

# An Assessment of Diversity and Population Structure of Disabled Population in Maharashtra

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## Abstract

*Diversity among the disabled population needs to be explored and examined to be able to represent the disabled population in the mainstream. Hence, proper operationalization of diversity depends on exploring the diversity. Analytically, the diversity is at minimal when there are no differences among the members of a group. Although, preliminary analyses indicated the least diversity among the disabled population analysis using diversity indices such as Blau and Teachman and separation measures such as standard deviation and coefficient of variation indicates diversity by both age group and by type of disability among disabled population. We demonstrate diversity both by variation and separation within districts of Maharashtra determined by age group and by type of disability. Results indicate distinct sets of districts distributed accordingly and diversified by age group and disability type. This we believe will help policy makers make better planning and programme by incorporating these diversities across and within states.*

## I Introduction

Information related to the magnitude of disability prevalence, type and age, etc. are very essential not only for policy makers in formulating of any scheme/programme but also in general for the welfare of the disabled persons of the society.

There is every likelihood the population of disability increases as one gets older. Disabilities such as hearing, seeing, movement, mental illness tends to increase as one gets older. In the middle age group inclusion of disability such as movement, mental illness tends to be higher due to lifestyle and accidents. Although disability by birth and disability identified is more prominent among younger age groups any type of disability can happen at any age. Disability type such as mental illnesses is more common among the middle age group and precisely among males as they are prone to accident and stress in life. Whereas, the proportion of the disabled population by disability type such as seeing, hearing, and movement will be higher in older age groups as compared to younger age groups.

Further, one needs to understand the young population in the age group 0-10 in census 2011 will be in the age group 10-20 in census 2021 whereas the population in the age

group 20-59 will be in the age group 30-70+, and finally population in the age group 60+ will be in the age group 70 and above. When formulating policies one also needs to access the future needs of the disabled population. For example; the young disabled population will be in the middle age group, hence policies not only on education but also on employment, self-sufficiency need to be planned well in advance.

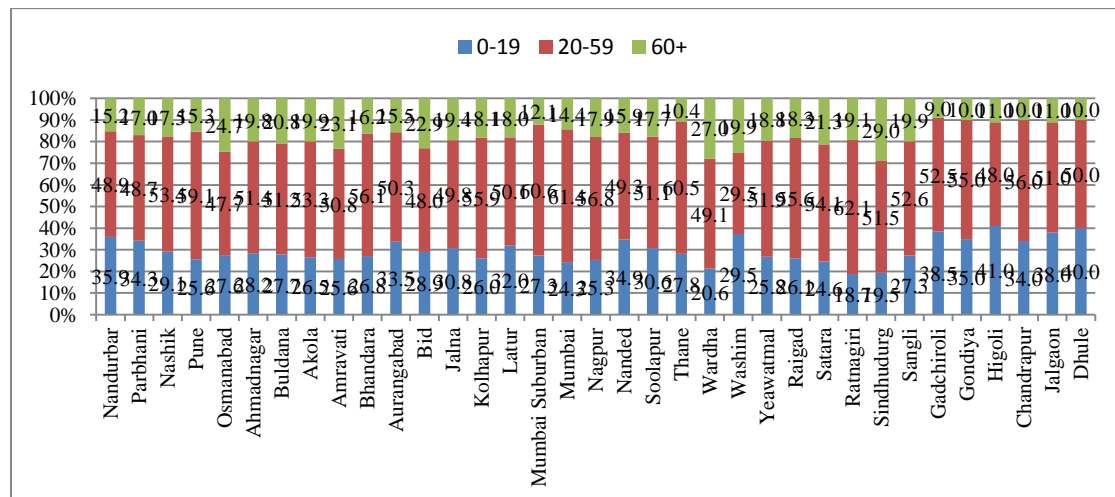
The present study is an attempt to find the distribution of the disabled population across Maharashtra by age group. As per census 2011, there were 2963392 disabled persons in Maharashtra.

Maharashtra is a large state; hence regional variation among the population is also expectedly high. For the convenience of our study, we distributed the disabled population into three main age groups 0-19 (young population); 20-59 (working population) and age 60 and above (elderly population). Primarily the focus was on the distribution of the disabled population by age group and was undertaken to explore the differential if any by disability type, and by age group.

Figure 1 shows, proportionately the disabled population is much higher in the age group 20-59 years with the highest concentration in Ratnagiri district (62 per cent) to lowest concentration in Osmanabad district. Districts such as Dhule, Hingoli has near about 40 per cent of the total disabled population in the age group 0-19 years of age, which is more than double the proportion in districts with the lowest representation such as Sindudurg (19 per cent) and Ratnagiri (18 per cent).

In the older age group 60 and above the highest proportion of the population are in the districts of Sindudurg (29 per cent) and Wardha (27 per cent) whereas the least number of disabled population in the elderly population are from districts Gadchiroli (9 per cent), Jalgaon and Hingoli (11 per cent each), Chandrapur, Dhule, Thane and Gondiya (10 per cent each)

Figure1: Percentage of the Total Disabled Population Distributed by Age Group and across Districts in Maharashtra, 2011



When we consider only disability type seeing as shown in figure 2 the distribution of disabled population shows near about a quarter of the population distributed almost equally in the age groups 0-19 and 60+ whereas the remaining 50 percent of the

population are in the age group 20-59 years of age. The percentage of the disabled population with disability type seeing is highest in Nandurbar district (38 per cent) and least in Sindudurg and Wardha (15 per cent each) of the total disabled population with disability type seeing. Near about 60 of disabled type seeing are in the age group 20-59 in Mumbai and Ratnagiri districts as compared to only 36 percent in Hingoli districts. Among older age groups of 60 and above Ratnagiri (40 per cent) and Wardha (44 per cent) shows highest representation and the least is in Mumbai (10 per cent).

Figure 2: Percentage of the Total Disabled Population with Disability Type Seeing and Distributed by Age Group and across Districts in Maharashtra, 2011

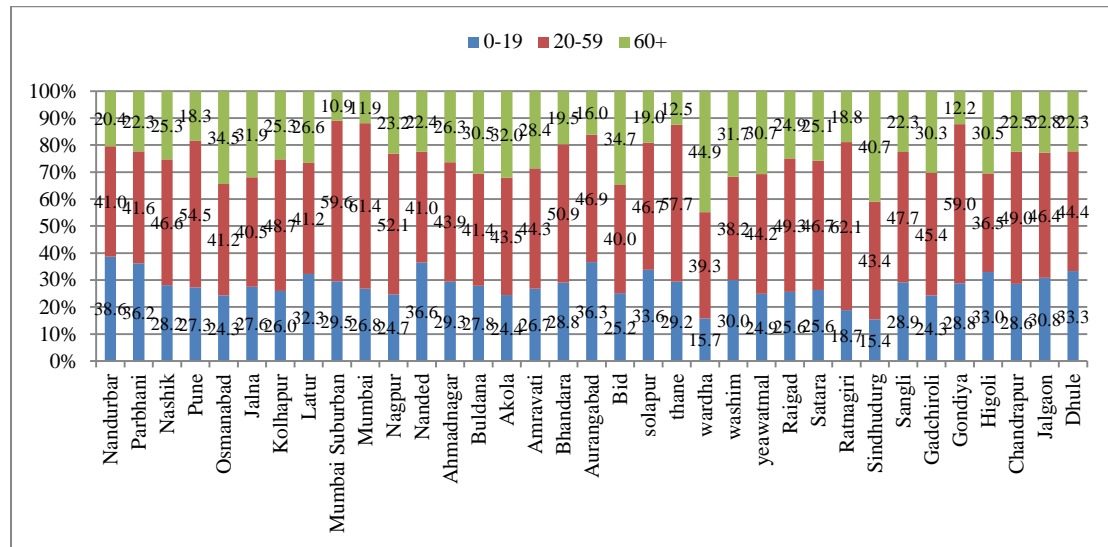
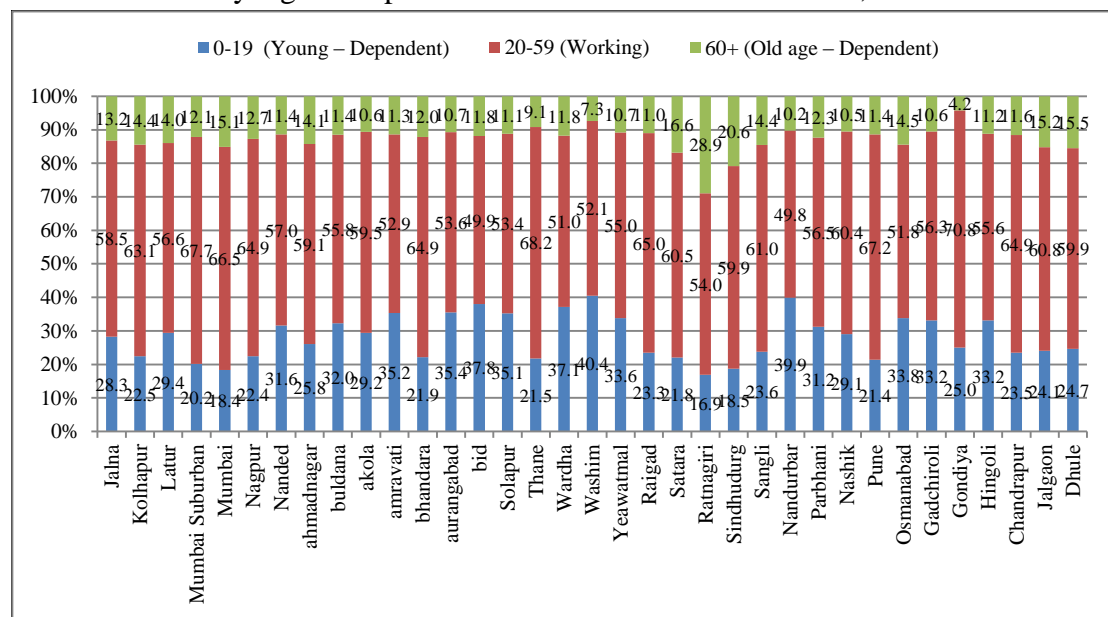


Figure 3: Percentage of the Total Disabled Population with Disability Type Speech and Distributed by Age Group and across Districts in Maharashtra, 2011



In disability type speech as shown in figure3 the percentage of the disabled population is found to be highest in the age group 20-59 and is highest in districts of Gondiya (70 per cent), followed by Thane (68 per cent), and in metropolitan cities of Mumbai and

Pune (67 per cent each). Whereas, the proportion of disabled population speech in the age group 0-19 is highest in the districts of Wardha and Nandurbar (40 per cent each). Ratnagiri district has the highest number of the disabled population with disability type speech among the districts and in the age group 60 and above.

Figure 4: Percentage of the Total Disabled Population with Disability Type Movement and Distributed by Age Group and across Districts in Maharashtra, 2011

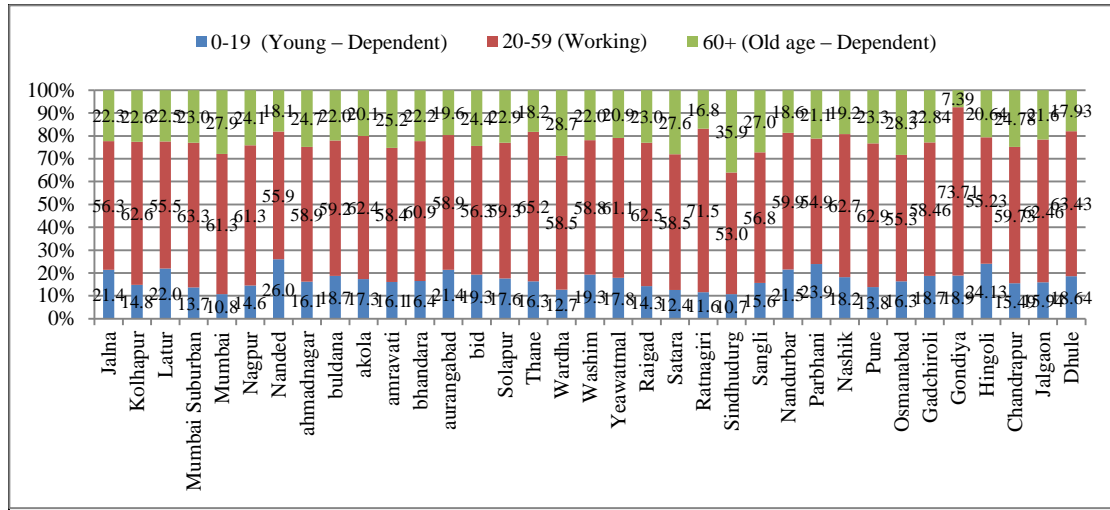
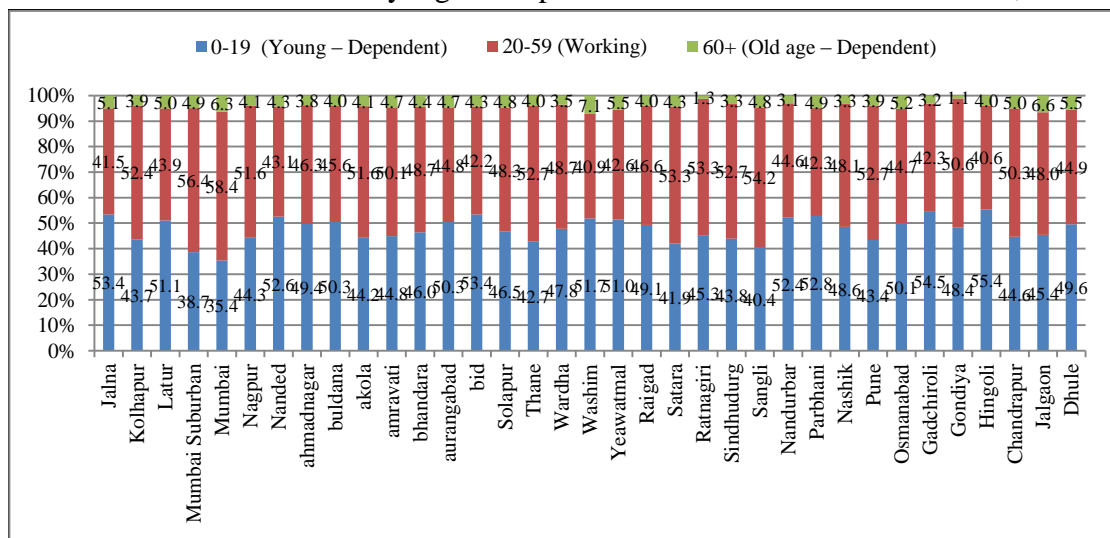
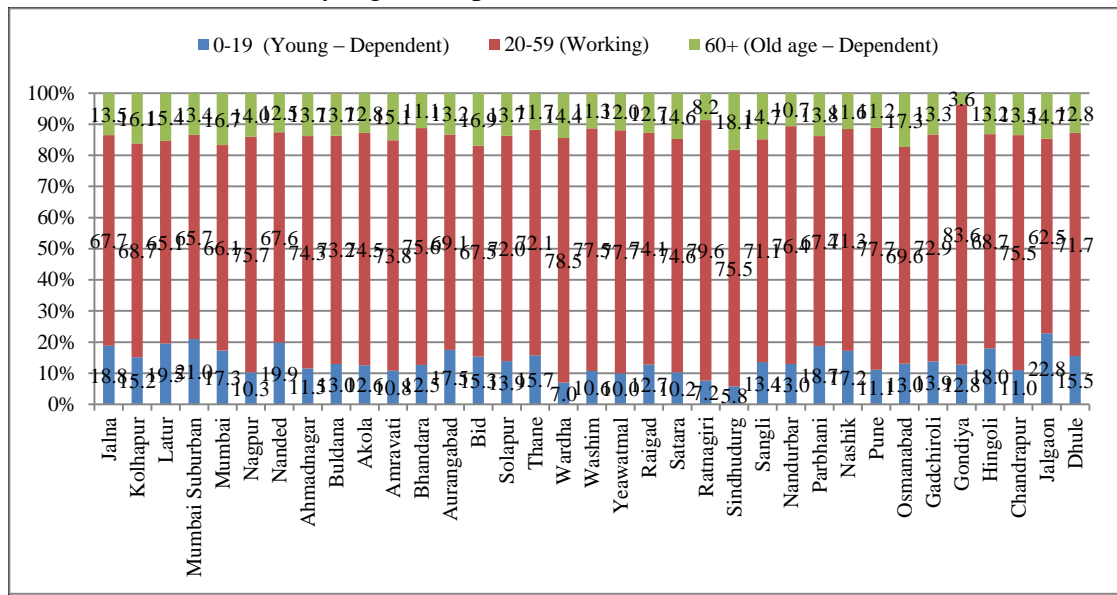


Figure 5: Percentage of the Total Disabled Population with Disability Type Mental Retardation and Distributed by Age Group and across Districts in Maharashtra, 2011



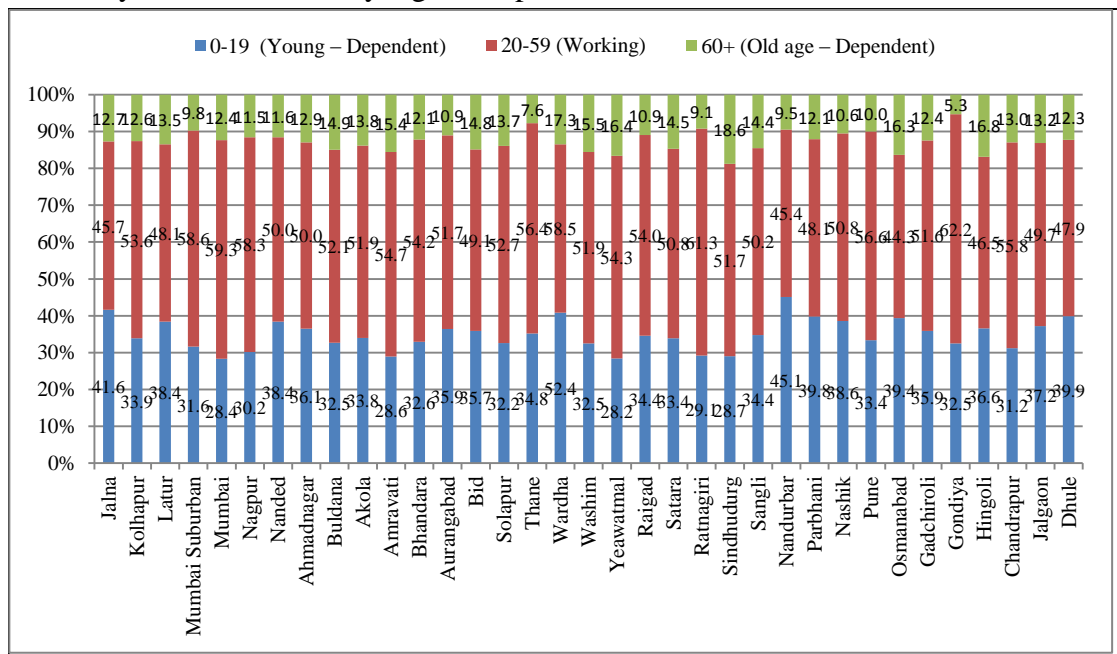
Among the disabled type mental retardation as shown in figure 5 the distribution is equivalently distributed in the age group 0-19 and 20-59 age group and proportionately very few people are represented in the age group 60 and above. This reflects, high mortality among the disabled population with disability type mental retardation in age younger and middle age groups. The distribution of the disability type mental retardation shows just a little above half the number of the population are in the age group 0-19 years of age in the districts of Hingoli (54 per cent) and Gadchiroli (55 per cent). Districts of Mumbai (58 per cent) and Sangli (56 per cent) have the highest concentration of the disabled type mental retardation are in the age group 20-59.

Figure 6: Percentage of the Total Disabled Population with Disability Type Mental Illness and Distributed by Age Group and across Districts in Maharashtra, 2011



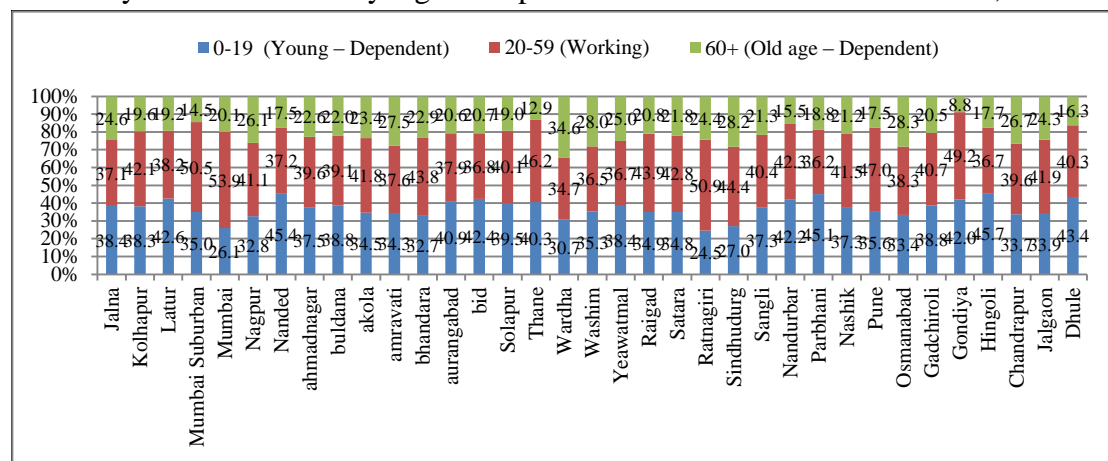
In contrast to the disability type mental retardation the distribution of population by age group in disability type mental illness as shown in figure 6 shows very few percentage of population in the age group 0-19 and a high concentration in the age group 20-59. This may be due to the fact that identification of mental illness happens or is realized in the later age as is depicted in above figure with the highest concentration of disability type mental illness in the age group 20-59. Districts of Ratnagiri (79 per cent); Wardha (78 per cent); Pune, Yavatmal and Washim (77 per cent each) have the highest concentration of the disabled population with disability type mental illness.

Figure 7: Percentage of the Total Disabled Population with Disability Type Any Other Disability and Distributed by Age Group and across Districts in Maharashtra, 2011



Any other disability is disabilities which are not identified by other seven types of disabilities. As shown in figure 7 substantial number of the disabled population is found in the age group 0-19 years of age in disability type any other. In districts of Nandurbar equivalent number of the disabled population with disability type any other (45 per cent) are found in the age group 0-19 and 20-59 years of age. A Substantial number of disabled population with disability type any other disabilities are also found in the age group 20-59 years in districts of Gondiya (62 per cent) and Ratnagiri (61 per cent).

Figure 8: Percentage of the Total Disabled Population with Disability Type Any Other Disability and Distributed by Age Group and across Districts in Maharashtra, 2011



Multiple disabilities are disabilities which are identified by at least three types of disabilities. Near about half of the disabled population with multiple disability as shown in figure 8 are in the age group 0-59 years of age and are from the districts of Mumbai (53 per cent), Mumbai Suburb Gondiya and Ratnagiri (50 per cent each). In the age group 0-19 substantial number of the disabled population is from the districts of Hingoli, Parbhani and Nanded (45 per cent each); Dhule (43 per cent); Latur, Nandurbar, Bid and Gondiya (42 per cent each).

Based on the above analysis Table 1 and 2 presents the top and bottom five districts with an overall concentration of the disabled population in Maharashtra

Table 1: Top and Bottom Five Districts of Maharashtra with Highest Concentration of Total Disabled Population to Total Population and Respective Age Groups, 2011

Rank	Total	0-19	20-59	60+
Highest				
	THANE	THANE	THANE	Pune
	Mumbai (SUBURB)	Mumbai (SUBURB)	Mumbai (SUBURB)	Mumbai
	Pune	Pune	Pune	THANE
	Jalgaon	Jalgaon	Jalgaon	Jalgaon
	Ahmadnagar	Solapur	Nagpur	Ahmadnagar
Lowest				
	Sindhudurg	Sindhudurg	Sindhudurg	Nandurbar
	Gadchiroli	WARDHA	Gadchiroli	Gondiya
	Gondiya	Ratnagiri	WARDHA	Gadchiroli
	Nandurbar	Gadchiroli	Nandurbar	Hingoli
	WARDHA	Gondiya	Hingoli	Washim

Table 2: Top Five Districts of Maharashtra with Highest Concentration of Total Disabled Population to the Population in respective Age Groups, 2011

Ranks	Age Group		
	0-19	20-59	60+
	Nandurbar	Mumbai	Ratnagiri
	Nanded	Mumbai (SUB)	Wardha
	Parbhani	Thane	Sindudurg
	Aurangabad	Pune	Osmanabad
	Hingoli	Nagpur	Amravati

As per census 2011, Thane, Pune and Mumbai districts have the highest concentration of the disabled population and the least number of disabled populations are in districts of Sindudurg, Gadchiroli Gondiya and Wardha. Expectedly, these are the same districts with highest and lowest number of the overall population in terms of population size.

However, when we examine the proportionate of the disabled population to the total population by age group reverse is observed in younger and older age groups. Nandurbar and Ratnagiri districts which were least in terms of population size of the disabled is highest in terms of proportionate of the disabled population to the total population in the respective. Whereas, the proportionate of the disabled population in the younger age group 0-19 is highest in Nandurbar district in older age group it is highest in Ratnagiri district. However, Mumbai and Thane districts not only as highest number of the disabled population by population size but also has proportionately a higher number of the disabled population in the middle age group 20-59 years.

## II Methodology

The most commonly used indexes in diversity research are Teachman's index, Blau's index, coefficient of variation, and standard deviation for analyzing within-group variance.

Blau's index, denoted here by B, is defined as  $\sum_{i=1}^n p_i^2$  where  $p_i$ , corresponds to the proportion of the disabled population in respective district and n denotes the number of categories which can be either age group or by types of disability. B equals its minimum value (i.e., zero), all members of the group are classified in the same category and there is no variety. In contrast, the higher B is the more dispersed group members are over the categories.

In general, we are interested in measuring variability of measuring group heterogeneity.

Whereas, Teachman's index, T, is defined as,  $-\sum_{i=1}^n p_i \times \ln p_i$

The minimum value of T is equal to zero, meaning that there are no differences among group members for the specific categories. That is, apart from one of them, all proportions are equal to zero.

Following these conceptualizations, the table below shows that it is important to consider the issue of group characteristics of interpreting index values.

Table 3: Diversity Indices across Age Groups and Disability Type of Disabled Population in Maharashtra, 2011

Name of the Districts	Blau's index		Teachman index	
	Age group	Disability type	Age group	Disability type
Raigad	0.59	0.84	0.99	1.92
Ratnagiri	0.63	0.83	1.03	1.91
Sindhudurg	0.61	0.85	1.02	1.96
Satara	0.60	0.83	1.01	1.89
Sangli	0.61	0.84	1.01	1.92
Nandurbar	0.61	0.84	1.00	1.90
Parbhani	0.62	0.83	1.02	1.88
Nashik	0.60	0.84	1.00	1.91
Pune	0.57	0.84	0.95	1.90
Osmanabad	0.64	0.82	1.05	1.87
Gadchiroli	0.61	0.84	1.02	1.92
Gondiya	0.59	0.84	0.99	1.93
Hingoli	0.63	0.83	1.04	1.89
Chandrapur	0.60	0.83	1.00	1.88
Dhule	0.60	0.83	1.00	1.86
Jalgaon	0.60	0.84	1.01	1.88
THANE	0.55	0.82	0.90	1.85
SOLAPUR	0.61	0.82	1.01	1.85
WASHIM	0.62	0.83	1.03	1.89
WARDHA	0.63	0.82	1.04	1.89
Yavatmal	0.62	0.83	1.03	1.91
Ahmadnagar	0.62	0.84	1.02	1.92
Aurangabad	0.61	0.81	1.00	1.83
Bhandara	0.59	0.84	0.97	1.90
Amravati	0.62	0.82	1.03	1.86
Akola	0.61	0.84	1.01	1.92
Buldana	0.62	0.83	1.03	1.89
Bid	0.63	0.82	1.05	1.88
Jalna	0.62	0.83	1.03	1.86
Kolhapur	0.59	0.83	0.98	1.88
Latur	0.62	0.83	1.02	1.85
Mumbai (SUBURB)	0.54	0.82	0.91	1.82
Mumbai	0.54	0.81	0.92	1.82
Nagpur	0.58	0.84	0.98	1.94
Nanded	0.61	0.84	1.01	1.90

The Table 3 gives the dispersion value as per Blau and teachman indices. The values of both these indices indicate not much variation between districts. However, analysis by age group indicates, the value of blau and teachman indices the variation by age group was highest in districts of Osmanabd, Bid, Wardha, Hingoli and Ratnagiri. Analysis by disability type shows highest diversity in disability type in the districts of Gadchiroli, Gondiya, Nashik, Pune, Raigad, Sindudurg, Sangli, Nanduurbar, Jalgaon, Bhandara, Akola, Amravati and Nagpur and Nanded.



Hence, the result shows distinctive types of variation by which districts are distributed, one set of districts with high variation by age group and other sets with high variation by disability type.

Table 4: Diversity Indices across Districts by Age Groups of Disabled Population in Maharashtra, 2011

Diversity Indices	Age Group			Total
	0-19	20-59	60+	
Blau's index	0.96	0.95	0.96	0.96
Teachman index	3.4	3.3	3.4	3.4

Analysis of diversity indices by age group shows highest diversity in younger (0-19 years) and older age groups (60+) and slightly more than the middle age group.

Table 5: Diversity Indices across Districts by Disability Type of Disabled Population in Maharashtra, 2011

Districts	Total number of Disabled population							
	Seeing	Hearing	Speech	Movement	Mental retards	Mental Illness	Any Other	Multiple Disability
Blau's index	0.95	0.95	0.94	0.96	0.96	0.96	0.95	0.96
Teachman index	3.3	3.3	3.2	3.4	3.4	3.4	3.3	3.4

Indices of variation across districts show high variation by disability type and reach its maximum as observed from the blau and teachman indices. As observed from respective values of disability the variation by districts is highest among disability type movement, mental retardation, mental illness and multiple disability and slightly more as compared to disability type seeing, hearing, speech and any other type of disability.

### III Summary

The proportionate of the disabled population to the total population by age group shows districts of Nandurbar and Ratnagiri districts which were least in terms of population size of the disabled is highest in terms of proportionate of the disabled population to the total population in the respective age groups. Whereas, the proportionate of the disabled population in the younger age group 0-19 is highest in Nandurbar district in older age group it is highest in Ratnagiri district. However, Mumbai and Thane districts not only as highest number of the disabled population by population size but also has proportionately a higher number of the disabled population in the middle age group 20-59 years.

Analysis as indicated by the values of blau and teachman indices the variation by age group was highest in districts of Osmanabd, Bid, Wardha, Hingoli and Ratnagiri whereas analysis by disability type shows highest diversity in disability type in the districts of Gadchiroli, Gondiya, Nashik, Pune, Raigad, Sindudurg, Sangli, Nandurbar, Jalgaon, Bhandara, Akola, Amravati, Nagpur and Nanded.

Hence, the result shows distinctive types of variation by which districts are distributed, one set of districts with high variation by age group and other sets with high variation by disability type.

By disability type variation by district is highest in disability type movement, mental retardation, mental illness and multiple disability.

## References

- Atkinson, A.B. (1970), On the Measurement of Inequality, *Journal of Economic Theory*, 2: 244-263.
- Bedeian, A.G., and K.W. Mossholder (2000), On the Use of the Coefficient of Variation as a Measure of Diversity, *Organizational Research Methods*, 3: 285-297.
- Bell, S.T., A.J. Villado, M.A. Lukasik, L. Belau, , & A.L Briggs, (2011), Getting Specific about Demographic Diversity Variables and Team Performance Relationships: A Meta-Analysis, *Journal of Management*, 37: 709-743.
- Blau, P.M. (1977), *Inequality and Heterogeneity*, New York, NY: Free Press.
- Harrison, D. A., & Klein, K. J. (2007), What's the difference? Diversity constructs as separation, variety, or disparity in organizations. *Academy of Management Review*, 32, 1199-1228.
- International Classification of Impairments, Disabilities and Handicaps (1980): *A Manual of Classification Relating to the Consequences of Disease*, Geneva, Switzerland: World Health Organization.
- Lele, S. (1993), Euclidean Distance Matrix Analysis of Landmark Data: Estimation of Mean form and Mean form Difference, *Mathematical Geology*, 25: 573-602.
- McWhinnie, J.R. (1981), Disability Assessment in Population Surveys: Results of the O.E.C.D. Common Development Effort, *Rev Epidemiol Sante Publique*, 29(4):413-419.
- Teachman, J.D. (1980), Analysis of Population Diversity: Measures of Qualitative Variation, *Sociological Methods and Research*, 8: 341-362.