

Research Article

Oral Health Status and Care Needs of People with Intellectual Disability in Specialized Centers of Ouagadougou, Burkina Faso

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Abstract

People with intellectual disabilities suffer from oral pain and discomfort twice as often as the general population. Their reduced cognitive and physical abilities, regular medication, and often the lack of a strong social support system lead to difficulties coping with the daily demands of life, including proper oral hygiene and nutrition. Having data on the oral health status of children and adolescents living with disabilities is crucial to reducing oral health inequalities within the population. The objectives of this study were to describe the main oral conditions, oral health behaviors and identify the care needs of people with intellectual disabilities in specialized centers in Ouagadougou, Burkina Faso. A descriptive transversal survey was conducted in the reception centers of intellectual disabled people benefiting from the subsidy of the Ministry of Women, National Solidarity, Family and Humanitarian Action. A questionnaire adapted for oral health surveys of the World Health Organization has been used for data collection that has been analyzed with Stata MP 16.0 software (College Station, Texas 77845, USA). Were included in the study 193 people with intellectual disabilities whose average age was 12.4 years \pm 7.9. Our study reported that 74.0% had never visited a dentist and 19.0% of subjects did not clean their teeth. The overall prevalence of caries was 58.6% with 95% CI [51.2 - 65.8]. The frequencies of gingival bleeding and calculus were 63.8% and 63.4% respectively. The other pathologies were divided into 25.5% sialorrhea; 15.0% dental wear; 39.1% malocclusions; 19.2% dental anomalies and 14.4% dental trauma. Subjects who needed prompt and urgent care were 51.6%. This study made it possible to report the oral health behaviors and the main oral diseases encountered in people with intellectual disabilities and the care needs. Health promotion strategies focusing on simple interventions such as appropriate oral care would improve the general well-being of these vulnerable people.

Keywords

Oral Conditions, Mental Disability, Intellectual Disability, Oral Care Needs

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Received: 12 February 2024; **Accepted:** 29 February 2024; **Published:** 13 March 2024



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1. Introduction

The term ‘Intellectual disability’ describes human functioning that is significantly below average because of limitations both in intelligence and adaptive behavior present before the age of 22 [1]. People with intellectual disabilities have significantly worse oral health problems compared to the general population [2-5]. The intersection of reduced cognitive and physical abilities, regular medication, and a lack of robust social support places this population at a heightened risk of oral health issues, leading to difficulties in maintaining proper oral hygiene and nutrition [2, 5].

Unfortunately, issues regarding the situation of persons with disabilities in Burkina Faso are scarcely researched up until now [6]. As a result, the country does not have recent information regarding oral health status and care needs of people with Intellectual Disability. This study aims to describe the oral health behaviors and main oral conditions and identify the care needs of people with intellectual disabilities in specialized centers in Ouagadougou in Burkina Faso.

2. Materials and Methods

2.1. Ethical and Regulatory Aspects

The study obtained:

1. Authorization from the ethics committee for health research of the Ministry of Health of Burkina Faso;
2. Authorization from the Central Regional Directorate of the Ministry of Women, National Solidarity, Family and Humanitarian Action;
3. Authorization from those responsible for reception centers for people with intellectual disabilities.

Participation in the study was voluntary after the study objectives were presented to parents and subjects. Respect for anonymity and confidentiality of data was observed.

2.2. Design, Period and Study Population

This was a cross-sectional study with a descriptive aim. The investigation took place from November 2, 2020 to January 22, 2021 in Ouagadougou.

The study concerned all intellectually disabled people attending reception centers benefiting from subsidies from the Ministry of Women, National Solidarity, Family and Humanitarian Action. They were included after having given their assent to participate in the study and after the consent of the legal guardian. People with difficulty opening the oral cavity and those without any autonomy were excluded.

2.3. Collection of Data

A modified WHO questionnaire for oral health surveys [7] was used for data collection. The information available at the reception centers (identification forms, medical files, etc.)

was reported on the collection form. A face-to-face interview followed by a clinical examination completed the collection.

The variables collected concerned sociodemographic variables, medical and dental history, oral hygiene habits and dietary habits as well as oral care needs.

2.4. Reproducibility and Quality Control

The investigators took part in training on the methodological aspects and the content of the collection tool before the start of the study. At the end of the training, the examiners, two in number, were calibrated in relation to a standard examiner and each other. The minimum time interval between two examinations was 2 days in a sample of 20 peoples. The lowest Cohen's Kappa coefficient was 0.80.

We collected data after pre-testing the questionnaire with a selection of 20 disabled people in one of the centers not selected.

2.5. Statistical Methods

After collection, data entry was done with the EPIDATA software via a mask created specifically according to the questionnaire used. The data were then transferred to STATA MP 16.0 analysis software (College station, Texas 77845, USA). After viewing the dataset, certain variables were recoded.

Means and their standard deviations were calculated for normally distributed quantitative variables. Frequencies were calculated for all qualitative variables of interest.

P values <0.05 were considered statistically significant in all tests.

3. Results

3.1. Sociodemographic Profile of the Study Population

In total, the study involved 193 subjects. The sociodemographic characteristics of the subjects surveyed are presented in Table 1.

The mean age was 12.4 years \pm 7.9 years with extremes ranging from 1 to 47 years. The age groups of [0-10 years] and [10 - 20 years] represented 44.5% and 42.9% of the sample, respectively. Male subjects represented 65.6% with a male/female sex ratio of 1.9.

Subjects who did not benefit from school education and those attending special education were the most represented, respectively 37.2% and 33% of the sample.

Among fathers or guardians, self-employed workers were the most represented, at 39.6%. A large proportion of mothers or guardians were housewives, i.e. 50.3%. The majority of fathers or guardians had a university level of education, i.e. 33.1%. A large proportion of mothers had no level of school

education, i.e. 34.9%, followed by 33.7% who had a secondary level of education.

The urban environment predominated for the type of locality from which the subjects came, with a frequency of 80.2%. The majority of subjects (93.8%) lived with family.

Table 1. Distribution of subjects according to sociodemographic characteristics.

Variables / Modalities	Number (n=193)	Percentage
Age		
[0 -10[85	44.5
[10 - 20[82	42.9
[20 - 30[14	7.3
[30 - 50]	10	5.2
Gender		
Male	126	65.6
Feminine	66	34.4
Level of education		
No education	70	37.2
Special education	62	33.0
Maternal level	17	9.0
Primary level	37	19.7
Secondary level	2	1.1
Profession of father/guardian		
Public employee	37	22.6
Private employee	39	23.8
Independent	65	39.6
Farmer/breeder	13	7.9
Pupil / Student	1	0.6
Retirement	6	3.7
Unemployed	3	1.8
Occupation of mother/guardian		
Public employee	20	11.2
Private employee	26	14.5
Independent	35	19.6
Pupil / Student	5	2.8
Housewife	90	50.3
Retired	3	1.7
Father's education level		
No education	41	24.3
Primary level,	28	16.6

Variables / Modalities	Number (n=193)	Percentage
Secondary level	44	26.0
University level	56	33.1
Mother's education level		
No education	61	34.9
Primary level,	28	16.0
Secondary level	59	33.7
University level	27	15.4
Type of locality		
Urban	150	80.2
Peri-urban	29	15.5
Rural	8	4.3

3.2. Medical Background

The majority of subjects had an intellectual disability, i.e. 56.0%, and this intellectual disability was moderate for 36.4% or mild for 33.1%. Subjects with total motor autonomy were 59.7%.

Twenty-nine percent of subjects were on drug treatment and 49.0% of subjects had a treatment duration of more than five years. Antiepileptic drugs were the most prescribed drug class (18.1%). Subjects with no known general pathologies were 64.8%.

The distribution of subjects according to medical history is presented in the table below.

Table 2. Distribution of subjects according to medical history.

Variables / Modalities	Number (n=193)	Percentage
DISABILITY		
Intellectual disability	108	56.0
Autism	33	17.1
Cerebral palsy / BMI	31	16.1
Epilepsy	40	20.7
Trisomy	21	10.9
Other disability	23	11.9
Degree of intellectual disability		
Light	39	33.1
Moderate	43	36.4
Severe	9	7.6
Deep	9	7.6
Unspecified	18	15.3

Variables / Modalities	Number (n=193)	Percentage
Motor autonomy		
Total	114	59.7
Partial	52	27.2
Absent	25	13.1
MEDICAL TREATMENT		
Taking medication	56	29.0
Tricyclic antidepressants	13	6.7
Neuroleptics	8	4.2
Antiepileptics	35	18.1
Others (Myorelaxant, traditional.)	13	6.7
Duration of drug treatment		
Less than a year	5	10.6
Between one and five years	19	40.4
More than five years	23	49.0
GENERAL ASSOCIATED PATHOLOGIES		
Respiratory disorders	11	5.7
Cardiovascular illnesses	2	1.0
Other diseases	12	10.6
No associated diseases	125	64.8

3.3. Dental History

Seventy-seven-point seven percent had not had a toothache in the last 12 months preceding the survey.

A large part of our study population has never been to the dentist either 74.0%. Among subjects who had consulted a dentist in the last 12 months preceding the survey, consultation or care was the predominant reason for visit.

No subject did not wear a dental prosthesis.

Table 3 presents the distribution of subjects according to dental history.

Table 3. Distribution of subjects according to dental history.

Variables / Modalities	Number (n=193)	Percentage
History of dental pain/discomfort in the last 12 months		
Yes	39	22.3
No	136	77.7
Frequency of visits to the dentist		
At least once in the last 12 months	27	14.9

Variables / Modalities	Number (n=193)	Percentage
Not been to the dentist in the last 12 months	20	11.0
Never been to the dentist	134	74.0
Reason for visiting the dentist		
Consultation / treatment	26	76.5
Routine check / advice	6	17.6
Don't know/don't remember	2	5.9
Wearing a prosthesis		
No	193	100

3.4. Oral Hygiene Habits

Table 4 shows the distribution of subjects according to oral hygiene habits.

Nineteen percent of subjects did not clean their teeth. Among the children who had the habit of brushing, 90.8% of them used toothpaste for brushing. Toothpaste was fluoridated in 51.7% of children.

As for objects used for cleaning teeth, 98.6% said they had a toothbrush.

Table 4. Distribution of subjects according to oral hygiene habits.

Variables / Modalities	Number (n=193)	Percentage
Teeth cleaning frequency		
One or more per day	124	69.3
One or more per week	15	8.4
One or more per month	6	3.4
Never	34	19.0
Toothpaste		
Yes	139	90.8
Fluoride toothpaste		
Yes	76	51.7
No	29	19.7
Do not know	42	28.6
Toothbrush		
Yes	144	98.6
Interdental wire		
No	117	98.3
Others (finger)		
No	106	99.1

3.5. Eating Habits

Sixty-four-point three percent had a daily food intake number less than 3. The majority of subjects consumed confectionery outside of meals, i.e. 53.9% of the sample.

Two-point six percent of subjects consumed tobacco and 2.8% consumed alcohol (Table 5).

Table 5. Distribution of subjects according to eating habits.

Variables / Modalities	Number (n=193)	Percentage
Number of food intake per day		
≤3 sockets	119	64.3
4 to 6 sockets	51	27.6
> with 6 sockets	15	8.1
Confectionery		
Yes	104	53.9
Pastry shop		
Yes	41	21.2
Acidic and sugary drinks, dairy products		
Yes	93	48.2
Other foods		
Yes	12	6.2
Tobacco		
Yes	5	2.6
Alcohol		
Not consumed during the 30 Days	176	97.2
Less than or equal to one glass	4	2.2
Greater than or equal to one glass	1	0.6

3.6. Oral Conditions

3.6.1. Caries Prevalence

The overall caries prevalence was 58.6% with 95% CI [51.2 - 65.8] and the mean DMF was 2.7 ± 3.7 . The DMF was broken down as follows:

- Decayed teeth = 485
- Missing teeth = 10
- Filled teeth = 4

3.6.2. Tartar and Gingival Bleeding

Sixty-three-point eight percent of the population had gingival bleeding and 63.4% of subjects had calculus. The mean calculus index was 0.98 ± 0.95 .

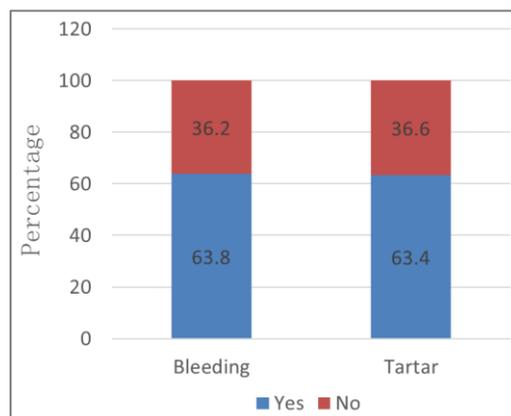


Figure 1. Distribution of gingival bleeding and tartar in 193 intellectually disabled subjects.

3.6.3. Other Oral Conditions

Table 6 below presents the distribution of subjects according to the other oral and dental conditions listed: 25.5% sialorrhea; 15.0% dental wear; 39.1% malocclusion; 19.2% dental anomalies and 14.4% dental trauma.

Table 6. Distribution of subjects according to oral conditions.

Variables / Modalities	Number (n=193)	Percentage
Sialorrhea		
Yes	47	25.3
Dry mouth		
Yes	4	2.1
Dental wear		
No sign	159	85.0
Enamel injury	20	10.7
Dentin lesion	8	4.3
Dental trauma		
No signs of injury	160	85.6
Enamel fracture only	22	11.8
Fracture of enamel and dentin / Pulp damage	5	2.6
Malocclusion		
None	114	61.0
Light	42	22.5
Moderate to severe	31	16.6
Dental anomalies		
Yes	37	19.2

3.7. Oral Care Needs

The majority of subjects needed rapid and urgent treatment, i.e. 51.6%. (Figure 2)

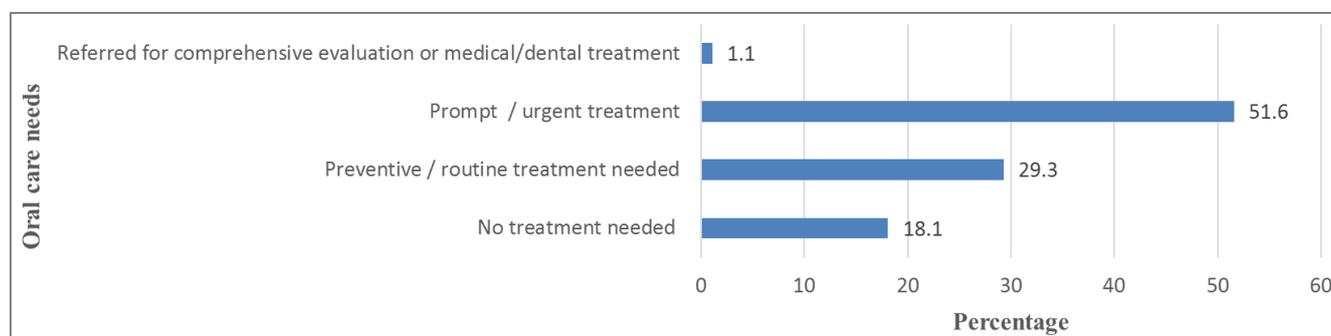


Figure 2. Distribution of subjects according to oral care needs.

4. Discussion

4.1. Oral Health Behaviors

Our study noted that the majority of individuals with intellectual disabilities engaged in tooth cleaning practices. However, the majority of our subject had gingival bleeding (63.8%) and calculus (63.4%) and the overall prevalence of caries was 58.6%. These results raise question on the efficacy of their cleaning ability. Persons with an Intellectual Disability (ID) may not understand how to take care of their own oral hygiene, while persons with physical disabilities may not be able to accomplish it. On the other hand, parents and personal caregivers often are inadequately trained in providing help with oral hygiene. Persons with ID and their caregivers need to receive appropriate and ongoing education regarding healthy living practices in areas such as nutrition, exercise and oral hygiene [8].

4.2. Dental History and Care Needs

Only 22.3% of subjects indicated the occurrence of dental pain during the last 12 months preceding the survey, while 81.9% were reported as needing dental treatment. The challenge in pain assessment and expression among this population can lead to underreporting or a lack of accurate portrayal of the severity of dental issues. This phenomenon aligns with previous research findings, such as those highlighted by Pradhan and colleagues, which have also noted a discrepancy between the reporting of pain and the perceived need for dental treatment among individuals with intellectual disabilities [9, 10]. The explanation for this incongruity lies in the limited communicative abilities of individuals with ID to articulate and describe the nuances of pain [11]. Regular oral

screenings are recommended to identify problems early, because ability to communicate pain and discomfort can be different for this population [9].

Our study also showed that a large part of our study population never went to the dentist, i.e. 74.0%, and that 14.9% had met a dentist during the 12 months preceding the survey. It has been definitely confirmed that people with ID were significantly less likely to visit the dentist during a year, compared with their unaffected counterparts [12]. However, in Burkina Faso, people are used to going to the dentist only in the event of a dental problem. Indeed, according to the 2021 stepwise survey, only 4.1% of the Burkinabe population had consulted a dentist [13]. Specific reasons for our subject's study [14] could be the fact that the parents of people with intellectual disabilities are not aware of the dental problems of their children, the lack of cooperation of the latter and the fact that dental surgeons are not trained specifically for better care of this category of the population. These results contrast with those of Kancherla *et al.* in 2013, in the United States (45.1%) [12] and those of Leroy *et al.* in 2013, in Belgium (50%) [15] due to their health systems and their more inclusive health and social policies, but also favorable socio-economic conditions, and progress in parental education.

The fact that 51.6% of subjects urgently require treatment highlights a critical oral health need among individuals with intellectual disabilities in Ouagadougou. This underscores the pressing demand for immediate interventions and improved access to dental care services to address severe oral health conditions and enhance the overall well-being of this vulnerable population. Gray and al [16], in their study revealing lower treatment needs (2.7%) among individuals with intellectual disabilities in the UK, attributed this result to several factors. They emphasized the role of community dental services, the official recognition of special care dentistry as a distinct dental specialty, and the integration of this specialty into the training of dental students.

4.3. Prevalence of Oral Diseases

Our study demonstrated that the overall prevalence of caries was 58.6% with 95% CI [51.2 - 65.8] and the average DMF of 2.7 ± 3.7 . Indeed, people with intellectual disabilities are more likely to have poor oral hygiene and, consequently, dental caries than people without this disability [2, 4]. Thus, the prevalence and the average DMF obtained are much higher than those found among non-disabled 12- and 15-year-old children (22.2% and 0.493) in the central region of Burkina Faso [17]. On the other hand, our result contrasts with the study by Sagheri [18], who demonstrated that the prevalence of dental caries among disabled preschool children in Ireland is lower than that of the general population. Well-established oral health prevention practices in Ireland may be linked to reducing the prevalence of dental caries in children with disabilities.

The frequencies of subjects with gingival bleeding and calculus were equal to 63.8%, respectively and 63.4%. This heightened susceptibility to periodontal problems can be attributed to a combination of factors, such as the intake of specific medications, the presence of malocclusion, the experience of multiple disabilities, and suboptimal oral hygiene practices. The interplay of these factors significantly amplifies the risk of periodontal diseases in individuals with ID. Notably, this aligns with existing research indicating that people with intellectual disabilities generally face an elevated risk of gingivitis and periodontal diseases compared to the general population [5]. Understanding the multifaceted nature of these risk factors is crucial for developing targeted interventions and oral health strategies tailored to the unique needs of individuals with intellectual disabilities, aiming to mitigate the increased prevalence of gingivitis and periodontal diseases in this vulnerable population.

Our study also reported that fifteen percent of our population showed signs of tooth wear. Indeed, tooth wear is also common among people with intellectual disabilities. Factors favoring dental wear include harmful oral habits, gastroesophageal reflux, frequent consumption of acidic drinks [19, 20]. Marro and *al.* in 2019, in Belgium [21] reported 50%. The difference in this prevalence with ours could lie in the socio-economic situation of the different countries.

The frequency of subjects presenting signs of dental trauma was 14.4%. Subjects with intellectual disabilities, cerebral palsy and seizure disorders are reported to be more vulnerable to dental injuries due to poor lip closure, slow response to environmental obstacles, oral pathological reflexes [5, 22]. Fernandez *et al.* [22] in a study in Europe and Eurasia (13.02%), Gray *et al.* [16] in United Kingdom (9.7%) had results similar to ours. On the other hand, Dagon *et al.* [23] in Israel reported a prevalence of dental trauma of 27.3%. The much higher values than ours can be explained by the fact that their study population consisted of people with special needs who participated in sports activities and did not benefit from protection.

Thirty-nine percent of our study population had malocclusions. The prevalence of malocclusion is generally higher in

these subjects compared to the general population [3]. Risk factors for malocclusion may arise from physical, behavioral, or pathological mechanisms [24]. Cabrita *et al.* in Lisbon [3] reported a prevalence similar to ours (37.4%).

Our study also demonstrated that 19.2% of our subjects presented dental anomalies. Dental abnormalities are yet another big concern for intellectually disabled patients. They are caused by interactions between genetic, epigenetic and environmental factors during the process of dental development, acquired during the morphodifferentiation or histodifferentiation stages [25]. Lamfon *et al.* [26] reported a prevalence of 100%. This difference could be due to the fact that their study population consisted exclusively of subjects with Down syndrome. The prevalence of oral and dental abnormalities appears to be higher in the Down syndrome group compared to other groups. Also, all anomalies in the mouth were taken into account in their study.

4.4. Limitations

While the absence of specific medical information could introduce information bias, we maintained a high level of representativeness across diverse collection sites, despite the unavailability of some subjects during the study. To ensure data reliability, clinical examinations involved two dental surgeons, and interviews were collaboratively conducted with parents and supervisors. A standardized questionnaire, recommended for this type of survey, minimized information bias. This pioneering study in six reception centers in Ouagadougou potentially offers valuable insights on a national scale, marking a significant contribution to the existing knowledge base.

5. Conclusions

This study sheds light on the significant oral health challenges faced by individuals with intellectual disabilities in specialized centers in Ouagadougou, Burkina Faso.

The findings underscore the prevalence of poor oral health behaviors and the high incidence of oral diseases among this vulnerable population, with a substantial proportion never having visited a dentist and many failing to maintain proper oral hygiene. The prevalence of dental caries, gingival bleeding, calculus, and other oral pathologies further highlights the urgent need for comprehensive oral health interventions tailored to the specific needs of individuals with intellectual disabilities. Moreover, the study identifies a considerable proportion of subjects requiring prompt and urgent dental care, emphasizing the immediate attention required to address their oral health needs.

Health promotion strategies focusing on simple interventions, such as oral hygiene education and access to dental services, are imperative to improve the overall well-being and quality of life of individuals with intellectual disabilities in Ouagadougou. Additionally, future research should explore new avenues to address the systemic inequalities in oral health

care and further investigate the factors contributing to poor oral health outcomes in this population.

Abbreviations

DMF: Decay-Missing-Filled

ID: Intellectual Disability

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Luckasson R. Intellectual disability. In: Friedman HS, Markey CH, editors. *Encyclopedia of Mental Health (Third Edition)*. Oxford: Academic Press; 2023. p. 259-64. <https://doi.org/10.1016/B978-0-323-91497-0.00214-9>
- [2] Wilson NJ, Lin Z, Villarosa A. Oral health status and reported oral health problems in people with intellectual disability: A literature review. *Journal of Intellectual & Developmental Disability*. 2019; 44(3): 292-304. <https://doi.org/10.3109/13668250.2017.1409596>
- [3] Cabrita JP, Bizarra MF, Graça SR. Prevalence of malocclusion in individuals with and without intellectual disability: A comparative study. *Special Care Dentistry*. 2017; 37(4): 181-186. <https://doi.org/10.1111/scd.12224>
- [4] Navarro Azevedo de Azeredo F, Silva Guimarães L, Azeredo A Antunes L. Global prevalence of dental caries in athletes with intellectual disabilities: An epidemiological systematic review and meta-analysis. *Special Care Dentistry*. 2019; 39(2): 114-124. <https://doi.org/10.1111/scd.12349>
- [5] US Department of Health and Human Services, Continuing Education: Practical Oral Care for People with Developmental Disabilities; Practical Oral Care for People with Autism, Practical Oral Care for People with Cerebral Pals.; Practical Oral Care for People with Down Syndrome; Practical Oral Care for People with Intellectual Disability; Dental Care Every Day: A Caregiver's Guide, National Institute of Dental and Craniofacial Research, NIH, Bethesda, Md, USA, 2009. Available on : <https://www.nidcr.nih.gov/sites/default/files/2017-09/practical-oral-care-intellectual-care.pdf>
- [6] Bezzina, L., 2019, 'Disabled people's organisations and the disability movement: Perspectives from Burkina Faso', *African Journal of Disability* 8(0), a500. <https://doi.org/10.4102/ajod.v8i0.500>
- [7] World Health Organization. *Oral health surveys: basic methods* 5th ed. Geneva: World Health Organization; 2013. Available on: <https://apps.who.int/iris/handle/10665/97035>
- [8] Petrovic BB, Peric TO, Markovic DLJ, Bajkin BB, Petrovic D, Blagojevic DB, Vujkov S. Unmet oral health needs among persons with intellectual disability. *Research in Developmental Disabilities*. 2016; 59: 370-7. <https://doi.org/10.1016/j.ridd.2016.09.020>
- [9] Pradhan A, Stormon N, Lalloo R. Pradhan A, Stormon N, Lalloo R. Oral and aural problems in Australian Special Olympics athletes. *Special Care Dentistry*. 2019 ; 39(5): 478-484. <https://doi.org/10.1111/scd.12406>
- [10] Pradhan A. Follow-up of Special Olympics athletes post oral health screenings. *Journal of Disability and Oral Health*. 2015; 16(2): 49-53. <https://espace.library.uq.edu.au/view/UQ:401959>
- [11] Barney CC, Andersen RD, Defrin R. Challenges in pain assessment and management among individuals with intellectual and developmental disabilities. *Pain Reports*. 2020; 5(4): e821. <https://doi.org/10.1097/PR9.0000000000000822>
- [12] Kancherla V, Van Naarden Braun K, Yeargin-Allsopp M. Dental care among young adults with intellectual disability. *Research in Developmental Disabilities*. 2013; 34(5): 1630-41. <https://doi.org/10.1016/j.ridd.2013.02.006>
- [13] Ministry of Health, Burkina Faso. Report of STEPS survey 2021. 2022.
- [14] Ummer-Christian R, Iacono T, Grills N. Access to dental services for children with intellectual and developmental disabilities - A scoping review. *Research in Developmental Disabilities*. 2018; 74: 1-13. <https://doi.org/10.1016/j.ridd.2017.12.022>
- [15] Leroy R, Declerck D. Oral health care utilization in children with disabilities. *Clinical Oral Investigations*. 2013; 17(8): 1855-61. <https://doi.org/10.1007/s00784-012-0874-2>
- [16] Gray D, Dunning N, Holder A. Oral health status of athletes with an intellectual disability competing in the Special Olympics GB National Games 2017. *British Dental Journal*. 2019; 226(6): 423-426. <https://doi.org/10.1038/s41415-019-0049-5>
- [17] Garé J. V W, Kaboré J, Kaboré WAD. Habitudes alimentaires et carie dentaire en milieu scolaire dans la région du centre au Burkina Faso, *Burkina Médical* 2019, 23(2) : 6-18.
- [18] Sagheri D, McLoughlin J, Nunn JH. Dental caries experience and barriers to care in young children with disabilities in Ireland. *Quintessence International*. 2013; 44(2): 159-69. <https://doi.org/10.3290/j.qi.a28927>
- [19] Vieira TI, Cavalcanti YW, de Sousa SA. Tooth wear prevalence in individuals with Down syndrome: a systematic review. *Clinical Oral Investigations*. 2023; 27(3): 943-53. <https://doi.org/10.1007/s00784-022-04856-5>
- [20] Hyder M, Tanboga I, Kalyoncu I. Are Down syndrome children more vulnerable to tooth wear? *Journal of intellectual disability research*. 2019; 63(11): 1324-1333. <https://doi.org/10.1111/jir.12673>
- [21] Marro F, Fernandez C, Martens L. Erosive tooth Wear in special Olympic athletes with intellectual disabilities. *BMC Oral Health*. 2019; 19(1): 37. <https://doi.org/10.1186/s12903-019-0727-3>
- [22] Fernandez C, Kaschke I, Perlman S, Koehler B, Marks L. A multicenter study on dental trauma in permanent incisors among Special Olympics athletes in Europe and Eurasia. *Clinical Oral Investigations*. 2015; 19(8): 1891-8. <https://doi.org/10.1007/s00784-015-1403-x>

- [23] Dagon N, Blumer S, Peretz B. Prevalence of dental trauma in individuals with special needs participating in local Special Olympics games. *Special Care Dentistry*. 2019; 39(1): 34-38. <https://doi.org/10.1111/scd.12343>
- [24] Peres KG, Frazão P, Flores-Mir C. Malocclusions. In: *Oral Epidemiology*. Springer; 2021. p. 79-105. https://link.springer.com/chapter/10.1007/978-3-030-50123-5_5
- [25] García Rosales L, Rebolledo Cobos M, Moreno Juvinao V. Anomalías dentales en personas con discapacidad. *Revista Cubana de Estomatología*. 2020; 57(3). <https://revestomatologia.sld.cu/index.php/est/article/view/3060>
- [26] Lamfon H, Fansa H, Beyari M. The Prevalence of Oral and Dental Anomalies in Mentally-Retarded Children in Holy Makkah Community. *International Journal of Health Sciences and Research*. 2015; 5: 317-24. https://www.ijhsr.org/IJHSR_Vol.5_Issue.6_June2015/45.pdf