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Multidimensional deprivation of persons with disabilities and Community-based rehabilitation: a multilevel impact evaluation

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Abstract
According to the literature persons with disabilities have a higher likelihood of experiencing multidimensional poverty in developing countries because of the institutional, environmental and attitudinal discrimination encountered.
Community-based rehabilitation (CBR) programs are considered an effective approach to reducing multidimensional poverty and promoting the rights and opportunities of persons with disabilities.
The aim of this paper is to explore the impact of CBR programs on the well-being of deprived persons with disabilities from a multidimensional perspective using a multilevel analysis. This approach takes explicitly into account the potential bias due to the fact that persons with disabilities live and interact in different local contexts (villages). Data are obtained from a large scale survey in two districts of Karnakata State (India).
The impact of CBR is positive and significant on deprived persons with disabilities. Its magnitude varies across different dimensions of well-being.

Keywords: multidimensional poverty, impact evaluation, persons with disabilities, community-based rehabilitation, India
JEL: I30, D04, J14

1. INTRODUCTION

Although the prospects for persons with disabilities have progressed in the last decade (WHO & World Bank, 2011; Yeo & Moore, 2003), largely thanks to the impetus of the United Nations Convention on the Rights of Persons with Disabilities (UN CRPD, 2006) and civil society movements, there is still widespread exclusion of persons with disabilities in the development literature. This is partly due to the lack of quality data on disability (Mitra, Posarac & Vick, 2013, p.1); the lack of reliable research hinders the development and implementation of effective rehabilitation policies and programs (WHO & World Bank, 2011, p.119). Often persons with disabilities have been assumed to be very small groups. The study of these groups has been reserved for specialist health or rehabilitation professionals rather than development practitioners. However, according to the *World Report on Disability*, persons with disabilities represent a sizeable proportion (15%) of the world's population and experience multiple deprivations compared to persons without disabilities (WHO & World Bank, 2011; Mitra, Posarac & Vick, 2013). Moreover, disability prevalence has recently been found to be higher in developing countries than developed countries (WHO & World Bank, 2011; Mitra & Sambamoorthi, 2014).

According to Tomlinson, Swartz, & Officer (2009), issues on Community-based rehabilitation (CBR) are among the top ten most relevant and challenging priorities for future research on disability. CBR programs are considered to be an effective approach for promoting the rights and opportunities of persons with disabilities (Mitchell, 1999; ILO, UNESCO & WHO, 2004; *Hartley*, Finkenflugel, Kuipers & Thomas, *2009;* WHO, 2010) and for enabling their participation in the community and society (Sharma, 2007; Biggeri, Deepak, Mauro, Trani, & Kumar, 2013). –Around one hundred countries worldwide are currently implementing CBR programs (WHO, 2010; WHO & WB, 2011, p.13). Although many CBR initiatives have been around for a long time, little is known about what works and why due to limited data collection and research. (Mizunoya & Mitra, 2013, p.39; Mitra, 2006b). Alavi & Kuper (2010) survey 51 studies that evaluated the impact of rehabilitation on Persons with disabilities in Africa, Asia and Latin America. They conclude that the available literature is still limited, especially in terms of evaluating the impact of CBR programs with reference to a control group[1].

It follows that data collection and research are needed to evaluate interventions that attempt to reduce deprivation and further the social inclusion of Persons with disabilities in developing countries.[2] In particular, more longitudinal household surveys that include questions on disability that can be used for impact analysis are desirable. Such studies are rare in developing country contexts (Mizunoya & Mitra, 2013, p.39).

The aim of this paper is to contribute to this area by exploring the impact of CBR programs on the well-being of deprived Persons with disabilities from a multidimensional perspective. This involves using multilevel analysis, which explicitly takes into account the bias introduced by the fact that Persons with disabilities live and interact within different contexts, i.e. in villages with different characteristics (possibly unobserved). The paper uses data from a large scale survey in two districts of Karnakata State (India) collected during research conducted by S-PARK/CBR (Samagama Participatory Action Research and Knowledge). In India CBR programs are quite diffused (O'Keefe & HDU SEAR, 2009).

The structure of the paper is divided into five sections. Following this introduction, the second section introduces the background of the research, presents the theoretical frame based on the WHO's CBR guidelines Amartya Sen's (1999) capability approach, and the UN CRPD (2006).

Our case study is also described. In the third section, the data and methods are presented. In the fourth section the main results regarding the impact of CBR (including potential spillover effects) are reported. In the final section the findings are discussed and analyzed.

2. BACKGROUND

a) The CBR and the theoretical framework

Our theoretical approach is based on a dialogue between Sen's capability approach (Sen, 1999), the WHO's CBR guidelines and the UN CRPD. According to the literature Persons with disabilities have a greater chance higher likelihood of experiencing multidimensional poverty "because of the institutional, environmental and attitudinal discrimination faced, from birth or the moment of disablement onward" (Yeo & Moore, 2003, p.572; Braithwaite & Mont, 2009; Trani & Loeb, 2010; *Groce*, Kett, Lang, & Trani *2011;* Trani & Cannings, 2013). The analysis of factors affecting the poverty and well-being of Persons with disabilities is relevant in development research; this involves disentangling the negative interaction between individual characteristics (internal conversion factors including e.g. impairments) and other conversion factors (both environmental and societal) (Robeyns, 2005; WHO, 2001, p.213). These conversion factors may produce material and immaterial barriers to opportunities for functioning (i.e. the capability set) and, in particular, towards participation in economic and social life for persons with health conditions (Mitra, Posarac, & Vick, 2013, p.1; Clark, 2012).

The UN CRPD has refined the social disability model within a human rights framework to promote the removal of obstacles, barriers and forms of discrimination that promote disadvantage, and to create new impulses towards equal opportunities and non-discrimination through self and social empowerment (Oliver, 1996; Griffo, 2008, Barbuto, Biggeri, & Griffo, 2011, p.193). The UN CRPD article on 'Habilitation and Rehabilitation' appeals for more active participation of Persons with disabilities and their caregivers through "… appropriate measures, including through peer support, to enable persons with disabilities to attain and maintain their maximum independence, full physical, mental, social and vocational ability, and full inclusion and participation in all aspects of life" (Art. 26, UN, CRPD 2006). To achieve this end "States Parties shall organize, strengthen and extend comprehensive services and programs, particularly in the areas of health, employment, education and social services". They should also "support participation and inclusion in the community and all aspects of society", and ensure these are "voluntary and "are available to persons with disabilities as close as possible to their own communities..." (UN, CRPD 2006). Hence, the aim is, to support an independent life for Persons with disabilities and to promote inclusion within the community (Art. 19), to facilitate personal mobility (Art. 20) and to promote functionings and capabilities (Barbuto et al., 2011, p.195).

It is estimated that, under certain conditions, 80% of rehabilitation needs could be met through the use of CBR (DFID, 2000, p.10). The 2010 CBR guidelines (WHO, ILO, UNESCO, & IDDC, 2011) are based on the principles of the Convention as well as on individual and social empowerment that embraces self-advocacy and sustainability. The CBR strategy "promotes the rights of people with disabilities to live as equal citizens within the community, to enjoy health and well-being, [and] to participate fully in educational, social, cultural, religious, economic and political activities" (WHO, ILO, UNESCO, & IDDC, 2011, p.4).

The theoretical frame that guides the CBR programs is the CBR matrix, proposed by WHO guidelines (WHO, ILO, UNESCO, & IDDC, 2011). It consists of five components: health, education, livelihood, empowerment and social participation (Figure 1).

Figure 1. Here

CBR programs are usually designed following the guidelines and taking into account the context and the funds available as well as the priorities of communities. Moreover, CBR programs can activate different components and sub-components of the matrix through several actions, process and procedures implemented by CBR workers. These components are expected to have a multidimensional impact on the quality of life of Persons with disabilities, including a potentially strong influence on the immaterial dimensions of well-being and well-becoming. All these aspects can be linked to the rights expressed by the CRPD and to human capabilities as well as agency (Sen, 1999; Nussbaum, 2003; Mitra, 2006a; Dubois & Trani, 2009; Trani, Bakhshi, Bellanca, Biggeri, & Marchetta, 2011; Biggeri, Deepak, Mauro, Trani, & Kumar, 2013; Deepak, Biggeri, Mauro, Kumar, & Griffo, 2013; Mauro, Biggeri, Deepak & Trani, 2014). For instance, the possibility of 'appearing in public without shame' is one of the most relevant capabilities according to Sen. CBR programs could reduce substantially the stigma towards Persons with disabilities and increase their active participation in society by involving the whole community and thus affecting both Persons with disabilities and collective capabilities and outcomes. Such institutional discrimination is the process by which Persons with disabilities are systematically marginalized by established laws, customs or practices that are rooted in widely shared attitudes, values and beliefs (Yeo & Moore, 2003, p.572).

Combining a perspective on individual capabilities with a territorial and context specific perspective makes it is possible to disentangle, and expand upon, our understanding of CBR effects. According to this territorial people-centered perspective, the impact of a program is measured at the individual level as final outcome, but it also has relevant impacts at local/community level (see STEHD framework in Biggeri & Ferrannini, 2014, p. 39-63). In particular CBR programs can influence the environmental and societal conversion factors as well as the quality of goods and services available for Persons with disabilities, as well as and the individual conversion factors (through direct rehabilitation), affecting the individual capability set throughout feedback-loops. The CBR program actions can break or reduce social exclusion, positively affecting different elements of the disability/poverty cycle presented by Yeo and Moore's (2003, p. 572-573). It also facilitates pro-active action and choice for Persons with disabilities through important feed-back loops (Trani & Loeb, 2010).

By virtue of being a community-oriented program the overall effects of CBR cannot be captured with reference to short term outcomes. Moreover, spillover effects can be expected because actions directly benefiting individual persons may influence the community at large and consequently those who choose not to engage with the program.

Notice that if the success of a CBR program depends on its capacity to collaborate with public and private institutions such as schools, training centers and hospitals (WHO, 2010; WHO & WB, 2011), contextual factors become essential in order to measure impact. From these perspectives, a medium term analysis and a multilevel approach become fundamental in order to get reliable estimates on final outcomes at the individual level. Therefore, in our study final outcomes have been measured from a multidimensional perspective and take into account several covariates at individual, household and community/village levels (see section 3).

b) The dimensions selected as response variables

Following the frameworks mentioned above, we evaluate final outcomes under different dimensions separately, and at the aggregate level. We begin by identifying the main domains/dimensions of well-being and well-becoming to be analyzed. This has been done by drawing on the CBR guidelines and matrix, research carried out through Focus Group Discussions (FGDs) in India. We have identified the following dimensions associated with the CBR program in question as essential for achieving a good life: psychophysical well-being, affection and care, self-care, freedom of choice, health prevention, bodily integrity, communication, social relations, political participation, education and knowledge, work, mobility, sport and recreational activities, housing, respect, spiritual dimension (Nussbaum 2003; Robeyns 2003; Biggeri, Libanora, Mariani, & Menchini, 2006; Biggeri & Libanora, 2011; Biggeri, Bellanca, Bonfanti, & Tanzj, 2011).

These dimensions were condensed into the eight essential capability/opportunity domains listed in Table 1 using four of the five CBR matrix components and sub-components.[3] The first two of these dimensions are linked to the CBR's health component, the third to the livelihood component, the fourth and fifth to the social component and the sixth to the empowerment component. We do not consider the education component as Persons with disabilities captured by the survey vary in age and the impact of education can only be measured for a limited number of young people. The last column of Table 1 considers the link with Nussbaum's tenth central human capability. Two further dimensions are introduced (prior to the quantitative research) from the FGDs mentioned above, both of which emphasize immaterial aspects of well-being.

Table 1. Here

Several Many of these domains can be linked to various sections of the International Classification of Functioning, Disability and Health (ICF) (WHO, 2001; Biggeri et al., 2011).

c) The case study

Our case study is a CBR program supported by the Italian Association Amici di Raoul Follereau (AIFO) in the State of Karnataka (India).[4] This program is administered in the Mandya and Ramanagaram districts by two partner organizations: MOB (Maria Olivia Bonaldo), and SRMAB (Sri Raman Maharishi Academy for Blind) of AIFO. The two organizations have adopted a similar methodology working through trained CBR workers supported by a project coordinator and a supervisor at sub-district level and based on CBR manual (WHO, 2010).

The CBR activities analyzed include: home visits, health awareness, therapy services, referral services, aid/appliance support, assistance for benefits (pension and allowances), assistance for school, educational benefits, non-formal education, school based awareness, support for inclusive education, sports/cultural events, celebration events, legal support, support for marriage, promoting in community events, assistance for social activities, support for loans, support for income activities, support for job, advice for savings, the promotion of Self-Help Groups (SHGs), the promotion of Persons with disabilities organization, and the promotion of HR activities (amongst other things).

The CBR program in Karnataka started in 1997 and, by 2010, had reached a total of 2,045 villages in the districts of Mandya and Ramanagaram, including approximately 22,000 Persons with disabilities (Biggeri et al., 2012).

3. DATA AND METHODS

a) Survey design

The units analyzed in this study were sampled in the districts covered by the intervention (Mandya and Ramanagaram), as well as in a neighboring district (Mysore) for control purposes. From 2001 onwards, more than 1,900 villages were included in the program following a random mechanism. Almost no communities refused CBR, which means that selection bias at the village level is limited. Control villages from the neighboring district are not covered by the CBR program, but otherwise have similar characteristics to the villages included in our study. In all the three areas, Persons with disabilities were selected using a one-stage cluster sample design with villages as primary sampling units. Villages have been stratified according to three variables: the geographical area at sub-district level (*taluk*), the size of the village (above or below 1,000 inhabitants), and the starting year of the CBR program (in covered areas only).

A two-week training program was held in November 2009 for a team of 5 supervisors and 35 interviewers. The program covered theoretical, practical and ethical aspects of the study and included a pilot survey. The main survey was administered between December 2009 and March 2010. Data was collected from 265 villages, including 237 villages covered by the CBR program and 28 villages located in control areas (Table 2). In control areas all Persons with disabilities were interviewed. In the villages covered by the program, only beneficiaries were interviewed, except for 17 villages where all Persons with disabilities were surveyed with the aim of measuring the presence of spillover effects, and estimating the coverage of the program (Biggeri, et al., 2012). Some tests were also undertaken to identify observable variables that may affect the probability to join the program. Results show that wealthier, older people and those experiencing milder disability are less likely to join the program, while caste and gender were not significant. These variables are included in the models, which take into account selection bias due to self-selection of the persons.

A nine question screening tool (based on the WHO's CBR Manual) was used to identify Persons with disabilities in the CBR program and the control areas. The performances of people who didn't join the program for the entire period could not be analyzed due to the low number of people who either dropped out of the program or joined at a later stage (less the 0.5% of the total sample). The survey sample consists of 2,540 respondents, including 1,919 beneficiaries and 621 people in the control group (see Table 2). The analysis below refers to villages where the program started in 2002; thus, the final sample consists of 1,629 Persons with disabilities in 171 villages.

Table 2. Here

Data entry took place between January and May 2010, followed by database management and analysis. Among the beneficiaries, the average response rate was 91.8%, with non-response usually due to lack of availability rather than refusals (Biggeri et al., 2012). A comparison between respondents and non-respondents showed no significant differences with respect to the available characteristics (age, gender, type and severity of disability), thus supporting the assumption of an ignorable missing data mechanism (Little & Rubin, 2002).

b) Response variables and estimation sample

In order to assess the short, medium and long-term effects of the program, outcomes were measured at the time of the interview and through retrospective questions relating to two points in time (2002 and 2006 respectively). In this paper, we analyze the impact of the program over two different periods of time (after four and seven years) with reference to the eight dimensions defined in detail in Table 1. The variables were measured using a Likert scale with four grades, except for `AccesRes` which was constructed by summing the binary objective sub-dimensions of "Having a job", "Having a pension or allowances" and "Possessing a disability certificate". The dimension `AccesRes` is therefore assigned a value between 0 and 3. In addition, an aggregate index was created by taking an un-weighted average of the eight dimension-specific variables, and assigning values between 0 and 3 to the levels of the Likert scale.

The aim of this study is to measure the impact of the program in terms of improving the lives of deprived Persons with disabilities. Therefore, for each dimension the analysis is restricted to Persons with disabilities who experienced specific deprivations at the beginning of the program (2002), that is, Persons with disabilities not achieving the maximum score on the scale (those scoring the maximum are regarded as 'non-deprived'). The share of deprived Persons with disabilities varies across the dimensions considered (ranging from 30% of `PersAuto` to 77% of `GoodHeal`, with an average of approximately 60% across all dimensions). This approach has the virtue of enabling us to separate the impact of the program on deprived Persons with disabilities from the effects on non-deprived persons. The question of whether the program contributes to the well-being of non-deprived Persons with disabilities is not considered as it would require separate analysis.

The improvement of a deprived person with disabilities in a given dimension is measured through the change in the outcome: specifically, for each unit and for both time periods, we define a binary variable taking a value of 1 if the person with disabilities experienced an improvement and 0 otherwise. This approach does not rely on the magnitude of the improvement, thus limiting potential bias from: (i) low reliability associated with the scoring of subjective variables based on recalling retrospective information; (ii) variations in responses due to the way that different respondents perceive and interpret the Likert scale.

c) Control variables

An unbiased estimation of the effect of the CBR program requires controlling for confounding factors. To this end, the effect is estimated through a regression model including covariates at both individual and village level. The covariates have been selected according to previous empirical analyses (Mauro et al-, 2014) and statistical significance. The individual-level covariates measured in 2002 (later denoted with X_{ij}) are gender (binary, 42.2% female), age (mean 28.7 years), presence of a mental disability (binary, 17.2%), level of disability (binary, heavy disability 26.1%), years of education (mean 2.8 years), education received (binary, 47.8% received at least one year of education), having a job (binary, 11.8% of people working), receiving a pension (binary, 40.5% receiving a pension), size of land owned (mean 0.195 hectares per household), and housing quality (binary, 72.0% owning a house made of bricks).

The village-level covariates (later denoted with Z_j) are: size of the village (three categories, 33.9% of villages below 500 people, 18.7% above 1,200), distance from the nearest hospital (mean 4.1 Km), presence of a middle school (binary, 51.4% of villages with a school), distance from a main road (mean 1.7 Km), type of the road entering the village (binary, 76.5% with an asphalt road), presence of a self-help group (binary, 57.9% of villages with a SHG or a member

of a DPO), and share of Persons with disabilities in the village (mean 1.41%)[5]. In addition, two variables were constructed using the averages of individual covariates: namely, the share of individuals in the village scoring 1 in housing quality (mean percentage, 71.9%), and the share of individuals in the village living in a house with a toilet (mean percentage, 30.0%).
For ethical reasons, and to minimize non-response, the scientific advisory committee advised not to collect information on caste and religion in the control sample because of the sensitive nature of these topics. Nonetheless, access to these variables was possible through the project records of the CBR program. This allowed us to undertake a sensitivity analysis, which indicated no caste or religion based discrimination in accessing CBR programs (Biggeri, Deepak, Mauro, Trani & Kumar, Ramasamy, Bakhshi & Giriyappa, 2012; Biggeri, Deepak, Mauro, Trani & Kumar, 2013).

d) The statistical model

The effect of the CBR program on the probability of improving the lives of deprived Persons with disabilities is estimated by means of a random effects logit model, controlling for both individual- and village-level covariates. A random effects model explicitly accounts for the multilevel structure of the data, thus the inferential results are adjusted for the within-cluster correlation (Snijders & Bosker, 2012; Rabe-Hesketh & Skrondal, 2012). For example, a random effects logit model has been used by Francavilla, Giannelli and Grilli (2013) to analyze the probability of attending school in India, where clusters are sets of children with the same mother. In the present application, clusters are villages, which are indexed by $j=1,\ldots,J$, whereas Persons with disabilities within village j are indexed by $i=1,\ldots n_j$. The random effects logit model adopted here is specified as follows:

$$logit[\mathrm{P}(Y_{ij}=1 \mid T_{ij}, S_{ij}, X_{ij}, Z_j, u_j)] = \alpha + \beta_T T_{ij} + \beta_S S_{ij} + \beta_X X_{ij} + \beta_Z Z_j + u_j \ , \qquad u_j \sim N(0, \sigma^2) \qquad (3.1)$$

The response variable Y_{ij} is the binary indicator for improvement on the dimension (1 if the person experienced an improvement, 0 otherwise). The model includes vectors of individual-level covariates X_{ij} as well as village-level covariates Z_j. The individual-level binary indicators T_{ij} and S_{ij} represent the type of treatment: specifically, $T_{ij}=1$ indicates that person i of village j joined the program, while $S_{ij}=1$ indicates that person i of village j did not join the program despite residing in a village covered by the program. Together the indicators T_{ij} and S_{ij} define three groups: (*i*) Persons with disabilities participating to the program ($T_{ij}=1$, $S_{ij}=0$); (*ii*) Persons with disabilities not participating in the program despite residing in villages covered by the program, thus potentially benefiting from spillover effects ($T_{ij}=0$, $S_{ij}=1$); and (*iii*) Persons with disabilities residing in villages not covered by the program ($T_{ij}=0$, $S_{ij}=0$). It follows that the parameter β_T is the net effect of the program on a person who participates compared with someone residing in a control village, while the parameter β_S is the spillover effect of the program as it compares a person not participating but residing in a village covered by the program with someone residing in the control villages.
In the model 3.1 the random effects $u_j \sim N(0, \sigma^2)$ summarize unobserved factors at village level affecting individual outcomes, thus the standard deviation σ measures between-village variations in response that are not accounted for by a simple logistic regression. The exogeneity of the random effects is checked through the Hausman test (e.g. Rabe-Hesketh & Skrondal, 2012) comparing the estimates from model 3.1 with those obtained from the fixed effects version (conditional logit model). Performing the test separately for the eight response variables yields *p*-

values well above the 1% threshold (with the exception of the model for the aggregate index, for which the *p*-value is slightly below the 1% threshold), so there is no evidence of violation of the exogeneity assumption.

4. MULTILEVEL ANALYSIS

a) Model selection and fitting

The multilevel model 3.1 was fitted for each of the response variables defined in Table 1. We focus on the results after four years of the CBR program, and then consider the slight differences found after seven years.

For each response variable we started fitting the model with no covariates (null model), then we added the individual-level covariates, and finally the village-level covariates (full model). Estimates were obtained via maximum likelihood with adaptive Gaussian quadrature (Rabe-Hesketh & Skrondal, 2012) using Stata 12 (StataCorp, 2011). The standard deviation σ of the random effects u_j summarizes the unobserved heterogeneity at village level. For the aggregate index after four years, the estimate of σ decreases from 1.38 in the null model to 1.34 in the model with individual covariates, and to 0.47 in the full model (which is still significant as the *p*-value of the likelihood ratio test is <0.01).

b) Impact Evaluation

The model results are displayed in Table 3 for the improvement after four years and in Table 4 for the improvement after seven years. This subsection summarizes the results of the impact evaluation, namely the treatment and spillover effects, whereas the next subsection considers the control variables. The estimates of the regression coefficients are reported as average marginal effects[6].

The treatment effect after four years is positive and significant for all the dimensions, ranging from 20.8% for expressing own views and participating in the family decisions, to 50.7% for access to resources. The effect on the aggregate index (`AggrIndx`) is 56.5%, which is higher than all the dimension-specific effects (the variables are defined in detail in Table 1).

Table 3. Here

The program has positive and significant spillover effects for two of the outcomes, namely `GoodHeal` (25.5%) and `FreePrej` (17.5%): compared to Persons with disabilities living in control villages, Persons with disabilities living in treated villages have a significantly higher probability of improving their health status and freedom from stigma even if they do not join the program. The spillover effect is relevant also for other response variables associated with community living (i.e. `LsuFrien`, with a marginal effect of 9.8%, and `ExprComm` with a marginal effect of 14.5%). Although these results are not significant due to the limited number of observations (the information was recorded in 17 villages out of 237), they represent an interesting insight that deserves further investigation in future research.

The average marginal effects for deprived Persons with disabilities after seven years show that the CBR program still has a significant impact on all outcomes (Table 4).

Table 4. Here

A comparison with the corresponding effects after four years (Table 3) suggest that, for most outcomes, the effect of the program is largely concentrated in the first four years. In fact, for the subjective outcomes the marginal effects for treated versus untreated Persons with disabilities after four years and after seven years remain similar, while for the objective outcome `AccesRes` the marginal effect substantially reduces over time, causing a reduction also in the impact recorded in the aggregate index. The two significant positive spillover effects found at four years are still relevant at seven years, although the effect on `FreePrej` loses statistical significance.

It is worth noting that a lessening of the marginal effect after seven years does not indicate that the performance of the program is deteriorating. It may well be the result of a reduction in the gap between treated and control Persons with disabilities due to those receiving treatment improving at a faster rate in the early years of the program. This is confirmed by Table 5, which reports the estimated probabilities of experiencing an improvement. The estimated probability $P(Y_{ij}=1|T_{ij},S_{ij},X_{ij},Z_j,u_j)$ is calculated setting an average profile[7] for individual-level covariates X_{ij} and village-level covariates Z_j and allowing T_{ij} and S_{ij} to define the three treatment groups. The estimated probabilities calculated for $u_j=0$, i.e. a mean village, are plotted in Figure 2. For each outcome and treatment condition, Table 5 also reports two estimated probabilities (in parenthesis) which are obtained by setting the random term u_j at two extreme values, namely $-1.96\hat{\sigma}$ and $+1.96\hat{\sigma}$, corresponding to villages whose Persons with disabilities have a low or high unobserved propensity to improve, respectively. In other words, the two probabilities in parenthesis define a 95% interval whose length summarizes the effect of the unobserved village-level heterogeneity.

The estimated probabilities in Table 5 and Figure 2 reveal the patterns underlying the marginal effects reported in Table 3 and Table 4. For a treated person with disabilities the probability of experiencing an improvement increases from four to seven years on all the considered dimensions and on the aggregate index. In particular, the lessening of the marginal effect of access to resources is due to the good result from the control group during the second period (the probability of improvement jumps from 8% after four years to 45% after seven years). The dimension feeling free of prejudice (`FreePrej`) also exhibits an improvement for the control group during the second period (increasing from 5% to 13%). This occurs also for untreated persons in treated villages that increase from 13% to 19% (positive spillover).

Table 5. Here
Figure 2. Here

The aggregate index is constructed as an un-weighted average of the eight dimension-specific indexes. Under this method, any increase in the aggregate index is interpreted as an improvement in the final outcome, making it very sensitive to small changes (an improvement on just one of the eight dimensions will yield an improvement in the final outcome). It is worth considering whether the large marginal effects identified remain significant if a less sensitive method of aggregation is utilized. A widely-used methodology to analyze the association between disability and multidimensional deprivation in the presence of ordinal variables is proposed by Alkire & Foster (2011). This methodology identifies a "poor" person as a function of the number of deprivations experienced, given a set of cutoffs (both at dimension and aggregate level) that must be defined before applying the methodology. As a result, a person may experience a general improvement in one or more dimensions and still remain "poor" if the improvement is not

sufficient. The results obtained using this alternative approach are still highly significant, although smaller in magnitude as expected (the effect after four years varies between 35% and 38% depending on the cutoffs chosen), confirming that CBR programs play a significant role in improving well-being of Persons with disabilities also from a multidimensional perspective.

c) Effects of control variables

The objective of the research is the multidimensional measurement of the impact of the CBR program. It follows that the main role of the covariates is to adjust for selection bias. Nevertheless, it is interesting to briefly consider the effects of the covariates. It is difficult to outline general patterns since the significance and magnitude of the effects are different across dimensions, even though significant effects typically have the same sign across dimensions.

At the individual level, improvements are generally less likely to occur for elderly people, women, people experiencing severe disabilities or mental disabilities, and people owning land. Education has a complex effect: for example, with reference to good health after four years, the marginal effects of 'Education (years)' and 'Education (binary)' are 0.020 and –0.188, respectively, thus educated people are less likely to benefit from improvements unless they study for at least ten years.

At the village level, the effects are rarely significant due to the limited number of villages. Some covariates have a highly significant effect for a single dimension, for example 'Asphalted road' on spending leisure time with friends and 'Presence of SHG or DPO' on expressing one's own views and participating in community decisions. Interestingly, the effect of living in a 'Small village' is positive on good health and negative on the access to resources.

d) Comparison with propensity score matching

The estimated impact of the program yielded by the multilevel model (3.1) is unbiased under the standard unconfoundedness assumption, or 'selection on observables' (Imbens & Wooldridge, 2009). Specifically, the probability of joining the program is assumed to be independent of the potential outcomes conditionally on the individual- and village-level covariates. Propensity score matching is an alternative approach to estimate the impact of the program. This approach allows us to continue relying on the unconfoundedness assumption, while avoiding the specification of a parametric model for the outcome. Therefore, propensity score matching can be used to check whether the results from multilevel analysis are robust to model misspecification.

The impact of the program on the aggregate index was evaluated separately for the two time periods (four and seven years) based on a propensity score estimated using the same covariates of the multilevel model. A kernel-based approach was chosen to match the units. The counterfactual outcome of each treated unit was calculated via a kernel-weighted average of the outcome of all control units, using the distance between units to estimate the weights. On the basis of 974 treated units and 392 controls, the estimated average treatment effect on the treated at four years is 0.529 (with bootstrap standard error equal to 0.024), whereas the effect at seven years is 0.351 (s.e. 0.026). Such estimates are reasonably close to the average marginal effects yielded by the multilevel model, namely 0.565 at four years and 0.368 at seven years. Therefore, the functional form of the fitted multilevel model seems to be adequate to adjust for the observed confounding factors. In the current analysis, multilevel modeling is preferred over propensity score matching because it allows us to investigate other interesting features, including spillover

effects and the role of individual- and village-level factors. Moreover, the multilevel model yields inferential results which properly account for the within-village correlation.

5. DISCUSSION

Our findings suggest that the CBR program under consideration[8] has significantly reduced the deprivation of Persons with disabilities. This is broadly consistent with the findings of other studies (Mitchell, 1999; Sharma; 2007; Alavi & Kuper; 2010; WHO & World Bank, 2010; WHO et al, 2011; Biggeri, Deepak, Mauro, Trani, & Kumar, 2013; Mauro, Biggeri, Deepak & Trani, 2014). Our analysis also shows that the impact of the program lasts over time, which indicates that this kind of intervention has the potential to tackle deeply entrenched structural problems at the core of the deprivation endured by Persons with disabilities.
The impact of the program varies according to the dimension analyzed. After four years, for deprived Persons with disabilities, the estimated marginal effects are 35.3% for achieving a good health, 30.9% for achieving personal autonomy, 50.7% for having access to resources, 20.8% for expressing their own views and participating in family decisions, 25.3% for spending leisure time with friends, 23.9% for expressing their own views and participating in the community decisions, 37.2% for being free from community prejudice and self-prejudice, and 32.4% for feeling respected by the community. The heterogeneity of the effects across dimensions suggests that the CBR program has different impacts on the quality of life of Persons with disabilities. In particular, the impact on immaterial aspects of well-being is relevant. These results closely follow those reported by Biggeri, Deepak, Mauro, Trani and Kumar (2013) and Mauro, Biggeri, Deepak, and Trani (2014), who analyzed three of the eight outcomes reported above (personal autonomy, expressing their own views, and participating in the family/community decisions) using propensity score matching. The overall impact of the CBR program measured by the aggregate index is remarkably high (56.5%). An alternative definition of deprivation based on the methodology of Alkire & Foster (2011) yields lower effects, although these effects are still relevant.

The marginal effects of treated versus control Persons with disabilities have been estimated at four and seven years from the beginning of the program. For each dimension of well-being, the effects in the two periods are quite similar, which suggests the results of the program are concentrated in the first period and then maintained. Notwithstanding this, it is worth emphasizing the rise in marginal effects for good health, feeling respected and expressing own views in the community. A possible explanation for this pattern is that contrasting prejudices (stigma and self-stigma) and nurturing the capability to express one's self in the community and influence decision making requires continuous activity within the community, with feedback-loops fostering the results over time. Contrary the marginal effect for the access to resources (`AccesRes`) is substantially lower after seven years, causing a slight reduction also in effect recorded in the aggregate index. The patterns of the predicted probabilities for the groups of treated and untreated persons reveals that the aforementioned lessening of the marginal effect after seven years is due to the treated persons improving at a diminishing rate after the first period. This is reasonable since the index for access to resources is based on items, like "job", "disability certificate[s]" and "pension and allowances", which can be obtained only once and

are rarely lost over time. Taking part in the program seems to boost access to resources in the short term, whereas in the long term untreated persons can benefit from spreading the positive effects of the program outside the areas covered by the intervention, thanks to the diffusion of good practices and the actions of different stakeholders (e.g. CBR programs, local authorities, NGOs and, especially DPOs).

The results of the statistical analysis are confirmed by qualitative analysis based on in-depth interviews and focus group discussions conducted before and after the quantitative research and by emancipatory research conducted by the research group (Deepak, Biggeri, Mauro, Kumar, & Griffo, 2013). The Report on Persons with disabilities in India produces evidence that attitudes of society, families and Persons with disabilities themselves contribute to converting impairments into disabilities (HDU/WB, 2007, p.21; O'Keefe & HDU SEAR, 2009). This may indicate that programs based on collective action and community rehabilitation, such as CBR, are a lever of change and produce high effects thanks to synergies within the community itself and within individual and intra-household rehabilitation activities, which are part of the program.

The analysis also shows that the CBR program has positive and significant spillover effects in the dimensions of good health (25.5%) and feeling free of prejudice (17.5%). It follows that living in a village participating in the program is beneficial to people not directly involved in CBR activities, as community involvement contributes to everyone's health and breaks down stigma over time. These indirect effects spread through the community where the CBR is underway producing a ripple effects via the role of CBR networking with DPO in awareness of State and local governments.

The multilevel approach allowed us to appropriately control for both individual- and village-level covariates through a random effects model explicitly accounting for the clustering of persons into villages, so that the inferential results are adjusted for the within-village correlation. The covariates are needed to adjust for selection bias in order to obtain unbiased estimators of the impact of the CBR program. While the estimated coefficients of the covariates need to be interpreted with care, as the sampling scheme was thought to estimate the impact of the program, they are broadly in line with the findings of other studies (Biggeri et al., 2013). At the individual level, improvements are generally less likely to occur for elderly people, women, people experiencing severe disabilities and mental disabilities, and people owning land. In this respect, the Report of the Human Development Unit (South Asian Region) of the World Bank emphasizes that the condition of Persons with disabilities in India may differ significantly, according to the type of disability, the socio-economic outcomes, the social stigma and access to basic social services (HDU/WB, 2007). People with mental illness and intellectual or learning disabilities seem to be particularly deprived and at risk of marginalization (Mitra & Sambamoorthi, 2008). Having a higher education level seems to have a positive effect, although people with no education appear to have higher probability of improving their well-being in comparison to people with little education. As for the village-level covariates, it is worth mentioning that the presence of a SHG or DPO representative in the village has a positive effect on expressing one's own views and participating in community decisions (Biggeri et al., 2013).
CBR activities with adequate monetary and human resources are carried out with success in many areas of India beyond Karnataka. In 2007, approximately 17% of 620 Indian districts were implementing CBR programs (HDU/WB, 2007, p.45). There is evidence (from the papers

presented at the First Congress on CBR programs in Agra, India in 2012) that these programs can readily adapt to different countries and contexts, including both rural and urban settlements (Trani & Cannings, 2013). In fact, CBR programs are present in almost 100 countries worldwide (WHO & World Bank, 2011). The CBR guidelines (WHO, 2011), the good practice Coordination Capacities advocated by AIFO, the networking and implementation services offered by the two NGOs - as good training for CBR workers, good capacities to relate with resources available in the territory - are behind the positive results reported above (see also Sharma, 2009). The actions and the movements expressed by the DPOs and NGOs are strategic elements for positive change and provide stimulus for future improvement in the wake of the First World Congress on CBR Programs in 2012 and other regional and national forums.

6. CONCLUSIONS

The analysis provides four main findings. The first is that the CBR program in Karnataka (India) has a positive impact on well-being of Persons with disabilities. The magnitude of these effects is different across dimensions of well-being. In particular, participation in CBR activities has an impact in terms of modifying attitudes and fighting prejudice and exclusion. Moreover, joining the program has a positive effect on the ability to express one's view as well as the opportunity to participate in community decision making.

The second finding is that improvements stimulated by the program occur mainly within the short-medium period (four years), but they are preserved or even expanded in some dimensions in the long term (i.e., over seven years).

The third finding is that the program affects some dimensions of well-being for Persons with disabilities who choose not to participate in CBR projects as long as they live in treated villages. These spillover effects are difficult to detect for all dimensions with the available sample size. However, the analysis revealed significantly positive spillover effects on the dimensions of health and freedom from prejudice.

Finally in keeping with the existing literature, the multilevel analysis showed that the well-being of Persons with disabilities is affected by several factors at both individual level (such as age, gender, and type of disability) and village level (such as the size of the village, and the presence of SHG or DPO). The multilevel analysis also revealed a substantial unobserved heterogeneity across villages.

These results underline the need for further research to explore the impact of CBR activities on the well-being of people with different characteristics – most notably in terms of the nature of their disability, gender and age. Future research also needs to consider how far contextual factors influence the capacity of CBR programs to promote the quality of life.

References

Alavi, Y., & Kuper, H. (2010). Evaluating the Impact of Rehabilitation in the Lives of People with Disabilities and their Families in Low and Middle Income Countries A Review of Tools, CBM-Germany.

Alkire, S., & Foster, J.E. (2011). Counting and Multidimensional Poverty Measurement, *Journal of Public Economics*, Vol. 95, No. 7-8.

Bakhshi, P., Trani, J.F., & Rolland, C. (2006). *Conducting surveys on disability a comprehensive toolkit*, Handicap-International, Lyon.

Barbuto, R., Biggeri, M., & Griffo, G. (2011). Life project, peer counselling and self-help groups as tools to expand capabilities, agency and human rights. *ALTER-European Journal of Disability Research* Vol. 5(3), pp. 192-205.

Biggeri, M., Libanora, R., Mariani, S., & Menchini, L., (2006). Children Conceptualizing Their Capabilities: Results of the Survey During the First Children's World Congress on Child Labour. *Journal of Human Development*, Vol. 7, n. 1, March.

Biggeri, M., Bellanca, N., Bonfanti, S., & Tanzj, L. (2011). Rethinking Policies for Persons with Disabilities through the Capability Approach: the Case of The Tuscany Region. *ALTER. European Journal of Disability Research*, Vol. 5 (3), pp. 177–191.

Biggeri, M., & Libanora, R., (2011). From Valuing to Evaluating: Tools and Procedures to Operationalize the Capability Approach. in M. Biggeri, J. Ballet, F. Comim (eds), *Children and the capability approach*, Palgrave Macmillan.

Biggeri, M., Deepak, S., Mauro, V., Trani. J.F., Kumar, J.Y.B., Ramasamy, P., ... Giriyappa, R. (2012). *Impact of Community-Based Rehabilitation (CBR) Programs for Persons with Disability in Mandya District (Karnataka, India)*. Report. AIFO.

Biggeri, M., Deepak, S., Mauro, V., Trani, J.F., & Kumar, J.Y.B. (2013). Do Community-Based Rehabilitation programs promote the participation of persons with disabilities? A case control study from Mandya District, in India, *Journal of Disability and Rehabilitation.*

Biggeri, M., & Ferrannini, A. (2014). *Sustainable Human Development (SHD): a new territorial and people-centered approach*, Palgrave Macmillan, New York.

Braithwaite, J., & Mont, D. (2009). Disability and Poverty: A Survey of World Bank Poverty Assessments and Implications, *Alter: The European Journal of Disability Research*, 3(3):219-232.

Clark, D.A. (Ed.) (2012). *Adaptation, poverty and development: The dynamics of subjective well-being*, Palgrave Macmillan, New York.

Deepak, S., Biggeri, M., Mauro, V., Kumar, J.Y.B., & Griffo, G. (2013). Impact of Community-based Rehabilitation on Different Groups of Persons with disabilities. *CBR and Inclusive Development Journal* (DCIDJ), Vol. 24, n. 4.

Department for International Development (2000). *Disability, Poverty and Development*. DFID Issues, London, February.

Dubois, J.L., & Trani, J.F. (2009). Enlarging the capability paradigm to address the complexity of disability. ALTER-European Journal of Disability Research, Vol. 3, pp.2-28.

Francavilla, F., Giannelli, G.C., & Grilli, L. (2013). Mothers' Employment and their Children's Schooling: A Joint Multilevel Analysis for India. *World Development*, Vol. 41, pp.183–195.

Griffo, G. (2008). Mainstreaming human rights of persons with disabilities in all policies. in *Proceeding of the Conference of Council of Europe*, Strasbourg. October.

Groce, N., Kett, M., Lang, R., Trani, J. (*2011*). Disability and poverty: the need for a more nuanced understanding of implications for development policy and practice, *Third World Quarterly 32.8, 1493-1513.*

Hartley, S., Finkenflugel, H., Kuipers, P., & Thomas, M. (2009). Community-based rehabilitation: opportunity and challenge. *Lancet*, Vol. 374, pp. 1803-1804.

HDU/WB (2007). *People with Disabilities in India: from commitments to outcomes*, Human Development Unit, South Asia Region, World Bank

ILO, UNESCO & WHO. (2004). *CBR: A Strategy for Rehabilitation, Equalization of Opportunities, Poverty Reduction and Social Inclusion of People with Disabilities*, Joint position paper, Geneva.

Imbens, G.W., & Wooldridge, J.M. (2009). Recent Developments in the Econometrics of Program Evaluation. *Journal of Economic Literature*, Vol. 47, pp. 5–86.

Kumar, P. (2009). Usage of quotas in the state budget: A case study of Karnataka in India. *Disability Studies Quarterly*, Winter 2009, Vol. 29, No. 1

Little, J.A., & Rubin D.B. (2002). *Statistical analysis with missing data* (2nd ed.). Wiley, New York.

Mauro, V., Biggeri, M., Deepak, S., & Trani, J.F. (2014). The Effectiveness of Community based rehabilitation programs: An impact evaluation of a quasi-randomised trial. *Journal of Epidemiology and Community Health*. pp. 1-7.

Mitchell, R. (1999). The research base of community-based rehabilitation. Disability & Rehabilitation, Vol. 21, pp. 459 – 468.

Mitra, S. (2006a). The capability approach and disability. *Journal of Disability Policy Studies*, Vol.16, pp. 236-247.

Mitra, S. (2006b). Disability and social safety nets in developing countries. *International Journal of Disability Studies*, Vol. 2(1), 43–88, also World Bank Social Protection Working Paper No. 509

Mitra, S., & Sambamoorthi, U. (2008). Disability and the rural labor market in India: evidence for males in Tamil Nadu. World Development, 36(5), 934–952.

Mitra, S., Posarac, A., & Vick, B. (2013). Disability and poverty: A multidimensional study. *World Development*, Vol. 41, pp. 1–18.

Mitra, S., & Sambamoorthi, U. (2014). Disability prevalence among adults: estimates for 54 countries and progress toward a global estimate, Disability and Rehabilitation, 36(11):940-7

Mizunoya, S., & Mitra, S. (2013). Is There a Disability Gap in Employment Rates in Developing Countries?". World Development, Vol. 42, pp. 28–43.

Nussbaum, M. (2003). Capabilities as Fundamental Entitlements: Sen and Social Justice., *Feminist Economics*, 9(2-3), pp.33-59.

O'Keefe, P., & Human Development Unit, South East Asia Region (2009). *People with disabilities from India: from commitments to outcomes.*, Human Development Unit, South East Asia Region, The World Bank.

Oliver, M. (1996). *Understanding disability. From theory to practice*. Basigstoke, New York.

Rabe-Hesketh, S. & Skrondal, A. (2012). *Multilevel and Longitudinal Modeling Using Stata* (Third Edition). Stata Press, College Station.

Robeyns, I. (2003). Sen's Capability Approach and Gender Inequality: Selecting Relevant Capabilities. *Feminist Economics*, 9(2-3).

Robeyns, I. (2005). The capability approach: A theoretical survey. *Journal of Human Development*, 6(1). pp. 93–114.

Sen, A.K. (1999a). *Development as Freedom*, Oxford University Press, Oxford.

Sharma, S.*K.* (2007). Community participation in community-based rehabilitation programs. Asia Pacific Disability Rehabilitation Journal, Vol. 18:146-157.

Sharma, S.K. (2009). Projection of Human Resource Requirement in the Field of Rehabilitation of Persons with Disabilities, Institute of Applied Manpower Research, IAMR Report No. 1/2009, Delhi.

Snijders, T.A.B., & Bosker, R.J. (2012). Multilevel analysis: an introduction to basic and advanced multilevel modelling. 2nd ed., Sage.

StataCorp (2011). Stata Statistical Software: Release 12. Stata Press, College Station.

Tomlinson M., Swartz L. & Officer A. (2009). Research priorities for health of people with disabilities: an expert opinion exercise. *Lancet*, Vol. 374, pp.1857-1862.

Trani, J.F., & Loeb, M. (2010). Poverty and disability: A vicious circle? Evidence from Afghanistan and Zambia, *Journal of International Development*, 24(S1):S19-S52

Trani, J.F., Bakhshi, P., Bellanca, N., Biggeri, M., & Marchetta, F. (2011). Disabilities through the Capability Approach Lens: Implications for public policies. *ALTER-European Journal of Disability Research*, Vol. 5 (3), pp. 143-157.

Trani, J.F., & Cannings, T. (2013). Child Poverty in an Emergency and Conflict Context: A Multidimensional Profile and an Identification of the Poorest Children in Western Darfur. *World Development*, Vol. 48: 48-70.

UN, CRPD (2006), United Nations Convention on the Rights of Persons with Disabilities. http://www.un.org/disabilities/. New York: United Nations.

WHO. (2001). International classification of functioning, disability and health. WHO Press, Geneva.

WHO. (2010). Community-based Rehabilitation manual. World Health Organization. WHO Press, Geneva.

WHO, & World Bank. (2011). *World Report on Disability*. World Health Organization and The World Bank.

WHO, ILO, UNESCO, IDDC. (2011). *Community-based Rehabilitation: CBR Guidelines, Towards Community-based Inclusive Development*. Geneva; 2011.

Yeo, R., & Moore, K. (2003). Including persons with disabilities in poverty reduction work: Nothing about us, without us. *World Development*, Vol. 31(3), pp. 571–590.

Table 1. Features of the response variables selected for the analysis

Name	*Dimension*	*CBR Matrix*	*Type*	*Nussbaum's List*
GoodHeal	To have good health	Health	Subjective	1. Life and 2. Bodily Health
PersAuto	To have personal autonomy	Health	Subjective	2. Bodily Health
AccesRes	To have access to resources (a job or other income source)	Livelihood	Objective	10. Control Over One's Environment B (Material)
ExprFami	To express own views and participate in family decisions	Social	Subjective	4. Senses, Imagination and Thought, 5. Emotions and 6. Practical reason
LsuFrien	To spend leisure time with friends	Social	Subjective	5. Emotions and 9. Play
ExprComm	To express own views and participate in community decisions	Empowerment	Subjective	6. Practical reason, 7. Affiliation and 10. Control Over One's Environment A (Political)
FreePrej	To be free from community prejudice and self-prejudice	Not in CBR matrix	Subjective	7. Affiliation A/B
FeelResp	To feel respected in the community	Not in CBR matrix	Subjective	3. Bodily Integrity and 7. Affiliation
AggrIndx	Overall quality of life (mean across the above dimensions)			Quality of Life

Source: Authors' calculations

Table 2. – Villages and Persons with disabilities by program implementation and type of Persons with disabilities surveyed

Village type	**surveyed Persons with disabilities**	**no. of villages**	**n. of Persons with disabilities**		
			Total	**Treated**	**Control**
Treated	Participants to CBR program only	220	1,731	1,731	0
Treated	All Persons with disabilities	17	366	188	178
Control	All Persons with disabilities	28	443	0	443
TOTAL		265	2,540	1,919	621

Source: Authors' calculations

Table 3. Average marginal effects for deprived Persons with disabilities after four years

	GoodHeal	PersAuto	AccesRes	ExprFami	LsuFrien	ExprComm	FreePrej	FeelResp	AggrIndx
	(n=1,145)	*(n=569)*	*(n=1,200)*	*(n=580)*	*(n=1,074)*	*(n=773)*	*(n=637)*	*(n=432)*	*(n=1,548)*
Treatment variables									
T_{ij} (Treatment effect)	.353 ***	.309 ***	.507 ***	.208 ***	.253 ***	.239 ***	.372 ***	.324 ***	.565 ***
S_{ij} (Spillover effect)	.255 ***	-.061	-.048	-.064	.098	.145	.175 *	-.010	-.003
Individual-level variables									
Age	-.002 **	-.002 *	-.001	-.001	-.002 **	-.003 ***	.000	-.001	-.002 ***
Female	-.018	.008	-.095 ***	-.021	-.029	.016	-.070 *	.022	-.054 **
Mental	-.075 **	-.065 *	-.145 ***	-.061 *	-.065 **	-.092 ***	-.164 ***	-.108 **	-.082 **
Heavy disab	-.064 **	-.053	-.047 *	-.080 **	-.055 **	-.097 ***	-.063 *	-.036	-.032
Education (years)	.020 ***	.024 ***	.013 **	.016	.005	.010 *	.027 ***	.034 ***	.016 ***
Education (binary)	-.188 ***	-.086	-.091 *	.026	-.071 *	-.069	-.157 ***	-.132 **	-.124 ***
Job	-.069	-.047		.086	.022	-.083	-.152 *	-.157 *	
Pension	-.016	.002		.019	-.009	-.021	-.065 *	.019	
Land owned	.000 *	.000	.000	-.001 ***	-.001 ***	-.001 ***	-.001 ***	-.002 ***	.000 **
Housing quality	.034	.012	-.054 *	.006	-.022	-.037	-.037	-.060	-.048 *
Village-level variables									
Housing quality (%)	-.081	-.065	.088	.000	.058	.033	-.037	-.080	.071
Big village	.055 *	-.048	-.039	-.046	-.034	-.038	.013	-.017	-.006
Small village	.153 ***	.026	-.120 ***	-.010	.002	.023	.120 *	.087	-.005
Distance from Hosp.	-.006	-.016 *	.000	-.009	-.001	.012 **	-.019 **	-.015 *	-.008
Presence of middle School.	-.011	-.023	-.066 *	-.016	.045	-.030	.058	-.069	-.001
Distance from main road	-.003	-.005	.020 ***	.009	.007	.005	.000	-.003	.011 *
Asfalted road	.062 *	.043	.065 *	.065	.084 ***	.054 *	.065	-.004	.049
Presence of SHG or DPO	-.026	-.033	.056	.011	.013	.083 ***	-.027	.020	.010
Percentage of PERSONS WITH DISABILITIES	-.001	.000	.000	.000	.000	.000	.000	.000	.000
Percentage of Toilets	-.025	-.065	-.115	-.056	-.088	-.139 **	-.119	-.128	-.042
Village-level st.dev. σ	.341	.477	.330 *	.836 ***	.448 *	.003	.677 ***	.002	.407 **

Legend: * p<0.10; ** p<0.05; *** p<0.01

Source: Authors' calculations

Table 4. Average marginal effects for deprived Persons with disabilities after seven years

	GoodHeal	PersAuto	AccesRes	ExprFami	LsuFrien	ExprComm	FreePrej	FeelResp	AggrIndx
	(n=1,145)	*(n=569)*	*(n=1,200)*	*(n=580)*	*(n=1,074)*	*(n=773)*	*(n=637)*	*(n=432)*	*(n=1,548)*
Treatment variables									
T_{ij} (Treatment effect)	.383 ***	.305 ***	.370 ***	.193 ***	.257 ***	.263 ***	.334 ***	.392 ***	.368 ***
S_{ij} (Spillover effect)	.205 **	-.142	-.051	-.127	.139	.094	.080	-.032	-.016
Individual-level variables									
Age	-.002 **	-.003 **	-.001	-.001	-.002 **	-.003 ***	-.001	.000	-.003 ***
Female	-.020	.010	-.113 ***	-.021	-.030	.007	-.029	.034	-.063 ***
Mental	-.062 *	-.045	-.113 **	-.084 **	-.080 **	-.104 ***	-.162 ***	-.078 *	-.031
Heavy disab	-.070 **	-.063 *	-.042	-.079 **	-.056 *	-.121 ***	-.072 *	-.098 **	-.015
Education (years)	.023 ***	.029 ***	.012 *	.019 **	.004	.010 *	.038 ***	.044 ***	.014 ***
Education (binary)	-.202 ***	-.128 **	-.050	.026	-.053	-.083 *	-.215 ***	-.178 ***	-.072 **
Job	-.052	-.111		.009	-.066	-.069	-.131	-.208 *	
Pension	-.014	-.017		.031	-.004	-.022	-.081 **	.018	
Land owned	-.001 **	-.001	.000	-.001 ***	-.001 ***	-.001 ***	-.001 ***	-.002 ***	-.001 ***
House OQ	.013	.032	-.042	-.026	-.026	-.056	-.009	-.049	-.034
Village-level variables									
Percentage of Toilets	.004	-.091	-.120	-.074	-.076	-.128 *	-.166	-.057	-.013
Percentage of House OQ	-.069	-.153	.062	.066	.103	.049	-.123	-.185	.049
Big village	.059 *	-.048	.026	-.048	-.023	-.043	-.024	.003	.032
Small village	.137 ***	.009	-.015	-.024	.002	.066	.139	.007	.036
Distance from Hosp.	-.007	-.017 *	-.011	-.011	-.003	.012 **	-.021 **	-.009	-.015 ***
Presence of middle School.	-.039	-.024	-.042	-.006	.036 *	-.026	.033 **	-.129 **	.010
Distance from main road	-.001	-.016	.019 **	.004	.004	.008	-.008	-.011	.013 *
Asphalted road	.078 **	.010	.047	.062	.109 ***	.067 *	.029	-.012	.040
Presence of SHG or DPO	-.007	-.004	.054	.017	.022	.086 ***	.021	.040	.002
Percentage of PERSONS WITH DISABILITIES	-.113 *	.001	.014	.001	-.011	-.026	-.005	.010	-.049
Village-level st.dev. σ	.373	.493	.587 ***	.652 **	.506 **	.003	.603 **	.000	.339 **

Legend: * p<0.10; ** p<0.05; *** p<0.01

Source: Authors' calculations

Table 5. P(Y=1 | average profile) for four and seven years on treated, never taker and control Persons with disabilities groups

	GoodHeal	PersAuto	AccesRes	ExprFami	LsuFrien	ExprComm	FreePrej	FeelResp	AggrIndx
Treated (4 yr)	32.90%	36.90%	60.40%	27.40%	26.40%	22.10%	42.10%	38.40%	71.90%
Low-high	*(19.9% - 49.1%)*	*(16.6% - 63.2%)*	*(40.1% - 77.7%)*	*(6.8% - 66.0%)*	*(11.9% - 48.8%)*	*(22.0% - 22.2%)*	*(16.1% - 73.2%)*	*(38.3% - 38.5%)*	*(50.7% - 86.4%)*
Spillover (4yr)	5.70%	2.60%	6.40%	2.30%	4.80%	4.20%	12.70%	4.80%	13.50%
Low-high	*(3.0% - 10.6%)*	*(0.9% - 7.4%)*	*(2.9% - 13.5%)*	*(0.5% - 10.9%)*	*(1.9% - 11.7%)*	*(4.2% - 4.3%)*	*(3.7% - 35.4%)*	*(4.8% - 4.8%)*	*(5.9% - 27.9%)*
Controls (4 yr)	1.10%	4.00%	8.30%	4.20%	2.50%	1.30%	5.00%	5.10%	13.70%
Low-high	*(0.6% - 2.1%)*	*(1.4% - 10.9%)*	*(3.8% - 17.1%)*	*(0.8% - 18.2%)*	*(1.0% - 6.5%)*	*(1.3% - 1.4%)*	*(1.4% - 16.6%)*	*(5.1% - 5.1%)*	*(6.0% - 28.3%)*
Treated (7 yr)	37.30%	39.20%	74.90%	30.80%	27.80%	26.30%	49.20%	46.60%	80.30%
Low-high	*(29.9% - 45.4%)*	*(25.7% - 54.6%)*	*(59.6% - 85.8%)*	*(16.1% - 50.7%)*	*(17.5% - 41.0%)*	*(26.3% - 26.3%)*	*(32.0% - 66.5%)*	*(46.6% - 46.6%)*	*(74.9% - 84.9%)*
Spillover (7yr)	5.50%	2.60%	31.20%	2.80%	8.30%	3.90%	18.90%	3.80%	39.60%
Low-high	*(4.0% - 7.5%)*	*(1.4% - 4.7%)*	*(18.3% - 47.8%)*	*(1.2% - 6.4%)*	*(4.8% - 14.1%)*	*(3.9% - 3.9%)*	*(10.2% - 32.4%)*	*(3.8% - 3.8%)*	*(32.3% - 47.3%)*
Controls (7 yr)	1.60%	6.70%	45.10%	8.40%	3.90%	2.00%	13.40%	4.60%	41.70%
Low-high	*(1.1% - 2.2%)*	*(3.7% - 11.7%)*	*(28.9% - 62.5%)*	*(3.8% - 17.4%)*	*(2.2% - 6.8%)*	*(2.0% - 2.0%)*	*(7.0% - 24.1%)*	*(4.6% - 4.6%)*	*(34.3% - 49.6%)*

Source: Authors' calculations

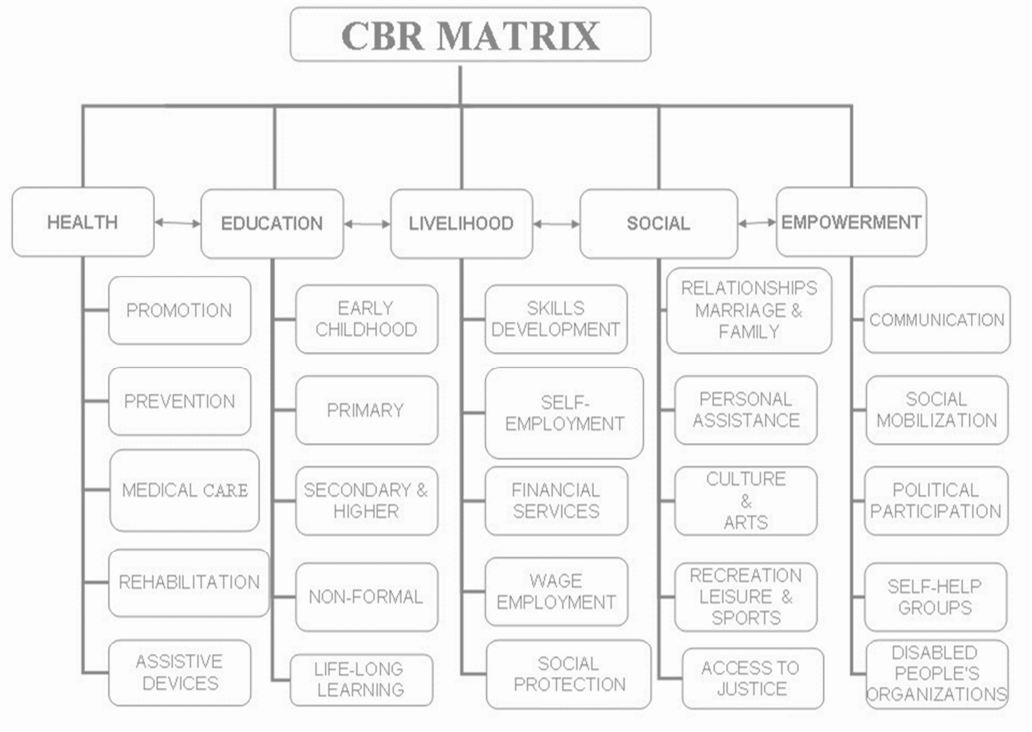

Figure 1. CBR Matrix
Source: WHO, ILO, UNESCO & IDDC, 2011: 25

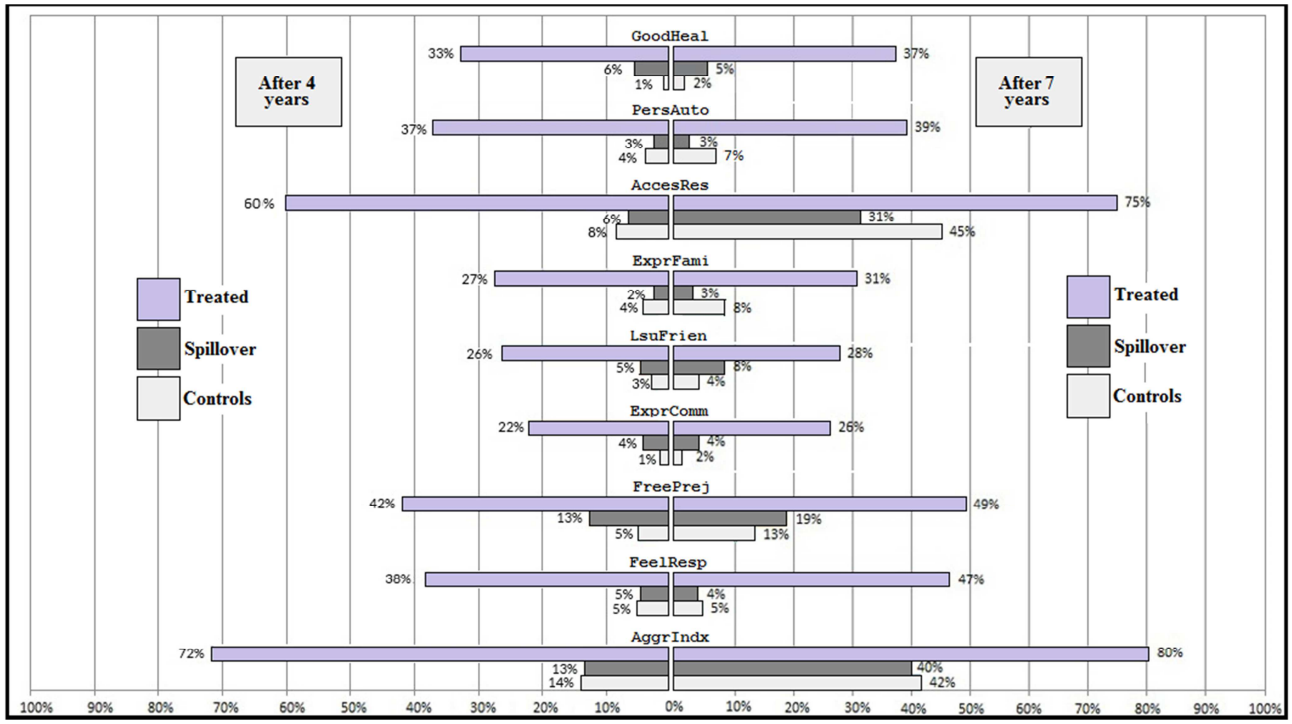

Figure 2. P(Y=1 | average profile) for four and seven years on treated, never taker and control Persons with disabilities groups

Source: Authors' calculations

[1] According to Alavi & Kuper (2010: 29) only two studies evaluating CBR programs or services used a comparison group. It is worth noting that one of these two pieces of research is this study –the S-PARK/CBR coordinated by Sunil Deepak (AIFO) that applied mixed methods (quantitative, qualitative and emancipatory research). Two of the authors of this paper (M. Biggeri and V. Mauro) were involved as scientific director and statistician respectively.

[2] A comprehensive toolkit for conducting surveys on disability is provided by Bakhshi, Trani, & Rolland, (2006).

[3] The terms 'dimension' and 'domain' are used interchangeably throughout this paper.

[4] The NGO AIFO has been active in India for the last fifty years. At present it supports partner organizations running CBR programs in 5 States of India. AIFO India based in Bangalore was fully involved in this research.

[5] All the village-level means were calculated across villages without using weights to adjust for village size.

[6] The marginal effects are averaged over the values of the covariates in the estimation sample (deprived Persons with disabilities for each response variable), whereas the random effect is set to zero, corresponding to a mean village.

[7] As the group of deprived people analyzed is different for each of the response variables, the average profile for covariates X and Z was calculated over all the units of the sample (see section 3c for details).

[8] Following the 1995 Persons with Disabilities Act in India, Karnataka State has allocated the full 3% quota expected to PwD from poverty alleviation programs and schemes for PwD (Kumar, 2009). Karnataka State was amongst the first two states to draft policy in line with the National Policy on PwD (approved by GoI in 2006). The Karnataka Commissioner for Disabilities has also introduced progressive and innovative practices (HDU/WB, 2007, pp.130-134).