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Status and Trend of General Education, Technical Education, and Vocational Education by Persons with Disabilities in India: Reflection of three NSS rounds

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Abstract : The present study attempts to estimate the status and trend in educational achievement, particularly in technical and vocational education among persons with disabilities in India across gender and social groups. 47th, 58th, and 76th round unit-level National Sample Survey data were analyzed using the gender parity index, compound annual growth rate, ordered logit model, and binary logit model. Result shows that though the literacy rate among persons with disabilities in India gradually increases over time, still half of the persons with disabilities were illiterate compared to one-fifth of non-disabled peers. A large section of children with disabilities drops out. The transition of education from school level to higher education, technical and vocational education by persons with disabilities was very slow. Only 4.31 percent, 3.08 percent, and 1.08 percent of persons with disabilities received higher education, vocational education, and technical training in 2018. There was a gradual decrease in gender disparity against women with disabilities and turns in favor of women at all levels of general education. However, gender disparity persisted against females with disabilities, in the attainment of technical and vocational training. The attainment of technical education by males with disabilities was three times higher compared to females with disabilities. Strong caste discrimination still exists in all levels of educational attainment against scheduled castes and scheduled tribes. Educational achievement is negatively related to the severity of the disability, household size, and rural-urban areas, but positively to households' economic status. The study draws important policy implications to improve the education of persons with disabilities.

Keywords: Caste discrimination, Gender discrimination, General education, Persons with disabilities, Technical Education, Vocational Education

1. Introduction

According to the United Nations, persons with disabilities (PWD) are the world's largest minority and comprise 15% of the world's population. In India, PWD consists of 2.2 percent of its population (NSSO, 2019). They can contribute to the country's GDP if their right to decent work is promoted and protected (Biswas & Reddy, 2016). Proper education not only empowers this vast demographic group, but also facilitates them to obtain skills that can accelerate

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productivity. Social welfare will improve significantly (National Policy for Persons with Disabilities, 2006). Unfortunately, persons with disabilities face many problems on physical, social, attitudinal, technological, financial, and discrimination grounds that prevent them from attending school and college. It is required to provide barrier-free education to PWD (NSO, 2017). Some studies also found that many children with disabilities excluded from the education any form (Emin Baris & Uslu, 2009; Munzur-E-Murshid & Haque, 2020; Oliver & Barnes, 2010; Seilan, 2020). Most of them never go to school or pass the elementary level of education (Mukhopadhyay & Mani, 2017; Thohari & Rizky, 2021). According to the United Nations, 90 percent of disabled young people never go to school and become illiterate (United Nations, 2020). Most of them engaged in domestic work (Uromi & Iboku Mazagwa, 2014). Secondary-level passed students with disability deprived of receiving standard curriculum content and institutional support (Stodden, n.d.). In the world, the attainment of education by PWD was low in low-income countries compared to high-income countries, and those PWD who got an education had no capacity development for earning their livelihood due to a lack of employable skills and technical knowledge (Ghoshal, 2018). In a sociological study in Malawi, it observed that the poverty rate among PWD was higher due to social exclusion and exclusion from education (Braathen & Loeb, 2011). According to the 2011 census, 45.48 percent of persons with disabilities were illiterate in India, where women's illiteracy (55.44%) was higher than men's illiteracy (37.63%) (Majumder, 2019). It found that 49 percent of India's population were women in 2018. The percentage women among disabled persons in India at that time was 49. That means women are equally important as men in demographic structure but are neglected regarding access to education and from getting employment. Sometimes girl-children were considered a burden for the family (Kassah et al., 2014; Limaye, 2016). The education gap between men and women increases when we consider persons with disabilities (Bassoumah & Mohammed, 2020). Gender discrimination in the achievement of general education among PWD is a matter of grave concern for their overall development. Section 26 of the Persons with Disabilities Act 1995 provides free and compulsory education for disabled persons up to the minimum age of 18 years (National Policy for Persons with Disabilities, 2006). The Sustainable Development Goal (SDG)-4 also targets to provide equal and accessible education to all disabled persons irrespective of gender and social caste (NSO, 2017). India's New Education Policy 2020 advocated barrier-free access to education for children with disabilities (wecapable.com, 2020). Therefore, education is an instrument in raising standard of living of persons with disabilities. In India, there is legal provision for education among PWD. It has little reflection. Literature on policies for disability provides an analytical synthesis of government social security schemes like income support programs for PWD. Important issue is that most PWD do not have access to primary education. It is an urgent to include them in mainstream education (Mehrotra, 2013).

A. Research Gap:

Existing literature focused mainly on the literacy rate and social security scheme of PWD but higher education, technical and vocational education of persons with disabilities did not receive adequate attention among researchers.

B. Research contribution:

The present study is the first-ever quantitively estimate of the status and trend of attainment of general education, technical education, and vocational education of persons with disabilities in India using a nationally representative vast unit-level database of three rounds of national sample survey (NSS). NSS is the only data source that provides individual-level data on disability (Mishra et al., 2021). The analysis focused on the trend of transition from school-level education to higher education, technical education, and vocational education. The study also attempts to assess whether any gender inequality or caste discrimination prevails in access to education by PWD mainly in technical and vocational education.

C. Objectives:

1) To measure the status and trend of educational attainment (general, technical, and vocational) by persons with disabilities (PWD) in India

2) To assess gender inequality among PWD in educational attainment

3) To assess caste discrimination among PWD in

educational attainment

4) To identify factors that affect access to education by PWD

2. Literature Review

Education is the most effective means of social and economic empowerment (National Policy for Persons with Disabilities, 2006), which transforms the socio-economic lives of the people and thus ensures social mobility (World Economic Forum, 2013). It is the process of feasible learning opportunities for all students within the regular school and college system (Alkaji, 2015; Seilan, 2020). A vast chunk of persons with disability are outside the education system in India (Majumder, 2019). It observed that colleges and universities are not yet inclusive, accessible, and engaging places for persons with disabilities (Evans et al., 2017) Lower admission rates for PWD show that pioneer educational institutions exclude persons with disabilities (Carlson, 2016). Most institutions do not offer services to children with disabilities (Moyi, 2017). The main reasons behind this are social neglect, the absence of a support system in the home and inadequate facilities in educational institutions (Ghoshal, 2018), peer attitude (de Boer & Pijl, 2016), lack of training to key stakeholders, lack of awareness, and poverty (Limaye, 2016). New Education Policy 2020 took a policy initiative to include how to teach students with specific disabilities in every teacher education program (Kumar & Singh, 2022). A study revealed that problem-based learning is an effective tool for boosting students in technical education (Dabir et al., 2022).

Now a days, every aspect of life is encircled by technology (Rajarapollu et al., 2022). Sound technical knowledge and skills will raise productivity and scope of employment (Aron & Loprest, 2012). There is a shortage of skilled and technically sound workforce compared to the demand in India (Fajaryati et al., 2020; Vedhathiri & Ramadass, 2020). A study about B.VOC in New Delhi showed that graduates with vocational training are more likely to be employed and have higher earnings than general graduates. However, the existing vocational education in India is poor in the context of prevalence and poor employability (Balodi, 2021). Other studies found that employability skill is the key to the measurement of quality education for engineering graduates (Dotong et al., 2016; Widarto et al., 2023). The job market demands employability skills in terms of cognitive skills (communication, teamwork, problem-solving) and technical skills should be incorporated into each classroom program (Fajaryati et al., 2020). Employees should also acquire transferable skills to support their careers in the ever-changing job market (Ana et al., 2020). SWOC analysis can enhance the employability skills of students and the placement of an institution (Joshi et al., 2021). Some studies suggested that triangular model is the best way to improve employability skills among students of technical institutions (Shinde & Prasad, 2020). A mechanized learning process with a humanitarian approach will overcome the challenges of technical education (Jha, 2018).

In 1999-2000, the government of India launched a scheme to integrate 25 PWD each year in different Polytechnique colleges under mainstream technical and vocational training. UNESCO New Delhi launched the 2nd edition of the State of the Education Report for India 2020: Technical and Vocational Education and Training (TVET) on 11th December 2020. The report stated that the key to sustainable socio-economic development is skill development through technical and vocational training for the youth, the prime goal under the Skill Development Mission of the Government of India. The report strongly suggested ensuring inclusive access to persons with disabilities, women, SC, and ST in Technical and Vocational Education and Training. TVET has three targets: 1) to boost youth employment with decent work, 2) to reduce gender inequality and social discrimination, and 3) to promote sustainable societies through creating green economies (Wadia & Dabir, 2020). It also observed that multimedia in the form of art will accelerate teaching and learning in TVET (Razali et al., 2023). E-Learning-based interactive multimedia AutoCAD 3D also helps to enhance vocational education (Nurtanto et al., 2021). A high rate of unemployment among PWD was observed due to skill gaps. Students with disabilities have limited access to technical and vocational training (Light for the World, 2020).

Article 21A of the 86th Constitutional Amendment adopted that education is a fundamental right for all children between 6 and 14 years (Government of India, 2002). The Right to Free and Compulsory Education of Children Act 2009 comes into effect on 1st April 2010 (Right of Children to Free and Compulsory Education Act 2009, 2009). It has the provision to provide free and compulsory education for all children of the age group 6 to 14 years

regardless of disability, gender, and social category (Dhar, 2016). According to the act, education will provide the opportunities to gain knowledge, skills, principles, and attitudes of children and young people and make them responsible and active civilians of India. Thus, the human capital of India will become strong in the future (Jolly et al., 2023). Like all children, children with disabilities deserve quality learning to develop skills and realize their full productive potential (Mwoma, 2017; UNICEF, 2021).

3. Material And Methods

We used the nationally recognized most authentic large base of unit-level secondary database of three NSS rounds (47th round in 1991, 58th round in 2002, and 76th round in 2018) on persons with disabilities in India. In the 47th round, 338984 persons were interviewed consisting 69454 PWD. In the 58th round, 407709 persons were interviewed consisting 86745 PWD. In the 76th round, 576569 persons were interviewed consisting 106894 PWD. These data include different quantitative and qualitative variables like types of disabilities, social categories, demographic factors, economic factors, and difficulties in accessing education, health care, and jobs. We also used unit-level data and reports of the 75th round NSS for general people. Besides, we used UNESCO data on primary, secondary, and tertiary school enrolment in India from 1991 to 2012. STATA 12 was used to analyze data. See the appendix for the data set link.

We used the percentage method to calculate the status of educational achievements. We measured the relative achievement of education among men and women by the Gender Parity Index (GPI). This measure was designed, introduced, and observed by UNESCO (Baudot, 2017). GPI is the ratio of the percentage of females to the percentage of males in educational achievement. If GPI =1, there exists gender parity. GPI>1 indicates females are favored compared to males and GPI<1 indicates females are discriminated against compared to males. GPI tends to zero implying disparity against women widens. The trend in educational achievements is represented by line graph and bar graph. We calculated the growth rate of educational achievement as a compound annual growth rate (CAGR) (Grand View Research, 2021). We calculated the disparity in educational achievement among different castes as the ratio of the percentage of PWD of the "other" category social group attained any education level to the percentage of PWD of the disadvantaged social groups (either ST or SC or OBC) attained that education level.

To identify factors that affect access to general education by persons with disabilities, the present study used an ordered logistic regression model (Ademola, 2013; Fullerton & Anderson, 2021). The dependent variable used in the present paper is different levels of general educational achievement in an ordered manner: illiterate=1, primary =2, middle school =3, 10th and 12th class = 4, higher education (graduate and post-graduate) =5.

The probability of a given observation for ordered logit

$$p_{ij} = \Pr(y_j = i) = \Pr(K_{i-1} < x_j\beta + \mu_j \le K_i) = \frac{1}{1+\text{ex}\ (-K_i+x_j\beta)} - \frac{1}{1+\exp(-K_{i-1}+x_j\beta)}$$

μ_j is assumed to be logistically distributed in ordered logit. In either case, we estimate the coefficients β_1,β_2,…… β_k together with the cut-points K1, K2, …, Kk-1, where k is the possible number of outcomes, K0 is taken as-∞ and Kk is taken as +∞.

Side by side we used binary logistic model (Niu, 2020) to find out the factors behind the access to technical and vocational training by PWD.

$$log\frac{P_i}{1-P_i} = a + b_1x_{i1} + b_2x_{i2} \dots\dots\dots\dots + b_kx_{ik},$$

Where i=individual, a=intercept, b=regression coefficient, x=explanatory variables, P_i denotes the probability of occurrence of an event and 〖1-P〗_i denotes the probability of non-occurrence of an event. $\frac{P_i}{1-P_i}$ represents the odds ratio and log $\frac{P_i}{1-P_i}$ is the log of odds ratio i.e., logit. We estimated two logistic regression model, 1st for technical education and 2nd for vocational education. In the first logit model, P_i denotes the probability of a person with disabilities to achieved technical training. Whereas in the 2nd model, P_i denotes the probability of a person attaining vocational training.

4. Results

By analyzing NSS unit-level data, we found that 2.2 percent of people in India were differently abled in 2018. Among persons with disabilities, 58 percent were male and 42 were female. The distribution of persons with disabilities by caste is as follows: OBC (41.7%), SC (26.9%), “other” (general) (23.3%), and ST (8.1%).

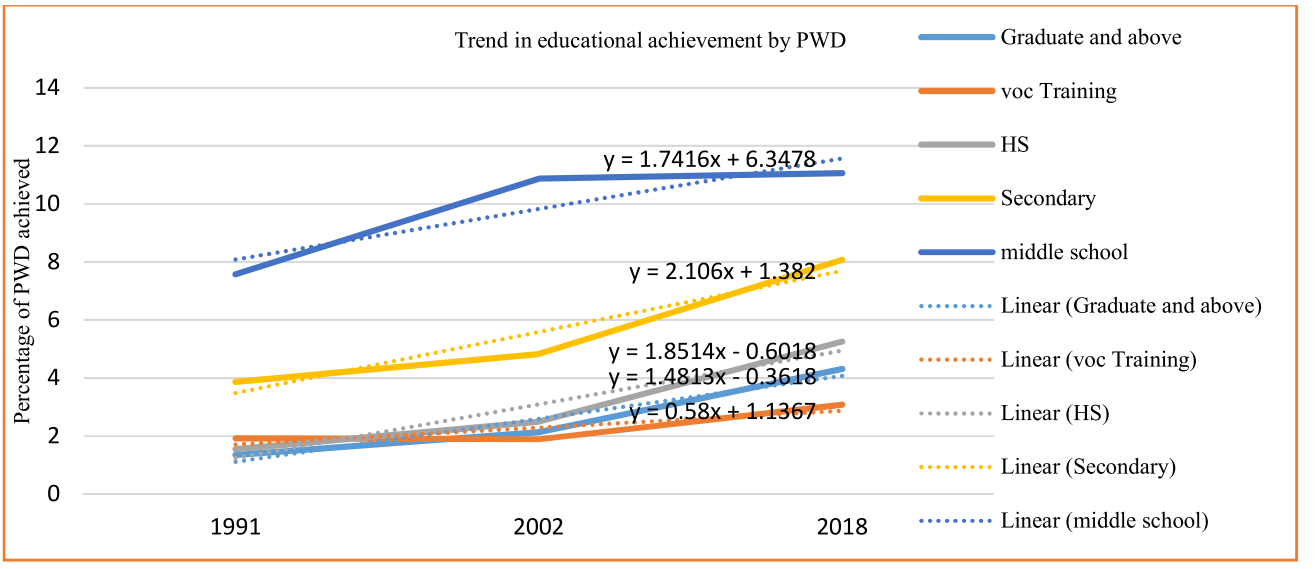

Fig. 1 : Trend in educational achievement by PWD from 1991 to 2018 (Source: Authors calculation from NSS unit level data). Note: Dotted line shows the trend line with the respective trend equation

A.Status and trend of educational achievement by persons with disabilities

It observed that almost half (47.8%) of persons with disabilities (PWD) were illiterate in 2018 (76th round NSS) compared to 22.3 percent of general people in 2017 (75th round NSS). It means the illiteracy rate among PWD was more than double compared to general people. The trend of illiteracy shows a positive side, where illiteracy among PWD fell by 23% from 61.8% in 1991 to 47.8% in 2018. This reflects the outstripping growth in literacy among disabled persons in India during 1991-2018. Again, 12% of PWD were literate below primary, 11.38% of PWD achieved primary education, 11.05% PWD achieved middle school education, 8.08% of PWD completed secondary level, and 5.25 percent achieved higher secondary level education in 2018. On the other hand, attainments of the above level of education were 14%, 16%, 15.48%, 13.58%, and 9.92% in 2017 among general people. The trend (steepness in trend line and coefficient of trend equation in Figure 1) in general education shows impressive progress in school education (Middle School, Secondary, and Higher Secondary) among PWD from 1991 to 2018.

However, the transition to a higher level of education by persons with disability was low in India. 4.31 percent of persons with disabilities passed the graduate and post-graduate levels in 2018. Attainment of technical and vocational education by persons with disabilities was very low at 1.08% and 3.08% in 2018. In the previous two rounds (1991 and 2002) less than 2 percent of PWD received vocational training. It implies there was an improvement in the attainment of vocational training among PWD but slowly (flat trend line with low coefficient of trend equation in Fig. 1). NSS collected data for technical education from 2018, so it is not possible to fit the trend line for technical education over the three periods. Despite that, the percentage of educational achievement by PWD at all levels showed an increasing trend during the study period (Figure 1).

In 2018, 50 percent of vocational trained PWD obtained formal training and the other half received informal training such as hereditary, self-learning, learning on the jobs, etc. Most formally trained PWDs have taken training from IT sectors, electrical and power sector, health care, engineering, textile, and manufacturing sectors. About 50 percent of formal vocational trained PWD received training in the low-profile category. In 2018, among technically trained persons with disabilities, half of them received a technical diploma below the graduate level, one-fourth received a technical degree, and the rest of them received a graduate-level technical diploma. Most PWD in these three categories received training from the engineering field.

A preschool intervention program habituates a kid into the educational environment. We found that 10 percent and 13 percent of children with disabilities

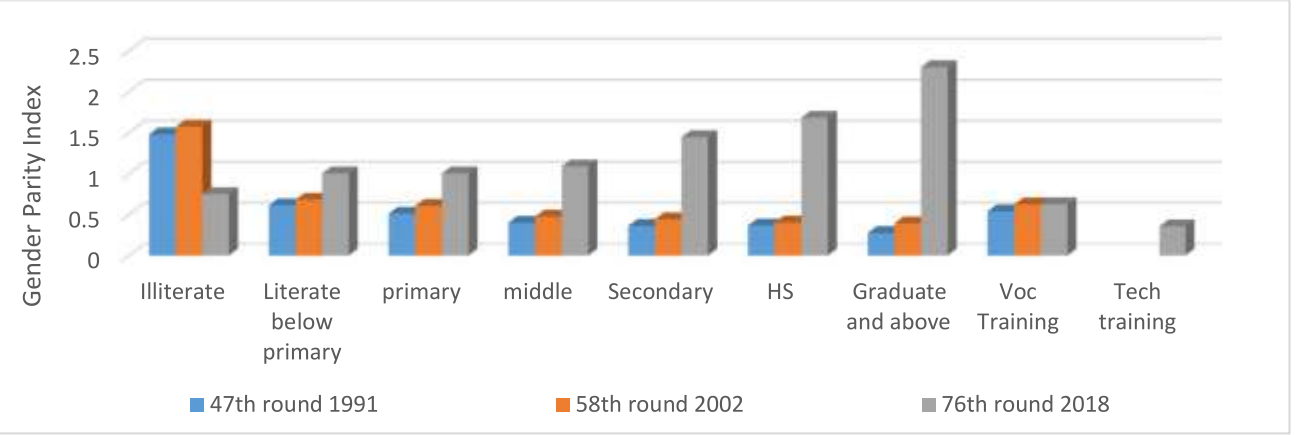

Fig. 2 : Gender Parity Index among PWD in educational achievement in India (Source: Authors calculation from NSS unit level data)

below 6 years of age attended preschool intervention programs in 2018 and in 2002. It indicates that attending preschool intervention programs gradually decreases over time. Learning of children with disabilities in ordinary schools paves the way for inclusive education in which they can learn and grow along with general students with unique value systems. The percentage of persons with disabilities enrolled in ordinary schools was 62.9 in 2018. This enrollment has slowly increased over time in three NSS rounds. Again, for those enrolled in an ordinary school, 36.62% of children with disabilities currently attend school. Among those disabled children who did not enroll in a general school, their enrolment rate in school for PWD is only 5 percent. Of those enrolled in a PWD school, 50 percent of them continued in that school for PWD. This analysis indicates PWD were dropouts from the education system.

Status and trend Gender disparity in access to education among persons with disabilities

In 2018, 48.98 % of men with disabilities and 37.26% of women with disabilities were illiterate. It shows the illiteracy rate among men with disabilities was higher than women with disabilities. In the case of general people, illiteracy was higher among females (29.71%) than males (15.32%). It also shows that the illiteracy rate among disabled men was three times more than among general men. We estimated Gender disparity in educational achievement by the gender parity index (GPI). The estimated GPI in literacy among persons with disabilities was more than one in 2018. Which means gender disparity was in favor of females in 2018. GPI in literacy among persons with disabilities was less than one in 2018. Which indicates gender disparity was against females in 1991 and 2002. Hence, the trend of GPI in literacy indicates gender disparity in literacy against women decreases and turns in favor of females.

The same trend of gender disparity follows in the attainment of secondary, higher secondary, and graduate levels. In all these three levels of education, GPI was less than one in 1991 and 2002 but greater than one in 2018 (Fig. 2). It is an interesting fact about the trend of GPI in educational achievement that with the increase in the level of education gender discrimination improves in favor of females and discrimination is observed highest at the graduate level. However, in the case of access to vocational training, GPI <1 in 1991, 2002, and 2018 indicates that gender disparity exists against women in all three NSS rounds. This disparity against women slowly decreases over time (Figure 2). Again, we found gender discrimination in the automotive, electric, power, and engineering fields of vocational training. The attainment of technical education by males with disabilities was three times that of females with disabilities in 2018, which shows that gender discrimination persists against women in the achievement of technical training in 2018. The persistence of gender discrimination against women was observed in each type of technical education and was observed highest in the engineering field.

In the case of attending a preschool intervention program among children with disabilities, we observed that girls were lagging behind boys. GPI in attending the pre-intervention program, enrolment in an ordinary school, and enrolment in school for PWD by children with disabilities were less than one. This indicates the existence of gender disparity against women. The gender disparity gap in attending pre-

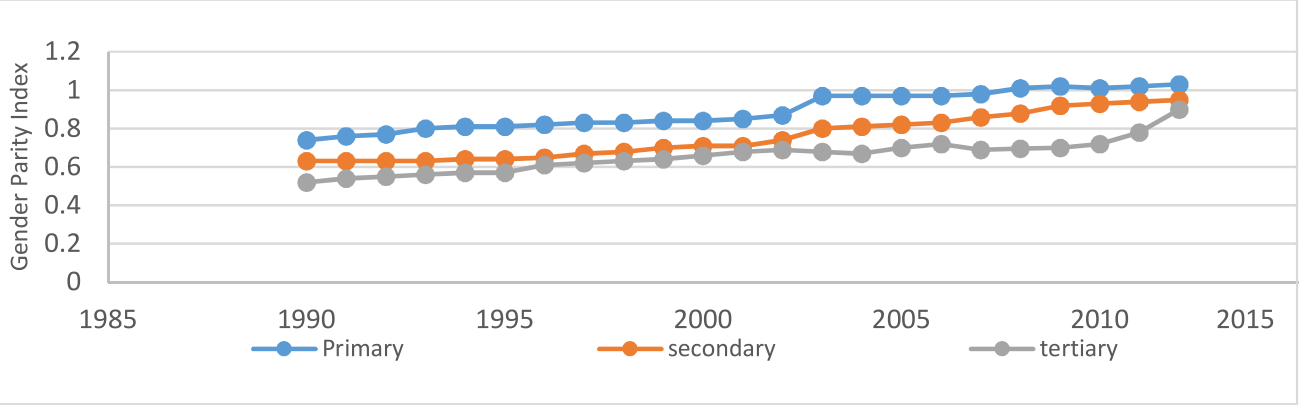

Fig.3 : Gender Parity Index in school enrollment (Source: Authors calculation from UNESCO data)

intervention programs shows a diverging trend and converging trend for enrolment in ordinary schools and a fluctuating trend for enrolment in a school for PWD. GPI on continuation in ordinary school is more than one compared to less than one in school for PWD. We estimated the trend line of GPI in school enrolment in India over the period 1990 to 2012 using UNESCO data (Fig. 3). It revealed that GPI in primary school enrolment of general children in India was more than one (1.03) in 2012, indicates gender discrimination in primary school enrolment was in favor of females. In 1990, GPI in primary school enrolment was 0.74 (less than one). It shows higher gender discrimination existed against women in 1990. The GPI grew at 1.58 percent compounded annually from 1990 to 2012. Again, GPI in secondary and tertiary school enrolment among general children increased from 0.63 and 0.52 in 1990. to 0.95 and 0.9 in 2012.

It shows that gender decimation against women persisted in secondary and tertiary enrolment. However, the growth rate of GPI was 2.19 percent and 1.81 percent compounded annually for secondary and tertiary enrolment during 1990-2012, indicating gender discrimination against women was coming down. It also found that gender disparity against women in enrolment widens with the increase in educational level.

Disparity across social groups on access to education among persons with disability

It found that within the social groups illiteracy among persons with disabilities was higher among Scheduled Tribe (ST) (58%) followed by Scheduled Caste (SC) (54.97%), Other Backward Caste (OBC) (48.98%) and "Others" (36.72%) in 2018. The illiteracy rate among persons with disabilities was double that of general people across all social groups.

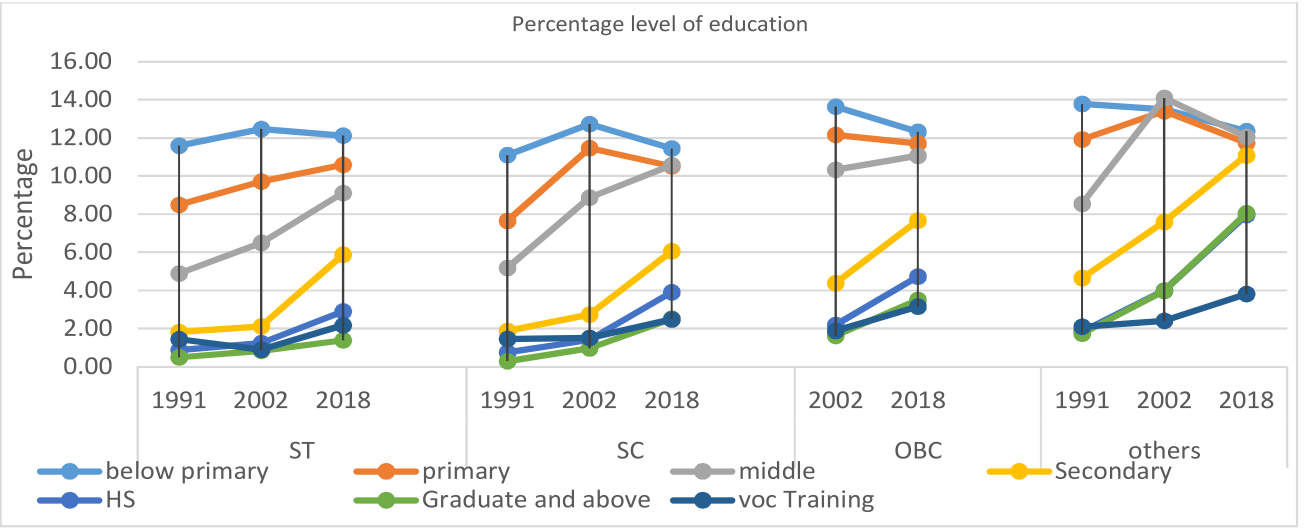

Fig. 4 : Percentage Level of Education by Social Groups in Three NSS Rounds (Source: Authors Calculation From NSS Unit Level Data)

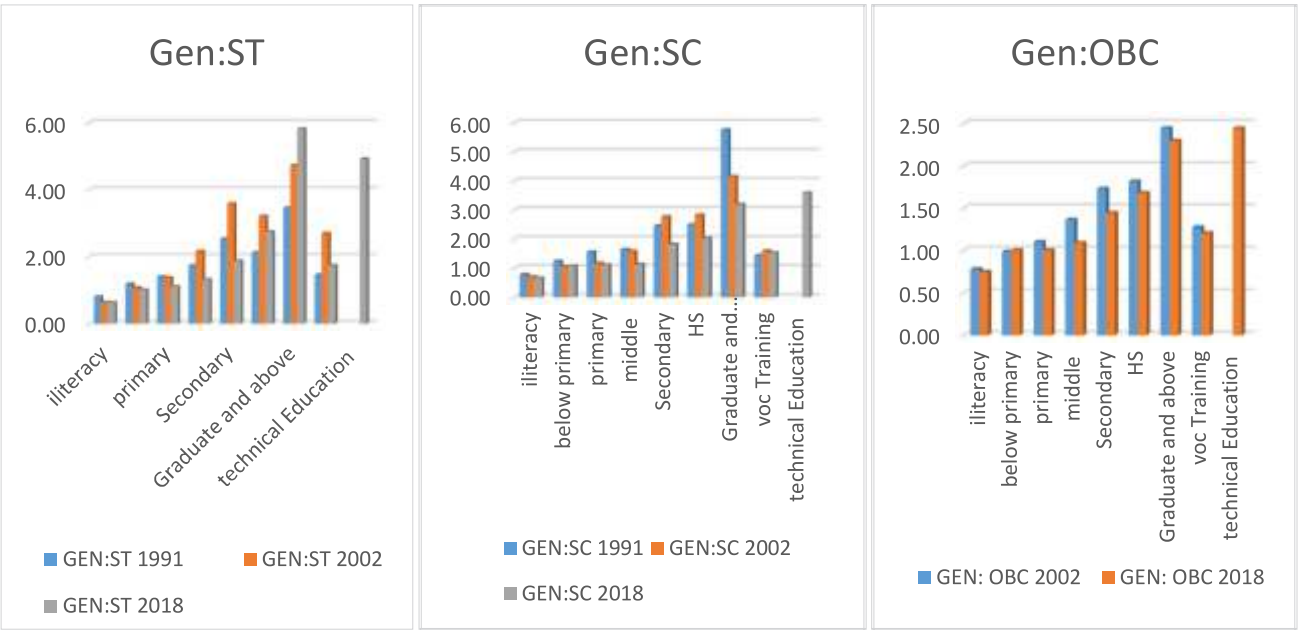

Fig. 5 : Disparity gap in educational achievement among social groups (Source: Authors calculation from NSS unit level data)

The trend shows that the illiteracy rate was higher among disadvantaged sections in all three rounds of NSS from 1991 to 2018 compared to privileged sections. It revealed that the percentage of people who achieved any level of education including vocational education and technical training was highest among other (general) categories of PWD followed by OBC, SC, and ST in all three rounds of NSS. That indicates caste discrimination in the attainment of all educational levels and training existed in all study points against marginalized sections of our society. The trend also shows that educational attainment above primary level among persons with disabilities for all social groups increased from 1991 to 2018 (Fig. 4). This increased rate was highest among SC. Another important aspect is that transition to higher education is the least among disabled ST persons which were estimated as 1.38 percent only in graduate and above level against 2.52% for SC, 3.51% for OBC, and 8.06% for "Others in 2018. Again, achievement of technical education was insignificant among ST (0.42%) and SC (0.52%) persons with disabilities in 2018. Attainment of vocational training by ST (2.18%) was least followed by SC (2.48%), OBC (3.61%), and "Others" (3.81%) in 2018.

We estimated the disparity among social groups by the ratio of the percentage of persons with disabilities who achieved educational levels. All ratios of disparities viz- General: ST, General: SC, and General: OBC were greater than one in the achievement of all education levels including technical and vocational training, and across three rounds of NSS (Fig. 5). It indicates caste disparity persisted in access to education which is in favor of the general caste and against SC, ST, and OBC. The disparity against ST, and SC increases from 1991 to 2002 and thereafter reduces from 2002 to 2018 for secondary and higher secondary levels of education.

On the other hand, in achieving graduate and above level disparity against ST gradually widens over the three rounds but narrows the disparity gap against SC. In the attainment of vocational training disparity against SC and ST rose during 1991-2002 and decreases during 2002-2018.

It revealed that attending preschool intervention programs by children with disabilities decreases for all social groups but increases among ST. We observed the highest growth rate of enrolment in ordinary schools among ST and SC. In the case of continuing in general school, ST and SC children with disability are lagging behind. Enrolment in special schools among ST and SC disabled children is very low at 2.24 percent and 3.91 percent in 2018. However, enrolment in special schools slowly progresses over time among all social groups. Again, continuation in school for PWD was also the least among ST and SC children with disability.

D. Ordered logistic regression model: finding factors of general education

To identify factors that affect the achievement of general education by persons with disabilities, we estimated an ordered logistic regression model. The model considers the following explanatory variables:

Gender: Female =1, male=0,
Age measured in years,
Marital status: if married(yes) =1, otherwise = 0,
Widow: yes=1, otherwise =0,
The severity of disability:
1 for disability less than 40%,
2 for disability of more than 40% but less than 60%,
3 for more than 60% but less than 80%=3 and
4 for more than 80%

Type of disability like locomotor disability, visual disability, hearing disability, mental disability: in all cases yes=1, otherwise =0,

Region: rural=0, urban=1,

Household size: number of family members,

Caste dummy: 1) 1=ST, 0=otherwise, 2) 1=SC, 0= otherwise 3)1=OBC, 0=otherwise

Economic factor: Land: Possession of land (owned + leased in-leased out)

MPCE: household's Monthly Per Capita Expenditure (MPCE)

The result of the Ordered Logistic Regression Model displays in Table I. The study used 103205 numbers of observations of disabled persons of the age group 7 years and above. The P value of the model is 0.000. So, our model is highly statistically significant at 1 percent level. Variable-wise interpretation of the ordered logit model is as follows:

The coefficient of gender is positive and significant at 1% level (p value=0.000) which implies that women with disability got more opportunities for access to education compared to men with disability. With one unit increase in gender (i.e., going from 0 to 1) we expect a 0.72-unit increase in access to education by females compared to men, given that all other variables remain constant. The coefficient of age

Table 1 : Result of ordered logit model: finding factors of accessibility of general education by persons with disabilities

		Coefficient	Stand error	z	P>z
Gender		0.7180	0.0130	55.27	0.000
Age		-0.0275	0.0004	-61.96	0.000
Household size		0.0048	0.0027	1.80	0.071
Married		0.6117	0.0189	32.30	0.000
Widow		-0.3050	0.0286	-10.66	0.000
Severity		-0.0512	0.0067	-7.62	0.000
Locomotor disability		-0.0494	0.0233	-2.12	0.034
speech		-0.2510	0.0251	-10.00	0.000
Hearing		-0.5556	0.0284	-19.55	0.000
Visual		-0.8550	0.0233	-36.75	0.000
Mental disabled		-0.8599	0.0248	-34.71	0.000
Caste dummy	1=ST, 0=otherwise	-0.6905	0.0222	-31.12	0.000
	1=SC, 0= otherwise	-0.7608	0.0184	-41.40	0.000
	1=OBC, 0=otherwise	-0.4948	0.0148	-33.43	0.000
Region		0.6921	0.0138	50.26	0.000
Land code		0.0024	0.0008	3.14	0.002
MPCE		0.0001	0.0000	42.35	0.000
		1E+49			
Number of observations = 103205 Prob. > chi2 0 Log likelihood = -127228					
LR chi2(17) = 25256.18 Pseudo R2 = 0.0903					

Source: computed by authors from NSS, 76th round data, 2018

is negative and significant which implies that educational achievement likely to be more for children and young PWD compare to old aged PWD. he significant and negative sign of the coefficient of severity of disability shows that if disability of a person is more severe, his chance of educational achievement is less and less. The coefficient of all types of disability is negative and significant, which shows that there are different degrees of hindrance in the achievement of education by persons with disabilities. Coefficient values show that the person with mental disability suffered most in accessing education which is followed by visually disabled persons, hearing-disabled persons, speech-disabled persons, and locomotor disabled persons. Mentally disabled persons have 0.86 times fewer chances to achieve any level of education compared to other types of disability. Persons with visual disability suffered 0.85 times in accessing education compared to 'other' types of disability. Coefficients of social groups are negative and significant, which indicates that PWD belonging to SC, ST, and OBC are less likely to attain education compared to the general caste. SC, ST, and OBC populations have 0.76, 0.69, and 0.49 times fewer chances of accessing education than "other" (general) castes. That means caste differences largely affect educational achievement among persons with disabilities. The disparity in achieving a higher and higher level of education widens among disadvantaged groups (SC and ST) compared to a privileged group. The coefficients of economic factors like land and household's monthly per capita expenditure are positive and significant at a 1% level. Achievements in the field of education of persons with disabilities will rise with the rise in the economic condition of the household. The coefficient of the region is positive and significant. It means educational attainment among persons with disabilities is more likely in urban areas than in rural areas.

E Binary Logistic Model: finding factors of technical and vocational education

The study estimated two binary logistic models to find out the factors behind achievement in technical

Table 2 : Result of binary logit model: factors of accessibility of technical and vocational education by persons with disabilities

	Model 1: Technical Education				Model 2: Vocational Education			
	Marginal effect	Std. Err.	z	P>|z|	Marginal effect	Std. Err.	z	P>|z|
Gender	-0.0042	0.0004	-9.69	0.000	-0.0217	0.0028	-7.78	0.000
Age	-0.0001	0.0000	-7.53	0.000	0.0245	0.0003	77.62	0.000
Household size	-0.0002	0.0001	-2.74	0.006	0.0027	0.0006	4.62	0.000
Married	0.0012	0.0005	2.26	0.024	-0.0912	0.0059	-15.48	0.000
Widow	-0.0037	0.0007	-5.52	0.000	-0.0391	0.0049	-8.02	0.000
Severity	-0.0017	0.0002	-8.77	0.000	-0.0007	0.0017	-0.41	0.679
Locomotor	0.0027	0.0008	3.56	0.000	0.0241	0.0057	4.26	0.000
Visual	-0.0032	0.0005	-6.27	0.000	-0.0071	0.0058	-1.23	0.220
Hearing	0.002	0.0011	1.78	0.074	0.0327	0.0073	4.51	0.000
Speech	-0.0017	0.0008	-2.04	0.041	0.0241	0.0073	3.29	0.001
Mental	-0.0017	0.0007	-2.42	0.016	-0.0235	0.0055	-4.27	0.000
ST	-0.004	0.0005	-8.38	0.000	-0.0053	0.0047	-1.14	0.252
SC	-0.0038	0.0004	-9.13	0.000	-0.004	0.0039	-1.02	0.306
OBC	-0.0026	0.0004	-6.4	0.000	-0.0015	0.0032	-0.47	0.639
Region	0.0079	0.0007	12.29	0.000	0.0138	0.0031	4.46	0.000
Land	0.0000	0.0000	1.44	0.149	0.0000	0.0002	0.25	0.803
MPCE	0.0015	0.0000	13.16	0.000	0.0021	0.0000	2.7	0.007
	No. of Observation=97504 Prob>chi2=0.000				No. of Observation=93412 Prob>chi2=0.000			
	LR chi2(17) =89997.95, Pseudo R2=0.6959				LR chi2(17) =1337.21, Pseudo R2=0.1168			
	Log-likelihood = -19662.84				Log-likelihood = -5056.7492			

Source: Calculated from unit level 76th round NSS data, 2018, Note: vocational education was calculated for ages 12 years and above, and technical education was calculated for ages 15 years and above.

and vocational education: In model 1, the dependent variable is the attainment of technical education (yes=1, otherwise=0), and in model 2, the dependent variable is the attainment of vocational education (yes=1, otherwise=0). The sets of explanatory variables are the same as listed in the ordered logistic model. Both logit models are overall highly significant (at 1% level) as the p-value is less than 0.001(Table II). It is difficult to interpret the odds ratio. Alternatively, we used the marginal effect to discuss the relationship, where marginal effects are partial derivative or instantaneous rates of change for continuous independent variables and discrete changes for categorical independent variables (Niu, 2020). The p-value of each variable indicates the significance level. Variable-wise interpretation of the result of the binary logit model as in above table.

The marginal effect of gender is negative on both models, which implies that women with disabilities are less likely to achieve technical education and vocational training compared to males with disabilities. Between technical and vocational training, females with disabilities are less likely to complete technical education compared to vocational education. The marginal effect of 'married' in model 1 is positive but in model 2 is negative. It indicates that married persons with disabilities are more likely to access technical training and less likely to access vocational training compared to unmarried persons with disability. The marginal effects of the widow for both models are negative and show that the probability of achievement of both technical and vocational education is lower for a widow with disabilities. The marginal effect of household size was positive for vocational training and negative for technical training. The meaning is that a disabled person from a family with a large household size has higher chances of achieving vocational training but lower chances of achieving technical training. The positive marginal effect of MPCE indicates that there are higher chances of access to technical and vocational training by disabled persons from economically better households. The negative marginal effect of severity of disability for both types of training facility. The implication is that if a person's disability is more severe, he has fewer chances to achieve technical and vocational training.

It was also found that persons with mental disabilities, visual disabilities, and speech disabilities have lower chances of access to technical training. Again, only persons with mental disability and visual disabilities have lower probabilities of access to vocational training. Because the marginal effects of these types of disabilities are negative. Marginal effects for all social groups SC, ST, and OBC are negative. This implies that achievements of technical and vocational training by persons with disabilities belonging to SC, ST, and OBC have lower chances compared to persons with disabilities belonging to the "other" (general) category. Persons with disabilities residing in urban areas have more chances to achieve both technical and vocational training compared to persons with disabilities residing in rural areas.

5. Discussion

In this study, we observed that the illiteracy rate among PWD was higher than that of general people, though illiteracy among PWD has decreased over the decades. We found dropouts among persons with disabilities. The results have some similarities with existing literature. Students with disabilities were lagging and more likely to drop out compared to their non-disabled peers (Aron & Loprest, 2012). It showed that the literacy rate among persons with disabilities was 7 percent in the Raichur district of Karnataka state compared to the 46 percent literacy rate among general people (Limaye, 2016). It indicates that discrimination against persons with disabilities regarding education persists (Srivastava et al., 2015). Educational outcomes for persons with disabilities were low, and most PWD did not get the full benefit of education (Ghoshal, 2018). It is due to biased attitudes, skewed representation, and low expectations (Froschl et al., 1999). A study in Assam assessed that children with disability face severe discrimination due to existing policies and programs that are insufficient to wipe out the stigma attached to their lives (Islam Laskar & Sarma, 2017). Hence, the educational attainment of disabled people has increased over time. However, its rate is low, which is not desirable.

The present study found a lower transition of education among PWD from school-level to higher education. Some studies found similar results (Aron & Loprest, 2012), where they observed lower rates of graduate and post-graduate education and employment among persons with disabilities.

In past studies, we also found gender disparity across educational achievement among persons with

disability. The reason lies in access to education across different socio-economic statuses and regions (Rousso, 2003). Some scholars argued that poor households with multiple children think that a male child is a fortune (Butt et al., 2017), so they invest in their male child and neglect the girl child. The situation has changed over time. The present study found that gender discrimination in general education (elementary, primary, secondary, higher secondary, and higher education) favors females with disability. However, gender discrimination still exists against women with disabilities in the attainment of vocational training and technical training. Measuring gender discrimination in the achievement of vocational education and technical training is the unique contribution of the present article. We found no existing literature on this matter. Some studies observed that educational attainment among women has increased during the last few decades (Greenbank & Hepworth, 2008). Perhaps it occurred due to attitudinal change among parents toward girls regarding the value of education (Limaye, 2016). The present study also found that gender discrimination in primary school enrolment favors females. However, gender discrimination is against women in secondary and tertiary school enrolment of general children and the gap widens with the increase in educational level. A study observed that girl's enrollment in technical education will increase with the increase in awareness and exposure to the nature of engineering jobs among parents and girls (Geethalakshmi et al., 2021).

Again, inequality in education persists among the social groups in India. The illiteracy rate was higher for disadvantaged social groups compared to general categories of people. To reduce disparity in education among social groups, (Das & Kattumuri, 2011) have emphasized community participation in education at a higher level of children from SC/ST, minorities disadvantaged groups, and children with disabilities through functional decentralization down to the school level. Caste discrimination also persists against disadvantaged sections (SC, ST, and OBC) with disabilities in the attainment of vocational training and technical training. Measuring caste discrimination in the achievement of vocational training and technical training is the unique contribution of the present article. We also found no existing literature on this matter.

The present study found that the accessibility of education by persons with disabilities was higher for urban areas compared to rural regions, though the majority (74%) of persons with disabilities are living in rural areas. Because central and state government schemes and NGO activity as well as rehabilitation centers are situated mostly in urban areas (D'Costa, 2008). A similar result has shown that women's achievement of formal education was about 74 percent in urban areas compared to 50 percent in rural areas (Shah & Subramanyam, 2021). However, disability is an important barrier to access to education (Tinklin & Hall, 1999). We found that PWD from low-income families got less education. A similar result was obtained in (Filmer, 2008).

Disability is the main reason for non-enrollment by children with disabilities in school. For those who enrolled their name in school but are currently discontinued, the major reason for their discontinuity was disability. Technical and vocational education in different engineering institutions provides training to improve employable skills and knowledge that have high job prospects in India and abroad. However, persons with disabilities find their limited place there. As a result, the transition from school level to technical and vocational education is very slow in India. This finding is the major contribution of the present research paper. It was revealed that online learning is more convenient and attractive for those who are facing problems in attending physical classes (Gaikwad & Kulkarni, 2021; Nurtanto et al., 2020). If the colleges adopt the blended mode of teaching and learning, the success of technical education and vocational education among PWD will increase.

Certificate of disability is the main weapon of PWD for claiming entitlement and provisioning of different government welfare programs and social benefits like health care facilities, educational facilities, employment opportunities, etc. according to their degree of disability (Mehrotra, 2013; Mishra et al., 2021). The present study estimates that only 29.23 percent of persons with disabilities had a certificate of disability. There is a strong gender disparity in having disability certificates, with only 22.44 percent of female PWD having certificates as compared to 34.13 percent of male persons. Among social groups having disability certificates is highest among ST (30.48%) followed by OBC (29.95%), general (27.95%), and SC (25.03%). Low accessibility of disability certificates and disparity in the distribution of disability certificates is the prime reason for the low accessibility of education by PWD. It is the deprivation of basic rights to the PWD.

6. Conclusion

Results show that literacy among persons with disabilities (PWD) gradually increases. However, half of persons with disabilities are still illiterate compared to one-fifth of their non-disabled peers. There was impressive progress in school-level education among persons with disabilities but the transition of education from school level to a higher level of education, technical and vocational education was slow and uneven compared to general people in India. Most of the vocational training obtained by PWD is low in the profile category. There was a gradual decrease in gender disparity among persons with disabilities in the achievement of education at all levels (elementary, primary, secondary, higher secondary, and higher education). However, gender disparity persists among persons with disabilities, in technical and vocational training and in attending preschool intervention programs. Caste discrimination in all levels of educational attainment including technical and vocational training among PWD exists in all study points against marginalized sections of our society. In each case of educational achievement among PWD, caste discrimination is higher compared to their non-disabled peer. PWD coming from a family with large household size has higher chances of vocational training but lower chances of technical training. If a person's disability is more severe, his /her chance of educational achievement is less. The person with mental disabilities suffered the most in accessing general as well as technical education which is followed by blind persons, and deaf persons. A household's economic status positively affects the education of persons with disabilities. PWD residing in urban areas get more access to education and training compared with PWD residing in rural areas. The low accessibility of disability certificates is another prime reason for the low accessibility of education by PWD.

7. Policy recommendations:

1. All children with disabilities should have a disability certificate which helps them to avail of financial, non-financial, and reservation facilities in education and the job market.

2. Awareness and counselling programs should be initiated for parents regarding the talent and potential of their children with disabilities which will motivate them to send their children with disabilities to pursue education. They should also be aware of their girls' performance in technical and vocational training. This will reduce the dropout rate on one side and gender discrimination on the other side.

3. Proper guidance in the selection of branches of study in higher education and training programs according to the talent and potentialities of children with disabilities will raise success in higher education, technical education, and finding a decent job.

4. Implementation of strict caste reservation rules in education and recruitment can reduce caste discrimination.

5. A large number of higher education institutions, technical institutions, and training centres should be set up so that all children with disabilities can avail the facilities of higher education with technical education.

8. Limitations and future study:

The present study has no scope to find factors behind the low coverage with disability certificate among PWD. This is the scope for future studies to find determinants and recommend accordingly for universal coverage with disability certificates among PWD.

The study used the data of children with disabilities. However, comparative study with children without disabilities could highlight the problems of education, particularly technical education.

The present study has no scope to find levels of awareness among parents about the prospects of their children with disabilities in education and different government facilities and schemes.

Educational institutions should be barrier-free for the learning of children with disabilities. A future study can provide us with a clear picture in this regard.

The employability scope among PWD with higher education, technical training, and vocational training is beyond the scope of the present study. Future research can motivate parents to send their children with disabilities to higher education and technical and vocational training.

APPENDIX

Link for the data set:

1) http://mospi.nic.in/unit-level-data-report-nss-76th-round-schedule-260-july-december-2018-survey-persons-disabilities for 76th round

2) http://mospi.nic.in/unit-level-data-report-nss-75th-round-schedule-252july-2017-june-2018social-consumption-education for 75th Round

3) 58th round 2002 disability

http://microdata.gov.in/nada43/index.php/catalog/99/download/1713

4) 47th round 1990 disability

http://microdata.gov.in/nada43/index.php/catalog/66/download/1674

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