likewise, owning a driving license opens up work opportunities typically performed by men, such as working as a commercial goods driver, a chauffeur, a taxi driver. As a result, men are more likely to express a "need" for a driving license.

Figure 6: Need for Goods and Services, By Gender

Percent of adults

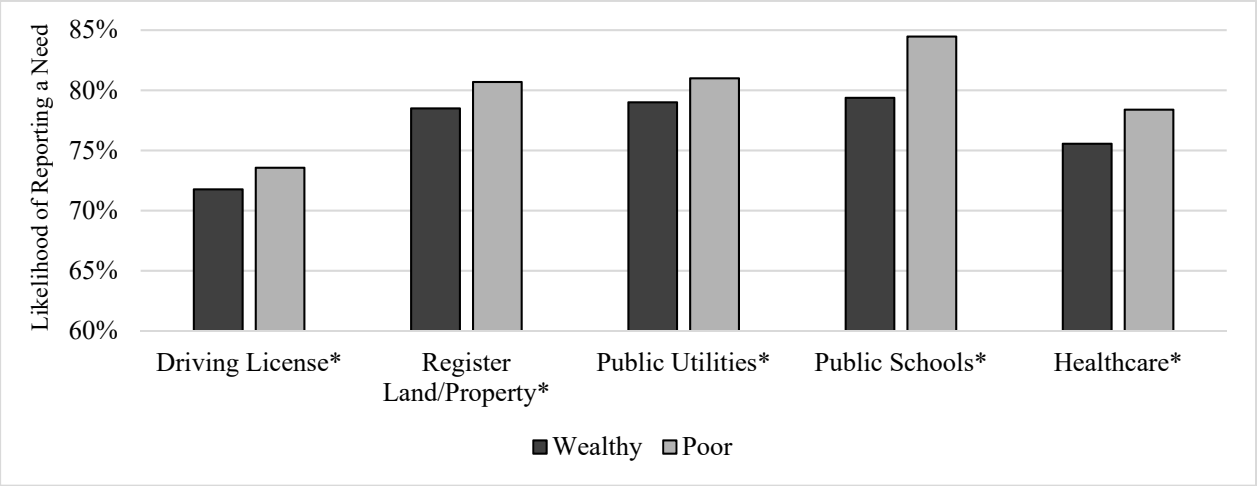


Note: This figure shows the likelihood that a man or a woman would express a need for a good or service. For example, of every 100 men, 74 are likely to report a need for a driver's license. For women, the corresponding likelihood is 69 of every 100. It also implies that men are 5 percentage points more likely than women to express a need for a driving license. An asterisk indicates a statistically significant difference between men and women.

Survey respondents were also divided into two groups by income level: wealthy (the top 60 percent of earners) and poor (the bottom 40 percent of earners). From Table 3, the coefficients for "Poor" are positive and statistically significant for all government provided goods and services. These differences are illustrated in Figure 7 which shows, for every 100 wealthy (and poor), the percentage who are likely to express a "need" for a government provided good or services. The likelihoods are estimated from the first stage of the Heckman regression (called the selection stage), reported in Table 3. The poor are 5 percentage points more likely than the wealth to express a need for access a government run public school. We report this gap, 5 percentage points, as the "Income Gap" in expressed needs for government provided goods and services. The analysis

reveals that poor citizens are typically more likely to report a need for all government provided goods and services (Figure 7).

Figure 7: Need for Goods and Services, By Income
Percent of adults



Note: This figure shows the likelihood that the wealthy or the poor would express a need for a good or service. For example, of every 100 respondents coded as wealthy, 72 are likely to report a need for a driver's license. For those coded as poor, the corresponding likelihood is 74 of every 100. An asterisk indicates a statistically significant difference between the wealthy and the poor.

4.2 The Second Stage: Measuring Gaps in Access by Gender and Income Level

Table 4 presents the Stage 2 results of the Heckman Two Stage Regression. Stage 2, as discussed above, measures whether "access" to government provided goods and services varies by gender or income level.

The preceding section noted that women are more likely than men to express a need for goods such as education or health care. By contrast, men are more likely to express a need for services, such as a driver's license, land or property registration, and access to public utilities, such as water, electricity and gas. This section shows that regardless of their expressed needs, women are less likely than men to be able to access government provided goods and services. In Table 4, the coefficient for the indicator variable "women" is negative and statistically significant across all

types of government provided goods and services (except utilities, which is statistically not significant). This implies that women have lower access versus men (the base category). And it suggests that for some goods such as government run schools and healthcare, women have lower access in spite of having a higher "need" (From Tables 3 and 4).

Table 4: Stage 2 of Heckman Regression

Stage 2: Estimating Differences in Access to Government Provided Goods and Services					
	Driving License	**Register Land**	**Utility**	**Public School**	**Healthcare**
Women	-0.172***	-0.178***	-0.02	-0.076***	-0.034***
	(0.008)	(-0.010)	(-0.075)	(-0.011)	(-0.010)
Illiterate	-0.203***	-0.110***	0.001	-0.093***	-0.049***
	(0.014)	(-0.017)	(-0.086)	(-0.019)	(-0.019)
Primary	-0.165***	-0.048***	0.027	0.014	0.005
	(0.013)	(-0.014)	(-0.070)	(-0.017)	(-0.016)
Poor	-0.052***	-0.020*	-0.099*	-0.042***	-0.044***
	(0.009)	(-0.011)	(-0.055)	(-0.013)	(-0.012)
Age	0.012***	0.015***	0.009	0.038***	0.016***
	(0.001)	(-0.001)	(-0.008)	(-0.002)	(-0.002)
Age2	-0.0001***	-7.97e-05***	-0.0001	-0.0004***	-0.0001***
	(-0.0001)	(-0.00002)	(-0.0001)	(-0.00002)	(-0.00002)
Rural	-0.073***	0.056***	-0.021	-0.014	0.008
	(0.009)	(-0.011)	(-0.055)	(-0.012)	(-0.012)
State FE	Yes	Yes	Yes	Yes	Yes
Lambda	-0.445***	0.144**	-2.343***	0.483***	-0.236***
	(-0.054)	(-0.071)	(-0.863)	(-0.055)	(-0.064)
Total	13000	13000	13000	13000	13000
Censored	2467	2697	2543	2511	3020

Note: This table shows the results for the second stage of Heckman Two Stage regression. The second stage shows, given an individual's need for a good or service, the likelihood that he/she is able to apply for the good or service. Base categories are male, above primary school, richest 60 percent, urban. The second stage uses state GDP per capita. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Access estimated in this section is conditioned upon reported "need". Mathematically, it is represented as E(Access|Need=1). We estimated need in Section 4.1. "Needs" reported in Figures 6 and 7 were directly estimated from Stage 1 of the Heckman Regression (reported in Table 3). In this section, we estimate "Access", given that "Need=1" (from Stage 1, Table 3). In less mathematically involved terms; our estimates of "Access" to a government provided public good

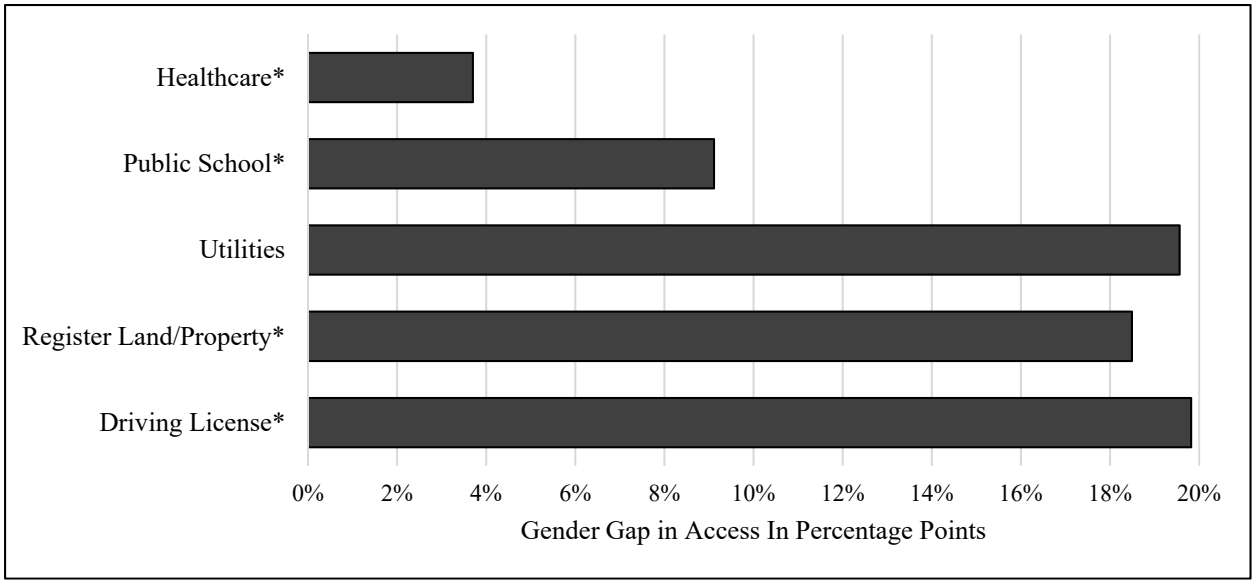
or services controls for the fact that many did not report a "Need" for the corresponding good or service. By imposing the condition "Need=1", we are measuring access only among those who self-report a need for a government provided good or service. For example, we estimate that 53 percent of the men and 44 percent of the women had access to a government run school. This estimate controls for the fact that in Stage 1, only 80 percent of the men and 81 percent of the women had reported a "need" for access to government run schools. The "Gender Gap", the difference between access for men and women, in this example is 9 percentage points (53-44=9). To be noted here is that, though self-reported "need" was marginally higher for women (81 percent for women versus 80 percent for men), "access" was higher for men (44 percent for women versus 53 percent for men). Had we not controlled or conditioned for "need", our estimates would have had two kinds of biases;

1. Conditioning on "need=1", access to government run schools is estimated to be 53 percent for men and 44 percent for women. Had we not conditioned for "need", access to government run schools would have been estimated to be 43 percent for men and 35 percent for women. This downward bias is introduced because while the former estimates controls for the fact that about 20 percent of population did not need to access to a government run school; the latter does not control for those who did not need access. Not controlling for those who did not need access to government provided goods and services would introduce a downward bias in the estimate of "access".
2. Conditioning on "need=1", also allows us to control for the fact that women expressed a need for public schools at a higher rate as compared to men. Yet, women had lower access to government run schools as compared to men. The Gender Gap in access is estimated to be 9 percentage points. Without controlling for gender-based variation in "needs", the

Gender Gap would have been estimated to be 8 percentage points. Thus, not controlling for those variation in "needs" by gender, would bias our estimates of variation in "access" by gender.

Figure 8 reports the Gender Gap in access to public goods and services. "Gender Gap", as defined above, equals "access for men" – "access for women". Thus, a positive value for Gender Gap implies that men better access than women. From Table 4, the coefficients for "women" are negative and statistically significant for all government provided goods and services (except utilities). This difference in access is reflected in Figure 8. In spite of reporting a higher need, women are less likely than men to have access to government run schools or government provided healthcare. For government run services, such as issuance of driving license or registration of land or property, men reported a higher need, and men had higher access too.

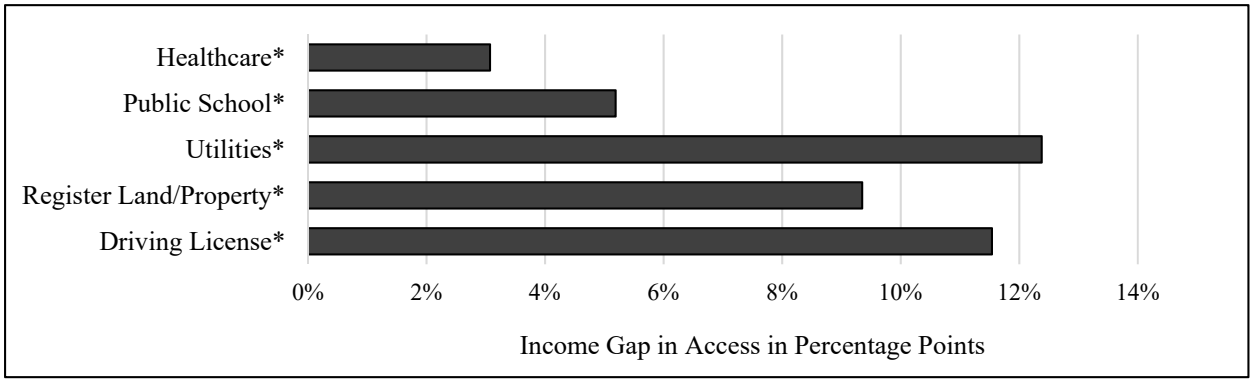
Figure 8: "Gender Gap" In Access to Goods and Services



Note: This figure plots the difference between the likelihood that men had access to goods and services and the likelihood that women had access to goods and services. For example, the gender gap for a driver's license is 20 percentage points, which implies that men are 20 percentage points more likely than women to be able to apply for a license. An asterisk indicates that the Gender Gap was statistically significant.

Access to goods and services also varies by income. The access gap between rich and poor citizens is large and statistically significant.[23] The Access Gap is estimated in the same way as Gender Gap; while measuring difference in "Access" we conditioned difference in "Need" as reported by the wealthy and the poor. The gap is largest for services and the smallest for goods.[24] The poor are 12 percentage points less likely to be able to apply for a driver's license (Figure 9). The income gap is 12 percentage points for utilities too. By contrast, the gap is small — though statistically significant — for government run schools and health care. This could imply that states have been relatively more successful in delivering schools or hospitals to poorer citizens. Another possibility is that public schools or hospitals have *giffen* qualities — the rich do not apply for government run schools or hospitals because they prefer private alternatives. In the absence of private alternatives, such as in the case of driver's license or land or property registration, access for the relatively wealthy continues to remain significantly higher than access for the poor.[25]

Figure 9: "Income Gap" In Access to Goods and Services



Note: This figure plots the difference between the likelihood that those coded wealthy had access to goods and services and the likelihood that those coded poor had access to goods and services. For example, the income gap for a driver's license is 12 percentage points, which implies that the wealthy are 12 percentage points more likely than the poor to be able to apply for a license. An asterisk indicates that the Income Gap was statistically significant.

[23] World Bank (2004, Page 39) shows that in India, the poorest fifth of the population consistently receive less than 10% of health expenditure. In contrast, the richest fifth of the population receive more than 30% of health expenditure. For more, see Chapter 1 "Services Can Work For Poor People But Too Often They Fail", World Bank (2004)

[24] This consistent with Paul et al.' (2004, Page 932) assessment: "*Primary education and drinking water are two services that have done reasonably well in terms of access for the poor. The poor are worse off in terms of access with respect to the other three services.*"

[25] For more examples, see Deverajan and Reinikka (2004), Yazbeck et al. (2002)

4.3 Intra-State Variation in Access

In this section, we construct a state-level inequality in access score on the premise that access to goods and services should not vary by gender or income level. The measure is based on the expectation that if access varies by gender or income level, then it indicates a weakness in a state's capacity to deliver goods and services. Inequality in service delivery could also contribute to economic inequality within a state. This paper considers the following gaps for construction of the index:

1. Gender Gap measures gap in access between men and women.
2. Income Gap measures gap in access between the poor (income in the bottom 40 percentile) and the wealthy (income in the top 60 percentile)

Figure 8 listed Gender Gap in Access for each government provided good and service. Likewise Figure 9 listed Income Gap in Access for each government provided good and service. In this section, we estimate Gender Gap and Income by type of good or service and by state. The method of estimation remains the same as detailed in Section 4.2. The only difference is that while Section 4.2 measured Gender Gap in Access (or Income Gap in Access) by type of good or service, this section measured Gender Gap in Access (or Income Gap in Access) by type of good or service and by state. The purpose is to measure "Inequality in Access" by state. Section 3 measured "Access" by state. Thus, while Section 3 measured "*Inter*-State Variation in Access", this Section measures "*Intra*-State Variation in Access".

Table 5 details the underlying methodology using the state of Maharashtra as an example. From Table 5, the Gender Gap in Access in the state of Maharashtra is: 22.5 percentage points for issuance of a driver's license; 18.47 percentage points for registration of land or property; 15.47

percentage points for utilities such as access to water, electricity, gas; 9.48 percentage points for access to a government run public school; and 3.83 percentage points for access to government provided healthcare. The Average Gender Gap is therefore[26] 13.96 percentage points. This is reported as the Gender Gap for the state of Maharashtra in Column I of Table 6. Likewise, the Income Gap in Access in the state of Maharashtra is: 11.69 percentage points for issuance of a driver's license; 3.22 percentage points for registration of land or property; 8.71 percentage points for utilities such as access to water, electricity, gas; 2.96 percentage points for access to a government run public school; and 4.64 percentage points for access to government provided healthcare. The Average Income Gap is therefore[21] 6.25 percentage points. This is reported as the Income Gap for the state of Maharashtra in Column II of Table 6. The rest of the rows for Columns I and II are populated by applying the same methodology to each state in the sample.

Table 5: Measuring Access at the State-Level (Maharashtra)

Good or Service	Gender Gap (%)	Income Gap (%)
Driving License	22.55	11.69
Register Land / Property	18.47	3.22
Public Utility	15.47	8.71
Public School	9.48	2.96
Health care	3.83	4.64
Average	**13.96**	**6.25**

In Table 6, Columns III and IV convert absolute measures from Columns I and II into relative rankings. This conversion is done to allow the combination of "Absolute Access" (Section 3.1, Table 2) with "Inequality in Access" (Section 4.3, Table 6). To develop relative scores a value of one is assigned to the state with the lowest Gender Gap in Access (Column 1, Table 6) and the lowest Income Gap in Access (Column 2, Table 6). A value of zero is assigned to the state with

[26] Using a simple unweighted average.

the highest Gender Gap in Access (Column 1, Table 6) and the highest Income Gap in Access (Column 2, Table 6). For example, from Table 6 Column 1 (Gender Gap), a score of 1 was assigned to Kerala (with a Gender Gap of 12.95 percent) and a score of 0 was assigned to Orrisa (with a Gender Gap of 16.26 percent). Likewise, from Table 6 Column 1 (Income Gap), a score of 1 was assigned to Orissa (with an Income Gap of 3.23 percent) and a score of 0 was assigned to Himachal Pradesh (with an Income Gap of 7.17 percent). All other states are assigned a value between 0 and 1 using the following formula:

$$Relative\ Ranking\ of\ State\ 'i' = \frac{Gap\ in\ State\ 'i' - \ Gap\ in\ Lowest\ Ranked\ State}{Gap\ in\ Highest\ Ranked\ State - Gap\ in\ Lowest\ Ranked\ State}$$

The overall "Inequality in Access" score (Column V) is the arithmetic mean of the "Relative Gender Gap Score" (Column III) and the "Relative Income Gap Score" (Column IV).

Kerala, which has an overall "Inequality in Access" score (Column V) of 0.88, is the best ranked state, with the lowest level of inequality in access to government provided goods and services. On gender, as seen in Column III of Table 6, relatively richer states like Maharashtra and Punjab outperform; while relatively poorer states like Odisha and Bihar underperform. Interestingly, the trend reverses for income (Column IV of Table 6): Relatively richer states underperform; while relatively poorer states outperform. This may point toward differences in the type of inequality between rich and poor states. In richer states, variation in access by gender is the source of inequality, while in poorer states variation in access by income is the source of inequality. Or, it could imply that when the income gap in access is high, only relatively richer women have access to government provided goods and services. These women tend to be more educated and have access to other resources—For example, they can employ an agent to procure a driver's license.

As a result, "Gender Gap in Access" is lower when "Income Gap in Access" is high. Irrespective, Gender Gap and Income Gap appear to be inversely related.

Table 6: State-Level Measures for Inequality in Access

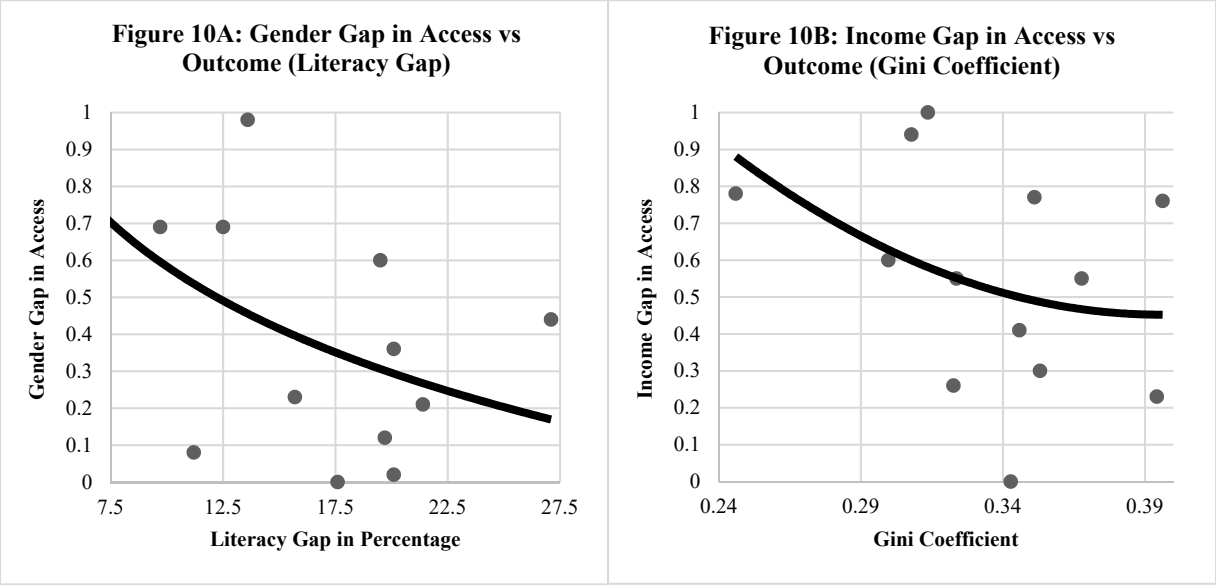
State	Gender Gap (%)	Income Gap (%)	Gender Gap Score	Income Gap Score	Inequality in Access
	(I)	(II)	(III)	(IV)	(V)
Andhra Pradesh	15.50	3.45	***0.23***	***0.94***	**0.59**
Bihar	15.85	4.09	***0.12***	***0.78***	**0.45**
Chhattisgarh	15.07	4.14	***0.36***	***0.77***	**0.56**
Himachal Pradesh	13.02	7.17	***0.98***	***0.00***	**0.49**
Jharkhand	15.58	4.79	***0.21***	***0.60***	**0.40**
Kerala	12.95	4.19	***1.00***	***0.76***	**0.88**
Madhya Pradesh	14.28	5.02	***0.60***	***0.55***	**0.57**
Maharashtra	13.96	6.25	***0.69***	***0.23***	**0.46**
Odisha	16.26	3.23	***0.00***	***1.00***	**0.50**
Punjab	13.98	6.13	***0.69***	***0.26***	**0.48**
Rajasthan	14.81	5.01	***0.44***	***0.55***	**0.49**
Uttar Pradesh	16.18	5.54	***0.02***	***0.41***	**0.22**
West Bengal	16.00	5.99	***0.08***	***0.30***	**0.19**

Note: Columns I and II estimate Gender Gap in Access and Income Gap in Access using methodology discussed in Section 4.3 and the regression results shown in Table 4. Columns III and IV convert absolute scores listed in Column I and II, respectively, into a relative score. Column V is the arithmetic mean of Column III and Column IV.

One would expect that if the gender gap in access is high, it would result in poorer socioeconomic outcomes for women. Likewise, if the income gap in access is high, it would be symptomatic of high economic inequality. Figure 10 tests if the measured gender and income gap in access match up to observed outcomes. Figure 10A plots for each state: The gender gap in literacy on the horizontal axis and the "Gender Gap" score (From Table 6 Column III) on the vertical axis. The higher the Gender Gap in Access to government provided goods and services: (i) the lower is the state's rank in the gender gap score; and (ii) the higher is the state's literacy gap. In other words, we observe that low inequality in access (by gender) is correlated with lower gender gap in literacy rates. Figure 10B plots for each state: The state-level Gini coefficient on the horizontal axis and the "Income Gap" in Access (From Table 6 Column IV) on the vertical axis. The higher the income gap in access to government provided goods and services: (i) the lower is the state's rank in the

income gap score; and (ii) the higher is the state's Gini coefficient. In other words, we observe that low inequality in access (by income-level) is correlated with lower economic inequality in the state (lower state-level Gini coefficient).

Figure 10: Correlation Between Access to Goods and Services and Absenteeism



Note: Gender Gap and Income Gap data are from Columns III and IV of Table 6. Literacy Gap data is sourced from Planning Commission (India). Gini Coefficients from Chadha and Nandwani (2016, Table 4).

5. Quality of Service Delivery

This section measures several aspects of quality:

- The number of months needed to process an application for a good or service
- The number of documents needed to file an application for a good or service
- The number of trips made to a government office to complete an application
- The total costs of filing an application
- And the overall ease of applying for a good or service

Because we are asking people to recall exact costs and time expenditures, only respondents who applied for the good or service within the past five years were asked about the quality of service delivery. The findings suggest that, by some measures, the application process has become easier over the last five years, and most applicants are satisfied with the quality of service delivery[27].

5.1 Processing Time

On average it takes between 1.4 months and 2.5 months to process an application for a good or service. In the last five years, the average processing time for a good (which includes government run schools and hospitals) has increased by 6 days while it has been unchanged for a services (which includes registration of land or property and issuance of driving license). There is no indication that processing times are longer for women, the poor or those who are illiterate. This might imply that while women and the poor do not have equal access to government provided goods and services, among those who do have access there is little variation in the quality of service by gender or income. Processing times are slow overall: Nationally, it takes more than two months on an average to register property or to obtain a driver's license.

5.2 Documentation Requirements

The average respondent said it takes between two and three documents to apply for a service and two documents to apply for a good. Over time, there has been a slight decrease in the number of documents required to obtain a good, and no change in that required for a service. Women as well as illiterate and poor respondents tend to require the same number of documents as any other

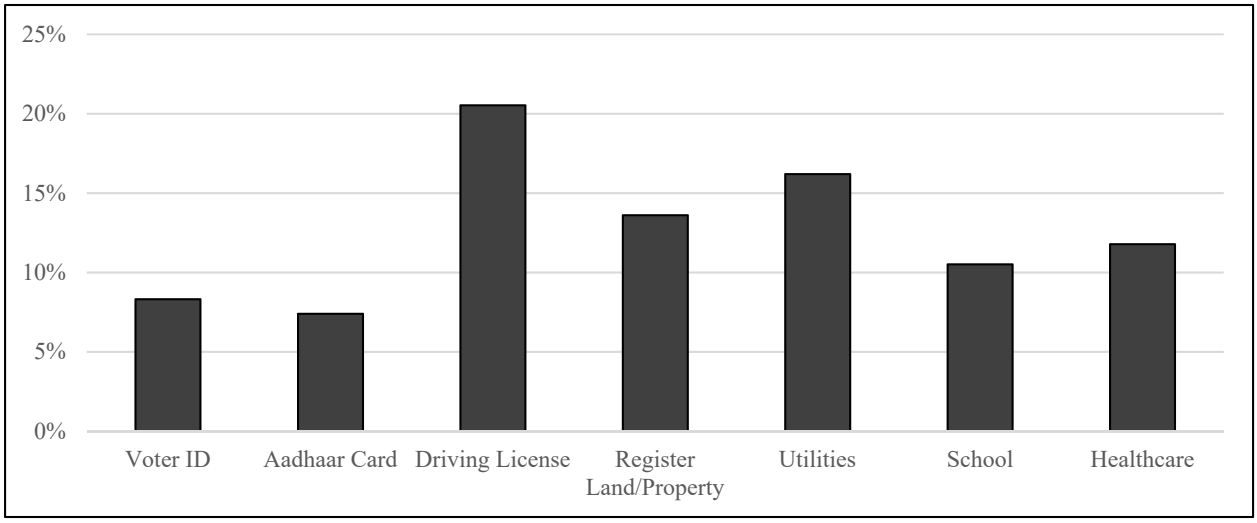
[27] Paul et al's (2004) also measured satisfaction with the delivery of government provided goods and services. They found that, overall in India: 24% were satisfied with the quality of piped water supply; 13% were satisfied with the quality of government healthcare; 21% were satisfied with the quality of public transport (government bus); 9% were satisfied with the quality of the Public Distribution System; and 10% were satisfied with the quality of public schools.

respondent. Furthermore, most states require a similar number of documents to process an application.

5.3 Application Costs

Some 21 percent of respondents felt it was "too costly" to apply for a driver's license, while 14 percent said the same for land registration. About 11 percent of respondents were likely to report that the application process was "too costly" for government provided goods (such as government run schools or hospitals).

Figure 11: Cost of Application: Expensive
Percent of adults that applied for a good or service in the past five years



Note: This figure reports the percentage of respondents, from among those who applied for a good or service, who found the application "too costly." For example, 21 percent of those who applied for a driver's license reported the application was too costly.

While the application cost may not appear to be very high, these results must be viewed in the context of exclusion: More than half the respondents could not even file an application, and the majority of those who could not apply cited a lack of affordability as the biggest reason. Further, given that these services are meant to be free, even a "reasonably priced" application fee could still create barriers for the very poor. Most respondents in Andhra Pradesh, Chhattisgarh,

Karnataka and West Bengal reported that services such as registration of land or property, or issuance of driving license were too expensive. Most respondents reported that goods such as schooling and health care were reasonably priced.

5.4 Travel Times

On average, it takes 40 minutes to travel to an office to file an application for a government provided good. It takes 70 minutes for a service. Furthermore, a good requires two or less visits, while a service requires two or more. There has been little change or improvement in this area over the last five years. Travel times vary widely across states. People seeking to register land or get a driver's license in Chhattisgarh, Himachal Pradesh, Rajasthan, Uttar Pradesh and Andhra Pradesh must travel more than an hour each time they visit the application center or a government office. Overall, travel times are the highest for issuance of driver's licenses and lowest for Aadhaar cards (Table 7).

Table 7: Travel Time to Apply for a Good or a Service
Percent of adults that "Needed and Applied" for a goods or service in the past five years

Type of Good or Service	Average Total Travel Time in Minutes	Number of Visits
Voter ID	87	1.90
Aadhaar Card	66	1.64
Driving License	166	2.39
Register Land or Property	137	2.33
Public Utility	124	2.28
Public School	88	1.86
Health care	91	1.94

One way to reduce travel time would be to offer more avenues for submitting applications for a government provided good or service. For example, about 20 percent of Aadhaar card applications are submitted somewhere other than a government office, such as through an agent or at a post office. As a result, the average travel time to make an application for an Aadhaar card was the

lowest within the group. The total travel time (adjusted for number of visits to and from the application center) was almost six hours for a driver's license. In terms of monetary costs, it equaled an individual's day wage to procure a driving license. Estimating the cost of obtaining a driver's license in terms of time (or the wage equivalent of that time), by contrast, is seldom done.

Table 8: Percentage of Applications Outside of Government Office
Percent of adults that "Needed and Applied" for a goods or service in the past five years

Voter ID (%)	11	Public Utility (%)	10
Aadhaar Number (%)	20	Public School (%)	12
Driving License (%)	12	Health care (%)	8
Register Land /Property (%)	7		

5.5 Inter-State Variation in Quality

Table 10 below constructs a relative ranking of states on their quality of service delivery. For each state it calculates the average time required to process an application (in months), the average number of documents needed to make an application, the average time spent travelling to and from the application center, the cost of filing an application, and the overall respondent rating about the ease of the application process. Processing Time is the average number of months needed to process an application. Cost of Application is coded as 0 if the respondent reported application cost as 'Expensive', 0.5 if the respondent reported application cost as 'Reasonably Priced', and 0 if the respondent reported application cost as 'No Cost'. Total Travel Time is the time spent, in minutes, in travelling to and from the government office to submit an application. Ease of application (discussed in Section 5.5) is from Column 5 of Table 9.

Table 10: Measuring the Quality of Service Delivery by State

Percent of adults that "Needed and Applied" for a goods or service in the past five years

States	Processing Time	Documents Required	Cost of Application	Total Travel Time	Ease of Application
Andhra Pradesh	1.58	2.21	0.27	98	28
Bihar	1.78	1.96	0.41	86	48
Chhattisgarh	1.97	2.70	0.30	199	20
Himachal Pradesh	1.95	1.96	0.46	253	40
Jharkhand	1.13	2.21	0.34	100	41
Kerala	1.48	2.42	0.40	65	11
Madhya Pradesh	0.97	1.98	0.46	50	48
Maharashtra	1.51	2.65	0.25	89	14
Odisha	2.43	2.05	0.13	72	72
Punjab	2.42	2.67	0.35	133	22
Rajasthan	1.51	2.14	0.38	161	57
Uttar Pradesh	1.37	1.88	0.34	89	38
West Bengal	2.82	2.49	0.33	106	18

Note: Processing Time is months. Cost of Application=1 if 'Expensive', 0.5 if 'Reasonable Price', 0 if 'No Cost'. Total Time Required is in minutes.

Table 11 converts absolute measures (From Table 10) into a relative ranking. This conversion is done to enable comparison and combination across different measures of quality. For example, travel time is measured in minutes, processing time is measured in months, and number of documents needed is measured in units. To add or compare these different measures, the paper will convert absolute scores into relative ranking. To develop the relative score, a value of zero is assigned to the state with the lowest score and a value of 1 is assigned to the state with the highest score. For example, from Table 10 a score of 1 was assigned to Madhya Pradesh for travel time while a score of 0 was assigned to Chhattisgarh. All other states were assigned a value between 0 and 1 using the following formula:

$$\text{Relative Ranking of State 'i'} = \frac{\text{Travel Time in State 'i'} - \text{Travel Time in Lowest Ranked State}}{\text{Travel Time in Highest Ranked State} - \text{Travel Time in Lowest Ranked State}}$$

The overall quality index is the arithmetic mean of the relative scores for processing times, number of documents required, application costs, total travel time and ease of application.

Table 11: Relative Ranking for Quality of Service Delivery

States	Length of Application	Documents Required	Cost of Application	Total Travel Time	Ease of Application	Quality Score
Andhra Pradesh	0.67	0.60	0.58	0.76	0.28	**0.58**
Bihar	0.56	0.90	0.15	0.82	0.61	**0.61**
Chhattisgarh	0.46	0.00	0.48	0.27	0.15	**0.27**
Himachal Pradesh	0.47	0.90	0.00	0.00	0.48	**0.37**
Jharkhand	0.91	0.61	0.36	0.75	0.49	**0.63**
Kerala	0.72	0.34	0.18	0.93	0.00	**0.43**
Madhya Pradesh	1.00	0.88	0.00	1.00	0.61	**0.70**
Maharashtra	0.70	0.06	0.64	0.81	0.05	**0.45**
Odisha	0.21	0.78	1.00	0.89	1.00	**0.78**
Punjab	0.22	0.04	0.33	0.59	0.18	**0.27**
Rajasthan	0.71	0.68	0.24	0.45	0.75	**0.57**
Uttar Pradesh	0.78	1.00	0.36	0.81	0.44	**0.68**
West Bengal	0.00	0.26	0.39	0.72	0.11	**0.30**

Note: Each column of Table 11 is derived from the corresponding column in Table 10. While Table 10 reports absolute measures, Table 11 converts absolute measures to a relative score.

Overall, in terms of quality of service Odisha, Madhya Pradesh, Uttar Pradesh, Bihar, and Jharkhand were among the better performing states, while Chhattisgarh, Punjab, West Bengal, and Himachal Pradesh were among the poorly performing states. Incidentally, in terms of "Access" (From Table 1, reproduced in Table 12), Punjab and Himachal Pradesh were among the better performing states. Furthermore, Bihar, Uttar Pradesh, and Jharkhand underperformed in access. This reversal can be explained by the fact that ease of application is relevant only for those who could apply for a good or service. In states where overall access is low, those who can apply for a good or service generally occupy a relatively more privileged position in society, or, in other words, have a relatively higher socioeconomic status. These individuals tend to be more educated, and have the means of employing help—such as an agent or an intermediary—to obtain a government provided good or a service. When access is limited only to the relatively better off, it is plausible that these people will have a higher likelihood of finding the application process easy

because they tend to be educated and wealthy; they also can employ agents or procure help to file an application on their behalf.

To distinguish between Kerala (which outperformed the rest of the country on "Access" and "Quality"), Punjab (which outperformed the rest of the country on "Access" but underperformed on "Quality"), and Jharkhand or Bihar (which underperformed on "Access" and hence outperformed on "Quality"): we control for "Access" while measuring the "Modified Quality Score" (Table 12). Unlike the raw "Quality Score" which has a small negative correlation with "Access"; the "Modified Quality Score" by conditioning on "Access" does not penalize states for coverage of a larger proportion of the population. To arrive at the "Modified Quality Score" we multiply "Quality Score" with "Percentage of Population that Needed and Applied for a Government Provided Good or Service".

Table 12: 'Modified' Quality of Service Delivery—Controlling for Access

States	Quality Score	Access (%)	Modified Quality Score
Andhra Pradesh	**0.58**	42	0.24
Bihar	**0.61**	17	0.10
Chhattisgarh	**0.27**	31	0.08
Himachal Pradesh	**0.37**	45	0.17
Jharkhand	**0.63**	35	0.22
Kerala	**0.43**	54	0.23
Madhya Pradesh	**0.70**	47	0.33
Maharashtra	**0.45**	46	0.21
Odisha	**0.78**	47	0.37
Punjab	**0.27**	55	0.15
Rajasthan	**0.57**	51	0.29
Uttar Pradesh	**0.68**	28	0.19
West Bengal	**0.30**	17	0.05

Note: "Quality Score" is from Table 11. "Access" is measured in percentage and is from Table 1: Column— "All Goods and Services"; Sub-column— "Of Whom Applied (%). "Modified Quality Score" equals "Quality Score" multiplied by "Access (%)".

As per the modified quality scores, Odisha and Madhya Pradesh are the best performing in terms of quality of service (conditioned on access to government provided goods and services). Bihar and Chhattisgarh underperform in terms of quality of service. Bihar's performance is poor in terms of access and in terms of quality.

5.6 Interlinkages between Access, Inequality in Access, and Quality of Service Delivery

Does the ability to deliver goods and services translate into equal access to goods and services? Table 12 suggests that, to some extent, it does. The correlation between the "access" and "inequality in access" scores is positive and equals 0.63 — a moderately strong correlation. This implies that more coverage does translate into less inequality in access. However, when "inequality in access" is divided into constituent parts — gender and income inequality — one can observe that the more access translates into lower "gender inequality" in access but not into lower "income inequality" in access. A possible reason could be that when access improves, the benefits first percolate to the rich — thus access among the relatively richer women also improves. As a result, improvements in access may not, in the near term, may benefit the relative richer women before they benefit the poor. This could be one of the many reasons for rising inequality within Indian states (Deaton and Dreze 2002, Deshpande 2002, Ravallion and Datt 2002).

Table 12: Correlations Between the Three Indicators of Service Delivery

	Inequality in Access	Modified Quality of Service Delivery
Access	0.63	NA[28]
Inequality in Access	—	0.37
	Inequality in Access (Gender)	Inequality in Access (Income)
Access	0.68	-0.08

Note: The table reports correlations between "Access" from Table 2, "Inequality in Access" from Table 6, and "Quality of Service Delivery" from Table 11.

[28] The correlation is estimated to be 0.65. However, it is not reported because, Access (%) is used to estimate the modified quality score— "Modifed Quality Score" = "Quality Score" × "Access (%)". As a result, both Access (%) and "Modified Quality Score" are expected to be correlated.

Does improved access also translate into improved quality of services? Our results indicate it does However, self-reported quality suffers from information asymmetries and biases. For example, while examining the state of public health services in rural Rajasthan, Banerjee, Duflo, and Deaton (2004, Page 330) noted that villagers' health is poor, the quality of public service is abysmal, and private players are unregulated and for the most part unqualified to provide the bulk of health care — and yet villagers self-reported satisfaction with the state of both their health and the health care facilities. Thus, they concluded that (p. 331) "self-reported health and well-being measures may be uncorrelated with the quality of the public facilities." Our findings indicate that in states with low access; quality is reported to be higher. The may result from information asymmetries or biases at the respondent level.

6. Conclusion

Existing definitions and measures of governance or state capacity might be too broad to determine a state's capacity to deliver goods and services. This paper reports from a survey designed to measure service delivery in India. The new measure is motivated by the belief that good state capacity to deliver goods and services should translate into more access or coverage of all citizens, equal access to all citizens, and higher quality delivery of goods and services. Furthermore, a measure of state capacity to deliver goods should be able to explain variation in outcomes between countries, within a country (or between states), and within individual states.

We find that access in India is generally low: only 40 percent are able to apply for the goods and services they need. Furthermore, there exists significant variation between states. In states such as Kerala, for example, it is estimated that more than half the population have access to the government provided goods and services they need, but in Bihar less than 20 percent of the

population have such access. Lack of affordability is the most cited reasons for an inability to apply for a good or service. Our measures of access correlate with some known measures of governance — such as teacher absenteeism or doctor absenteeism — and with some outcome indicators—such as literacy rates and the percentage of hospital births.

Next, we find that access varies both by gender and income level. Women are about 5 percentage points less likely to be able to apply for goods such as health care and public schools and about 15 percentage points to 20 percentage points less likely to be able to apply for access to utilities and services, respectively. The poor, by contrast, are about 5 percentage points less likely to be able to apply for goods such as health care and public schools and about 10 percentage points less likely to be able to apply for access to utilities and services, respectively. Furthermore, we find that relatively richer states such as Maharashtra and Punjab have a lower gender gap in access to government provided goods and services. By contrast, relatively poorer states such as Odisha and Bihar have higher gender gaps in access to government provided goods and services. The trend reverses with income gap: Relatively richer states underperform while relatively poorer states outperform. This may point toward differences in the type of inequality between rich and poor states. In richer states, variation in access by gender might be the source of inequality, while in poorer states variation in access by income might be the source of inequality. Alternatively, it could merely imply that when income inequality in access is high, only relatively richer women have access and hence we see low gender inequality in access.

In terms of quality of service delivery, we find there is scope for improvements. On average, it takes more than two months to process an application for a good or service. About one in four respondents found the application costs to be "too costly." Given that more than half of the population could not even apply and those who could not apply cited a lack of affordability as the

key reason, implies that the cost of application is a significant barrier to access to government provided goods and services. Further, given that some of these goods and services are meant to be universal and free, even a "reasonably priced" application fee could be unaffordable for some and still exclude the very poor from accessing government provided goods and services. Citizens spend more than two hours in travel time to make an application. Less than 15 percent of the applications are made outside of a government office — such as private agents, over the internet, or a post office. Travel times could be reduced significantly if alternate channels were made available to receive and process applications, such as agent and online/internet-based applications and payments.

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Appendix 1: India State Survey 2015 — Measuring User Experience with Service Delivery

B26. Have you, personally, EVER done any of the following? *(Programmer: Randomly rotate B26A-B26G)*

		Yes	No	(DK)	(RF)
B26A.	Apply for or reissue a voter ID card	1	2	3	4
B26B.	Apply for an Aadhaar card	1	2	3	4
B26C.	Apply for or renew a driver's license to operate a motor vehicle or two-wheeler	1	2	3	4
B26D.	Register your land or property	1	2	3	4
B26E.	Apply to receive a new water, gas or electricity connection in your home or apartment	1	2	3	4
B26F.	Register a child for primary or secondary school	1	2	3	4
B26G.	Apply for a card for the local health insurance scheme, [insert local scheme (i.e., RSBY/ jeevandayee/Arogyasri, etc.)]	1	2	3	4

B27. When was the LAST TIME you tried to [INSERT TEXT FROM B26]? Was it in the last 12 months, in the last 5 years or more than 5 years ago?"

B28. Did you [INSERT TEXT FROM B27] yourself or did someone such as a friend, relative, or hired agent do it for you?

If "Yourself" in B28A-G, ask equivalent item in B29-B43. Ask B29-B43 for each item, before moving onto the next item. If "Someone else" to ALL in B28, Skip to SC3/WP17487

B29. Now, I would like to ask you a few questions about the LAST TIME you needed to [FILL IN TEXT FROM B28]. Was the whole process easy or difficult?

B30. When you tried to [FILL IN TEXT FROM B28], were you able to complete the process and get what you needed?

(If "No" in B30, Continue; Otherwise, Skip to B33)

B31. You said you did not complete the process. Is it because you were denied the service, because it is still in process, or some other reason?

(If "In Process" in B31, Continue; Otherwise, Skip to B34)

B32. About how long has it been since you completed the application process?

(Open-ended and record actual number of months below. If 96 months or more code as 96. If less than one month, code as 97) (Interviewer: If respondent does not know the exact number of months, please ask them to make their best guess.)

(All in B32, Skip to B34)

B33. About how long was the application process, from the time you first applied until you received what you needed?

(Open-ended and record actual number of months below. If 96 months or more code as 96. If less than one month, code as 97)

B34. Where did you first [FILL IN TEXT FROM B28]? At a government office, the post office, with an agent, on the Internet or using a mobile phone, or some other place?

(If "Internet or using a mobile phone" in B34, Skip to B38; Otherwise, Continue)

B35. Roughly, how long did it take to get to the place to [FILL IN TEXT FROM B28]? Less than 30 minutes, more than 30 minutes, but less than an hour, 1 - 4 hours, or more than 4 hours?

(If "Yes" in B30, Continue; Otherwise, Skip to B37)

B36. Roughly, how many visits were required in order to complete the process to [FILL IN TEXT FROM B28]? (*Open ended and record actual # of visits below. If 97 visits or more code as 97.)*

B37. Was it expensive, a reasonable cost, or no cost for you to get to the place where you went to [FILL IN TEXT FROM B28]?

B38. How many government documents did you need to [FILL IN TEXT FROM B28]? *(Open ended and record actual # of documents below. If 97 documents or more code as 97.)*

B39. Did you have all government documents in your home at that time that were necessary to [FILL IN TEXT FROM B28]?

(If "No" in B39, ask B40; Otherwise, Skip to B41)

B40. Roughly, how many visits to a government agency(s) were required in order to collect all necessary documents you needed?*(Open ended and record actual # of visits below. If 97 visits or more code as 97.)*

B41. Which of the following best describes ALL OF THE COSTS to [FILL IN TEXT FROM B28]? Was it expensive, a reasonable price, or was there no cost? Please do not include transportation costs.

(If "No Cost" in B41, Skip to B43; Otherwise, Continue)

B42. How did you pay for the cost to [FILL IN TEXT FROM B28]? Did you pay by cash or cheque, electronically using a card, electronically at a kiosk, on the Internet or using a mobile phone, or some other way? *(Interviewer: If respondent says they used more than one payment method, ask them to pick the one they used most recently.)*

B43. Did you have to give some presents or money, in addition to any official cost, in order to [FILL IN TEXT FROM B28]?

If never applied:

B44. Please tell me whether each of the following is a BIG REASON you never tried to [FILL IN TEXT FROM B26]. Is it because you didn't need to?

B45. Please tell me whether each of the following is a BIG REASON you never tried to [FILL IN TEXT FROM B26]. Is it because it costs too much or you cannot afford it?

B46. Please tell me whether each of the following is a BIG REASON you never tried to [FILL IN TEXT FROM B26]. Is it because you don't know how?

B47. Please tell me whether each of the following is a BIG REASON you never tried to [FILL IN TEXT FROM B26]. Is it because you don't have the necessary documents?

Appendix 2: India State Survey — Survey Methodology

In each state, Gallup selected 100 wards and villages with probability proportional to population size with the exception that it selected only 50 wards and villages from Andhra Pradesh. For each interviewer, Gallup assigned a starting point, such as a school, ward office or place of worship. From the starting point, the interviewer counted three households to the right, and attempted to contact and interview a respondent at the third household. The third household could be a structure like an apartment building, in which case the interviewer entered the building and, using rules outlined above, determined the household to be selected. The interviewers completed 85.7 percent of interviews at main households and 14.13 percent at substitution households.

Interviewers selected the respondents within households by the following procedure;

- First they listed the names and ages, from oldest to youngest, of all male and female individuals aged 15 and older who lived in the household permanently, even if they were not present at the time of his initial contact.
- Then a software program randomly selected one household member to be the respondent.
- Interviewers asked to speak with the randomly selected household member. If not available at that time, then the interviewer asked for the best time to talk to the selected respondent, and recorded this information on the contact sheet as a reminder or an appointment to come back to that household later.
- If the selected respondent refused or was not available during three visits to the household, the interviewer replaced this household.