

A Clinical Review on Intellectual Disability

Hesham Maged Mohamed Abdelfatah^{1*} and Mahmoud Mohamed Gomaa²

¹International Researcher, lecturer, Neuropsychiatry Doctor, Cairo University, Egypt

²Psychiatrist and addiction treatment, Resident Doctor, Ain Shams University (ASU), Egypt

*Corresponding Author

Hesham Maged Mohamed Abdelfatah, International Researcher, lecturer, Neuropsychiatry Doctor, Cairo University, Egypt.

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Abstract

About 2.3% of the population has an intellectual disability. The diagnosis of this disability is based on medical history, personal ability, and adaptive function. More than 75% of people with intellectual disability are classified as having mild intellectual disability, while a small percentage of people with severe symptoms are classified as having severe intellectual disability or profound intellectual disability. The specific cause of intellectual disability has not been identified, but genetics and heredity play a role. Complications before, during, or after birth also play a role. also, mother's Substance abuse and alcohol intake during pregnancy play a role, physical ill health and disabilities are more common in people with intellectual disabilities, mental ill health is more common in children and adolescents and adults with intellectual disabilities. Also, people with intellectual disabilities don't live as long as other people, and life expectancy is shorter than in general population.

Keywords: Intellectual Disability, Mutation, Genetic Factors, Chromosomal Abnormality, Down Syndrome, Cognitive Function, Physical Ill Health, Lifespan

1. Discussion

1.1. At First We Discussed the Prevalence of Intellectual Disabilities that Not Uncommon

A meta-analysis of 52 studies reported the prevalence of intellectual disabilities to be 10.37/1000 population. Prevalence varied according to age, income group of the country of origin (with higher rates from low income countries), and study design [1]. In high-income countries, rates for all ages combined were 9.2/1000, with the highest rates in child/young person populations only at 18.3/1000, and the lowest rates in adult-only populations at 4.9/1000. Careful understanding of the nuances is needed though to interpret these findings. Twenty-five of the studies included in the meta-analysis did not provide their age range: a further two did not report their observation period, and some studies were outliers in their findings. An earlier 1960 and 1987 review of studies between relevance to today's population, given cohort effects, almost all were studies in childhood/youth, and some provided very limited methodological information [2]. Studies of prevalence are, of course, challenging to conduct, as they ideally require intelligence to be tested on whole populations and therefore

would require considerable resources and costs. Other approaches can provide useful information, for example:

Studies of administrative samples, such as people known to local authorities, which account for the majority of studies. These are the people who are making demands upon services, so the information is useful, but there are likely to be some people with intellectual disabilities not included in these samples and some people who do not have intellectual disabilities within the sample. For example, a rate of 4.3/1,000 aged 16+ was reported from Welsh local authorities as being in receipt or in need of intellectual disabilities services [3].

Studies of people with a record of intellectual disabilities in their general practitioner medical records. In high-income countries, people are likely to have been assessed once their developmental delay was reported, so a record is likely to exist. However, this is complicated by the multiple and changing terminology in use over time. For example, a rate of 5.4/1000 patients aged 18+ was reported from an English database of 451 practices [4].

Other secondary analysis of data routinely collected for other samples can be analyzed at relatively little costs, but findings refine purposes. These have the attraction that large and whole country the original definitions used and the ways the data were collected for example, a rate of 4.9/1000 aged 16+ (self-/proxy report) was reported from an analysis of Scotland's 2011 census 5, and a rate of 23/1000 school-aged children/young persons (teacher report) was reported from Scotland's 2015 pupil census 6.

Population intelligence approximates to a normal distribution with a mean intelligence quotient of 100 and a standard deviation of 15 points. A statistical definition of intellectual impairments is an intelligence quotient less than two standard deviations from the mean, that is, <70. Simplistically, this would suggest that 2.3% of the population have intellectual impairments [5]. However: The greatest deviation from the normal distribution of intelligence is at the extreme ends.

A test error of 5 points is recognized-and a normal distribution would place 2.5% within the range of 70-75, so this can greatly in fluency identified prevalence.

There is the Flynn effect (overly high scores due to out-of-date test norms). Intellectual disabilities are a social construct, not simply a statistical measure of impairments; the definitions of intellectual disabilities in the standard classificatory manuals ICD-10 and DSM-5 also include the functional requirement of the need for additional support [6-8]. People learn throughout their lives, and so a child with an intelligence quotient of 69 will need additional educational support at school but, as an adult, may gradually acquire life skills to live independently, maintain relationships, hold employment, raise children, and not identify with intellectual disabilities nor be identified by others as having intellectual disabilities or put demand on services designed for people with intellectual disabilities. In countries that provide additional educational support for children with intellectual disabilities, there is a clear advantage to having the label, and flexibility in its use is beneficial for children with abilities that are a little above an intelligence quotient of 70 ('borderline' intellectual disabilities).

People with intellectual disabilities experience premature death hence the proportion of the population with intellectual drivable as progressively falls within older age groups. abilities until they attend school, so rates are lower in pre-scholar's than in school-aged children. Cohort effects can influence rates over time, for example, the sika virus epidemic in South America in 2015-2016 causing micro-cephaly, immunization, iodine, maternal smoking, and alcohol intake (currently falling, but could possibly increase

with the introduction of first trimester diagnosis, improved antenatal, perinatal, and neonatal health care, increased survival of very low-birthweight infants, identification and treatment of metabolic causes of intellectual disabilities like phenylketonuria, better childhood education, access to cardiac surgery for children with Down syndrome, improved lifestyles, and access to health care [9].

Migration and clustering can influence spatial patterning at local levels and can be influenced by economic factors and local policy. Prevalence of mild intellectual disabilities is influenced by many cultural and societal factors that determine whether a mild learning impairment is likely to result in a functional disability, contributing to geographic differences. Clearly, there is an intellectual gradient across the population, and the cut-off of 70 is purely arbitrary. Indeed, the accepted cut-off was changed in 1973, substantially affecting rates. Despite these complexities, there are some reasonably consistent findings across studies:

In high-income countries, about 5/1000 adults have intellectual disabilities, falling to about 2/1000 over the age of 65 years.

Prevalence is higher in children and young people than in adults. Prevalence is higher in boys/men than girls/women; across the whole of Scotland, 58% of people with intellectual disabilities are male [5].

Prevalence is higher in low-income countries than in high- and middle-income countries for multiple reasons, including life-style and health care, although in areas that are less driven by technology, having mild intellectual impairments may be less disabling. The great majority of people with intellectual impairments have mild intellectual impairments (6 mild impairment: 1 moderate to profound impairments), and the majority with intellectual impairments in whom this is disabling have mild, rather than severe, intellectual disabilities.

2. Causes and Degree of Intellectual Disabilities

People with intellectual disabilities have some characteristics in common such as needing additional educational support at school, finding it hard to manage money and bills without help as an adult, and having difficulties remembering the temporal sequencing of events. Every person with intellectual disabilities is also unique. Each child inherits a range of genetic information from both their parents which is not shared with other children with intellectual. Identifying the cause of intellectual debilities is undertaken by pediatrician's and clinical geneticists. There are four degrees of intellectual disability (Mild – Moderate – Severe – Profound).

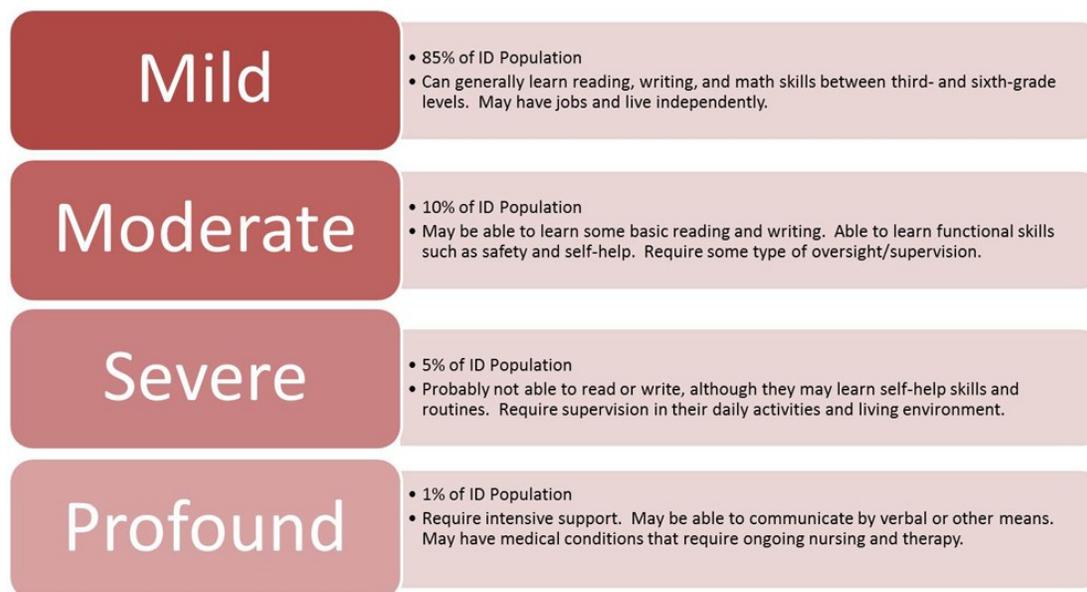


Figure 1: Degrees of Intellectual Disability

3. Genetic Factors

Genetic studies indicate intelligence is highly heritable and can itself be conceptualized as a spectrum of syndromes [10]. Additionally, there are many genetic causes of intellectual disabilities, and recent and ongoing studies have found numerous copy number variants associated with developmental disorders. genetic conditions include:

Chromosomal anomalies, Examples are trisomy Down syndrome (trisomy 21). Palau's syndrome (trisomy 13), Edwards syndrome (trisomy 15); autosomal deletions, for example, cri-du chat syndrome (terminal deletion of chromosome 15), Williams syndrome (deletion on chromosome 7), and Prader-Willi syndrome and Angelman's syndrome (deletion on chromosome 15 or uniparental disomy), and sex-linked conditions, for example, fragile X syndrome. Autosomal and sex-linked recessive conditions (particularly in communities with high rates of consanguinity). Examples are phenylketonuria, homocystinuria, galactosaemia, lipid disorders-Tay-Sachs disease, Gaucher disease, Niemann-Pick disease; and mucopolysaccharidoses Hunter's disease and Hurler's disease. Autosomal and sex-linked dominant conditions. Examples in tuberous sclerosis and neurofibromatosis.

4. Regarding the Prevalence of Individual Conditions in Childhood

1/800 has Down syndrome.

1/3600 boys and 1/4000-6000 girls have fragile-X syndrome.

1/7500 has Williams syndrome.

1/10,000 has Cornelia de Lange.

1/10,000-25,000 has Prader-Willi syndrome.

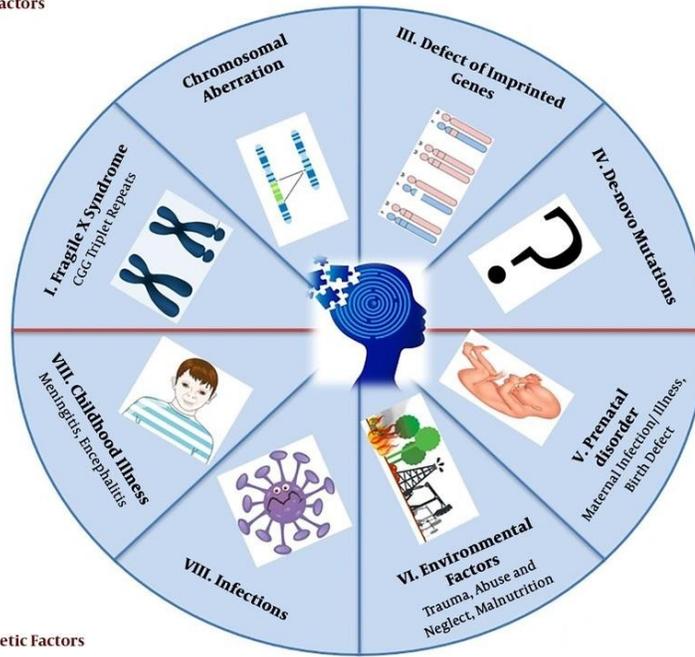
1/15,000 has Angelman syndrome.

1/20,000 has Smith-Magenis syndrome.

1/50,000 has cri-du-chat syndrome.

In addition to causing intellectual disabilities, physical condition's, and influencing trajectories, these genetic conditions can cause a range of other cognitive, behavioural, and mental health problems, for which the term 'behavioural phenotype' is used. Behavioural phenotypes have attracted particular research attention and can inform clinical assessments. Examples include high rates of dementia in middle-aged and older adults with Down syndrome; affective psychosis in Prader-Willi syndrome; self-injurious behavioral in Smith-Magnus syndrome; and depression in phenylketonuria [11-16]. While these behavior's/mental ill as interventions may help the individual. Additionally, some health is genetically driven, it is important to avoid therapeutic nihilism syndromes effect physiological differences, which influence treatment choices, for example, the low rates of heart disease and low blood Pressure in down syndrome differing immunology causing high rate of thyroid disorder and other immunological disorders.

A. Genetic factors



B. Non-genetic Factors

Figure 2: Two main of ID Etiologic Genetic Factors

Inheritance of X-linked syndromal intellectual disability

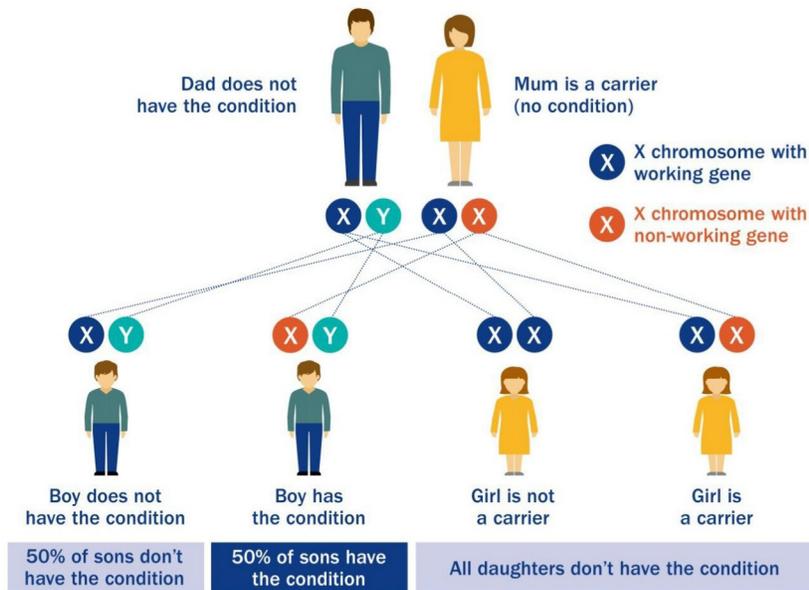


Figure 3: Inheritance of X-linked Syndromal Intellectual Disability

5. Antenatal Factors

Include, Teratogenic drugs and toxins. Examples include alcohol Infections. Examples include toxoplasmosis, rubella, cytomegalovirus, herpes simplex, syphilis, zika virus, and other infections. Fetal growth retardation. Examples include placental dysfunction and hypoxia Endocrine. Examples include iodine deficiency

6. Perinatal Factors

Include: Birth injury, especially in premature and low-birthweight infants Kernicterus, Infections, Postnatal factors,

7. Postnatal Factors Include

Infections, encephalitis, Toxins, Brain tumor's, Head injury, Starvation.

Extreme prematurity has been shown to account for 17% of cases of intellectual disabilities, together, gestational age and birthweight centile have been reported to account for 26.6% of intellectual disabilities [17]. The month of conception (January-March conception, compared with summer conception) has been reported to account for 15% of intellectual disabilities, postulated to be related to vitamin D or infections at the critical first trimester stage of development [18]. Fetal alcohol syndrome is underdiagnosed.

8. Mental Ill Health

Two recent systematic reviews reported that mental ill health is more common in children, young people, and adults with intellectual disabilities than in the general population [19,20]. Problem behaviors, such as aggressive, self-injurious, and destructive behavior, are very common in people with intellectual disabilities and do not have an obvious comparator in the general population. Widely reported prevalence rates have been given in view of differences in populations studied (some from mental health services and so their rates are biased and inflated), methods used to identify mental ill health, the types of conditions included within the re-reported mental ill health (particularly whether or not problem behaviours and/or autism are included), the diagnostic criteria used whether studies are reporting point or life prevalence, and if strictly applied, especially for public CD-10 and DSM-5 under-report mental ill health. It is not surprising that mental ill health is more common in people with intellectual disabilities, compared with the general population in view of complex biological factors, psychological and oral advantages, and additional developmental factors [22].

Population-based studies in children and young people with intellectual disabilities reported the prevalence of mental ill health including problem behaviors, ranging from 30% [23-25]. A robust UK study reported a rate of 36% in children and young people (aged 5-16 years) with intellectual disabilities compared with 8% of 17,774 children without intellectual disabilities in the same study. The children and young people with intellectual disabilities accounted for 14% of all children with mental health [26].

Population-based studies in adults with intellectual disabilities reported the prevalence of mental ill health, excluding problem behaviours, ranging from 14.5% (when also excluding ADHD, dementia, and personality disorder, people aged 65 and over, and people with severe intellectual disabilities (271) to 43.8% (with moderate to profound intellectual disabilities only [27-28]. The largest adult population-based prevalence study, in which each person was individually assessed, included 1023 adults with intellectual disabilities [29]. It reported a point prevalence of mental health of 40.9%, or 28.3% excluding problem behaviors, and more robust methods than previous smaller studies [30,31]. Some types of mental ill health are more common in people with intellectual disabilities, including schizophrenia, bipolar disorder, dementia (particularly in adults with Down syndrome), but also in adults with intellectual disabilities of other or unknown causes, autism [26,32-38]. ADHD, and pick with intellectual disabilities are reported to be higher than for other children and young people for 27 out of 28 ICD-10 categories (26) Prevalence rates of mental

ill health in children and young people Depression and anxiety are common in people with intellectual disabilities, but probably not more so than in the general population [34,39].

intellectual disabilities. In a large-scale, population-based study of Problem behaviors are very common in the population with adults aged 16+ years, 22.5% were reported to have problem behaviors, and of those, 10% had aggressive behavior and 5% had self-injurious behavior [29,40,41].

The incidence of mental ill health in adults, excluding problem for psychotic disorders [33,42]. The incidence of dementia has also behaviors, has been reported to be 12.6% over a 2-year period—been reported for older adults with intellectual disabilities NOT 8.3% for affective disorders, 1.7% for anxiety disorders, and 1.4% due to Down syndrome and found to be considerably higher than for the age-matched general population. At the age of 65 years or older, the standardized incidence ratio for dementia was 4.98 [43]. Regarding problem behaviours, the 2-year incidence of aggression was reported as 1.8%, and of self-injury 0.6% [40,41]. Full remission of psychosis after 2 years was only 14.3%, aggression 27.7% [33]. incidences are higher than those found in the general population. much of the current high prevalence of mental ill health is due to and self-injury 38.2% [40,41]. These findings suggest that while incidence is higher than those found in the general population much of the current high prevalence of mental ill health is due to. Enduring disorders, rather than new episodes, though research on this is limited in quantity. longitudinal cohorts show high and enduring rates of depression Studies on common types of mental ill health using general population and anxiety in adults with intellectual disabilities, compared with the general population [44-46].

Longitudinal studies have also reported on the mental ill health of children and young people with intellectual disabilities. In an Australian cohort study, children and young people aged 4-19 years were followed over four waves of data collection over 14 years. High rates of psychopathology levels were reported, with hyperactivity more prominent at younger ages and persisting for longer in children/young people with more severe degrees of intellectual disabilities. Emotional disorders emerged later in childhood [47-49]. Similar findings have been reported from longitudinal studies in children with intellectual disabilities/borderline intellectual disabilities (excluding those with more severe intellectual disabilities or with additional sensory or physical disabilities) in the Netherlands [50,51].

9. Neurodevelopmental Disorders Cluster

The term 'ESSENCE' (Early Symptomatic Syndromes Eliciting Neurodevelopmental Clinical Examination) to describe this [52]. He defined ESSENCE as major problems in: motor skills; general development; speech and language, social interaction and communication; behavior; hyperactivity or impulsivity; hypo activity, inattention; and sleep or feeding difficulties. Genetic data also increasingly support clustering of neurodevelopmental (including epilepsy) and mental health problems [53].

10. Physical Ill Health, Disabilities, and Multi-Morbidity

Additional physical ill health and disabilities are common in people with intellectual disabilities. Indeed, multi-morbidity is typical for people with intellectual disabilities, and hence too is polypharmacy [4,54]. This has implications, as it adds complexity to mental and physical health assessments (for example, distinguishing between complex partial seizures, depression, and anti-epileptic drug side effects), in assessments that are also challenging due to communication needs, impairment of understanding, and visual and hearing impairments, all of which are common in people with intellectual disabilities. This probably contributes to the under-recognition of mental ill health that occurs in this population. It also means that there are more disease-disease, drug-disease, and drug-drug inter-actions to take account of when managing conditions. For example, postural problems and deformities (common in people with cerebral palsy and people with profound intellectual disabilities) impact upon gastro-oesophageal reflux disease (GORD), which is extremely common in people with intellectual disabilities, more so the more severe their intellectual disabilities, and can cause anxiety. GORD occurs in about 50% of adults with intellectual disabilities, a consequence is that drugs to manage osteoporosis cannot be tolerated, drugs, commonly prescribed for people with intellectual disabilities, and osteoporosis is common in this population. Many psychotropic lower the seizure threshold, and epilepsy is common. People with intellectual disabilities may not be able to self-report drug side effects is essential. Anticholinergic burden due to polypharmacy of drugs and are reliant on others observing these; hence, pharmacovigilance with these side effects is an issue for people with intellectual disabilities, with potential negative side effects such as further impairment of cognition [55].

Long-term conditions are more common for adults with intellectual disabilities, compared to the general population. Children, young people, and adults with intellectual disabilities have higher rates of epilepsy (25%), visual impairment (50%), hearing impairment (40%), impacted cerumen, GORD (50%), dysphagia, constipation, diabetes, thyroid dysfunction, osteoporosis, contractures, mobility and balance impairments, injuries, eczema, xerosis, obesity, and heart failure, compared with the general population [4,54,56-60]. Asthma is also reported to be more common in people with intellectual disabilities and may be due to obesity, but it is possible that some of this is a misdiagnosis of reflux pneumonitis or aspiration pneumonia. In some cases, the excess physical ill health burden relates to the person's underlying cause of intellectual disabilities (for example, thyroid dysfunction and Down syndrome). but lifestyle and environmental factors and suboptimal support and health care are also important contributors. Some problems pre-dispose to others. For example, psychotropic drugs (prescribed to about 20% of the adult population with intellectual disabilities) can increase diabetes risk, as can obesity which is common, and sedentary lifestyles, also common [61-63]). In view of the shorter life expectancy of people with more severe intellectual disabilities and those with syndromal causes for their intellectual disabilities, older adults with intellectual disabilities have different characteristics, compared with younger adults. Older adults as a group have milder levels of intellectual disabilities and

lesser quantities of additional physical ill health. The profile of their health needs changes, as they have lower rates of the physical ill health and disabilities associated with severe intellectual disabilities but start to acquire physical ill health associated with ageing. In extreme old age, the health characteristics of people with intellectual disabilities becomes more like those of the general population.

11. Lifespan

People with intellectual disabilities do not live as long as other people; and life expectancy is shorter, the more severe the person's intellectual disabilities. A recent systematic review included 27 studies and found that although life expectancy has improved in recent decades, it is lower, compared with the general population. by about 20 years, with no evidence of any closure of the inequality gap [64]. More severe intellectual disabilities and/or additional comorbidities were associated with the shortest life expectancy. Standardized mortality rates showed a greater inequality for women than for men, for reasons that are unknown. The main causes of death differed from the general population, with respiratory disease the most common, then circulatory diseases.

greater congenital, and lesser ischemic, disease compared with the general population). Cancer was less common, compared with the general population, and the cancer profile differed from that in the general population.

Specific syndromes can also shorten life expectancy, including death in utero and in infancy and childhood. Life expectancy for people with Down syndrome has improved markedly over the last 50 years, with access to treatments for congenital heart disorders and improved surgical techniques and post-operative care accounting for much of this, but is still reported to be 30 years less than in the general population [65]. Down syndrome has been reported to occur in 1.2/1000 pregnancies, of which 78.1% are live births. Survival at 1 year for live births in 1995-1999 was 91.6%, and 85% are estimated to survive to 10 years [66,67]. The proportion of people with Down syndrome reduces in older cohorts, 75% survive to 50 years, 50% to 58.6 years, and 25% to 62.9 years [68].

The shorter life expectancy of people with intellectual disabilities does not relate to syndromal causes of death and multi-morbidity. Some deaths are potentially avoidable, being amenable to good quality care. A confidential inquiry reviewed 247 deaths of people with intellectual disabilities, finding that 22% were aged less than 50 years [69]. Avoidable deaths from causes that could have been amenable to good-quality health care occurred in 37%, compared with only 13% of the general population [69]. A further large-scale study (16,666 people with intellectual disabilities-656 deaths. compared with age, gender, and practice-matched controls, 113,562-1358 deaths) also found high rates of deaths amenable to good-quality health care at 37.0%, compared with 22.5% in the general population [70]. The authors also pointed out the standard definition of amenable deaths they used did not include some types of death that could be considered amenable to health care and which

they found occurred more commonly in people with intellectual disabilities, including deaths from urinary tract infections and aspiration pneumonitis [70]. Hence, these disturbing figures are actually an undercount of the deaths amenable to good care that people with intellectual disabilities experience. Improving health care for people with intellectual disabilities needs to become a priority for clinicians, service commissioners, and policymakers.

12. Conclusion

While a variety of studies focus on the multiple potential risk factors for intellectual disability, few have comprehensively examined the groups most at risk. Our review indicates that the risk is higher in cases of lower socioeconomic status, ethnicity, teenage motherhood, adolescent mental illness, and alcoholism. This highlights the target of desirable strategies. These include identifying and monitoring at-risk groups before, during, and after pregnancy, as well as the potential for new developmental disabilities in children, improved antenatal, perinatal, and neonatal health care, increased survival of very low-birthweight infants, identification and treatment of metabolic causes of intellectual disabilities like phenylketonuria, better childhood education, access to cardiac surgery for children with Down syndrome, improved lifestyles, and access to health care.

Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this article.

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