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Young Lives
An International Study of Childhood Poverty

Women's Political Reservation, Early Childhood Development and Learning in India

Yuvraj Pathak and Karen Macours

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The data used come from Young Lives, a longitudinal study of childhood poverty that is tracking the lives of 12,000 children in Ethiopia, India (in Andhra Pradesh), Peru and Vietnam over a 15-year period. **www.younglives.org.uk**

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Contents

Abstract

This paper analyzes the long-term impacts of reservation of local political seats for women on children's learning outcomes in rural Andhra Pradesh. Using the random rotation of seats reserved for women over different election cycles, and three rounds of a panel dataset, we analyze the impact of exposure to political reservation during critical periods of childhood. The paper shows that the reservation policy for female leaders had the largest impact on learning outcomes of primary school children when they were exposed to reservation very early in life. These results can be explained by improved health and nutrition in utero and during the first years of life.

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1. INTRODUCTION

Early childhood experiences are often thought to be crucial determinants of children's cognitive and non-cognitive development (Heckman, 2008). Many children in the developing world are exposed to a multitude of risk factors, hampering their cognitive development from very early on (Grantham-McGregor et al. 2007). This is often thought to lead to subsequent lack of human capital accumulation, resulting in poverty and continued inequality. A lot of recent policy interest therefore has focused on policies that can improve health, nutrition and educational outcomes during early childhood and beyond. As many studies find a strong relationship between mother's characteristics and children's cognitive and educational outcomes, policies addressing constraints on the mothers of these children are often believed to be particularly promising (World Bank, 2011). Even if those relationships are not necessarily causal (see Duflo 2012) if women have stronger preferences for human capital investments (Thomas 1990, 1993), policies that increase women's decision-making power could potentially have large implications for children's human capital. Very little is known about the impact of such policies on children's learning outcomes.

To analyze this issue, this paper analyzes the impact of women's representation in elected bodies on children's human capital and tests whether political reservation for women resulted in improvements in children's longer-term educational and nutritional outcomes. The 73rd Amendment of the Constitution of India of 1992 prescribes that one third of the seats in all local council councils, as well as one third of the Pradhan (leadership) positions, must be reserved for women.[a] Exploiting the random allocation of the seats reserved for women in local elections, several studies have shown that these reservations had important impacts on policy choices. Chattopadhayay and Duflo (2004) show that female reservation increased investment in infrastructure related to the expressed development priorities of women in West Bengal and Rajasthan. Duflo and Topalova (2004) further show for a sample covering 24 states that GPs reserved for women invest more in public goods, and that the measured quality of these goods is at least as high as in non-reserved villages. This is particularly the case for drinking water infrastructure. Beaman et al. (2009) show that reservation for women has not only led to a decrease in bias amongst voters against women candidates, but has also resulted in a subsequent increase in the percentage of women local leaders in the state of West Bengal. More broadly, political reservation for the Scheduled caste, Scheduled Tribe and women has also been linked to more policy influence for these groups (Pande,

[a] Seats in council and Pradhan positions were also reserved for the two disadvantaged minorities in India, Scheduled Castes and Scheduled Tribes, in the form of mandated representation proportional to each minority's population share in each district.

2003). Pande and Ford (2011) further show the effectiveness of quotas in changing attitudes towards women leaders and giving them more policy influence. And potentially important, exposure to female leaders can raises parents' aspirations for their girls (Beaman et al., 2012).

These results suggest that there are a number of different mechanisms through which the reservation policy could affect children's human capital. If female leaders indeed favor policies beneficial to human capital, they could increase investments in education and health care infrastructure. They may also affect children's food intake, for instance by increasing the delivery of food through mid-day meal programs in schools or by increasing the number of households benefitting from public food distribution system. But giving women political power does not necessarily lead to better human capital investments, as it is not automatically true that women would favor such investments (Duflo, 2012). That said, even if women focus more directly on their own needs, such as their access to food and preventive health care, this could result in indirect benefits for children, in particular through better protection during the critical in utero period. And the shift in educational aspirations could further enhance such effects.

Existing empirical evidence on the impacts of female leaders in India indicates that several of these mechanisms could be at play. Bhalotra and Clots-Figueras (2011) find that female leaders are more likely to invest in rural health infrastructure as compared to men. Clots-Figueras (2012) shows that female leaders have a positive effect on primary education attainment of children in urban India, though not in rural areas. While these two papers identify the impact of female leaders by analyzing close elections, and hence do not analyze the reservation policy directly, they do indicate that female leaders might indeed favor health and education investments. Beaman et al (2012) suggests this might be particularly important for girls, as having a GP reserved for a female leader reduces the gender gap in school attendance. And Kumar and Prakash (2012) similarly exploit the random allocation of GP seats to women and find positive impact of women leaders on child mortality in Bihar.

This paper builds on this literature and contributes by showing long term impacts of reservation of seats for women, in the Gram Panchayat (GP) elections in 1995 and 2001 elections, on children's learning outcomes in rural Andhra Pradesh. It further contributes by analyzing potential critical periods during early childhood in which such policies can be particularly effective. Hence we go beyond the direct impact of female leaders on policy decisions and focus on the longer-term results of having been exposed to the results of these policy decisions during early childhood, as measured by children's test scores at age 8. We rely on the 3 waves of the Young Lives panel dataset that follows a cohort of young children from 2002 to 2009 and analyze the impact of exposure to political reservation in utero and during early

childhood. We show that women's political reservation improved conditions very early in the children's life, and measure the longer-term impacts on children's test scores capturing both math and language achievement, and their physical growth (height and weight). We are able to attribute causality to the reservation policy in the Panchayat as the seats to be reserved were randomly allocated through a rotating mechanism. Since GPs were randomly selected for reservation, differences between investment decisions by reserved versus unreserved GPs can be attributed to the policy.

The results show that children in GPs that were randomly reserved for women prior to the child's birth have significantly better outcomes on test scores when compared to GPs that were reserved after the child turned 5. These results are explained by better nutrition and health outcomes very early in childhood. As such, this paper contributes to the literature on the long-term impacts of early life interventions (Barnett, 1995; Garces, Thomas and Currie, 2002; Walker et al., 2005; Maluccio et al., 2009; Barham, 2012) and the critical periods for such interventions (Barker 1992; Adair 1999, Doyle et al. 2009; Almond and Currie, 2010; Barham, Macours and Maluccio, 2013). Further exploiting the rich panel nature of the YLS survey, we also shed light on schooling outcomes and aspirations as other intermediate mechanisms that can help explain the impacts of differential timing of reservations. As such, this paper relates to other recent work investigating the relationship between schooling and learning (Beatty and Pritchet, 2013) and on educational aspirations (Krishnan and Krutikova, 2012; Bernard, et al., 2013; Serneels and Dercon, 2013). Finally, understanding the impact of women's reservation policy on children's human capital accumulation is arguably of high interest given existing evidence on children's delays in physical growth, cognition and educational outcomes in India. Stunting rates, for instance, remain particularly high in India (as in our sample), despite economic growth (Deaton and Dreze, 2009).

The paper is structured as follows: Section 2 outlines the data sources and the various variables we look at, section 3 discusses the reservation policy, the random allocation of seats, and identification. Section 4 then discusses the impact of having a women legislator on child learning. Section 5 provides evidence on the underlying mechanisms by analyzing intermediate impacts on health, nutrition, education and aspirations. Section 6 concludes.

2. DATA

We use the Young life survey (YLS) dataset for Andhra Pradesh, a 3 wave panel dataset (2002, 2007 and 2009) focused on childhood poverty spread over 6 rural districts of Andhra Pradesh.[b] After ranking all the mandals/sentinel sites in these districts on the basis of a selected set of indicators of economic, human development and infrastructure, 20 mandals were sampled from these districts.

YLS follows two cohorts of children: the first cohort consists of 2000 children that were between 6 and 18 months of age in 2002; the second cohort consists of 1000 children that were on average 8 years old in 2002. In particular, each mandal was divided in 4 geographical areas, and one village was randomly selected in each area. YLS then randomly sampled 100 households with a one-year old child and 50 households with an 8-year old child in each mandal. In this paper we focus on the first cohort, given our focus on the impact of reservation during early childhood. Of the 2000 children, we focus on the 1033 children in rural districts for which we were able to obtain full information on the 2001 and 2006 reservation.[c]

The YLS survey instrument consists of a child questionnaire, a household questionnaire, and a community questionnaire. The child questionnaire includes a number of cognitive/achievement tests and anthropometrics (height and weight) as well as sections focusing on child health and education outcomes. Our main outcomes of interest are the test scores of the children in 2009. The 8-year old children were given the Early Grade Reading Assessment (EGRA) test, which measures the basic skills required for literacy acquisition in early years of schooling. It includes recognizing letters of alphabet, reading simple words, understanding sentences and paragraphs, and listening with comprehension.[d] The were also given a math test with basic computing exercises appropriate for children of average age of 8 years, as well as the PPVT (Peabody Picture Vocabulary Test), a popular test for assessing receptive vocabulary, often used as a proxy for cognition. Attrition rates are very low, only 3% of children originally sampled in 2002 are missing one or more test in 2009. Attrition is uncorrelated to 1995 or 2001 reservation (P-values 0.28 and 0.89).

[b] More generally, the YLS initiative collects data on 12,000 children in 4 countries over 15 years. It is led by a team in the Department of International Development at the University of Oxford in association with research and policy partners.

[c] YLS sampled 6 rural districts, two districts in each of three agro-climatic regions and selecting one poor and one non-poor district in each region: Srikakulam and West Godavari in the Coastal region; Anantapur and Cuddapah in Rayalaseema; and Mahboobnager and Karimnaga in Telangana. As we do not have the 2006 election data for Anantpur, observations for this district are not used in the analysis. Similarly, we don't use data from Hyderabad, as the local election system is different for urban areas.

[d] "Early Grade Reading," USAID https://www.eddataglobal.org/reading/index.cfm

This YLS data was merged with the Gram Panchayat (GP) election reservation data for Andhra Pradesh. The data was merged at the GP level by the YLS team, and the names of the GPs were removed assuring anonymity. The election data is freely available and comes from the Andhra Pradesh State election commission. We use the election data for the years 2001 and 2006. This data contains the reservation information for Scheduled Castes, Scheduled Tribes, and women. Since the election reservation is done on a rotation basis, this data also implicitly contains the election reservation data for the 1995 election (the GPs which did not receive reservation in 2001 and 2006, must have received reservation in 1995).

3. IDENTIFICATION and EMPIRICAL STRATEGY

The Panchayat is a system of village-level (Gram Panchayat), block-level (Panchayat Samiti), and district-level (Zilla Parishad) councils, with membership determined through local elections. Their main responsibility is the administration of local public goods. Each Gram Panchayat (GP) encompasses between 1,000 and 10,000 individuals in a group of villages (between 1 and 15). In 1992, the 73rd Amendment of the Constitution of India gave new powers to the Panchayats and provided that one third of the seats in all Panchayat councils, as well as one third of the Pradhan positions, must be reserved for women. Seats and Pradhan positions were also reserved for the two disadvantaged minorities in India, Scheduled Castes and Scheduled Tribes, in the form of mandated representation proportional to each minority's population share in each district.

In Andhra Pradesh, for all practical purposes, this act came into effect with the Andhra Pradesh Panchayat Raj act of 1994, which mandates the elections for the seat of the 'sarpanch' or the head of the Gram panchayat. For each subsequent election, one third of the total seats were reserved for women and this was to be done by rotation.[e] Only women candidates could contest the election for these seats, thereby ensuring a woman sarpanch in the reserved GPs, without any exception. The first panchayat or GP election after the Andhra Pradesh Panchayati Raj Act were held in the March 1995. The next elections took place in July-August of 2001 and 2006. The dates for the elections were typically announced by the

[e]The Andhra Pradesh Panchayat Raj act of 1994 mandates that the office of Sarpanch of the GPs in the state be reserved in the following manner: a) Of the total number of GPs in the state, the State election commissioner shall reserve number of GPs for Scheduled caste and Scheduled tribe, such that the proportion of reserved GPs to total GPs reflect the ratio of SC/ST population to the total population. b) This reservation of seats for SC/ST has to be done by rotation, which implies that a GP reserved for SC/ST in first election year is not to be reserved for SC/St in the next election year. An exception to this case though is possible in theory subject to the constraint that the total number of seats reserved must reflect the proportion of population of SC/ST in the state. c) A minimum of one third of the GPs reserved for SC/ST must be reserved for women. This is also to be done by rotation; and d) A minimum of one third of the GPs, including the ones reserved for SC/ST are to be reserved for women. This is also to be done by rotation. (http://www.apsec.gov.in/HANDBOOK/Election%20Law%20of%20PR%20Act%20-2006.pdf)

state election commission 1-2 months in advance and the term of the newly elected sarpanch starts immediately after each election.

The first round of YLS was conducted from September to December 2002, approximately one year after the sarpanch elected in 2001 came into power. The second round of data was collected from January to July 2007, i.e. 6-12 months after the 2006 election. The third round of YLS was conducted from August 2009 to March 2010 with more than 90% of the survey completed by Dec 2009.

The three GP elections hence result in three distinct treatment groups as a result of the rotation of the treatment: children in GPs that benefited from reservation from 1995 to 2001 constitute a first treatment group; children in GPs that benefited from reservation from 2001 to 2006 constitute a second treatment group; and children in GPs that benefited from reservation from 2001 to 2006 constitute a third group.

Given that the YLS data sampled children born in 2001-2002, in the GPs reserved from 1995 to 2001 (the first treatment group) reservation had been in place for 6 years when children were born and reservation was in place when they were in utero. While they had limited direct exposure to reservation after birth, they may have continued to benefit from policies implemented during reservations, for instance in case of infrastructure improvements. In contrast, in the GPs reserved from 2001 to 2006 (the second treatment group) reservation starts almost at the same time or just before they are born, and reservation was in place until they were about 5 years old. To the extent that the results of reservation and resulting policies may not immediately materialize, they may not have benefited much very early in life. Hence there are potentially important differences between the two treatment groups in terms of being affected by reservation: the first group of mothers may have benefitted from treatment during pregnancy, the second group did not, and any potential impact of the treatment on health or nutrition has had more time to materialize in the first group, implying children might have benefit from them at very early ages. We therefore look at the impact of 1995 and 2001 election reservation treatment separately. Finally in the GPs reserved from 2006 to 2011, reservation took place when children were older than 5, i.e. at the moment they are entering primary school age. Given the focus on early childhood in this paper, we refer to this group as the control group.

At the time of the first round of YLS in 2002, the children in the sample were on average about 1 year old (between 5 to 21 months). This same cohort is followed through the second round and the third round of the YLS. In the second round of the survey, in 2007, these children are 6 years old and by the time the

third round of the survey is conducted in 2009, they are 8 years old. This allows to analyze several intermediate outcomes at different moments in the children's young lives.

Details on the random allocation, verification and balance

For identification purposes the key feature of the reservation policy is that the reserved seats were to be randomly allocated. It is indeed this random allocation that other papers on women's reservation in India – as reviewed above – have relied on for identifying the causal impact of the reservation. To rely on the randomization, it is important to verify the compliance and to understand the exact mechanism used for the random allocation in AP. Ban and Rao (2006) describe the process of assignment of women reservation to GPs in some states of South India, including Andhra Pradesh as follows: GPs to be reserved for SC/ST in the first step, and GPs to be reserved for women in the next step are drawn by arranging the GPs in descending order of ratio of population of respective category for which it is to be reserved. Then the first, fourth, seventh and so on numbered GPs on the list were assigned reservation for the first election, 1995 in this case. The second, fifth, eighth and so on GPs are assigned reservation for the second election, 2001 in this case. And the third, sixth, ninth and so on GPs are assigned reservation in the third election, 2006 in this case.

Note that this rule implies that GPs reserved in 1995, on average, should have slightly higher female population ratios. This might be a potential concern for identification in this paper, if higher female population ratios are also related through other mechanisms to children's longer-term outcomes. We therefore analyze the extent to which we observe differential female population ratios between GPs reserved in each of the three years and analyze the correlation between treatment and the female population ratio. To do so, we merged the census data with reservation data (for both 2001 and 2006 elections) for the YLS sample.[f] GPs reserved in 1995 and in 2001 indeed have slightly higher female population ratios than those reserved in 2006 but the differences are very small (0.498 in 1995 and 2001 compared to 0.492 in 2006, with P-values of the differences between 0.158 and 0.073 respectively). It seems unlikely that these small differences would drive any big differences in test scores between the treatment groups. Nevertheless, we will control for the estimated female population ratios in all regressions.

[f] Due to differences in GP names between data sources and changes over time, we cannot merge all GPs, but can analyze the patterns in the 165 GPs out of a total of 360 GPs for which we have both the 2001 and 2006 election data. For the same reason we cannot use the census data on female population ratios as control in the regressions. Instead we use a proxy by estimating the GP average of the female population ratio for the households in the sample.

To further check the randomization, we can verify the balance of other baseline characteristics in the sample analyzed. We do not have a true baseline as the first round of YLS was conducted in 2002, while the treatment was already in place since 1995 and 2001 respectively. We hence focus on variables that a priori are unlikely to have changed since 1994 to verify baseline balance. Table 1 looks at the balance between the control and the first treatment group, i.e. the group that received reservation in 1995. Variables unlikely to be affected by the reservation policies such as mother's age and ethnicity, child's gender and household wealth seem to be balanced between control and treatment. Similar results are found for the comparison of the 2001 reservation treatment group with the control (Table 2), with the exception of housing quality and mother's education. In both cases the difference are negative so unlikely to be a result of reservation policies. The imbalance in education might lead to an underestimation of impacts of treatment on child cognitive development and physical growth, given the likely positive correlation of mother's education and child outcomes, documented in many settings (e.g. Behrman (1997); Behrman and Amin(2011); Carneiro, Meghir and Parey (2011)). We therefore control for mother's education in all regressions.

Empirical specification

We estimate simple intent-to-treat regressions, comparing outcomes of treatment group 1 and treatment group 2, respectively, versus the control. Specifically we estimate:

$$Y_{igm} = \beta_0 + \beta_1 T95_{gm} + \beta_2 T01_{gm} + X_{igm}\gamma + \Sigma\delta\eta_m + \varepsilon_{igm},$$

where Y_{igm} is the outcome of interest for child i in GP g and mandal m. Given the randomized rotation of the reservation, the estimates of β_1 and β_2 measure the differential impacts of having been exposed to the 1995 and the 2001 reservation, as compared to the 2006 reservation. As such they capture the impact of exposure early in the child's life, as compared to after the age of 5. The vector of child-level controls **X** includes child's gender and age (using monthly age dummies). Given the lack of a true baseline, we only add controls that likely reflect baseline information: mother's age, ethnicity (dummy variables for scheduled tribe, scheduled caste and other backward caste) and education (highest grade level achievement and a dummy for no education), household wealth and consumer durables indices, and the GP average female population ratio and female population ratio squared. In addition, we include mandal fixed effects to control for all the unobservables that are fixed at the mandal level, η_m. This can be

important as many policies affecting child outcomes are determined at the mandal level.[g] It also controls for reservations at higher levels than the GP.

The outcomes of primary interest are the longer-term impacts (in 2009) of reservation on children's test scores. Z-scores of these tests were calculated by subtracting the mean and dividing by the standard deviation. We also calculate the average of theses z-scores to account for multiple inferences.

4. LONG TERM IMPACTS ON TEST SCORES

Long term effect of 1995 and 2001 election reservation

Table 3 shows the estimates without mandal fixed effects in the top panel, and with mandal fixed effects in the bottom. The former have the advantage of using all the variation in the data, while the later specification allows controlling for possible other policy factors. The results show that 8 year olds in GPs randomly exposed to reservation in 1995 have significantly better test outcomes compared to 8 year olds who had reached the age of five before their GPs were exposed to reservation. The differences are significant and consistent across tests. The difference of 0.10-0.17 of a standard deviation for the average of different test scores is substantial, in particular given that the 2006 reservation could still have affected the control group.

Table 3 further shows that the 8 year olds in GPs randomly exposed to reservation in 2001 do not have significantly better test outcomes compared to 8 year olds who had reached the age of five before their GPs were exposed to reservation. This conclusion holds for all tests and the average differential impact is not significant. In the specification with mandal fixed effects the point estimate is in fact negative, and the difference between the 1995 and 2001 is significant at the 10% level. Note that these results do not necessarily imply that test scores were not at all affected by 2001 reservation, as it is possible that they just capture that the 2006 and 2001 reservations had similar effects by 2009.

Gender differences

Before turning to the potential mechanisms underlying these results, it is worth investigating heterogeneity between boys and girls. As the results suggest female policy makers might make different decisions than their male counterparts, one can wonder whether this has a differential impact on boys

[g] The data cover 12 mandals, and on an average there are 4.3 GPs per mandal. The number of GPs reserved per mandal is 1.5 in 1995, with the numbers varying from 0 GP/mandal to 3 GP/mandal. For 2001, the number of GPs reserved per mandal is 1.2, with the variation in number of GPs reserved per mandal the same as 1995 election. As there are a few mandals with 0 GPs reserved, the fixed effects effectively implies dropping these mandals and hence reducing the overall variation in the dataset.

versus girls. One could, for instance, hypothesize that reservation may have affected investments in schooling for girls in particular, in line with potential higher educational aspirations for girls. Moreover, gains of better nutrition in utero might be particularly important for boys (see Erickson et al 2010). Table 4 therefore shows results on test scores for boys and girls separately. Overall we do not find substantial differences in impacts on test scores between boys and girls for the 1995 reservation. While the point estimates for some of the individual tests differ, none of the differences is significant. And the results on the average test score are similar in magnitude. Differences for the 2001 reservation appear larger, with in particular a number of negative coefficients for boys and not girls. Yet overall these differences are also not significant.

5. MECHANISMS

There are a number of potential mechanisms through which reservation and the differences in the timing of the reservation could lead to differential outcomes for test scores. Indeed the literature has shown that reservation can affect several policy choices relevant for human capital outcomes. We hypothesize that female leaders have different priorities compared to men in terms of investment of local resources. The reservation of seats for women might then for instance lead to better maternal and child health care or might imply more access to programs favoring nutrition. Similarly, a difference in priorities might lead to more investment by women leaders in education leading to better quality of primary schools in the villages in the GP. The three rounds of the YLS survey provide a unique opportunity to analyze those intermediary outcomes at different moments in the young children's life to understand these mechanisms.

Early childhood circumstances

The difference between the differential effect of the 1995 and 2001 reservation is suggestive of the possible important role of early childhood circumstances. A first important hypothesis is therefore that better outcomes on language and mathematics tests at the age of 8 are the result of better cognitive development earlier in the children's life, which itself could have been affected by early health and nutrition. To investigate this hypothesis, table 5 shows results using the child-level data from the 2002 survey round. Recall that at the moment of this first survey round, GPs with 1995 reservation had just finished a 6-year period in which a female leader was the head of the GP through reservation. In GPs with 2001 reservation, a new female leader had recently taken up office, while the GPs with 2006 reservation had not yet had any reservation. Hence at this point, the 2006 group is a pure control, allowing us to interpret results as the absolute impact of a full period of reservation for the 1995 group, and the short-term impact of reservation for the 2001 group.

The results in table 5 suggest that the 1995 reservation indeed improved the health and nutrition circumstances at early ages. Pregnancies in the treatment group were more likely to be without difficulties and the young children are reported to be in better health. This is not necessarily due to better prenatal health care per se (and if anything the 1995 group had slightly less prenatal visits, possibly because they were less likely to perceive difficulties during pregnancy). But more generally preventive health care and nutrition was likely to be positively affected by the treatment. This is further corroborated with information from the community survey in 2002. While the number of observations is small (44 GPs between the 1995 and 2006 reservation groups) results suggest that investments by female leaders were instrumental in improving the early childhood circumstances for the 1995 reservation group – as compared to GPs that only received reservation in 2006. Consistent with evidence elsewhere in the literature, GPs with early reservation were 27 percentage points more likely to have piped water (P-value 0.059), and were 16 percentage points more likely to have a shop for the public food distribution system in the village (P-value 0.023).

For the 2001 reservation group, we see no average impacts, which may not be surprising given the short period between the survey and the start of the reservation. Nevertheless, when separating by gender, we note also here positive impacts for boys in particular, especially for nutritional outcomes that could be related to nutritional and preventive health care investments post-birth. Reservation reduced, for instance, the early use of solid food and the presence of diarrhea. The better nutritional environment is also reflected in higher height-for-age z-scores for boys of the 2001 reservation group (Table 6). While the estimate is only significant at the 10%, the point estimate is very large, 0.3 of a standard deviation. The lack of similar results for girls is consistent with a bias of early nutritional investments towards boys, as has been documented elsewhere. The anthropometric indicators for boys in the 1995 group are positive but not significant. However, considering later surveys, the early advantage in anthropometrics of boys in the 2001 group disappears, while the coefficients become larger for boys in the 1995 group. Indeed, by 2009, height-for-age of boys is .16 standard deviations higher in the 1995 reservation group than in the 2006 reservation group.

Overall, the results in table 5 and 6 hence indicate that children in the 1995 treatment group indeed seem to be exposed to a more nurturing environment early in their childhood, which could help explain the longer-term differential impacts on tests scores. On the other hand, for the boys in the 2001 treatment group, improvements – which in themselves were substantial - possibly came too late in their young lives in order to have a sustained impact on health and brain development, and subsequent test scores.

Schooling

In addition to influencing the health and nutrition environment of young children, reservation policies could affect test scores through changes in investments in education. If reservation policies are instrumental in increasing educational quality during the years of reservation and beyond, children born in GPs with earlier reservations could have benefited for a longer period of such higher quality. When they entered the schooling system, the quality improvements may already have materialized, while for children born in 2006 reservation GPs the quality improvements would not have been there when they entered.

Information on schooling outcomes in the 2007 and 2009 round of the YLS dataset allows to trace intermediate educational outcomes over time. While unfortunately there is no survey round in which the cohort of interest was of primary school age while the 2006 reservation did not yet start, the 2007 round nevertheless is relatively early after the start of the reservation in the last group. Table 7 shows that in 2007, the 2001 reservation was 14 percentage points more likely to have started primary school, as compared to the 2006 group, clearly suggesting an important differential in schooling investment at that stage. Both the 1995 and the 2001 reservation groups also were at a higher grade-level in 2006, though not significantly so.[h] Note however that by 2009, the grade advantage of the 2001 group had evaporated, and children in the 2001 group reported to be performing worse than their class mates, reported quality of education was also lower, and children were less likely to get school meals when compared to the 2006 reservation group. This switch between 2007 and 2009 is suggestive of educational investments in the 2006 reservation group. Remarkably however, a similar switch is not observed for the 1995 reservation group. These results can further help understand the differences in test score results.

Aspirations

To further understand the 2007 and 2009 schooling results, we consider the role of aspirations considered in the literature as an important mechanism to explain educational gains from female reservation. Table 8 shows that already in 2007, only 1 year after the start of the 2006 reservation, educational and professional aspirations of children in the 2001 reservation group were substantially lower than for children in the 2006 reservation group. This difference in aspirations is maintained in 2009. And mirroring the results in Table 7, we do not see an aspirational disadvantage for the 1995 reservation group. The contrast between the 1995 and the 2001 reservation group could be related to the advantages the 1995 group accumulated during early childhood. But it could also be indicative of a potential

[h] There are no significant differences in the two cognitive tests that were administer in round 2. However, give that these tests were administered right around the transition to primary school they are likely noisy measures of cognition.

heterogeneous treatment effects. Recall indeed that mothers in the 2001 reservation group had lower average education levels. While all regressions control for mothers education, this does not rule out treatment effect heterogeneity. Hence potentially the impact of reservation on schooling outcomes is higher when mothers have higher education levels.

Note however that despite these significantly lower aspirations and schooling indicators in table 7 and 8, the tests results for the 2001 reservation group were not significantly lower than for the 2006 groups. And more strikingly, despite the fact that schooling and aspiration results in 2007 and 2009 are not significantly different for the 1995 and the 2006 reservation group, the test score results showed a sustained advantage of the 1995 reservation on learning outcomes. This then clearly suggests that reservation policies may have the highest potential when affecting the life circumstances of children very early in their young lives.[i]

6. CONCLUSION

This paper shows long-term impacts of reservation of local political seats for women on learning outcomes in rural Andhra Pradesh. It relies on three rounds of the Young Lives panel dataset to analyze the impact of exposure to political reservation during different stages of a young children's life. We are able to attribute causality to the reservation policy in the Panchayat as the seats to be reserved were randomly allocated through a rotating mechanism. Using this exogenous variation, we show that reservation policies can be particularly effective in increasing learning outcomes when they occur very early during a child's life. The results indicate that improved health and nutritional environment in utero and during the first years of life as a result of political reservation can help explain long-term impacts on children's learning.

These findings go beyond the existing evidence on reservation policies by shedding light on their potential longer-term impacts. They suggest in particular that empowering female leaders might be especially important for improving the health and nutrition environment of very young children, and that

[i] An alternative interpretation of the findings could be the potential decrease in effectiveness of reservation policies to affect policy choices. When the reservation first came into place in 1995, it might have had a shock effect and the impact of reservation might have diminished in subsequent cycles, in 2001 and 2006. This could be because other political actors might have been able to respond to the initial shock of reservation and possibly made it ineffective in affecting policy choices by the time the third group of GPs benefited from reservation. Nevertheless, the fact that we see the sudden shift in education and aspiration outcomes between 2007 and 2009 is suggestive of the fact that reservation was still affecting decisions even after 3 elections with political reservations.

this in turn can lead to substantial longer-term impacts. The evidence also suggests that these longer-term impacts might potentially be more easily observed later in the child's life, indicating that evaluations of policies targeting early childhood may need to take a sufficiently long perspective. Future analysis with upcoming rounds of the Young Lives Panel will allow demonstrating whether the obtained learning gains translate in further dynamic welfare gains.

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Table 1: Descriptive statistics in 2002 for the GPs reserved in 1995 and 2006

	GP with 1995 reservation	GP with 2006 reservation	Difference	P-value
Child's gender	0.527	0.561	-0.0335	0.370
Child's age (in moths)	12.67	11.99	0.686**	0.013
Age of biological mother	23.63	23.45	0.179	0.653
Mother's ethnicity (dummy for Other Caste)	0.151	0.177	-0.0265	0.631
Mother's ethnicity (dummy for Scheduled Caste)	0.387	0.455	-0.0671	0.479
Mother's ethnicity (dummy for Scheduled Tribe)	0.217	0.175	0.0412	0.446
Mother's ethnicity (dummy for backward Caste)	0.245	0.193	0.0524	0.605
Number of women in the household > 15 years	1.647	1.780	-0.134	0.162
housing quality index	0.451	0.468	-0.0173	0.684
consumer durables index	0.144	0.134	0.0102	0.651
housing services index	0.392	0.461	-0.0693	0.220
wealth index	0.329	0.354	-0.0255	0.464
education level of household head	0.383	0.317	0.0662	0.318
highest grade mother completed in school	2.415	2.420	-0.0055	0.993

Note: N = 813. *** p<0.01, ** p<0.05, * p<0.1 s.e. clustered at GP level (in parentheses).

Table 2: Descriptive statistics in 2001 for the GPs reserved in 2001 and 2006

	GP with 2001 reservation	GP with 2006 reservation	Difference	P-value
Child's gender	0.525	0.561	-0.0356	0.203
Child's age (in moths)	12.66	11.99	0.672*	0.085
Age of biological mother	24.07	23.45	0.621	0.285
Mother's ethnicity (dummy for Other Caste)	0.104	0.177	-0.0733	0.279
Mother's ethnicity (dummy for Scheduled Caste)	0.512	0.455	0.0580	0.625
Mother's ethnicity (dummy for Scheduled Tribe)	0.196	0.175	0.0205	0.738
Mother's ethnicity (dummy for backward Caste)	0.188	0.193	-0.0051	0.966
Number of women in the household > 15 years	1.912	1.780	0.131	0.287
housing quality index	0.334	0.468	-0.134**	0.042
consumer durables index	0.141	0.134	0.00700	0.771
housing services index	0.457	0.461	-0.0038	0.958
wealth index	0.311	0.354	-0.0436	0.357
education level of household head	0.233	0.317	-0.0834	0.299
highest grade mother completed in school	1.021	2.420	-1.399**	0.0173

Note: N = 702. *** p<0.01, ** p<0.05, * p<0.1 s.e. clustered at GP level (in parentheses).

Table 3: Differential long term effect of 1995 and 2001 reservation(net of short term effect of 2006 reserv.): test scores 2009

	word recognition	reading fluency	reading (EGRA)	math	receptive vocabulary	Average z-score tests
1995 reservation	0.190**	0.153*	0.266**	0.170*	0.0897	0.174**
	(0.0736)	(0.0907)	(0.107)	(0.0921)	(0.0895)	(0.0739)
2001 reservation	0.154	-0.0620	0.0234	0.0780	0.0703	0.0602
	(0.143)	(0.131)	(0.228)	(0.177)	(0.145)	(0.152)
With mandal fixed effects						
1995 reservation	0.104*	0.0546	0.178**	0.0807	0.0646	0.0979**
	(0.0553)	(0.0601)	(0.0716)	(0.0584)	(0.0521)	(0.0452)
2001 reservation	0.0431	-0.0461	-0.0572	-0.114	-0.0402	-0.0369
	(0.0894)	(0.0701)	(0.0892)	(0.0801)	(0.0759)	(0.0649)
P-value 95 reserv. = 01 reserv	0.490	0.212	0.035**	0.058*	0.146	0.091*

Note: N=1023 *** p<0.01, ** p<0.05, * p<0.1 s.e. clustered at GP level (in parentheses). Controls include child's gender and monthly age-dummies, mother's age, ethnicity and highest educational grade completed and dummy for no schooling, household wealth index, consumer durables index, GPs estimated female poplation ratio and ratio squared, and mandal(sentinel) fixed effects.

Table 4: Differential long term effect of 1995 and 2001 reservation(net of short term effect of 2006 reserv.): test scores 2009 by gender

	word recognition	reading fluency	reading (EGRA)	math	receptive vocabulary	Average z-score tests
GIRLS						
1995 reservation	0.0730	0.0937	0.330***	0.191**	-0.0384	0.128*
	(0.0694)	(0.0985)	(0.0975)	(0.0906)	(0.0905)	(0.0713)
2001 reservation	0.110	0.117	0.0707	0.0623	-0.127	0.0513
	(0.0873)	(0.111)	(0.117)	(0.113)	(0.104)	(0.0880)
BOYS						
1995 reservation	0.173**	0.0470	0.102	0.0150	0.139*	0.0995*
	(0.0841)	(0.0721)	(0.0788)	(0.0849)	(0.0786)	(0.0560)
2001 reservation	0.0248	-0.186*	-0.118	-0.224**	-0.001	-0.0959
	(0.157)	(0.110)	(0.102)	(0.110)	(0.0945)	(0.0849)

Note: see table 3. None of the differences between boys and girls are significant except reading fluency in 2001

Table 5 : Effect of 1995 and 2001 reservation on health outcomes in 2002

	pregnancy without difficulties	any antenatal visits during pregnancy	child's health compared to others (scale 0-2)	child has had serious injury/ illness (you thought child might die)	pregnancy without difficulties	any antenatal visits during pregnancy	child's health compared to others (scale 0-2)	child has had serious injury/ illness (you thought child might die)	Given solid food before 6 months old	3 or more loose or watery stools in last 24hrs
1995 reservation	0.0527**	-0.0349*	0.116**	-0.0607**	0.0674**	-0.0272	0.164***	-0.0345	-0.0164	-0.0632**
	(0.0234)	(0.0193)	(0.0436)	(0.0302)	(0.0330)	(0.0271)	(0.0594)	-0.0385	(0.0367)	(0.0238)
2001 reservation	0.0185	-0.0280	0.0274	0.0552	0.0506	-0.0421	0.174**	0.0961*	-0.0662*	-0.0708**
	(0.0348)	(0.0409)	(0.0503)	(0.0380)	(0.0406)	(0.0484)	(0.0722)	-0.0505	(0.0359)	(0.0316)
1995 reservation*girl					-0.0317	-0.0166	-0.104	-0.0569	0.0105	0.0760**
					(0.0531)	(0.0377)	(0.0865)	-0.0481	(0.0522)	(0.0325)
2001 reservation*girl					-0.0684	0.0271	-0.309***	-0.0886	0.106**	0.110**
					(0.0521)	(0.0450)	(0.111)	-0.0703	(0.0498)	(0.0428)
Mean 2006 reservation	0.822	0.883	1.16	0.279	0.822	0.883	1.16	0.279	0.165	0.115
P-value 95 reserv. = 01 reserv	0.279	0.852	0.086*	0.001***	0.686	0.740	0.900	0.007***	0.249	0.795

Note: see table 3

Table 6 : Differential effect of 1995 and 2001 reservation(net of short term effect of 2006 reservation): anthropometrics

	2002		2007		2009	
	weight-for-age z-score	height-for-age z-score	weight-for-age z-score	height-for-age z-score	weight-for-age z-score	height-for-age z-score
1995 reservation	0.0768	0.0574	0.125*	0.115	0.0616	0.162**
	(0.0960)	(0.159)	(0.0719)	(0.0915)	(0.0832)	(0.0756)
2001 reservation	0.143	0.303*	0.0447	0.0369	-0.0127	-0.0144
	(0.122)	(0.170)	(0.105)	(0.111)	(0.121)	(0.106)
1995 reservation*girl	-0.221	-0.158	-0.0846	-0.129	-0.0789	-0.164
	(0.148)	(0.217)	(0.114)	(0.120)	(0.135)	(0.123)
2001 reservation*girl	-0.136	-0.204	0.0379	0.006	0.0677	0.0406
	(0.168)	(0.224)	(0.111)	(0.144)	(0.121)	(0.146)
Mean 2006 reservation	-2.070	-1.601	-2.006	-1.771	-1.925	-1.520
P-value 95 reserv. = 01 reserv	0.547	0.085*	0.455	0.527	0.623	0.785

Note: see table 3

Table 7: Differences between 1995, 2001 and 2006 reservation groups on schooling outcomes in 2007 and 2009

	Had begun school in 2007	Grade child was in 2006	Grade child was in 2009	How do you think you are doing compared to other children in your class? 2009	Nearest primary school provides good quality education for children 2009	Do you receive a midday meal at school? 2009
1995 reservation	0.0475	0.0358	0.0478	0.0231	0.0901	-0.0157
	(0.0470)	(0.0425)	(0.0943)	(0.0698)	(0.0816)	(0.0366)
2001 reservation	0.136*	0.0322	-0.172	-0.158*	-0.188*	-0.0713**
	(0.0679)	(0.0626)	(0.116)	(0.0863)	(0.112)	(0.0351)
Mean 2006 reservation	0.417	0.217	2.315	3.523	3.483	0.558
P-value 95 reserv. = 01 reserv	0.254	0.954	0.084*	0.033**	0.017**	0.170

Note: see table 3

Table 8: Differences between 1995, 2001 and 2006 reservation groups on aspirations in 2009 and 2007

	Years of education you would like your child to complete? 2007	Aspires traditional job for child at age 20. 2007	Aspires child to be professional or student at age 20. 2007	Years of education you would like your child to complete? 2009
1995 reservation	0.0500	-0.0380	-0.0192	-0.227
	(0.155)	(0.0284)	(0.0342)	(0.207)
2001 reservation	-0.615***	0.129***	-0.130***	-0.417**
	(0.217)	(0.0385)	(0.0420)	(0.198)
Mean 2006 reservation	12.37	0.150	0.700	12.49
P-value 95 reserv. = 01 reserv	0.005***	0.001***	0.026**	0.360

Note: see table 3

Women's Political Reservation, Early Childhood Development and Learning in India

This paper analyses the long-term impacts of reservation of seats for women in the local body elections at the village level in India on children's learning outcomes in rural Andhra Pradesh. Using the random rotation of seats reserved for women over different election cycles – 1995; 2001; and 2006, and three rounds of a panel dataset – 2002; 2007; and 2009, we analyse the impact of exposure to political reservation during critical periods of childhood. The paper shows that the reservation policy for female leaders had the largest impact on learning outcomes of primary school children when they were exposed to reservation very early in life. The results can be explained by improved health and nutrition in utero and during the first years of life. These results are suggestive of the impact women leaders have on child well-being in the long term.

Young Lives
An International Study of Childhood Poverty

About Young Lives

Young Lives is an international study of childhood poverty, involving 12,000 children in 4 countries over 15 years. It is led by a team in the Department of International Development at the University of Oxford in association with research and policy partners in the 4 study countries: Ethiopia, India, Peru and Vietnam.

Through researching different aspects of children's lives, we seek to improve policies and programmes for children.

Young Lives Partners

Young Lives is coordinated by a small team based at the University of Oxford, led by Professor Jo Boyden.

- *Ethiopian Development Research Institute, Ethiopia*
- *Pankhurst Development Research and Consulting plc*
- *Save the Children (Ethiopia programme)*
- *Centre for Economic and Social Sciences, Andhra Pradesh, India*
- *Save the Children India*
- *Sri Padmavathi Mahila Visvavidyalayam (Women's University), Andhra Pradesh, India*
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