

The Impact of Reservation Policy on Education in India:

An Evaluation of Karnataka's Gram Panchayat Presidency Reservation and Children's Education Attainment for Scheduled Caste and Scheduled Tribe Households

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Abstract

Reservation policy in local governments – Gram Panchayats – in India is one of three key means of affirmative action, ensuring lower caste groups are represented fairly in political institutions. Researchers have found local political reservations for Scheduled Caste (SC) and Scheduled Tribe (ST) populations strongly associated with more SC- and ST-friendly policies, increases in welfare spending and investment in infrastructure, as well as lower household poverty levels. This paper explores one potential indirect benefit of reservations, namely improvements in education attainment. The theory of role model effects is applied to the context of political reservations - greater presence of SC and ST presidents in Gram Panchayats could act as a positive role model of stereotype-defying success for SC and ST children, incentivizing more investment in education attainment. The paper tests the relationship between reservation rates and average completed years of schooling in a dose-response regression model at the sub-district level, using a sample of 13,408 SC children and 6,066 ST children ages 5 to 18 in Karnataka. The results of the analysis suggest that more SC and ST presidents in Gram Panchayats are associated with increases in education attainment among SC and ST children. Further research would be valuable to strengthen these findings and expand the literature on indirect benefits of reservations.

I. Introduction

The socially and religiously-imbedded caste system in India created schisms among the Indian population, forming large groups of ethnic and caste minorities. Scheduled Castes (SC), Scheduled Tribes (ST), and Other Backward Class (OBC) constitute about half of the country's population.¹ Due to beliefs that the historically low castes are impure by birth and association with stigmatized occupations such as butchers and day laborers, the lower castes - SC, ST, and OBC – have been socioeconomically marginalized.²

Recognizing issues of discrimination against the three minority caste groups, early forms of positive discrimination policies were put in place by the British during its colonial rule. In 1892 special schools were established for SCs and in 1944 a five-year budget of 300,000 rupees were set aside for these students. The British also introduced political representation quotas in 1919 and hiring quotas for civil service in 1934.³ The Indian Constitution of 1950 formalized legal protection against discrimination on the basis of caste, serving as the foundational document for affirmative action protecting SC, ST, and OBC groups through Articles 16, 17, 29, and 46.⁴

The reservation policy today takes three main forms: reservations for positions in local governments, civil service jobs, and in educational institutions. Seats in the local governments – Gram Panchayats (GP) – are saved for SC, ST, and OBC candidates proportionally to the group's population share to overcome underrepresentation of these marginalized groups in political institutions. Reservations for civil service jobs are facilitated through relaxation of minimum age restrictions, required qualifications, and lower application fees. The policy also provides equal footing for SC and ST applicants through pre-examination training and separate interviews. Lastly admission to educational institutions are reserved for SC and ST students through scholarships, grants, special housing, and concessions in fees as well as academic support.⁵ This paper focuses on the first form of reservation policy, enforced by the 73rd and 74th Amendment of the Constitution in 1993, mandating greater representation of SC and ST populations in the local governments.⁶

Despite the policy's intention to alleviate caste-based discrimination, reservation policy has at times been a point of contention among the public. Reservations in various institutions sparked debate on whether the policies have positive outcomes for society or merely provide an unfair advantage for SC, ST, or OBC individuals. There have been significant research conducted on the impact of the reservations in the last decade, but the impact evaluation in the literature is limited in the variety effects studied. The focus of evaluation has been on direct outcomes of policies implemented by GPs – spending, public goods, infrastructure, and poverty. On the other hand, specific areas of well-being such as health and education, which may be indirectly impacted by reservations, are yet to be fully developed. Considering the high level of growth and development the Indian economy has seen, it is important to evaluate the impact of the reservation policy as a means for inclusive growth. To explore the impact of reservations at the local government level, this paper examines how SC and ST children's education attainment is impacted by SC and ST reservations for GP presidencies.

Gram Panchayats and Reservation Policy

GP represent a group of villages through direct election and are in charge of administering local public goods, transfer programs, and of managing local civil servants. Each GP consists of general council members and leaders, namely the president and vice president. The elected council serves for a period of five years. There are a few key components of the reservation policy that allows researchers to study the impact of the policy.⁷ For this paper we focus on the reservation of presidencies, but the same rules apply for GP seats for the general council member elections.

GP reservations are based on the census and are allocated randomly. The number of Gram Panchayats assigned reserved presidencies in a given taluk must reflect that taluk's SC or ST population shares recorded from the most recent census, which is taken every decade. The reservations are randomly allocated among the Gram Panchayats in the taluk as long as any given presidency is not reserved for the same category for two consecutive election years.⁸ This random assignment of reservation within taluks creates exogenous variation external to the policy itself, and allows differences in outcomes between GPs with and without reserved presidencies can be attributed to the reservation policy.

II. Literature Review

Researchers have studied the impact of reservations on policy outcomes, public goods, other household benefits, and household poverty levels. Over the last decade researchers have continued to expand the subject from the policies implemented by the GPs and their expenditures, to the result of these policies and expenditures in public goods provided to households and poverty levels.

The first group of research considers the types of policies that are created when political reservations are in place. Pande focuses on the effect of minority representation in state legislature on policy outcomes. Using state-level panel data of 16 major states from 1960 to 1992, she analyzes the impact of SC and ST reservations on total spending, education spending, job quotas, and ST welfare spending. She concludes that increasing minority representation increases policies concerning transfers for minority groups. ST reservation increases spending on ST welfare programs, while lowers education and overall government spending. SC reservation also increases the share of government jobs for minorities.⁹

Similarly, Duflo et al. studies the district of Birbhum, West Bengal in 2000 using interviews with villagers and GP presidents. The authors survey investments in local public goods provided since 1993 in various hamlets that were randomly assigned SC/ST reservations of GP presidents. The study finds that while SC presidents allocate more public goods to SC hamlets and the share of investments in SC hamlets are 10% higher, reservations did not affect the mix of public goods that are provided. Thus reservation policy enables preference of recipients but not of the goods themselves.¹⁰

Others have studied the effects of reservations public goods and household benefits. Chattopadhyay and Duflo use village level data in West Bengal and Rajasthan, but focus on one third of the presidency seats reserved for women and their subsequent policy decisions. Between 2000 and 2002 results show that women presidents in reserved seats invest more in public goods according to the local women's preferences – namely drinking water and roads in West Bengal and drinking water for Rajasthan. Though there is no significant impact found on benefits for female-headed households, the authors prove that mechanisms based on identities and gender can have significant impacts on policy decisions.¹¹

Shifting the focus to goods and services received by households, Besley et al. analyze household and village level data for the impact of reservations for GP presidents in Andhra Pradesh, Karnataka, and Tamil Nadu on household benefits received. From September to November 2002, they find that SC and ST reservations in GPs increase private household benefits such as construction of houses and toilets, in addition to water and electricity connections. However public goods and infrastructure including construction of roads increase in the area of the presidents regardless of reservations.¹² A similar study by Bardhan et al. finds in West Bengal that among 69 villages between 2003 and 2005, SC and ST reservations increase household benefits, especially toilets. Tracking GP expenditures, the increase in benefits for SC/ST households most often was a result of a diversion of employment benefits from landless non-SC/ST to SC/ST households.¹³ Bardhan's updated paper finds no positive impact of women's reservation and mixed results for SC/ST reservations in GPs on targeting of specific programs. The mixed findings of the latter is largely attributable to the insignificance of effects of SC and ST reservations when combined.¹⁴

The most recent study determines the policy impact on the well-being of households. Chin and Prakash use reservation shares in 16 states SC and ST seats to study the effect of GP reservations on household poverty levels. The paper adds to previous research by quantifying the overall effect of the policy on rural, urban, and aggregate poverty. The methodology is based on poverty headcount per ratio and a poverty gap index to measure the percentage of the population below the poverty line as well as the magnitude of poverty. The study finds that while there are significant reductions in poverty for STs, SCs do not experience the same results, potentially due to the homogenous living environment and geographic isolation of many ST hamlets.¹⁵

Table 1. Previous Literature on Reservation Policy Impact

Authors	Region	Time Frame	Outcomes Measured
Pande	16 states	1960-1992	State-level total spending, education spending, ST welfare spending, job quotas
Duflo et al.	West Bengal	1998-2003	Investment in local public goods
Chattopadhyay & Duflo	West Bengal, Rajasthan	2000-2002	Investment in local public goods
Besley et al.	Andhra Pradesh, Karnataka, Tamil Nadu	2002	Household benefits received, public goods, infrastructure
Bradhan et al.	West Bengal	2003-2005	Household benefits received, Gram Panchayat expenditure
Chin & Prakash	16 states	1960-2000	Household poverty levels

These studies analyze the effect of reservations on policy decisions, provision of public goods and benefits, as well as household poverty. Research has shown that reservations often create policies geared towards benefiting disadvantaged groups and that benefits received by the targeted households increases. However how reservations affect the daily lives of disadvantaged households in less direct ways is unclear. This paper seeks to evaluate the effect of GP reservations on education attainment among the SC and ST children.

III. Role Model Effects in Reservations

When discussing the more indirect impacts of reservations and quotas of leadership positions, researchers highlight social mechanisms that may be at work. Group identities such as caste and gender can be seen as socially constructed identities in sociology and social cognitive theory.¹⁶ Role incongruities that arise from these social identities create stereotypes that feed into a gap in beliefs and aspirations. For example, individuals belonging to the Scheduled Caste group are historically associated with impure occupations.¹⁷ Such stereotypes can perpetuate into beliefs that SC individuals do not need education or find success worthy of investment in education. The presence of role models, in this case GP presidents, could help reduce the gap in achievement or aspirations, by acting as role models exemplifying potential future success for other SC and STs. This idea has been applied in the context of the U.S. and in India.

Marx et al. studies the “Obama Effect” on race-based performance in verbal problem-solving ability at four key times over the course of Obama’s presidential campaign and election. The four times are: before the convention, after the convention speech, between speech and election, and after the election. These are selected to present an increasing range of media exposure and success to the students. Researchers find that as Obama’s stereotype-defying accomplishment became more apparent through the four major time frames, African American student’s performance in the exams improved significantly. By the fourth exam after Obama’s presidential election, the African American student exam performance was equivalent to the White American students, who had been much better in performance previously.¹⁸

Similarly in India, Beaman et al. test the impact of female leaders in village of West Bengal on educational aspirations and attainment for girls. Under the reservation policy, one-third of local government seats are randomly selected to be reserved for women. The authors find that the presence of female leaders improve the educational aspirations and attainment for girls. More girls in villages with reserved female leaders are likely to aspire to graduate and receive higher education than those in villages without female leaders. Girls in villages that had two reservations for female leaders are associated with 0.6 higher grades completed than others. The study concludes after robustness checks that the role model effect of female leaders exceed the changes created by coinciding policy and infrastructure changes. Thus the study confirms the idea that reservations can help provide role models and new opportunities for disadvantaged groups.¹⁹

Building on these previous studies, this paper evaluates whether similar role model effects can be found in GPs for SC and ST presidents. The main hypothesis is that the more

cumulative SC presidency reservations, the higher the years of schooling will be for SC children at the taluk level due to the positive role model effects. Similarly greater cumulative ST presidency reservations will be linked to higher years of schooling for ST children. Greater presence of SC/ST leaders through GP presidency reservations provide more positive role models for children and incentivizes SC/ST households to invest more in their children's education attainment.

IV. Research Methodology

Taking advantage of the exogenous variation, the impact of reservation policy on education attainment is estimated through a dose-response regression model. This model analyzes the relationship between taluk-level reservation rates on completed years of schooling in 2004 and 2008. It specifies reservations to SC presidencies and the impact on SC children, then with ST presidencies and children. The functional form of the model is:

$$\begin{aligned} \text{Years of Schooling} = & \beta_0 + \beta_1 \text{Cumulative reservation rate} + \beta_2 \text{Year2008} \\ & + \beta_3 (\text{Cumulative reservation rate} \times \text{Year2008}) + \beta_4 \text{Age} + \beta_5 \text{Female} \\ & + \beta_6 \text{Household Asset Index} + \varepsilon \end{aligned}$$

Completed years of schooling is set to be a function of the cumulative reservation rate of SC/ST presidency reservation, the indicator for year 2008, and the interaction between the cumulative reservation rate and the 2008 indicator to capture any difference of the policy impact in 2004 versus 2008. The model also controls age, gender, and household assets to accurately isolate the reservations' effect on education attainment. The household asset index is created using household ownership of nine assets common to both waves of the DLHS survey (fan, radio, television, sewing machine, phone, bicycle, motorcycle or scooter, car, and tractor). Once the raw index score is created, the sample is categorized into four groups based on the raw index score to be equally distributed. The household asset index allows the model to control for household-level effects. The same model is for SC and ST reservations separately.

V. Data

Education and Reservation Data

Information on education attainment comes from the second and third series of the District Level Household and Facility Survey (DLHS) from years 2004 and 2008 respectively. DLHS is one of the largest demographic and health surveys initiated by the Ministry of Health and Family Welfare in India, containing household and village level information for all districts. For each wave of the survey 50 rural and urban primary sampling units (PSU) are selected independently in each district, in proportion to the urban population percentage for a given district in the 2001 census. Villages and urban wards are stratified into three groups as done in

the 2001 census and the 50 PSU's are allocated proportionately to the three strata. The household selections within each PSU is done using probability proportional size systematic sampling.²⁰ This sampling technique is implemented in order to ensure households are selected randomly into PSU's. The survey is initially conducted at the household level, thus the data is reshaped for each individual to be a unit of observation. This means that each observation is not independent and identically distributed; the likelihood of an individual to be sampled into the survey depends on the sampling of the household as a whole. Therefore the individuals used for the analysis is restricted those coded as children who are between the ages of 5 and 18, which are school attending years.

As shown in Table 2, the distribution of the sample population of children across different castes remain consistent between 2004 and 2008. SC and ST children make up less than 20% of the total sample in both years, but the large sample size allows the model to estimate the relationship with sufficient power.

Caste	2004	2008
SC	6,765	6,643
ST	2,869	3,197
OBC	15,392	17,282
Other	8,978	4,820
Missing	329	310
Total	34,333	32,252

Education attainment of children is measured by the years of schooling completed. The households in the survey are identified by religion and caste, which allows analysis of education level in relation to specific caste-based reservations. Additional information regarding household decisions regarding education and education attainment, namely the main reason for not attending school and reason for never attending school, will be used to inform the discussion of the analysis.

The data for GP presidencies reservations is publically available online on Professor Thad Dunning's website.²¹ The data set includes presidency and vice presidency reservations from 1993, 2000, 2002, 2005, and 2007 by GP, as well as population data for each GP derived from the 2001 census. In order to take into account the discrepancies in the number of GPs in each taluk, the sum of reservation frequencies is divided by the number of GPs in the taluk to create reservation rates at the taluk level. As the households in DLHS cannot be matched to specific GPs, new variables are generated to reflect the cumulative presidency reservations rates at the taluk level from two elections preceding each of the survey years. The cumulative reservation rates for 2004 is derived from 2000 and 2002 reservation rates, and 2005 and 2007 reservation rates for 2008.

Treatment of Missing Data

Initially, over 40% of the sample were missing years of schooling data in both waves of DLHS. However much of the missing data was a result of leading questions in the survey. Those who answered ‘no’ to ‘can you read and write’ in 2004 and ‘no’ to ‘have you ever been to school’ in 2008 were not asked about completed years of schooling, and were coded to be missing. Recoding these individuals to 0 years of schooling eliminated 46% of missing education attainment data for 2004 and 80% for 2008, as shown in Table 3.

2004			2008		
Literate	Freq.	Percent	Ever been to school	Freq.	Percent
No	3,571	46.64	No	2,323	80.86
Yes	51	0.67	Yes	167	5.81
Missing	4,035	52.7	Missing	383	13.33
Total	7,657	100	Total	2,873	100

Variable	Caste	2004			2008		
		Missing	Total	% Missing	Missing	Total	% Missing
Years of Schooling	all	4,086	34,333	11.90	550	32,252	1.71
Years of Schooling	SC	861	6,765	12.73	106	6,643	1.60
Years of Schooling	ST	381	2,869	13.28	70	3,197	2.19
Taluk	all	10,976	34,333	31.97	907	32,252	2.81
Taluk	SC	1,715	6,765	25.35	161	6,643	2.42
Taluk	ST	525	2,869	18.30	22	3,197	0.69

However there were no clear explanations regarding the over 30% of the respondents in 2004 that are omitted due to missing taluk data used for matching the reservation rate to education attainment. Table 5 shows a logistic prediction of missing taluk data using all districts, year, age, gender, and caste. Only the districts that predict the missingness of taluk identifiers are included in the table. Twelve of the twenty seven districts are shown to significantly predict missing taluk identifiers, with districts of Dharwad and Bangalore (districts coded 9 and 20) having the largest odds of missing taluk information. While this is not ideal for a comprehensive analysis, a sufficient number of respondents are matched from the other districts in 2004, and most of the sample from 2008 are not missing taluk information.

Table 5. Predicting Missing Taluks

Districts	4	-0.458*** (0.0884)
	8	0.171** (0.0852)
	9	1.879*** (0.0819)
	12	0.146* (0.0839)
	14	-0.214** (0.0903)
	15	0.261*** (0.0858)
	16	-0.535*** (0.104)
	18	0.189** (0.0899)
	19	-0.0571 (0.0874)
	20	3.817*** (0.0956)
	26	0.284*** (0.0874)
	27	0.220** (0.0900)
Year 2008		-3.276*** (0.0435)
Age		0.00247 (0.00294)
Female		0.0348 (0.0232)
SC		-0.447*** (0.0312)
ST		-0.943*** (0.0515)
Constant		-0.837*** (0.0739)
Observations		66,585
Standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

VI. Results

The results of the regression model for SC and ST presidency reservations is show in Table 6. The model indicates that with a 100% increase in cumulative reservation rate for SC presidents, the SC children between ages 5 and 18 will be likely to have 6.5 more years completed in school, significant at the 1% level. Or in a more likely context for GPs, SC children from taluks with a 10% higher cumulative reservation rate for SC presidents are associated with 0.65 more years completed in school. ST presidency reservations show a similar relationship with education attainment but at a smaller magnitude and statistical significance. A 10% increase in ST presidency reservation rate is associated with 0.1 more years of school for ST children. As expected older higher age and greater household asset wealth is associated in more years of schooling, while being female is associated with less years in school.

Table 6. Years of Schooling		
	SC	ST
Reservation	6.552*** (1.557)	1.228 (2.993)
Reservation by 2008	-7.072*** (1.575)	-3.127 (3.001)
Year 2008	3.041*** (0.580)	1.162*** (0.345)
Age	0.584*** (0.00711)	0.561*** (0.0104)
Female	-0.235*** (0.0531)	-0.255*** (0.0793)
Household Asset Index	0.477*** (0.0272)	0.522*** (0.0408)
Constant	-5.857*** (0.579)	-3.557*** (0.370)
Observations	9,367	4,452
R-squared	0.449	0.432

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

An interesting result is the estimation of years of schooling by the interaction of the cumulative reservation rate and indicator for 2008. The analysis suggests that the reservation rate in 2008 has a significant negative impact on the years of schooling. This may be attributable to sampling differences in the third wave of DLHS from 2008. Table 7 confirms this as the average years of schooling are compared by year for four different groups of taluks based on their cumulative reservation rates. After identifying the distribution of reservation rates for each year, those above the median are categorized as high, and those below as low. The four groups are created by the various category combinations: high-high, high-low, low-low, and low-high. The

first three group suggests that there seems to be an overall slight decrease in the average years of schooling from 2004 to 2008. However the low-high group shows a greater increase in average years of schooling over time, supporting the initial hypothesis that increasing reservation rates increases education attainment. Sampling differences between 2004 and 2008 thus likely explains the overall decrease in education attainment and the negative coefficient for the interaction term in the initial analysis.

Group	2004		2008	
	Mean	Standard Deviation	Mean	Standard Deviation
High-High	4.938	3.332	4.798	3.534
High-Low	5.074	3.247	4.791	3.419
Low-Low	5.027	3.132	4.993	3.437
Low-High	4.019	3.390	4.815	3.571

VII. Discussion

The analysis shows that higher cumulative reservation rate for SC GP presidents is associated with greater educational attainment for SC children at a significant level, and similar trends for ST reservations though at a statistically insignificant level. The estimation model is checked for robustness by estimating the effect of reservation rates on the number of total household members, which based on our motivating hypothesis should not be impacted significantly. The results of the robustness check is shown in Table 8. The ST reservation once again does not have a significant effect on household members. The SC reservation, however, seems to show a slightly significant negative association with total household members. While this relationship is statistically significant, it is in the opposite direction of the effect on education attainment, and is unlikely to be a confounding effect on the main analysis.

DLHS 3 provides main reasons for household members that have never or no longer attend school. Although this information is only provided in 2008 and does not fully explain the households' reason for the increase in education attainment shown through this paper, it can contribute to placing the results in more insightful context. For SC children never having attended school, the second most popular response following 'other' was 'required for household work'. The most commonly cited reason for ST children never having attended school was that education was not considered to be necessary. Both SC and ST children that are no longer attending school are doing so mainly due to the lack of interest in studies and requirement for household work. Further research would be necessary to uncover how much of these reasons for never or not currently attending school is underlined by a low perceived returns to education due to caste-based stereotypes.

Table 8. Total Household Members		
	SC	ST
Reservation	-2.762** (1.398)	1.090 (2.624)
Reservation in 2008	4.637*** (1.416)	0.665 (2.632)
Year 2008	-1.904*** (0.522)	-0.695** (0.305)
Age	0.00327 (0.00631)	0.00164 (0.00925)
Female	0.266*** (0.0498)	0.288*** (0.0742)
Household Asset Index	0.288*** (0.0257)	0.225*** (0.0383)
Constant	6.688*** (0.519)	5.753*** (0.323)
Observations	9,950	4,748
R-squared	0.022	0.025

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

While the analysis presents insight into the relationship between GP presidency reservations and children's education attainment at the taluk level, the paper faces several limitations. As discussed in the previous section missing taluk information in the 2004 survey omitted nearly 30% of the respondents who are most concentrated in two districts. The large sample size and the close to complete taluk information for 2008 allows the analysis to estimate the relationship. However including the missing respondents would provide a much more accurate estimation, especially if the missing respondents' education attainment change is significant. Secondly the apparent sampling differences between 2004 and 2008 hinders the ability to estimate the impact with greater certainty. Clarifying how the samples differ in the two survey waves demographically would allow the current analysis to be strengthened by including necessary weights for the respondents. Lastly the analysis is completed at the taluk level, evaluating the average impact rather than determining the true effect on individuals. Access to panel data with identifiers matching households to specific GPs would allow for estimation using individual level data.

VIII. Conclusion

Researchers have shown political representation of socio-economically marginalized groups generate positive policy and welfare outcomes, and the presence of these leaders can impact children and students to improve educational aspirations, attainment, and performance through a role model effect. The results of the analysis in this paper suggest that increases in the presence SC and ST presidents in Gram Panchayats in Karnataka are associated with increases in education attainment among SC and ST children between the ages of 5 and 18. These findings can be strengthened through more thorough individual-level reservation and education data, and further expand current research regarding the benefits of affirmative action policy in India.

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³ Ibid.

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