

# Intellectual Disability Among Disabled Children: Prevalence and Risk Factors in a Rural Area of Jammu, India

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## Abstract

**Background:** Disabled Children suffer Intellectual Disability/ies (ID) to a varying extent. Role of environmental and non-genetic factors in Intellectual Disability remains largely unexplored in developing nations. The study aimed to determine Intellectual Disability among disabled rural children and its association of various demographic variables. **Methods:** A cross sectional study was conducted in a randomly selected rural health zone. 52 children of ages 1-18 years with various disabilities were assessed for IQ by a clinical psychologist using Developmental Screening Test, Sequin Form Board test, CM Bhatia test and Vineland Social Maturity Scale. Chi-square test was used to find associations, if any. **Results:** 16 children out of 52 were suffering from Intellectual Disability thus resulting in a prevalence of 30.7%. Male: Female ratio for Intellectual Disability was 1.3:1. Among the demographic variables, sex of the child and maternal age at child birth were significantly associated with Intellectual Disability ( $p < 0.05$ ). **Conclusions:** High prevalence of Intellectual Disability among disabled children is a cause of concern. Healthcare team needs to raise awareness among females of reproductive age about various risk factors and screen children with disabilities for Intelligence Quotient (IQ) for early interventions.

## Keywords

Intellectual Disability, Prevalence, Rural area, India, Intelligence Quotient

## Introduction

Intellectual disability (ID), previously known as 'mental retardation' is a condition characterized by significant below average intellectual functioning and impairment in adaptive behaviors, manifested before age 18 years. Intellectual disability is a matter of great concern due to number of children affected and role of multi-disciplines like medical, psychosocial and educational service required for their well-being. As per estimates about 1% of children between ages 3-10 years are suffering from ID globally.<sup>[1]</sup>

Among the causes, genetic factors like chromosomal

abnormalities, inherited genetic traits and single gene disorders account for one third to half of all Intellectual disability. Among non-genetic factors, prominent prenatal risk factors are maternal morbidities like diabetes, hypertension, asthma etc. Besides use of alcohol/tobacco, prenatal advanced age, low maternal literacy, multiparity etc. have also been implicated.<sup>[2]</sup> Various factors of Intellectual disability interact in a complex manner with environmental and socio-demographic variables of the population.<sup>[3]</sup> Many of these factors for ID can be

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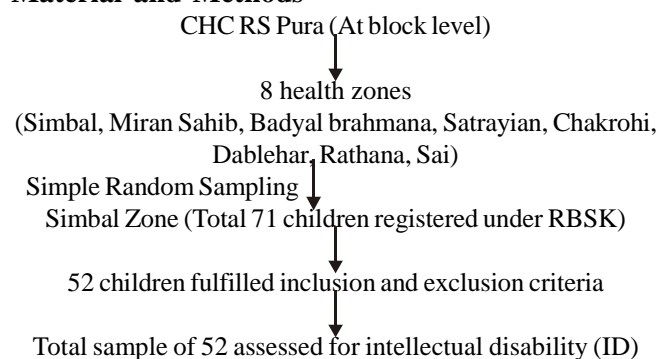
prevented, provided timely detection and early interventions are instituted.<sup>[1]</sup>

Majority of the research regarding risk factors of ID have been carried out in developed nations with very little information being contributed from developing nations.<sup>[4]</sup> In India, there is paucity of literature regarding incidence, prevalence and associated factors of Intellectual disability. Hence, the present study was conducted in a rural area of Jammu district, UT of J&K, India. This study is first of its kind in this region as it assesses the IQ among disabled children at community level. The data so generated will provide a basis for health planners for initiation and integration of appropriate services- healthcare, social service and educational policy- for effective care of the affected children and possible prevention.

### Objectives

- To assess the Intelligence Quotient (IQ) and adaptive skills in disabled children belonging to one randomly selected Health Care Delivery Zone of R.S. Pura block of Jammu district.
- To study the association of various socio-demographic variables with IQ of disabled children.

### Material and Methods



**Fig 1: Flow chart showing selection of health zone and sample of children assessed for ID.**

This cross-sectional study was conducted in RS Pura block of Jammu district from November 2018 till October 2019. Block RS Pura has a total population of 1.64 lakhs (Census 2011) and healthcare services are delivered through a CHC at block level and PHCs, Ayurvedic dispensaries and subcentres in its eight healthcare delivery zones. RBSK programme is being implemented in RS Pura block and under this, screening of children is conducted both at community level and facility level. The children upto 18 years of age with four D's i.e. defects at birth, deficiencies, diseases, developmental delays and disabilities are registered and managed under Rashtriya Bal Swasthya Karyakram (RBSK) programme.

### Inclusion Criteria

1. Children with disability (1 to 18 years) of Simbal health zone of R.S. Pura block who are registered under RBSK.
2. Those giving their consent.

### Exclusion Criteria

1. Age < 1 year and > 18 years.
2. Those not giving consent.
3. Detailed address not available as per RBSK record
4. Parents not available inspite of visiting the household thrice.
5. Child not available inspite of visiting the household thrice

**Data collection technique:** Social and opinion leaders of the villages were met beforehand and explained about the study in detail to seek their cooperation. On reaching the house of the identified child, the purpose of the study was explained to parents. Information regarding socio-demographic profile was collected from parents (preferably mother) on a pre-designed questionnaire. For IQ testing, written informed consent of child (if age is more than 7 years) and parents was taken. If age of the child was less than 7 years, then only parent's consent was taken. For interviewing the parents, written informed consent was taken from both the parents.

### Study Tools

Four tools were used in the study. These are:

1. Socio-demographic profile
2. To assess IQ- following scales were used:
  - (A) Developmental Screening Test (DST) – by Bharatraj was used for children aged upto 3 years<sup>[5]</sup>
  - (B) Sequin Form Board test was used for the age group 3 to 10 years<sup>[6]</sup>
  - (C) C M Bhatia test was used for the age group 11 to 18 years<sup>[7]</sup>
3. Vineland Social Maturity Scale (VSMS) Indian adaptation by Dr. AJ Malin A measure of social competence or adaptive behavior.<sup>[5]</sup>

Tool no. 2 and 3 were administered by clinical psychologist assisted by research scholar to assess the IQ score and adaptive skills. Every fortnightly clinical psychologist visited the field practice area along with the research scholar for which the prior arrangement were made by informing the identified families. Those children with severe disabilities/severe intellectual disability were included for the conduct of the study but were not administered tool no.2. Intellectual disability (ID) is used to describe developmental disorders which include deficiency in level of intelligence and social adaptive skills. It includes mild, moderate, severe and profound categories of intelligence quotient classification with score below 70.<sup>[8]</sup>

### Intelligence Classification

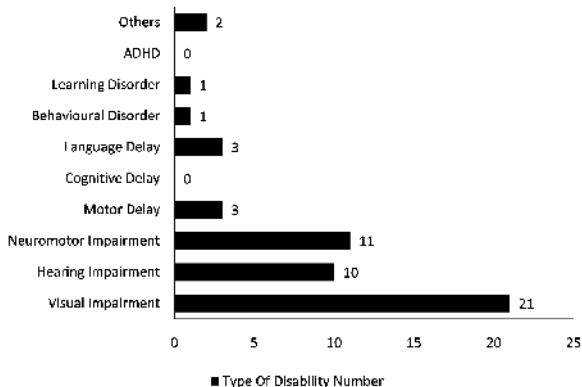
| IQ SCORE | CATEGORY |
|----------|----------|
| 50-69    | MILD     |
| 35-49    | MODERATE |
| 20-34    | SEVERE   |
| BELOW 20 | PROFOUND |

The data collected was compiled, coded, tabulated and analysed using computer software SPSS version 23. Quantitative data was presented as percentages and proportions. Mean and standard deviation were also used to portray quantitative data. The test of significance applied was chi square test and P value <0.05 was considered to be statistically significant.

### Results

A total of 52 children with disability registered under RBSK in Simbal Zone were surveyed to assess their Intelligence Quotient (IQ). Out of 52 surveyed children, 19 (36.53%) were males and 33 (63.46%) were females with a male:female ratio of 1:1.7. Mothers of 45 children i.e. 86.53% were <33 years at the time of child birth. The mean age of mothers of disabled children was 26.6±4.73. 57.69% of the mothers had received education up to class 10<sup>th</sup> while 9.62% were illiterate. Majority of the fathers i.e. 71.15% were educated up to class 10<sup>th</sup> while 6.12% were illiterate. Majority of the deliveries (88.46%) were reported to be institutional [86.54% in Government and 1.92% in private institutions]. Only three children (5.76%) had a higher birth order of more than 3 and 34.62% were delivered through lower segment caesarean section.

The most common form of disability reported among the children was visual impairment (40.38%) followed by hearing impairment (19.23%) and neuromotor impairment (21.15%) [Fig. 2].



**Figure 2: Distribution of children of Simbal zone according to the type of disability.**

Prevalence of the abnormal IQ among disabled children was 30.76%. Among the 16 children with abnormal IQ, seven children (43.7%) showed a mild impairment in intelligence, 25% had moderate impairment while 31.25% presented with severe impairment in intelligence. 43.75% of the children with abnormal IQ were between 4 to 9 years of age. M:F ratio was 1.3:1 The association of various socio-demographic variables with the IQ level of children when assessed revealed that only sex of the child (p=0.04) and maternal age at childbirth (p=0.0007) had a statistically significant association (Table 1).

Table 2 depicts that neuromotor impairment was the most common disability noted among children with abnormal IQ while visual impairment was most common among children with normal IQ.

The percentage of children with abnormal IQ increased with the rise in birth order with birth order 1, 2, 3 and >3 showing abnormal IQ in 20.83%, 30.77%, 41.66% and 66.66% respectively, in disabled children although this association between birth order and abnormal IQ was found to be statistically insignificant (p=0.16). Further, association of various socio-demographic variables with the severity of abnormality in IQ was assessed wherein only father's occupation was found to be statistically significant (Table 3). Mild, Moderate and Severe ID in children less than 10years was seen in 42.85%, 28.5% & 28.5% where as the similar figures in those with ages more than 10 years was 43.75%, 22.22% & 31.25%.

Neuromotor impairment was the only disability noted among children with severely abnormal IQ. Among children with mild abnormality in IQ, neuromotor impairment followed by motor delay, language delay and behavioural disorders were seen (Table 4).

### Discussion

The present study examined demographic characteristics and IQ levels of 52 disabled children in Simbal health zone of RS Pura block which is a field practice area of PG department of Community Medicine, Government Medical College, Jammu.

The results revealed that visual impairment was the prominent disability followed by neuromotor impairment and hearing impairment. About half of these children were found in the age group of 10-16 years and these results were in contrast to a report by Ministry of Statistical Program and Implementation (MOSPI) on disabled persons in India.<sup>[9]</sup> The report has said that 23% of disabled children in 0-6 year age group were having hearing disability and number of disabled persons being highest in the age group of 10-19 years. The results of the present study further revealed that higher number of boys were afflicted with disabilities and these results were

**Table 1: Association of socio-demographic characteristics with IQ level of disabled children**

| VARIABLE                   | IQ LEVEL OF CHILDREN |              |                    |              | TOTAL |              | X <sup>2</sup> | P value |
|----------------------------|----------------------|--------------|--------------------|--------------|-------|--------------|----------------|---------|
|                            | NORMAL<br>(n=36)     |              | ABNORMAL<br>(n=16) |              | n     | %            |                |         |
|                            | n                    | %            | n                  | %            |       |              |                |         |
| <b>Sex of the child</b>    |                      |              |                    |              |       |              |                |         |
| <b>Male</b>                | 10                   | <b>27.78</b> | 9                  | <b>56.25</b> | 19    | 36.54        | 3.87           | 0.04    |
| <b>Female</b>              | 26                   | 72.22        | 7                  | 43.75        | 33    | <b>63.46</b> |                |         |
| <b>Maternal Age</b>        |                      |              |                    |              |       |              |                |         |
| <33                        | 35                   | 77.77        | 10                 | 22.22        | 45    | 86.53        | 11.46          | 0.0007  |
| >33                        | 1                    | 14.28        | 6                  | 85           | 7     |              |                |         |
| <b>Maternal education</b>  |                      |              |                    |              |       |              |                |         |
| <b>Illiterate</b>          | 4                    | 80           | 1                  | 20           | 5     | 9.61         | 0.0015         | 0.96    |
| <b>Literate</b>            | 32                   | 68.08        | 15                 | 31.91        | 47    | 90.38        |                |         |
| <b>Type of delivery</b>    |                      |              |                    |              |       |              |                |         |
| <b>FTND Home delivery</b>  | 2                    | 34           | 4                  | 66           | 6     | 11.53        | 4.143          | 0.126   |
| <b>FTND Institutional</b>  | 21                   | 80           | 7                  | 20           | 28    | 53.84        |                |         |
| <b>LSCS</b>                | 13                   | 72.22        | 5                  | 27.78        | 18    | 34.61        |                |         |
| <b>Birth Order</b>         |                      |              |                    |              |       |              |                |         |
| <b>Up to 3</b>             | 35                   | 71.42        | 14                 | 28.57        | 49    | 94.23        | 1.926          | 0.16    |
| >3                         | 1                    | 33.33        | 2                  | 66.66        | 3     | 5.76         |                |         |
| <b>Age (In Years)</b>      |                      |              |                    |              |       |              |                |         |
| <10                        | 7                    | 50           | 7                  | 50           | 14    | 26.92        | 3.33           | 0.07    |
| 10-19                      | 29                   | 76.31        | 9                  | 23.68        | 38    | 73.07        |                |         |
| >19                        |                      |              |                    |              |       |              |                |         |
| <b>Father's Occupation</b> |                      |              |                    |              |       |              |                |         |
| <b>Labourer</b>            | 5                    | 50           | 5                  | 50           | 10    | 19.23        | 3.82           | 0.28    |
| <b>Business</b>            | 10                   | 76.92        | 3                  | 23.08        | 13    | 25.00        |                |         |
| <b>Service</b>             | 12                   | 80           | 3                  | 20           | 15    | 28.84        |                |         |
| <b>Others</b>              | 6                    | 54.54        | 5                  | 45.45        | 11    | 21.15        |                |         |
| <b>Socioeconomic class</b> |                      |              |                    |              |       |              |                |         |
| <b>III</b>                 | 17                   | 68           | 8                  | 32           | 25    | 48.07        | 0.46           | 0.80    |
| <b>IV</b>                  | 18                   | 72           | 7                  | 28           | 25    | 48.07        |                |         |
| <b>V</b>                   | 1                    | 50           | 1                  | 50           | 2     | 3.84         |                |         |

in agreement with those reported by Christianson AL *et al.*<sup>[10]</sup>

Regarding Intellectual Disability (ID), 30.7% (16/52) of the children were found to be having ID with male preponderance. The prevalence rate reported in the current study is congruent with that reported by Christianson AL *et al.*<sup>[10]</sup> Male: Female ratio was found to be 1.3:1 which is in contrast to the higher ratio of 3:2 reported by Christianson AL *et al.*<sup>[10]</sup> This slightly higher rate of incidence of ID in males than in females is congruent to the results reported by Akhavan *et al.*<sup>[11]</sup> and Hasani PAM *et al.*<sup>[12]</sup> In contrast, Noori *et al.*<sup>[13]</sup> reported higher rates of ID in females. These variations can be ascribed to different study population in different

geographical regions.

In the current study, severe ID was present in 33% and 28% in males and females respectively whereas Hasani *et al.*<sup>[12]</sup> reported all the severe ID cases among females. Among the various socio-demographic variables, only sex of the child and maternal age at child birth were found to be significantly associated with IQ levels ( $p < 0.05$ ). Other variables like maternal education, birth order and socio-economic status did not elicit any statistical association with IQ ( $p > 0.05$ ).

Stannard S *et al.*<sup>[14]</sup> have reported an association between birth order and mental disorders but Hasani *et al.*<sup>[12]</sup> reported no particular birth order association with ID. Hasani *et al.*<sup>[12]</sup> and Noori *et al.*<sup>[13]</sup> reported no significant

**Table 2: Distribution of various disabilities among children with normal and**

| Disability            | IQ level of children |         |             |         | Total |       |
|-----------------------|----------------------|---------|-------------|---------|-------|-------|
|                       | Normal IQ            |         | Abnormal IQ |         | No.   | (%)   |
|                       | No.                  | (%)     | No.         | (%)     |       |       |
| Visual Impairment     | 21                   | (100)   | 0           | (0)     | 21    | (100) |
| Hearing Impairment    | 10                   | (100)   | 0           | (0)     | 10    | (100) |
| Neuromotor Impairment | 0                    | (0)     | 11          | (100)   | 11    | (100) |
| Motor delay           | 1                    | (33.33) | 2           | (66.66) | 3     | (100) |
| Cognitive delay       | 0                    | (0)     | 0           | (0)     | 0     | (100) |
| Language delay        | 2                    | (66.66) | 1           | (33.33) | 3     | (100) |
| Behavioural disorder  | 0                    | (0)     | 1           | (100)   | 1     | (100) |
| Learning disorder     | 1                    | (00)    | 0           | (0)     | 1     | (100) |
| ADHD                  | 0                    | (0)     | 0           | (0)     | 0     | (100) |
| Others                | 1                    | (50)    | 1           | (50)    | 2     | (100) |
| Total                 | 36                   | (69.23) | 16          | (30.76) | 52    | (100) |

**Table 3: Association of socio-demographic characteristics with severity**

| VARIABLE            | IQ LEVEL    |                 |               | Chi square | P value |
|---------------------|-------------|-----------------|---------------|------------|---------|
|                     | MILD<br>n % | MODERATE<br>n % | SEVERE<br>n % |            |         |
| Sex                 |             |                 |               | 0.094      | 0.9539  |
| Male                | 4 (44.44)   | 2 (22.22)       | 3 (33.33)     |            |         |
| Female              | 3 (42.86)   | 2 (28.57)       | 2 (28.57)     |            |         |
| Birth Order         |             |                 |               | 0.09       | 0.9     |
| =2                  | 4 (44.44)   | 2 (22.22)       | 3 (33.33)     |            |         |
| =3                  | 3 (42.85)   | 2 (28.57)       | 2 (28.57)     |            |         |
| Age (In Years)      |             |                 |               | 0.09       | 0.95    |
| <10                 | 3 (42.85)   | 2 (28.57)       | 2 (28.57)     |            |         |
| =10                 | 4 (44.44)   | 2 (22.22)       | 3 (33.33)     |            |         |
| Father's Occupation |             |                 |               | 16.73      | 0.01    |
| Labourer            | 2 (40)      | 0 (0)           | 3 (60)        |            |         |
| Business            | 1 (33.33)   | 0 (0)           | 2 (66.66)     |            |         |
| Service             | 0 (0)       | 3 (100)         | 0 (0)         |            |         |
| Others              | 4 (80)      | 1 (20)          | 0 (0)         |            |         |
| Socioeconomic class |             |                 |               | 2.58       | 0.63    |
| III                 | 3 (37.5)    | 3 (37.5)        | 2 (25)        |            |         |
| IV                  | 3 (42.85)   | 1 (14.28)       | 3 (42.85)     |            |         |
| V                   | 1 (100)     | 0 (0)           | 0 (0)         |            |         |

association between IQ levels and parents' educational levels which is consistent with the results of the current study. But He *et al*<sup>[15]</sup>, on the contrary, reported a significant relationship between low IQ among children and low literacy of parents. Low literacy levels of parents lead to poor knowledge about IQ levels being affected by genetics<sup>[16]</sup>, pregnancy<sup>[17]</sup>, childbirth and neonatal problems.<sup>[18]</sup> Hasani *et al*<sup>[12]</sup> also reported that children with low IQ levels were more likely to have older parents. Current evidence suggests that changes in women's chromosomes after 30 years of age might lead to birth of children with ID.<sup>[19]</sup> Current evidence suggests that consanguineous marriages lead to intelligence problems in children but authors did not investigate it and it can be considered a limitation of the present study. Also, the number of children in the study is small in number, hence authors exercise caution in generalization of the results.

**Conclusion**

A high prevalence of 30.7% of ID with male

preponderance was revealed in the present study. Male sex and maternal age at child birth were found to be statistically associated with ID.

**Recommendations**

As there is a significant prevalence of low intelligence quotient among disabled children, hence under RBSK programme, all children diagnosed with disability should be further screened to assess intelligence quotient with the aim to limit intellectual disability by early intervention at younger ages. A team including a medical psychologist, medical social worker, counselor and health worker should be constituted for this purpose.

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Nil.

**Conflicts of Interest**

There are no conflicts of interest.

**References**

1. Pratt HD, Greydanus DE. "Intellectual disability (mental

**Table 4: Distribution of various disabilities among children with varying**

| Disability               | IQ level |         |          |         |        |         | Total |       |
|--------------------------|----------|---------|----------|---------|--------|---------|-------|-------|
|                          | Mild     |         | Moderate |         | Severe |         |       |       |
|                          | No.      | (%)     | No.      | (%)     | No.    | (%)     | No.   | (%)   |
| Visual Impairment        | 0        | (0)     | 0        | (0)     | 0      | (0)     | 0     | (100) |
| Hearing Impairment       | 0        | (0)     | 0        | (0)     | 0      | (0)     | 0     | (100) |
| Neuromotor Impairment    | 3        | (27.27) | 3        | (27.27) | 5      | (45.45) | 11    | (100) |
| Motor delay              | 1        | (50)    | 1        | (50)    | 0      | (0)     | 2     | (100) |
| Cognitive delay          | 0        | (0)     | 0        | (0)     | 0      | (0)     | 0     | (100) |
| Language delay           | 1        | (100)   | 0        | (0)     | 0      | (0)     | 1     | (100) |
| Behavioural disorder     | 1        | (100)   | 0        | (0)     | 0      | (0)     | 1     | (100) |
| <b>Learning disorder</b> | 0        | (0)     | 0        | (0)     | 0      | (0)     | 0     | (100) |
| ADHD                     | 0        | (0)     | 0        | (0)     | 0      | (0)     | 0     | (100) |
| Others                   | 1        | (100)   | 0        | (0)     | 0      | (0)     | 1     | (100) |
| Total                    | 7        | (43.75) | 4        | (25)    | 5      | (31.25) | 16    | (100) |

- retardation) in children and adolescents,” Primary Care-Clinics in Office Practice 2007;34(2):375-86.
- Huang J, Zhu T, Qu Y, Mu D. “Prenatal, perinatal and neonatal risk factors for intellectual disability: a systemic review and meta- Analysis.” PLoS ONE 2016;11(4):e0153655.
  - Sharma S, Raina SK, Bhardwaj AK, Chaudhary S, Kashyap V, Chander V. “Socio demography of mental retardation: a community-based study from a goitre zone in rural sub-Himalayan India.” Journal of Neurosciences in Rural Practice 2015;6(2):165-9.
  - Maulik PK, Harbour CK. “Epidemiology of intellectual disability.” International Encyclopedia of Rehabilitation, 2010. <http://cirrie.bufalo.edu/encyclopedia/en/article/144>.
  - Reddy TA. Behavioural Interventions for children with intellectual disability having autism. Indian Journal of Applied Research 2013;3(42):437-9
  - Venkatesan S. Celebrating a century on form boards with special reference to Seguin Form Board as measure of intelligence in children. Glob J Interdiscip Soc Sci 2014;3(6):43-51.
  - Bhatia CM. Performance Tests of Intelligence Under Indian conditions. London: Oxford University Press,1955.
  - Ma X, Tan J, Jiang L, Wang X, Cheng B, Xie P, et al. Aberrant structural and functional developmental trajectories in children with intellectual disability. Front Psychiatry 2021;12:634170
  - Disabled persons in India, A statistical Profile 2016. Available at: [http://mospi.nic.in/sites/default/files/publication\\_reports/Disabled\\_persons\\_in\\_India\\_2016.pdf](http://mospi.nic.in/sites/default/files/publication_reports/Disabled_persons_in_India_2016.pdf). Last accessed on 5 October, 2018.
  - Christianson AL, Zwane ME, Manga P, Rosen E, Venter A, Downs D, et al. Children with intellectual disability in rural South Africa: prevalence and associated disability. Journal of Intellectual Disability Research 2002;46(2):179-86.
  - Akhavan KS, Golestan M, Fallah R, Behnaz F. Evaluation of inheritance pattern in mentally retarded children. J Shahid Sadoughi Univ Med Sci 2011;19(3):292-301.
  - Hasani PAM, Mokhtaree M, Rezaeian M, Jalaladdini A. Investigating the characteristics of Intelligence Quotient in individuals with intellectual disability in Rafsanjan, 2019. Trends in Med Sci 2021;1(1):e113794.
  - Noori M, Bakhshi H, Vakilian AR. Survey the frequency of mental retardation associated factors among students of Rafsanjan Exceptional Schools in 2014. J Rafsanjan Univ Med Sci 2015;13(10):1007-12.
  - Stannard S, Berrington A, Alwan N. Associations between birth order with mental wellbeing and psychological distress in midlife: Findings from the 1970 British Cohort Study (BCS70). PLoS One 2019;14(9):e0222184.
  - He P, Chen G, Wang Z, Guo C, Zheng X. The role of parental education in child disability in China from 1987 to 2006. PLoS One 2017;12(10):e0186623.
  - Ghafouri-Fard S, Dianatpour M, Tabei SMB, Miryounesi M. Mental retardation due to chromosomal translocation in an Iranian consanguineous family: report of three cases. Tehran Univ Med J TUMS Publ 2017;74(11):817-22.
  - Wang Y, McDermott S, Mann JR, Hardin JW. Preventing intellectual disability during pregnancy: what are the potentially high yield targets? J Perinat Med 2016;44(4):421-32.
  - Huang J, Zhu T, Qu Y, Mu D. Prenatal, perinatal and neonatal risk factors for intellectual disability: a systemic review and meta-analysis. PLoS One 2016;11(4):e0153655.
  - Heuvelman H, Abel K, Wicks S, Gardner R, Johnstone E, Lee B, et al. Gestational age at birth and risk of intellectual disability without a common genetic cause. Eur J Epidemiol 2018;33(7):667-78.