

The “State” of Persons with Disabilities in India

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Abstract

Among countries with comparable levels of income, India has one of the more progressive disability policy frameworks. However, people with disabilities in India are still subject to multiple disadvantages. This paper focuses on state-level variations in outcomes for people with disabilities to provide an explanation for the contrast between the liberal laws on paper and the challenges faced by people with disabilities in practice. Using average monthly per capita expenditure as an indicator of economic well-being, instrumental variables Wald estimator results indicate that households with members with disabilities have expenditures that are 14 percent lower as compared to households with able members. This effect is most pronounced among families with male adults and children with disabilities, and in states that are relatively poor, relatively more urban, those that experience extremes in annual rainfall and temperature, and those that have low to medium levels of inequality.

Keywords: Disability, India, Monthly Expenditure, State Variations, Poverty, Inequality
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I. Introduction

Despite differing estimates, empirical evidence as of 2007 suggests that between 4 to 8 percent of the population in India is comprised of people with disabilities (World Bank 2007). This translates into 40-90 million people, a substantial number. People with disabilities in India are subject to multiple deprivations and limited opportunities in several dimensions of their lives. Households with people with disabilities are 25 percent less likely to report having 3 meals per day year around, more likely to have members who are illiterate and children who are not enrolled in school, have much lower employment rates and have limited awareness of entitlements and services available by law for people with disabilities (World Bank 2007). Not surprisingly, these households are over-represented among the poor and socially marginalized.

The experiences of people with disabilities are in stark contrast to the fact that certain government departments in India such as the education sector have been viewed as progressive in their delivery of options to children with distinctive needs (World Bank 2007). Disability statistics were collected in the Census of India from as early as the late nineteenth century and the country had special schools that catered to the needs of people with disabilities from around the same time period. However, integration of people with disabilities and policy commitment to their participation as equals in society occurred only twenty-five years ago with the passage of four important laws. These included the Mental Health Act of 1987, the Rehabilitation Council of India Act of 1992, the People with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act of 1995 (PWD Act), and the National Trust for Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities Act of 1999 (World Bank 2007). India also ratified the UN Convention on the Rights of Persons with Disabilities in 2007. The PWD Act of 1995 was the key central legislation that provided certain entitlements in the

areas of education, employment and affirmative action, and other privileges in prevention and early detection of disabilities. The PWD Act of 1995 also provided for non-discrimination in access to public modes of transportation such as railways and buses by requiring that these vehicles be modified in ways to make them accessible to people in wheelchairs, and called for the installation of ramps in government buildings and public primary health centers as well as the provision of braille signs and auditory signals at traffic lights and intersections. Under the PWD Act, the establishment of these entitlements to persons with disabilities was conditional on being “within (the government’s) limits of economic capacity and development” (World Bank 2007).

How does one reconcile the vulnerabilities of Indians with disabilities in practice with the relatively advanced set of law (for a developing country) on paper? This is an important question since widespread hardship among people with disabilities persists in India despite the extant legislation. Under the Constitution of India, obligations to people with disabilities fall under the jurisdiction of state governments and the State List under “Relief of people with disabilities and unemployable” (World Bank 2007).¹ Hence, state governments are primarily responsible for implementing laws and distributing social welfare benefits to people with disabilities. States also have considerable leeway in independently deciding priorities among issues related to disability and in creating legislation suited to the context of their environment’s socio-cultural background (Bagchi 2003, Sinha 2004). By using empirical methods that recognize the role of states, this research documents considerable variation across sub-national entities in a basic measure of economic well-being – average monthly per capita expenditures in households with and without people with disabilities. The results demonstrate that while a

¹ Under India’s federal set-up, the State List consists of 66 topics that state governments may legislate on independent of the central government. “Relief of people with disabilities and unemployable” is one of these 66 topics.

comprehensive set of commitments to people with disabilities exists by law in India, some states have been more effective than others in the delivery of their obligations.

Evidence of considerable variability at the state-level in providing for people with disabilities is evident when one notes that some states have been pro-active in increasing awareness among people with disabilities about commitments and entitlements (Tamil Nadu, Karnataka, and New Delhi) whereas others have lagged in implementing many of the basic entitlements enshrined in the PWD Act of 1995 (Bihar, Maharashtra, Orissa, Uttar Pradesh). In fact in Uttar Pradesh which is the most populous state in India, 80 percent of households with people with disabilities were unaware of the process of certification as a person with disability (World Bank 2007). Further, there appears to be little correlation between the institutional capacity of a state and provision of services to persons with disabilities. For example Chhattisgarh, a relatively new state, has a well-thought out state-level disability policy that is often touted within India as a “best practice framework” and model for other states. Alternatively Gujarat, a more established state, has demonstrated little commitment in implementing a key requirement of the PWD Act of 1995 (has had only one meeting to facilitate center-state coordination in distribution of benefits as of 2003) (World Bank 2007).²

This study examines relative differences in economic well-being among households with members with disabilities and those without by using average monthly per capita expenditure as a benchmark measure. Among households with member(s) with disabilities, we investigate how

² Measuring the institutional capacity of a state as the sum of planned and non-planned revenue expenditures between 2002-2003 normalized by state population, pair-wise correlations between this variable and indicators of state-support in 2002-2003 for persons with disabilities such as central government grants to NGOs to promote voluntary action for PWDs, central assistance to PWDs for purchase/fitting of aids and appliances and the number of special schools for disabled children, reveals no correlation that is significant at the 5 percent level. Data on state-wise revenue expenditures and total population were obtained from the Reserve Bank of India's *Database on the Indian Economy*. Sources for state-level measures of support for PWDs are discussed below.

expenditure varies by gender of the person with disabilities and by age (whether burden is different in families with children with disabilities). We begin by using a method that allows sub-national entities to exhibit different trends in the cross-section (random coefficients regressions). These household comparisons are conditional on state-specific variations in the recognition of challenges faced by people with disabilities in India and state-wise differences in delivery of services to this population.³ Next, we implement an instrumental variables Wald estimator methodology that corrects for the possibility that the disability indicator is endogenous. The study concludes by reporting results at different percentiles of state characteristics including net domestic product, ratio of rural to total population, average rainfall and temperature and population weighted average inequality in order to explore the relative positions at which the burden for Indian families with persons with disabilities may be greatest.

Results from the state-level random coefficient regression models show that in a comparison of households with no people with disabilities, households with members with disabilities have monthly per capita expenditure that is lower by about Rupees 212 (about 23 percent of overall average per capita expenditures). Estimates from linear regression models (OLS) with state controls are similar in magnitude to those obtained from the random coefficients empirical framework. Wald estimator results that correct for endogeneity in the status of disability indicate that the random coefficient and OLS estimates are positively biased. These estimates suggest that as compared to the reference group of households with able members, households with persons with disabilities have average expenditures that are lower by about Rupees 89 (approximately 14 percent of overall per capita expenditures). Within the group of households that have members with disabilities, those with female individuals with disabilities have per capita expenditures that are *higher* than households with male individuals

³ We think of these as exploratory results.

with disabilities. This is striking given that there is little reason to believe that disabilities afflicting men may be more severe than those afflicting women. The Wald estimator reveals that the greatest burden of disability is experienced in households with children (0-17 years of age) with disabilities. In such households, average monthly expenditure is lower by up to 15 percent as compared to households with no persons with disabilities.

The negative economic burden of disability documented by the Wald estimator is not uniform across state characteristics. Analysis at different points in the distribution of state attributes indicates that the negative effects are most evident in states with less than the 25th percentile value of net state domestic product, with less than the 25th percentile value of rural to total population, with less than the 25th percentile value of average annual rainfall, with more than the 75th percentile value of average annual temperature, and between 25th to 50th percentile values of inequality. These results underline the importance of state characteristics and sub-national institutions in determining the welfare of people with disabilities in India.

II. Background on Disability Research in India

Although past work has noted the important but incomplete role played by the state in delivery of services and entitlements (Thomas 2005, World Bank 2007), there is little rigorous work in economics on state-level variations in indicators of well-being among people with disabilities in India. Not surprisingly, disability research in developing countries in general has tended to focus on the link between disability and poverty (Trani and Loeb 2010, Braithwaite and Mont 2009, Hoogeveen 2005, Yeo and Moore 2003). This is particularly true for India. Thomas (2005) argues that poverty is one of the biggest causes and consequences of disability in India. People with disabilities in India are among the poorest, often are disabled at birth or before school age, are mostly uneducated and widely unemployed. Using 2006 data from

Vietnam, Mont and Cuong (2011) show the strong inter-linkage between disability and poverty when the additional cost of living with a disability is taken into account. This is particularly true in households with children with disabilities. Filmer (2008) argues that among school-age children (6-17 years) across 13 developing countries, disability-based school participation deficits are often larger than those associated with characteristics such as gender, residence in rural areas or the household's economic standing. Furthermore, Cuong and Mont (2011) notes that in families where a parent is disabled, non-disabled children tend to have lower primary and secondary school participation rates. Part of this is attributed to the fact that in such households, child's time substitutes for parental time in income generation and household production. Among children with disabilities in India, girls receive less care than boys and are more likely to die as a consequence (Thomas 2005). Among children with disabilities, girls also tend to receive less education than boys.

In an attempt to improve the educational outcomes of children with disabilities, the government of India has emphasized the development of "special schools" and alternative systems such as informal education centers. However, education experts have criticized the widespread development of such schools and systems as the quality of education offered at these institutions is sub-par and because attendance at these facilities perpetuates inequalities (Singal 2006a, Singal 2006b). Moreover, the gender gap in schooling measures remains evident in these institutions as they make little attempt to encourage the schooling of girls with disabilities (Kalyanpur 2008).

The particular vulnerability of girls with disabilities resonates with other findings for women with disabilities in India. Mehrotra (2004) argues that women with disabilities in India face double discrimination due to the prevalence of traditional gender roles and expectations.

Among older adults, there is empirical evidence that women are more likely to hide physical disabilities if their spouse is still alive (older married women are less likely to report disabilities), and because of cultural differences, older women in northern India appear to be more disadvantaged as compared to their counterparts in the south (Sengupta and Agree 2002). Furthermore, there is evidence that rural women with disabilities are most likely to be disregarded by survey enumerators (Jeffrey and Singhal 2008).

A reason for the inter-linkage between disability and poverty is that people with disabilities have significantly lower employment rates on average even though the large majority of this population is capable of working. Using a cross-sectional data set from the state of Tamil Nadu, Mitra and Sambamoorthi (2008) shows that the gap in employment between disabled and non-disabled males cannot be explained by differences in education, health or productivity. This conclusion is reached as a selectivity-corrected wage equation indicates that wages are not statistically different between disabled and non-disabled males. Alternatively, the lower employment probability of people with disabilities is attributed to differential returns to characteristics and from discrimination in employment opportunities.

Other studies that have focused on the employment outcomes of people with disabilities in India include Thompkins (2010). In a study of the Indira Kranthi Program which facilitates micro-lending through self-help groups to people with disabilities in rural Andhra Pradesh, Thompkins (2010) found that although the program resulted in increased borrowing, education and asset ownership, there was negative to zero effects on the labor market participation of the beneficiaries. The presence of members with disabilities in a household also has important implications for the labor supply of other household members. Estimates from Uttar Pradesh and

Tamil Nadu show that about 45 percent of households with people with special needs report another adult being absent from work to care for the person with disability (World Bank 2007).

III. Empirical Methodology

The main question is whether households with disabled members have lower average monthly per capita expenditures compared to households with able members. In its basic form, this may be answered by estimating the following empirical specification:

$$Y_{ij} = \beta_0 + \beta_1 D_{ij} + \beta_2 X_{ij} + \beta_3 X_j + \beta_4 S_j + \varepsilon_{ij} \quad (1)$$

where Y_{ij} denotes average monthly per capita expenditure for household i in state j , D_{ij} is an indicator for whether the household has person(s) with disabilities (and its decomposition by age and gender of disabled members), X_{ij} denotes household characteristics including rural status, Hindu (majority group) religious denomination, whether the household belongs to scheduled caste or scheduled tribe (SC/ST) groups, quantity of land owned in hectares, household head's age, gender and literacy status, and indicators for household's physical composition including whether the structure stands independently or is made of concrete. In addition to land ownership, a household's physical composition in particular is a proxy measure for assets which may serve to bolster expenditures in households with disabled persons. X_j are state-specific characteristics including those related to resources and climate (real value of net state domestic product, ratio of rural to total population, average rainfall, average temperature), economic inequality (population weighted average of rural and urban Gini coefficients), and resources for persons with disabilities (grants per non-government organization to promote voluntary action for persons with disabilities, amount of central government assistance to disabled for purchase of aids and appliances, number of special schools for disabled, and whether certain government jobs and educational institutions have reservation quotas for those with disabilities or whether

persons with disabilities receive a pension per month). Reasons for including measures for a state's economic resources, inequality and assistance for persons with disabilities in equation (1) are self-evident. Weather-related phenomena are included as well since in the primarily agricultural economy of India with limited irrigation facilities, natural events such as rainfall and temperature are critical in determining crop output. These natural events are not expected to differentially impact household with persons with disabilities in equation (1). However, by influencing state resources for example, they may affect the welfare of such households. In order to control for state-level heterogeneity which does not vary by time, equation (1) also includes state dummies (S_j); ε_{ijt} is the standard idiosyncratic error term. The coefficient of interest is β_1 : the impact of disability on per capita expenditures at the household-level.

In equation (1), household characteristics such as rural status, SC/ST status, lack of education for the household head, and the indicator of whether the household structure is unstable (not concrete) are hypothesized to have negative effects on the dependent variable. Households that own land, have older heads who are male, and those that live in independent homes built of concrete are expected to have positive effects on per capita expenditure. Controlling for these characteristics, annual per capita expenditures are expected to be lower in households with disabled members. Those states with more resources (as measured by state domestic product), adequate rainfall and temperature, and relatively more equal distributions of income are hypothesized to have a positive effect on per capita expenditures, while those with larger rural populations are expected to have the opposite effect. All state characteristics that measure support for persons with disabilities should improve annual expenditures. Estimated impacts of these variables are discussed below.

To gauge the expenditure penalty in households with disabled members, equation (1) is estimated using three different empirical methods. We begin by documenting the influence of state-level variations using a random coefficients model following the methodology outlined in Swamy (1970). As noted above, this model allows for different trajectories or trends for each state whereas the more standard OLS model measures the mean trajectory or trend over all states. The details of the model are presented in the Appendix, and Appendix Table 1 reports the results of the state-specific random coefficients linear regression model along with statistical tests for the presence of state-level heterogeneity. Next we estimate OLS models with dummies for each state to control for unobserved variations at the state-level. These models treat the indicator for disability status as exogenous and provide a comparison benchmark for our preferred specification, the IV Wald estimator. The use of state dummies also allows a test of the null hypothesis that these are jointly zero, that is, there is no evidence of state-level heterogeneity in the data. For the random coefficients and OLS models, the outcome and control variables are measured at the household-level. This is because we implement a comparison of differences among households with and without disabled members conditional on state-level variations. With multiple households per state, the results tables for the random coefficients and OLS models report standard errors that are clustered at the state-level.

Validity of the random coefficients and OLS estimators rests on the assumption that the indicator for disability status D_{ij} is exogenous. This may not be the case as the disability indicator might be measured with error or be correlated with included and omitted variables. Measurement error might result if there is under-reporting of disability as might happen in the

case of women with disabilities in rural areas.⁴ Endogeneity in the indicator of households with members with disabilities might also result due to correlation with omitted variables. For example, if women with poor nutrition are more likely to bear children with disabilities and also more likely to live in resource-constrained households, then not controlling for health investments in mothers may lead to spurious correlations between disability indicators and average household expenditure. One technique to correct for such endogeneity is to use instrumental variables (IV). A number of potential instruments were tested and rejected since they did not satisfy the exclusion restriction, that is, are correlated with the endogenous variable but uncorrelated with the outcome variable. This is the standard condition that an instrument needs to satisfy in order to be valid and to be considered as randomly assigned. Given this, we develop an alternate instrument based on a regional measure of the incidence of disability as per Moffitt (1996), and provide details on this across-district IV Wald estimator in the Appendix.

For the district mean of disability status to be a valid instrument it must be correlated to disability status at the household-level (the instrument is relevant) but conditional on this variable, the incidence of disability at the district-level should not be correlated to average monthly expenditures (the instrument satisfies the exclusion restriction). In this framework, it is fine for district of residence to have an impact on the dependent variable conditional on the district mean of disability status. For example, if some districts are better served by non-government organizations (NGOs) or government services for persons with disabilities, the target population in such districts may have higher net household expenditures since they spend less on costly treatments. Since we directly control for such measures in the models using state-level information from the Ministry of Social Justice and Empowerment, these are no longer

⁴ However, note that such under-reporting leads to a *conservative* bias in our estimates. That is, with the inclusion of such members, our results should become stronger.

omitted variables that may induce correlation to invalidate the exclusion restriction. Further, to ensure the validity of the exclusion restriction, we include state dummies in the Wald estimator regressions to control for all factors that might make other state allocations (that we do not have measures for) correlated to average monthly expenditures.⁵ We present the first stage regressions and tests of instrument validity below. Finally, as before, standard errors are clustered at the state-level to control for multiple district-level observations by state.

IV. Description of Data

Complicating the assessment of the security of people with disabilities in India is the relative dearth of nationally representative surveys with detailed data on this population. In the last decade, there are only two such surveys – the National Sample Survey (NSS) of 2002 and the Census of India from 2001. Both sources have different definitions for the major types of disabilities; the NSS is judged to be better than the Census in terms of hearing, speech, and motor disabilities (Jeffrey and Singal 2008). In terms of visual disabilities, the NSS 2002 survey disregarded people wearing spectacles and contact lenses but the Census did not.⁶

Relying on the relative strengths of the NSS versus the Census, we use the nationally representative information in the former to contribute to research on disability in India in two ways. First, we offer one route to reconcile the contrast in the relatively enlightened nature of India’s disability policies and the challenges faced by people with special needs in every-day life by focusing on state-level heterogeneity in the distribution of commitments to the disabled. This

⁵ For example, if states provided more for disabled populations because residents had lower average monthly expenditures to begin with.

⁶ An example of an NSS disability question that is asked when the demographic and other particulars of household members are being compiled is “whether (a particular member) has a disability?” The (coded) responses allowed are “yes: single: mental-1, visual-2, hearing-3, speech-4, locomotor-5; multiple-6; no-7.” Note that disability status is self-reported and beyond a broad question outlining the extent of physical disability (“cannot take self-care even with aid/appliance, can take self-care only with aid/appliance, can take self-care without aid/appliance or aid/appliance not tried/not available”), there is no distinction made between minor and major disabilities.

is accomplished by allowing for state-level differences in the behavior analyzed, and to the best of our knowledge, is the first study to explicitly model state-level variation in outcomes for people with disabilities in India. Second, within this state-specific structural framework, we consider differences in results by gender and age of the person with disabilities. Although it is qualitatively recognized that in the population of people with disabilities households with female members and children with disabilities may be most vulnerable, this study breaks new ground by quantitatively assessing how large the differentials actually are for such households in comparison to those without persons with disabilities.

Data used in this analysis are constructed by combining the dedicated disability module and the consumer expenditure module of the NSS 2002. The disability module surveys only those households that have disabled member(s); hence these data alone do not allow a comparison of outcomes with households that have no disabled individuals. In order to create the appropriate data set that facilitates such a comparison, households in the disability module are merged with households in the consumer expenditure module that was fielded in the same year. The data set has information on 32,669 households of which 15,201 households (46.53 percent) have one or more disabled members. 6,533 households (20 percent) have disabled male member(s), 4,822 households (14.76 percent) have disabled female(s), and 4,783 households (14.64 percent) have children with disabilities. Households are the basis of analyses for the random coefficients and OLS models, thus individual-level outcomes are averaged to the household-level for these regressions. The IV Wald estimator regressions are implemented at the district-level. Nationally representative estimates are obtained by using NSS weights.

The NSS has details on different types of disabilities: single, which includes mental, visual, hearing, speech or locomotive, and multiple, which includes more than one category of

impairment (as noted above, this is the manner which disability is defined in these data). Among the disabled under the single grouping, the most common is that associated with hearing (25.56 percent), followed by mental (24.47 percent) and visual (20.73 percent). Less than one percent of the sample (0.34 percent) reports multiple disabilities. For purposes of this study, the different types of disabilities are analyzed together since we do not possess detailed data to model state-level differences in provision of services by disability type. About 43 percent of households with disabilities report being disabled from birth and about 66 percent reside in rural India.

Figure 1 reports the state-wise percent of households with disabled member(s) where the comparison group is households with no person(s) with disabilities. If any household member reports a disability, the disability indicator for that household receives a value of one. Alternatively the indicator is zero if no member within the home has any one (or more) of the five disabilities measured in the data. From Figure 1 it is clear that the highest proportion of households with person(s) with disabilities is present in the states of Kerala, Orissa and West Bengal. For the purpose of analysis, union territories under central government jurisdiction are combined with neighboring states. Further, newly created states such as Chhattisgarh and Jharkhand are combined with the states that they were created from (Madhya Pradesh and Bihar, respectively). This classification system results in 16 state entities as shown in Figure 1.

Figure 2 is a state-wise disaggregation of households with male adult member(s) with disabilities, female adult member(s) with disabilities and children (below 18 years) with disabilities (these gender and age-segregated disability measures are constructed in a similar manner to the creation of the general indicator for disability status at the household-level). The comparison group in each case is households with no person(s) with disabilities. From Figure 2 it is clear that the proportion of households with disabled male members exceeds the proportion

of households with disabled female members across all states. Some part of this may be explained by the fact that women are less likely to report being disabled, or as noted above, be overlooked by enumerators particularly in rural areas. The highest proportion of households with children with disabilities is present in the states of Orissa, Kerala, and Bihar.

Figure 3 paints a picture of average household economic resources among household with and without disabled individuals. As expected, the figure shows that in general, average monthly per capita expenditure is higher in households without person(s) with disabilities. This figure also shows that among households with person(s) with disabilities, average monthly expenditures are highest in the states of Kerala, Punjab, and Haryana.

Summary statistics of household and state characteristics are reported in Tables 1. This table shows that average monthly per capita expenditure is about 31 percent lower in households with person(s) with disabilities as compared to households with able members. Among households with person(s) with disabilities, the negative burden is most pronounced in those with children with mobility and other disabilities. Moreover, households with persons with disabilities are significantly more likely to be rural and have older household heads. Households with members with disabilities are likely to own more land as compared to households without such members; however families with individuals with disabilities are also more likely to have household heads that are illiterate. Families with member(s) with disabilities are also more likely to live in independent structures that are made of unstable materials.

Table 1 further reports summary statistics for state-level services available for persons with disabilities including grants (over Rupees 1 lakh) per NGO to promote action on behalf of the disabled, central assistance for the disabled to purchase aids and appliances, number of special schools for the disabled, number of beneficiaries of loans from the National Handicapped

Finance and Development Corporation (NHFDC), and an indicator for whether there is reservation in government jobs (grade “C” or “D” posts, 1 percent each for visual, orthopedic and hearing) or reservation in educational institutions, or availability of a disability pension of Rupees 75 per month or higher.⁷ The sources for these variables include publications of the Ministry of Social Justice and Empowerment, the NHFDC and Census of India, 2001.

The summary statistics for these variables in Table 1 show that for grants per NGO and amount of central funding for purchase and fitting of devices in particular, mean values are highest for households with child (children) with disabilities. Number of special schools for the disabled also appears to favor households with disabled children and female members to some extent; whereas number of beneficiaries of loans from the NHFDC has the highest mean values in households with disabled adult male and female members. The indicator for reservation in government jobs or educational institutions or availability of a basic pension per month suggests leakage since the proportion is highest among households with no persons with disabilities.

Information on other state attributes including economic and geographic characteristics was obtained from several sources. Data on net state domestic product and state-level rural and urban populations were obtained from the Economic Organization and Public Policy Program (EOPP) database housed at the London School of Economics. Given that the NSSO data are from 2002, these state characteristics were selected from 2001 and merged into the NSSO sample to understand contemporaneous impacts as a function of state attributes in the preceding year. Data on annual rainfall and temperature were obtained from the India Meteorological Department. These data are as of 2000 since 2001 numbers were unavailable. Finally, state-wise data on rural and urban inequality (Gini coefficients constructed from consumption

⁷ “Reservation” implies that jobs or seats in educational institutions are only to be filled by persons with disabilities (are reserved for them). Hence for example, 1 percent of vacancies in government jobs in certain posts may only be filled by those with visual, orthopedic or hearing impairments.

expenditures) measures from 2000 were obtained from the annual publications of the Reserve Bank of India. These were subsequently combined into a single population weighted average measure of inequality for each state using information on rural and urban populations from the EOPP database as weights. Summary statistics for state characteristics in Table 1 indicate that whereas households with person(s) with disabilities reside in states with somewhat higher levels of net state domestic product and annual average rainfall as compared to households with no person(s) with disabilities, such relative differentials are absent when the ratio of rural to total population or the population weighted average measure of inequality is taken into consideration.

V. Results

Random coefficients model

Results from the random coefficients linear regression models are reported in Appendix Table 1. As noted above, these models present a preliminary test for state-level heterogeneity. The comparison group for all columns in this table is households without individuals with disabilities. Overall, the results are as hypothesized. Households with members with disabilities have significantly lower average per capita spending as compared to households in which all members are able. Among those with members with disabilities, the negative burden of disability as measured by reduced average per capita spending is most pronounced in households with male adult person(s) with disabilities followed by households with children with disabilities. Results in Appendix Table 1 show that although households with female person(s) with disabilities also experience reduced per capita expenditures, the magnitude of the decline is not as extreme as in other cases. An explanation for this may be that labor markets in developing countries such as India are often segmented by gender and primarily hire and cater to male workers. Hence there is a significant effect on household income and expenditures when

the main bread-winner in the home is unable to participate in wage or skilled work due to disability. It may also be the case as noted above that when men and women have similar levels of disabilities women are more likely to continue to work. The sizeable relative decline in per capita expenditures in households with children with disabilities likely reflects interrupted labor force participation from time spent caring for the child, and from the additional expenses involved in the provision of this care. That this is indeed the case is evident from the underlying data which indicates that in comparison to households without disabled members, those with disabled members have lower labor force participation rates and higher medical expenditures.⁸

Appendix Table 1 also reports tests of parameter constancy in the random coefficients framework, which is a test for equivalence in coefficient estimates across states. The *p*-values for all outcomes indicate that the null hypothesis can be rejected. This is as expected given India's state-level heterogeneity in drafting and implementing socio-economic policies and regional differences in politics, culture, climate and geography.

OLS with state dummies

Table 2 reports results from the linear OLS and Wald estimator regressions. The OLS estimates are the benchmark against which the preferred IV Wald estimator results that follow are compared. Patterns evident in the random coefficients results resonate here as average per capita monthly spending is significantly lower in families with people with disabilities and this effect is largest in households with adult male members with disabilities. An explanation could be as noted above, that is, this reflects the gender-segmented nature of wage and labor markets in India. However, if families with female individuals with disabilities tend to live in households

⁸ The household mean of an indicator for those who do not work is 0.281 in households with disabled members versus 0.252 in households without disabled members. The annual mean medical expenditure (medicines, tests, doctors' fees and hospital and nursing home charges) in households with disabled members is about Rupees 9000 versus Rupees 8400 in households with able members.

that are female headed (18 percent of our sample), then given the nature of segmentation, the per capita expenditure penalty associated with disability should be more stark in households with female(s) with disabilities. This is especially so when one notes from Table 1 that the percentage of households in which the head is illiterate is highest among households with female person(s) with disabilities. Thus in addition to a labor market segmentation story, it is also likely that the estimate in the third column of the OLS results in Table 2 reflects under-reporting of disability by women and/or the fact that women with disabilities continue to participate in everyday activities. In any case, a comparison of the estimates in columns two and three of the top half of Table 2 leads to the interesting observation that in relation to households that have no members with disabilities, those with disabled adult female(s) have slightly *higher* levels of monthly per capita expenditure (of about Rupees 54, which is 7.5 percent of the average monthly per capita expenditure in households with disabled members) as compared to households with disabled adult male(s). As in the case of the random coefficient estimates, families with children with disabilities have lower average per capita expenditures as compared to those with no members with disabilities. An F-test that the state dummies are jointly zero is rejected in Table 2.

IV Wald estimator

As noted above, the indicator for disability status may not be exogenous due to measurement error and possible correlation with included and omitted variables. In addition to misreporting of disability, endogeneity in the indicator of households with members with disabilities might result due to omitted variables or due to selection on unobservables. For example, in households with more egalitarian preferences, girls with disabilities may not be discriminated against in terms of human capital investments. Such households may thus have less depressed average per capita spending since as adults, these girls might work to supplement

household income. We address these concerns by instrumenting for disability by using a Wald estimator of the form discussed above. The IV Wald estimator results are presented in the bottom half of Table 2.⁹

Before discussing the Wald estimator results, we examine the validity of the instruments as indicated by the first stage regressions shown in Appendix Table 2. This table reports coefficients and standard errors for the identifying instrument from two sets of regressions for each of the four dependent variables: households with person(s) with disabilities, with adult male(s) with disabilities, with adult female(s) with disabilities and with child (children) with disabilities. The first set of regressions for each dependent variable includes household and state characteristics but no controls for state-level heterogeneity. The second set of regressions includes state-level dummies as well and mirrors the first stage specification in the Wald estimator models of Table 2. It is clear that in every case the identifying instrument has a positive and significant impact on the dependent variable indicating that it is relevant. Across the columns the identifying instrument explains between 10 to 13 percent variation in the disability indicator at various levels. Further the F-statistic on the identifying instruments in every column of Appendix Table 2 is above 10 the rule-of-thumb threshold value for sufficient strength. This is consistent with the corresponding *p*-value which strongly rejects the null hypothesis that the identifying instrument is insignificant. These results indicate that the instrument is strong and valid, and that district mean of disability incidence is a relevant, valid and significant determinant of disability status.

⁹ The full set of results for all controls in the Wald estimator models are presented in Appendix Table 3 at the end of the paper. Note that these results indicate that state spending on disability programs increases household expenditures, suggesting that in these specifications, institutional capacity of the state which may be reflected in such spending has a positive impact on the welfare of households with PWDs.

The IV Wald estimator results (based on these first stage regressions) in the bottom half of Table 2 reports that as compared to households with no people with disabilities, those with members with disabilities have average monthly per capita spending that is lower by about Rupees 89 (14 percent of overall per capita expenditures). The smaller magnitude of this result in comparison to the OLS models above suggests that endogeneity caused the OLS estimate to be positively biased. As before, the greatest burden associated with having member(s) with disabilities in the household is reflected in families with children and adult male members with disabilities. The Wald estimator result in the third column indicates that when compared along the average per capita spending dimension, families with female members with disabilities are statistically equivalent to those without any members with disabilities.¹⁰

There is clear statistical evidence for the presence of state-level variation in the models analyzed thus far. In the final section of this study, we shed light on which economic and climate-related state attributes have the strongest implications in this study. Our focus on economic descriptors of states is self-explanatory. As above, climate related factors are particularly important in ensuring food and income security in settings where agriculture is the source of livelihood for the majority of the population. The organizing model for this section of the analysis is based on equation (1) – the difference is relative expenditure effects for

¹⁰ In order to further check the validity of the identifying instrument and these results, we re-estimated the model using the standard two stage least squares (TSLS) technique. The identifying instrument in the first stage is the same as in the Wald estimator models: district mean of the disability indicator at different levels. Results from the TSLS models were broadly consistent with those of the Wald estimator models: the expenditure penalty is highest in households with a child (children) with disabilities and male disabled members; the penalty is not evident in households with females with disabilities. The TSLS models have the further advantage of reporting tests of instrument validity and in all cases, tests reject the null hypothesis that the models are weakly (Kleibergen-Paap statistics) or under-identified (Craig-Donald statistic). Since the equations are exactly identified (one identifying instrument in each case), no test of over-identification (Hansen's J) is reported. Further, tests of endogeneity (equivalent to a Durbin-Wu-Hausman test) strongly reject the null that the disability indicator at the household-level, for males, for females and for child (children), is exogenous. Since we already report results from three alternate specifications in the paper (Random coefficients, OLS and Wald estimator), the TSLS results are not reported but are available on request.

households with and without persons with disabilities are compared at different points in the distribution of five state characteristics in X_j : net state domestic product, ratio of rural to total population in state, average annual rainfall, average annual temperature and a state-specific population weighted Gini measure. We hypothesize that the expenditure penalty in households with disabled members should be lower in states with more resources, low rural to total population ratio, adequate annual rainfall, moderate temperatures and low levels of inequality. To focus the analysis, we compare households with person(s) with disabilities to those with able members without differentiating by gender or age of the member with disabilities.

The Wald estimator results at different points in the distribution of state-specific characteristics are reported in Table 3 which shows coefficients on the indicator variable for a household with persons with disabilities (compared to households with able members) from twenty separate regressions: four regressions (at four separate percentiles) for each of the five state-specific characteristics.¹¹ Each of the twenty regressions includes household characteristics as well as state dummies.¹² Given that the regressions from which the estimates in Table 3 are derived already include controls for state-level heterogeneity and that individual coefficients denote their significance level, we do not further test whether the quartile coefficients at different points in the distribution of specific state-characteristics themselves are significantly different from each other. Indeed the point of this exercise is to examine variations at different quartiles implicitly assuming that differences are statistically discernible, and the relative size of coefficients to standard errors in Table 3 suggests that tests by rows (state characteristics) in this

¹¹ Appendix Table 4 shows the location of states by percentiles of the economic and climate-related state characteristics considered in this section.

¹² Unlike the previous tables, the F-statistics and p -values for the null test of equality of state effects are not reported in Table 3 given space constraints. These are available on request.

table will likely reveal that many of the quartile coefficients are statistically distinct from each other especially in the case of the ratio of rural to total population and the climate variables.

The most obvious source of state heterogeneity is that some states are richer than others and outcomes for people with disabilities may be less severe in relatively well-off states. We find some evidence for this in the first row of results in Table 3. Households with people with disabilities that reside in states with net state domestic product in the lower end of the distribution experience the only statistically significant negative effect on average monthly per person spending. There is no evidence that in the middle to upper parts of the distribution of net state domestic product, families with members with disabilities face any expenditure handicap.

The second state feature we consider reflects the observation that states with larger rural populations may have worse outcomes for people with disabilities. We do find some evidence for this in the second set of results in Table 3; however, the unexpected finding is that the burden of disability is up to three times as severe in states with low rural to total populations. That is, the negative effect on monthly per capita expenditures in households with person(s) with disabilities is relatively large in states that are more urban. An explanation for this may be that while rural India has widespread subsistence farming, income and spending in urban India depends on employment in wage labor markets. If sources of income are not diversified and disability results in job loss, then the adverse expenditure impact may be higher in urban settings.

Next we investigate the impact of the state's climate (rainfall and temperature). As discussed above the idea here is that given the general lack of weather-indexed insurance and widespread reliance on agriculture, outcomes for all households are likely to be more severe in states with extreme climate. The third and fourth sets of rows in Table 3 provide evidence in favor of this idea. In particular, families with members with disabilities in states with relatively

low rainfall (less than the 25th percentile value) experience the largest decline in average expenditures as compared to families with able members. States with relatively more rain (50-75th percentile values) also see significant negative impacts on households with person(s) with disabilities, but the magnitude of the effect is relatively small. Extremes in average annual temperature also appear to matter. In particular, although residence in relatively cold states has some effect on relative monthly spending, residence in states with the highest annual temperatures has a relative negative impact that is almost five times in magnitude. The rainfall and temperature estimates in Table 3 emphasize that as compared to families with able members, household income for those with members with disabilities is especially vulnerable in states that experience extremes in weather patterns.

The final set of results in Table 3 relate to state inequality measured by a population weighted average Gini measure. The intent here is to gauge whether the relative burden borne by households with people with disabilities is higher in states that are more unequal. There is some descriptive evidence in favor of this notion in the case of developed countries such as the United States (Parish *et al.* 2012). In the absence of social safety nets and other programs for adults and children with disabilities, this may be particularly evident in developing countries such as India. The fifth set of results in Table 3 report estimates related to the inequality measure we employ. Surprisingly, hardships faced by families with persons with disabilities are not largest at the upper tail of the distribution (most unequal states) but in the low to moderate range (25th to 50th percentile). The coefficient in Table 3 indicates that among states in this range, families with disabled members have per capita monthly spending that is lower by around Rupees 238 (37 percent of overall average monthly spending) as compared to other families with healthy members. This effect is large and an explanation may arise from a cause of inequality in

poor countries such as India. As is well understood, ownership of factors of production (land, capital, and labor) has direct implications for inequality and since ownership of land tends to be concentrated, states in which there is cultivable land will be less equal. In our data, the states that fall in the 25th to 50th percentile of inequality include Punjab and West Bengal, two of the most fertile areas in the country. Thus differences in average monthly spending are discernible in this range since households with members with disabilities (who tend to be more poor with fewer assets) in these states are even more deprived than households with members with disabilities in the overall data. On the other hand, states with low levels of inequality (Assam, Bihar, and Jammu and Kashmir) have households that are all uniformly poor (only asset is unskilled labor). Average expenditure differentials between families with and without members with disabilities are thus less likely to be evident in this sub-group of states. This is true for the most unequal states as well (Karnataka, Kerala, and Tamil Nadu) since in this group, households with people with disabilities are relatively better off in comparison to the general population of families with individuals with disabilities (these southern states have high rates of literacy and are socio-economically and culturally more progressive in comparison to the rest of India).

In sum, the burden of disability as measured by relative deficits in household average monthly per capita spending is most apparent in states with fewer resources, those that experience extremes in rainfall and temperature and rank in the low to moderate range of the Gini coefficient measure.

VI. Conclusion and Policy Implications

Outcomes for people with disabilities in India are not consistent with the aims of its disability legislation or its ratification of the UN Convention on the Rights of Persons with Disabilities. By using empirical methods that are cognizant of state-level variations this research

provides evidence of state-wise disparities in the economic well-being of people with disabilities. Under the Constitution of India, primary responsibility for delivery of services and commitments to people with disabilities rests at the state-level. Hence a focus on sub-national entities enables a clear understanding of where implementation may need to be improved. This is relatively evident even from early exploratory results which show that there is little correlation between the institutional capacity of a state and indicators of support for persons with disabilities.

Using an instrumental variables Wald estimator technique that corrects for endogeneity in the indicator of disability status, we find that households with members with disabilities fare significantly worse as compared to households without people with disabilities. In particular, households with individuals with disabilities have up to 14 percent lower average monthly per person spending as compared to families with able members. Similar trends hold when the analysis is disaggregated by gender of the individual with disabilities, however, in comparison to families with male adults with disabilities, those with female adults with disabilities appear to experience no statistically discernible penalty. This is contrary to the widely accepted wisdom that households with women with disabilities are especially disadvantaged and is consistent with Thomas (2005) which notes that when men and women have comparable levels of disabilities, women are more likely to continue to work. The burden for families with children with disabilities is higher than that experienced in households with adult male members with disabilities, but in comparison to the latter, the extent of the burden in child-disabled households is economically small (about 1 percent in magnitude). Tests for parameter constancy across states are almost uniformly rejected indicating the presence of state-level heterogeneity.

These results imply that a way to ameliorate the economic well-being of people with disabilities in India may rest on improving services at the state-level. In particular, a fruitful

route might be to further extend central government aid to this population, particularly households with persons with disabilities in poor states that are subject to extremes in rainfall and annual temperatures. National social assistance programs such as the Indira Gandhi National Disability Pension scheme and the District Disability Rehabilitation Centre (a country-wide program initiated by the Ministry of Social Justice and Empowerment) do exist to provide monthly pensions to people with disabilities between 18 to 59 years living below the poverty line or services to increase self-sufficiency of PWDs. However, many of those who are eligible remain uncovered in part because these are not demand driven schemes. The results of this study call for greater efforts in targeting of eligibility and benefits for similar social assistance schemes. Other forms of central assistance that rectify the omissions of these existing programs may prove helpful in redressing inequities. That such aid may have positive impacts on household welfare is especially clear from the beneficial impact of variables such as central grants to NGOs to promote action on behalf of PWDs and central assistance for purchase of aids and appliances on average monthly per capita expenditures in the models of this study.¹³ State governments too have critical parts to play since anecdotal evidence suggests that people with disabilities are often unaware of their rights and entitlements. A more dedicated role by state institutions to increase service outreach and awareness, perhaps in concert with non-government organizations, would be valuable. This is because with awareness of entitlements, families with members with disabilities will be in a better position to avail of resources dedicated towards them, thus helping to cushion declines in average monthly spending.

¹³ We acknowledge that it is not always the case that central government backed schemes have equally propitious impacts across states; rather, disparities may still remain as effects depend on state's effectiveness in administration. However, we do find that these state-level measures of centrally provided grants have positive impacts on welfare.

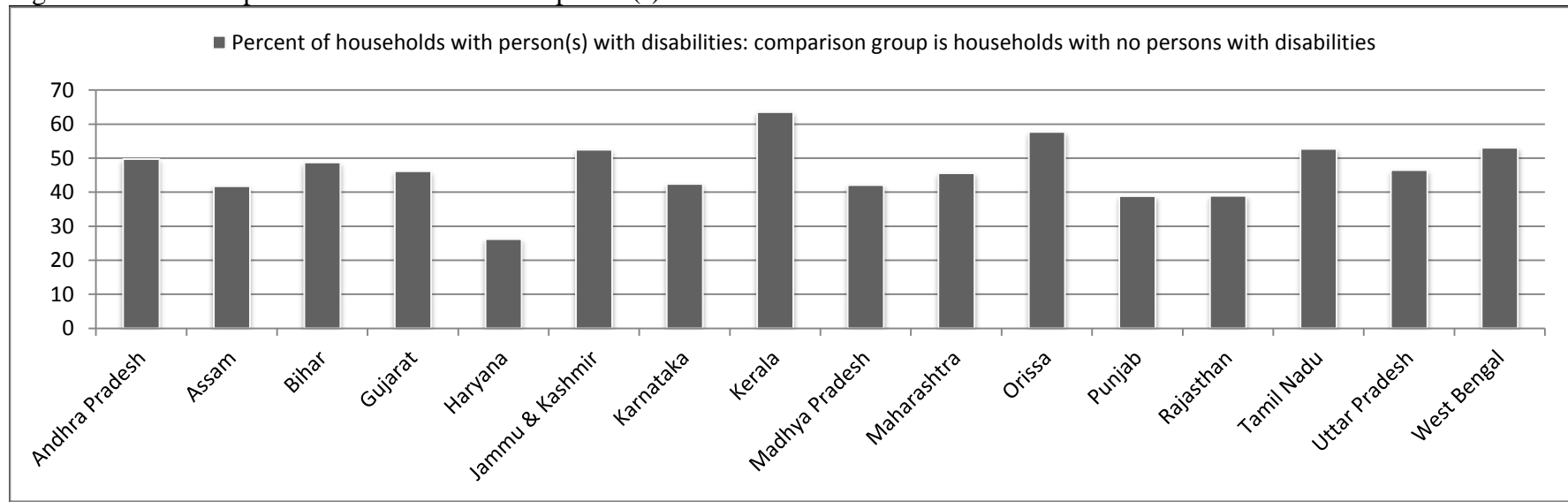
Furthermore, as opposed to aid alone, a more pro-active state-government role in furthering access to small loans (perhaps by acting as a part-guarantor) may be invaluable in relaxing resource constraints for people with disabilities in India. This is particularly so since although this paper does not directly test for borrowing constraints, a variable measuring the number of beneficiaries of loans from organizations such as NHFDC is found to have significant favorable effects on per capita expenditure. Finally, better mechanisms for increasing outreach to smaller administrative units (villages, districts and Panchayati Raj institutions) within a state may bring tangible benefits to people with disabilities and on the most vulnerable section of this population, families with children with disabilities. An example includes construction of schools in villages to accommodate children with learning, visual, hearing and mobility disabilities.

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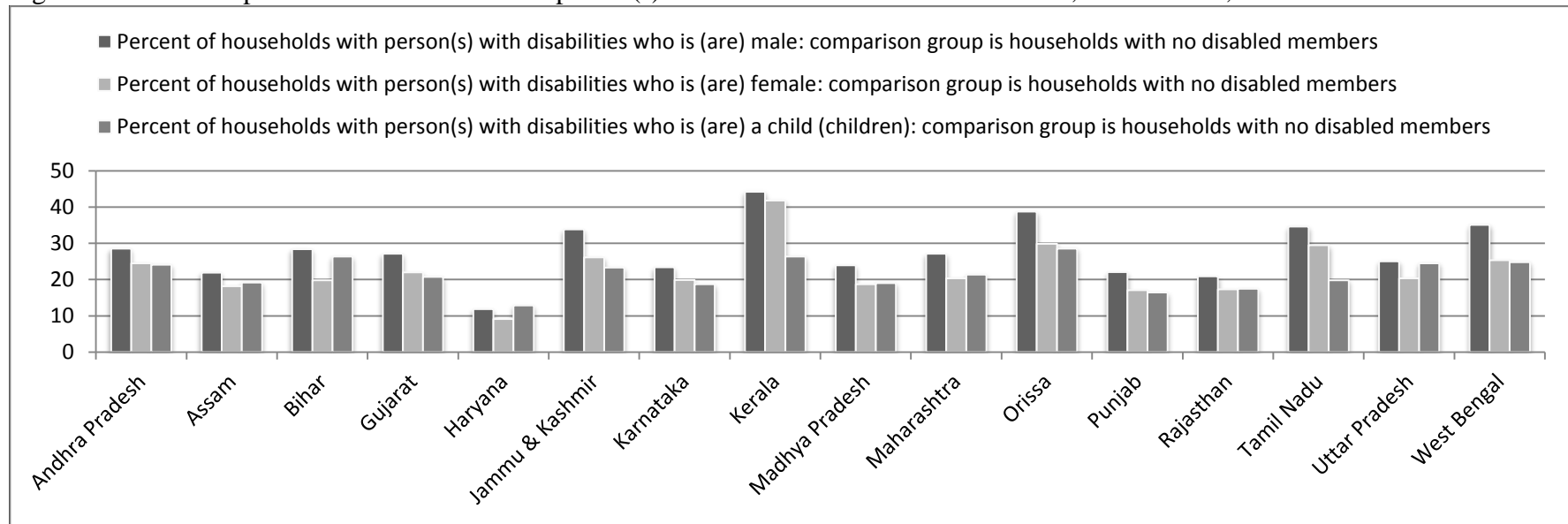
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Figure 1: State-wise percent of households with person(s) with disabilities.



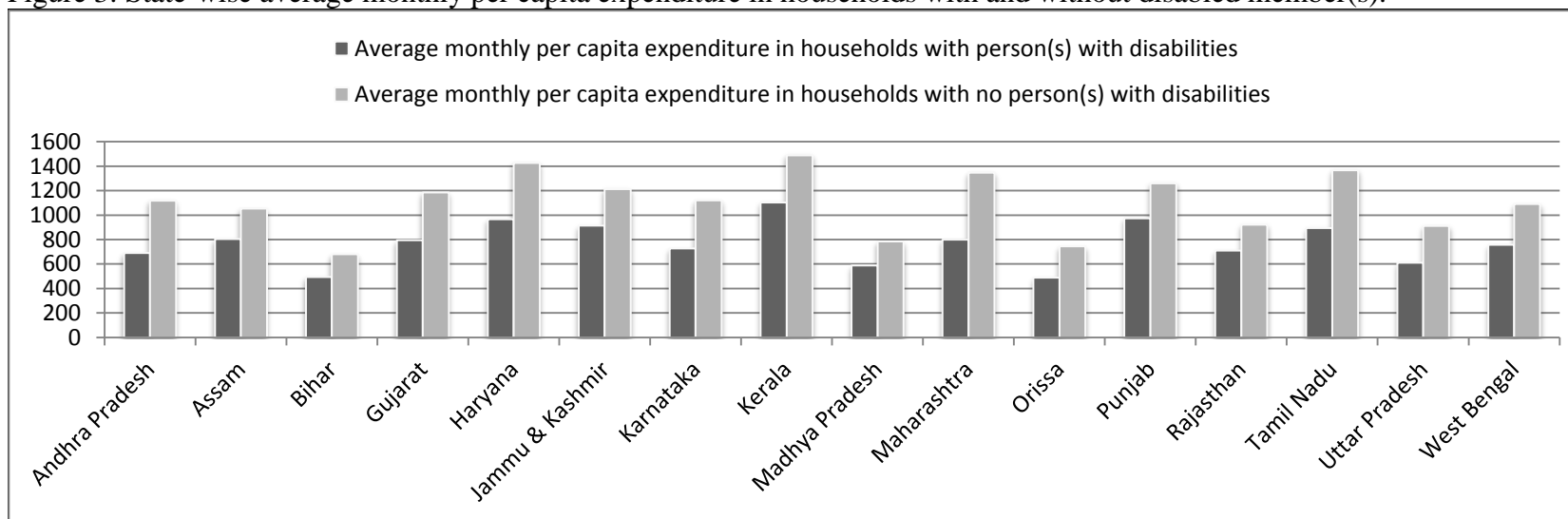
Notes: Author's calculations based on the National Sample Survey 2002. Estimates weighted to national level with weights provided by NSSO (2002).

Figure 2: State-wise percent of households with person(s) with disabilities who are adult male, adult female, or a child.



Notes: Author's calculations based on the National Sample Survey 2002. Estimates weighted to national level with weights provided by NSSO (2002).

Figure 3: State-wise average monthly per capita expenditure in households with and without disabled member(s).



Notes: Author's calculations based on the National Sample Survey 2002. Estimates weighted to national level with weights provided by NSSO (2002).

Table 1: Summary statistics

Variable	Households with no PWDs	Households with PWDs	Households with male PWDs	Households with female PWDs	Households with CWDs
<i>Household- level:</i>					
Average monthly per capita expenditure [†]	1079.402 (1008.492)	744.418 (651.957)	746.709 (579.654)	799.195 (804.971)	684.521 (559.305)
Dummy for rural household	0.498 (0.500)	0.657 (0.475)	0.634 (0.482)	0.657 (0.475)	0.689 (0.463)
Dummy for household religion is Hinduism	0.781 (0.414)	0.770 (0.421)	0.780 (0.414)	0.767 (0.423)	0.760 (0.427)
Dummy for household belongs to Scheduled Caste or Scheduled Tribe	0.278 (0.448)	0.297 (0.457)	0.287 (0.453)	0.286 (0.452)	0.315 (0.465)
Land possessed in hectares	0.591 (1.830)	0.663 (1.681)	0.679 (1.843)	0.669 (1.797)	0.652 (1.560)
Age of household head in years	44.348 (13.991)	46.066 (13.333)	47.743 (13.577)	47.923 (13.733)	42.056 (11.562)
Dummy for household has male head	0.879 (0.326)	0.904 (0.294)	0.967 (0.180)	0.819 (0.385)	0.908 (0.288)
Dummy for household head is not literate	0.288 (0.453)	0.354 (0.478)	0.346 (0.476)	0.362 (0.481)	0.354 (0.478)
Dummy for household lives in an independent structure	0.743 (0.437)	0.828 (0.377)	0.819 (0.385)	0.838 (0.368)	0.831 (0.374)
Dummy for household lives in a structure that is not solid (concrete)	0.112 (0.315)	0.181 (0.385)	0.188 (0.391)	0.172 (0.377)	0.174 (0.379)
<i>State-level:</i>					
Grants (over 1 lakh) per NGO to promote voluntary action for PWDs	9.828 (3.026)	9.941 (3.019)	9.906 (3.022)	9.916 (3.041)	10.004 (2.995)
Amount of central assistance to disabled for purchase/fit. of aids & appliances	456.201 (660.282)	443.546 (657.469)	418.745 (628.224)	423.017 (638.333)	493.928 (702.929)
Number of special schools for the disabled	30.733 (23.460)	31.924 (24.250)	31.436 (23.709)	32.331 (24.566)	32.051 (24.428)
No. of beneficiaries of loans from NHFDC	261.425 (174.031)	260.967 (175.042)	266.701 (174.754)	273.607 (175.129)	242.770 (174.002)
Dummy for govt. job res., educ. inst. res. or availability of pension for PWD	0.813 (0.390)	0.758 (0.428)	0.746 (0.435)	0.742 (0.437)	0.787 (0.410)

Table 1: Summary statistics continued

Variable	Households with no PWDs	Households with PWDs	Households with male PWDs	Households with female PWDs	Households with CWDs
<i>State-level continued:</i>					
Net state domestic product in 2001 (in billion rupees)	1005.898 (570.073)	1034.023 (562.633)	1040.212 (561.760)	1028.375 (555.105)	1039.533 (570.635)
Ratio of rural to total population in 2001	0.735 (0.099)	0.733 (0.100)	0.729 (0.101)	0.729 (0.101)	0.741 (0.099)
Average annual rainfall in mms. in 2000	203.614 (102.189)	217.433 (105.590)	219.983 (107.383)	223.568 (110.672)	207.924 (98.284)
Average annual temperature in degrees Celsius in 2000	26.613 (1.652)	26.855 (1.613)	26.898 (1.608)	26.912 (1.639)	26.768 (1.579)
Population weighted average of rural and urban Gini coefficients	0.257 (0.031)	0.259 (0.032)	0.260 (0.033)	0.261 (0.033)	0.257 (0.031)

Notes: † Denotes dependent variable where monthly per capita expenditure is reported in 2002 Indian Rupees. Author's calculations based on the National Sample Survey 2002. Weighted to national level with weights provided by NSSO (2002). Standard errors in parenthesis. Total number of households is 32669. "PWD" denotes persons with disabilities; "CWD" denotes children with disabilities. Number of households with no PWDs is 17468 and with PWDs is 15201; number of households with male PWDs is 6533, with female PWDs is 4822 and with CWDs is 4783.

Table 2: Ordinary least squares and Wald estimator regressions results for average monthly per capita expenditures.

	Households with persons with disabilities	Households with male person(s) with disabilities	Households with female person(s) with disabilities	Households with child (children) with disabilities
<i>Ordinary least squares with state FEs</i>				
Dummy for disability indicator	-210.212 ^{***} (25.807)	-220.080 ^{***} (29.317)	-165.813 ^{***} (27.135)	-204.440 ^{***} (21.929)
<i>Test of null hypothesis that state fixed-effects are jointly zero</i>				
F-statistic	22014.290 [0.000]	18923.280 [0.000]	99473.330 [0.000]	63726.560 [0.000]
Includes household characteristics	YES	YES	YES	YES
Household observations	32458	23830	22134	22095
Number of states	16	16	16	16
<i>Wald estimator with state Fes</i>				
Average monthly per capita expenditure	-88.833 ^{**} (37.139)	-81.257 ^{***} (25.420)	-18.435 (44.195)	-95.386 ^{**} (43.052)
<i>Test of null hypothesis that state fixed-effects are jointly zero</i>				
F-statistic	1000.240 [0.000]	5495.350 [0.000]	14200.390 [0.000]	1012.790 [0.000]
Includes household characteristics	YES	YES	YES	YES
District observations	509	509	508	509
Number of states	16	16	16	16

Notes: Author's calculations based on the National Sample Survey 2002. Weighted to national level with weights provided by NSSO (2002). In each column, the comparison group is households without persons with disabilities. Robust standard errors, clustered by state, in parentheses. *p*-values in square brackets. Household characteristics included are rural status, whether the religion of the household is Hinduism, whether the household belongs to SC/ST groups, the amount of land owned, age, gender, and literacy status of the household head, and indicators of household structure. The notation ^{***} is $p < 0.01$, ^{**} is $p < 0.05$, ^{*} is $p < 0.10$. Regressions include a constant term.

Table 3: Wald estimator results for different percentiles of state characteristics.

	<i>Outcome: average monthly per capita expenditure in households with person with disabilities compared to households with no persons with disabilities</i>			
	< 25 th percentile	25-50 th percentile	50-75 th percentile	> 75 th percentile
Net state domestic product	-62.096* (29.225) [N=120]	-60.538 (85.604) [N=144]	-127.716 (149.158) [N=117]	-77.606 (99.527) [N=128]
Ratio of rural to total population in state	-258.388* (112.506) [N=129]	-131.740*** (36.990) [N=133]	-46.679 (46.364) [N=133]	-89.781*** (26.710) [N=114]
Average annual rainfall	-150.765* (80.420) [N=137]	-134.002 (129.666) [N=121]	-66.887* (35.740) [N=157]	-75.842 (156.653) [N=94]
Average annual temperature	-49.027*** (14.146) [N=98]	25.509 (77.894) [N=92]	-154.038** (74.076) [N=169]	-243.833** (114.197) [n=150]
Population weighted Gini	-55.322 (41.293) [N=124]	-238.136** (121.115) [N=133]	-53.494 (42.291) [N=141]	-89.232 (92.674) [N=111]
Includes household characteristics	YES	YES	YES	YES
Number of states	16	16	16	16

Notes: Author's calculations based on the National Sample Survey 2002. Weighted to national level with weights provided by NSSO (2002). Robust standard errors, clustered by state, in parentheses; number of district observations in square brackets. Household characteristics included are rural status, whether the religion of the household is Hinduism, whether the household belongs to SC/ST groups, the amount of land owned, age, gender, and literacy status of the household head, and indicators of household structure. Rural status is omitted in the case of ratio of rural to total population in state estimates. The notation *** is $t \geq 1.64$, ** is $t \geq 1.96$, * is $t \geq 2.58$. Regressions include a constant term.

Appendix: Random Coefficients models

To allow for state-level variations in a preliminary comparison of households with and without disabled members, we employ a state-specific random-coefficients linear regression model based on Swamy (1970). Consider the following:

$$y_j = X_j' \beta_j + \epsilon_j$$

Where $j = 1, \dots, n$ denotes a state, and β_j is the ($k \times 1$) coefficient vector for the j^{th} state.¹⁴ X_j is a ($k \times l$) matrix of control variables with $l = 1, \dots, m$. Treating parameter heterogeneity as stochastic implies that

$$\beta_j = \beta + \vartheta_j$$

With $E(\vartheta_j) = 0$ and $E(\vartheta_j \vartheta_j') = \pi$. Swamy (1970) provides a solution to finding $\hat{\beta}$ and $\hat{\pi}$ by noting that the resulting generalized least squares (GLS) estimator from stacking the n equations is a weighted-average of the within-panel ordinary least squares (OLS) estimators (“panel” refers to states). The required parameters are estimated using an approach that includes two stages (where the procedure begins by estimating β_j with OLS) outlined in Swamy (1970). Results of these random coefficients models with conditioning at the state-level are reported in Appendix Table 1. Further, Swamy (1970) provides a test of the null of parameter constancy between the OLS estimate of β (disregarding the panel structure) and the weighted average of the within-panel OLS estimators. This is a test of whether statistically equivalent estimates may be obtained by pooling the models and ignoring cross-panel variations. Johnston and DiNardo (1997) shows that the test in Swamy (1970) is essentially the same as a test of the null that the estimated coefficients are equal in a generalized group-wise heteroskedastic least squares model. Results of these tests, which provide statistical evidence for state-level heterogeneity, are also reported in Appendix Table 1.

¹⁴ For clarity of exposition, this discussion ignores subscripts that pertain to the household.

Appendix: The IV Wald estimator

Relying on the intuition provided in Moffitt (1996) of IV being equivalent to a “comparison in a different dimension” or a “method of aggregation”, we obtain unbiased effects of disability status by regressing mean monthly expenditures at the *district*-level on the *district mean* of the disability indicator. The across-district IV estimator is equivalent to a Wald statistic of the following form:

$$\beta^{IV} = \frac{\bar{E}_1 - \bar{E}_0}{\bar{D}_1 - \bar{D}_0}$$

Where \bar{E}_Z and \bar{D}_Z are the means of expenditure and disability status for the two groups $Z = 1$ and $Z = 0$, where the two groups of Z denote those with and without disabilities. That is, “...IV estimator represents a least squares regression using aggregates taken over E_i and D_i within cells of Z_i .”¹⁵ The across-district IV comparison is valid as long as the variation in disability status across districts is exogenous and not systematically related to differences in average expenditures between households with and without disabled members, and there are no omitted variables that are correlated with the incidence of disability and average household expenditures at the district-level.

¹⁵ Moffitt (1996), p. 464.

Appendix Table 1: Random-coefficients regression results for average monthly per capita expenditure.

	Households with persons with disabilities	Households with male person(s) with disabilities	Households with female person(s) with disabilities	Households with child (children) with disabilities
Dummy for disability indicator	-212.092 ^{***} (13.571)	-219.195 ^{***} (20.747)	-162.483 ^{***} (13.347)	-208.413 ^{***} (15.111)
<i>Test of parameter constancy</i> χ^2 value	2319.89 [0.000]	1663.73 [0.000]	1583.60 [0.000]	1656.32 [0.000]
Includes household characteristics	YES	YES	YES	YES
Household observations	32458	23830	22134	22095
Number of states	16	16	16	16

Notes: Author's calculations based on the National Sample Survey 2002. Weighted to national level with weights provided by NSSO (2002). In each column, the comparison group is households without persons with disabilities. Bootstrapped standard errors, clustered by state, in parentheses. *p*-values in square brackets. Household characteristics included are rural status, whether the religion of the household is Hinduism, whether the household belongs to SC/ST groups, the amount of land owned, age, gender, and literacy status of the household head, and indicators of household structure. The notation ^{***} is *p*<0.01, ^{**} is *p*<0.05, ^{*} is *p*<0.10. Regressions include a constant term.

Appendix Table 2: First stage regressions of identifying instrument for the Wald estimator results.

<i>Identifying instrument</i>	<i>Endogenous variables – Dummy for disability indicator in:</i>							
	<i>Households with person(s) with disabilities</i>		<i>Households with male person(s) with disabilities</i>		<i>Households with female person(s) with disabilities</i>		<i>Households with child (children) with disabilities</i>	
District mean of indicator for household with disabled person	0.921 ^{***} (0.019)	0.927 ^{***} (0.021)						
District mean of indicator for household with male disabled			0.922 ^{***} (0.014)	0.926 ^{***} (0.014)				
District mean of indicator for household with female disabled					0.933 ^{***} (0.015)	0.940 ^{***} (0.015)		
District mean of indicator for household with child disabled							0.917 ^{***} (0.024)	0.918 ^{***} (0.024)
Includes household and state characteristics	YES	YES	YES	YES	YES	YES	YES	YES
Includes state dummies	NO	YES	NO	YES	NO	YES	NO	YES
R-squared	0.103	0.103	0.129	0.129	0.113	0.113	0.098	0.098
F-statistic	2359.60 [0.000]	1983.40 [0.000]	4658.64 [0.000]	4176.72 [0.000]	4126.59 [0.000]	3711.62 [0.000]	1504.40 [0.000]	1457.51 [0.000]

Notes: Author's calculations based on the National Sample Survey 2002. Weighted to national level with NSSO weights (2002). Table reports OLS regressions. Robust standard errors, clustered by state, in parentheses. *p*-values in square brackets. The notation ^{***} is *p*<0.01, ^{**} is *p*<0.05, ^{*} is *p*<0.10. F-statistics are reported for the identifying instrument. Regressions include a constant term and other characteristics as noted in the table.

Appendix Table 3: Wald estimator results for average monthly per capita expenditure.

	Households with persons with disabilities	Households with male person(s) with disabilities	Households with female person(s) with disabilities	Households with child (children) with disabilities
Dummy for disability indicator	-88.833** (37.139)	-81.257*** (25.420)	-18.435 (44.195)	-95.386** (43.052)
Dummy for rural household	-416.439*** (76.960)	-417.619*** (77.530)	-447.948*** (71.354)	-416.954*** (73.933)
Dummy for household religion is Hinduism	-84.869 (59.914)	-83.048 (59.842)	-78.945 (60.267)	-83.743 (58.292)
Dummy for household belongs to Scheduled Caste/Scheduled Tribe	4.023 (50.335)	5.893 (48.855)	9.536 (48.708)	3.993 (49.065)
Land possessed in hectares	5.751 (18.694)	4.854 (18.814)	6.177 (17.659)	7.265 (18.380)
Age of household head in years	3.375 (2.113)	3.740 (2.154)	4.146* (1.951)	2.778 (2.062)
Dummy for households has male head	153.636 (150.681)	153.180 (152.608)	157.208 (150.664)	147.705 (151.348)
Dummy for household head is not literate	-324.978*** (64.135)	-323.324*** (62.727)	-320.808*** (66.186)	-325.314*** (61.095)
Dummy for household lives in an independent structure	-201.737*** (55.222)	-206.148*** (54.811)	-198.530*** (55.834)	-199.367*** (54.498)
Dummy for household lives in a structure that is not of concrete	-20.043 (48.661)	-15.906 (46.955)	-31.695 (41.028)	-23.470 (48.910)
Net state domestic product in 2001	-0.005 (0.022)	-0.005 (0.022)	-0.012 (0.022)	0.001 (0.022)
Ratio of rural to total population in 2001	-	-	-	-
Average annual rainfall	-0.089 (0.107)	-0.090 (0.110)	-0.093 (0.100)	-0.110 (0.108)
Average annual temperature	24.315*** (6.054)	24.449*** (6.448)	21.463*** (6.103)	21.417*** (5.810)
Population weighted average of rural and urban Gini coefficients	-	-	-	-
Grants per NGO to promote voluntary action for PWDs	-37.557*** (4.038)	-37.175*** (4.161)	-34.484*** (3.659)	-37.097*** (4.191)
Amount of central assistance to dis. for purchase/fit. of aid & app.	0.033*** (0.007)	0.033*** (0.007)	0.033*** (0.008)	0.035*** (0.007)
Number of special schools for the disabled	2.306*** (0.296)	2.257*** (0.314)	2.122*** (0.251)	2.292*** (0.313)
No. of beneficiaries of loans from NHFDC	0.534*** (0.065)	0.539*** (0.062)	0.512*** (0.059)	0.546*** (0.061)
Dummy for reservation or availability of pension for PWD	5.040 (18.956)	4.731 (19.121)	2.201 (20.082)	-3.356 (17.175)

Notes: Author's calculations based on the National Sample Survey 2002. Weighted to national level with NSSO weights (2002). Robust standard errors, clustered by state, in parentheses. The notation *** is p<0.01, ** is p<0.05, * is p<0.10.

Appendix Table 4: Location of states by percentiles of state characteristics

	< 25 th percentile	25-50 th percentile	50-75 th percentile	> 75 th percentile
Net state domestic product	Assam Haryana J&K Orissa	Bihar Kerala Punjab Rajasthan	Andhra Pradesh Gujarat Karnataka Madhya Pradesh Tamil Nadu	Maharashtra Uttar Pradesh West Bengal
Ratio of rural to total population in state	Gujarat Karnataka Maharashtra Punjab Tamil Nadu	Andhra Pradesh Haryana J&K Kerala Madhya Pradesh West Bengal	Orissa Rajasthan Uttar Pradesh	Assam Bihar
Average annual rainfall	Gujarat Haryana J&K Orissa Punjab Rajasthan	Andhra Pradesh Bihar Madhya Pradesh	Assam Uttar Pradesh West Bengal	Karnataka Kerala Maharashtra Tamil Nadu
Average annual temperature	Assam J&K Punjab	Haryana Madhya Pradesh Rajasthan	Bihar Karnataka Uttar Pradesh West Bengal	Andhra Pradesh Gujarat Kerala Maharashtra Orissa Tamil Nadu
Population weighted Gini	Assam Bihar J&K	Gujarat Orissa Punjab Rajasthan West Bengal	Andhra Pradesh Madhya Pradesh Uttar Pradesh	Haryana Karnataka Kerala Maharashtra Tamil Nadu

Notes: Author's calculations based on the National Sample Survey 2002. "J&K" denotes the state of Jammu and Kashmir.