DYNAMICS OF DISABILITY AMONG THE CHILD POPULATION DUE TO THE NERVOUS DISORDERS IN UKRAINE

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Summary

In the study, data from the state statistical reporting forms 'Report on Children with Disabilities Aged 0-18 for the Years 2010-2022' were analyzed using the statistical analysis of medical data. The disability analysis was conducted using absolute values and widely accepted intensive measures (the rate of first-time and overall disability per 10,000 of child population aged 0-17 inclusive) as well as extensive measures (the structure of first-time and overall disability by causes). The disability of children due to nervous system disorders (NSDs) represents a significant medical, social, and economic problem. Disorders of the central nervous system cause every seventh case of disability in children in Ukraine and rank third in terms of prevalence (with a relative weight of 14.7% in 2022) among all causes of childhood disability. Approximately half of all cases of disability due to NSDs (48.5% in 2022) are associated with cerebral palsy (CP). Among children newly recognized as disabled individuals, CP is the cause of disability in almost every fourth case (27.7% in 2022). The obtained data on the rate of first-time and overall disability among children with NSDs will contribute to the development of an optimized model of rehabilitation assistance for children with this pathology and the implementation of modern rehabilitation technologies.

Key words: children with disabilities, cerebral palsy, central nervous system disorders.

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1. Introduction

A tolerant and compassionate attitude towards children requiring special attention due to disability is a traditional aspect of Ukrainian society. According to the State Statistics Service of Ukraine, as of January 1, 2020, there were 163.9 thousand children with disabilities in Ukraine (*Ministerstvo sotsialnoi polityky).*

According to researchers, in the structure of children's disabilities during the period of 2011–2015, among the causes leading to children becoming disabled, nervous system disorders (17.0%-18.9%) rank second *(Slabkyi H.O. et al., 2016)*. The disability of the child population is a leading indicator of public health, the quality of medical care and rehabilitation, and constitutes one of the significant medical, social, and economic challenges in Ukraine. Among the entire child population, children with disabilities comprise 2.0–2.1%, and the vast majority of them retain the status of a person with disability throughout their lives. This condition

necessitates substantial societal expenditures on medical social support for this group of individuals and significantly disrupts the process of ensuring the workforce potential and defense capability of the nation *(Slabkyi H.O. et al., 2016).*

According to the UN Convention on the Rights of the Child, to which Ukraine is a party, it is stipulated that every child, including those with functional limitations, "should lead a full life in conditions that ensure their dignity, promote self-confidence, and facilitate their adequate participation in society" *(Konventsiia OON "Pro prava dytyny", 1989).* The development and improvement of rehabilitation assistance are crucial components in ensuring this right for children with disabilities.

Despite the ongoing improvement of medical technologies and the enhancement of the quality of rehabilitation services for children with musculoskeletal disorders, there is no observed trend towards a reduction in childhood disability due to central nervous system diseases in Ukraine and other countries worldwide. This type of disability constitutes a percentage ranging from 17.0% to 18.9% in the structure of children's disabilities *(Slabkyi H.O. et al., 2016; Kukuruza H.V., 2013).*

The socio-economic situation that has emerged in the current stage of Ukraine's development, along with crises in the economic and financial spheres, necessitates the strengthening of social protection for children with disabilities and the identification of priority directions in this effort *(Dudina O.O. et al., 2014; Dudina O.O. et al., 2015).* Alongside the disorders in psycho-physical development in children, there is observable social maladjustment, disruptions in social interactions, and a low sociometric status. Therefore, it is crucial to conduct rehabilitation for children in this category to restore impaired socio-psychological functions.

Nervous system disorders stand as the leading cause of disability among the child population in Ukraine. They consistently hold the third position (with a relative weight of 11%) in the structure of disability incidence and the second position (with a relative weight of 15%) in the overall children's disability structure *(Dudina O.O. et al., 2014; Dudina O.O. et al., 2015).* According to the data from the Center for Medical Statistics of the Ministry of Health (MOH) of Ukraine for the year 2020, the total number of children with disabilities due to nervous system disorders in Ukraine was 24,876 individuals. In half of the cases (50.5%, 12,570 individuals), disability due to this class of diseases was attributed to cerebral palsy (CP) *(Slabkyi H.O. et al., 2016; Dudina O.O. et al., 2014).* A significant proportion of children with disabilities resulting from nervous system disorders experience substantial motor impairments that significantly restrict their activities of daily living, necessitating correction through the effective provision of comprehensive rehabilitation assistance *(Voronenko Yu.V. et al., 2015; Martyniuk V.Yu., 2019).*

Cerebral palsy (CP) is a severe condition leading to disability, encompassing a group of diverse syndromes with varying clinical manifestations arising from underdevelopment or damage to the brain during prenatal, intranatal, and early postnatal periods. Brain impairment manifests as disruptions in muscle tone and movement coordination, resulting in the patient's inability to maintain a normal posture and perform various movements *(Kukuruza H.V., 2013; Milieiko O.O., 2017; Lazoryshynets V.V. et al., 2014).* This is attributed not only to spastic paralysis and paresis but also to multiple contractures leading to the formation of deformities in the bone segments of the limbs, progressing throughout the child's growth and development *(Williams C.M. et al., 2010; Graham H.K. et al., 2016; Woolfenden S. et al., 2018).*

Attempts to combat muscle spasticity and contractures with medication do not always yield the desired results and success. Comprehensive conservative rehabilitative treatment for such patients is a complex and labor-intensive task and it does not always guarantee improvement in motor functions *(ElTallawy H.N. et al., 2014; Abramenko V.V., 2014).*

In recent years, numerous studies in this field indicate that only the combination of various high-tech rehabilitation methods for patients with cerebral palsy can lead to positive treatment outcomes for this category of patients. The most effective approach for these patients today involves a comprehensive set of measures encompassing socio-medical, psycho-pedagogical, and physical rehabilitation for children with disabilities due to organic central nervous system impairment. This approach is implemented with the involvement of specialists from a multidisciplinary team *(Kukuruza H.V., 2013; Dudina O.O. et al., 2015; Voronenko Yu.V. et al., 2015).*

Ukraine has made significant strides in this field, implementing modern socio-medical rehabilitation technologies. Over 45 socio-medical rehabilitation centers have been established within the system of the Ministry of Health of Ukraine (MOH), aimed at providing comprehensive rehabilitation assistance to children of early and preschool age. Additionally, 226 social rehabilitation centers operate within the system of the Ministry of Social Policy of Ukraine. Numerous centers, created by non-governmental and charitable organizations, as well as on private initiatives, are open and operational. However, each of these centers, while performing crucial work, faces specific challenges in providing assistance to families with children of the specified category *(Martyniuk V.Yu., 2019; Moiseienko R. O., 2013; Baierle H., 2016).*

Individual rehabilitation programs for children with disabilities are developed in accordance with the State Standard Rehabilitation Program by medical advisory commissions of healthcare institutions. The determination of specific volumes, methods, and timelines for rehabilitation measures that should be carried out for children with disabilities, the budgetary allocation or funding through compulsory state social insurance, as well as monitoring the implementation of the individual rehabilitation program within their jurisdiction, is conducted by socio-medical expert commissions (medical advisory commissions of healthcare institutions for children with disabilities), labor and social protection authorities, employment services, rehabilitation institutions, and administrators of the relevant funds *(Shkolnyk M.B. et al., 2022).* The provisions regarding the individual rehabilitation program for individuals with disabilities, the financing procedure, and implementation are approved by the Cabinet of Ministers of Ukraine.

The scope of rehabilitation measures outlined in an individual rehabilitation program for a person with disabilities cannot be less than what is stipulated by the State Standard Rehabilitation Program for individuals with disabilities.

Currently, there is a need for significant reform in the organization and provision of rehabilitation services for children with disabilities in Ukraine. The existing system requires restructuring based on principles of accessibility (general, territorial, and financial), and a diversity of programs and services that encompass all aspects of a child's life. Substantial changes are needed in creating a system of rehabilitation services for children, implementing an interdisciplinary approach, transitioning from a medical to a social model of disability, and introducing systematic work in the childhood protection network with an individual rehabilitation program for children with disabilities.

Therefore, justifying the possibilities of preventing the formation of disabilities and identifying the need for rehabilitation assistance require ongoing monitoring of the rates and primary causes of disability in the child population. This is a relevant issue in today's context.

The aim of the research was to analyze the disability among the child population of Ukraine, taking into account the structure of causes for overall disability in children, the relative weight of cerebral palsy in the structure of first-time and overall disability due to nervous system disorders in children up to 17 years of age inclusive, covering the years from 2010 to 2022.

2. Results

In the study, data from the state statistical reporting form No. 19 'Report on Children with Disabilities Aged 0-18 for the Years 2010–2022' were analyzed using the statistical analysis of medical data. These data were compiled for Ukraine and published in statistical handbooks such as "Indicators of Population Health and the Use of Healthcare Resources in Ukraine" (Pokaznyky zdorovia naselennia ta vykorystannia resursiv okhorony zdorovia v Ukraini [20–26].

The analysis of disability was conducted using both absolute values and commonly accepted intensive indicators (the rate of first-time and overall disability per 10,000 children aged 0-17 years inclusive) as well as extensive indicators (the structure of first-time and overall disability by causes). The analysis of disability among children aged 0-17 years due to nervous system disorders (NSDs) in Ukraine was carried out dynamically for the years 2010–2022.

Comprehensive analysis of disability in the child population of Ukraine

In 2022, the population of children with disabilities in Ukraine amounted to 156,010 individuals, and the overall disability rate reached 212.3 per 10,000 of the child population aged 0–17 years. This marked an increase of 3.9% compared to the rate in 2010, which was 204.3 (Table 1).

In the structure of overall disability among the child population in 2022, the leading cause was congenital anomalies, deformities, and chromosomal abnormalities (28.2%). The second position was attributed to mental and behavioral disorders (20.1%), followed by diseases of the central nervous system (14.7%) in the third place. The fourth position was occupied by diseases of the endocrine system, eating disorders, and metabolic disorders (10.6%), while diseases of the ear and mastoid process took the fifth place (5.6%). Diseases of the musculoskeletal system and connective tissue accounted for 4.5% in the sixth position, and diseases of the eye and ocular adnexa comprised 3.1% in the seventh position (Figure 1). The relative weight of these major causes of disability amounted to 86.8% among all disability causes.

The structural distribution of the main causes of disability in 2022 has changed compared to 2015 due to an increase in the relative weight of mental and behavioral disorders. These disorders moved to the second position in 2022, displacing nervous system disorders to the third position (Figure 2).

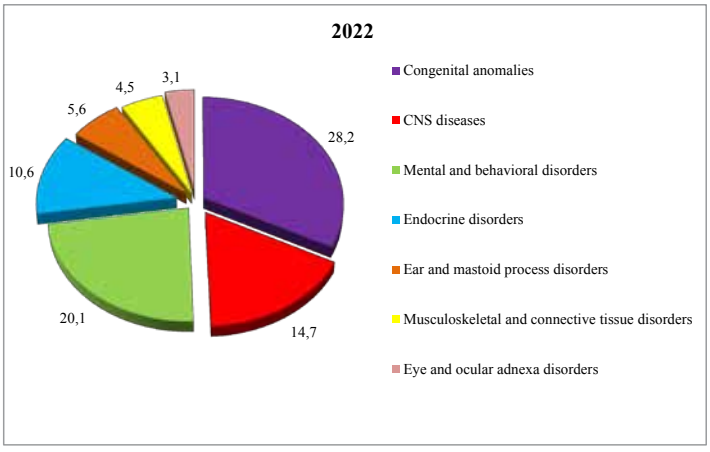

Fig. 1. Structure of the causes of overall disability in children aged 0–17 in Ukraine in 2022

Table 1

Disability indicators for children aged 0-17 in Ukraine from 2010 to 2022

Indicator	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	CGR*
All disability causes														
Overall disability (abs.)	165121	166164	167059	168280	151125	153547	156099	159044	161594	163886	162923	162214	156010	-5.5
Rate per 10,000 children aged 0–17 years	204.3	207.6	209.6	210.6	199.0	201.6	205.0	208.8	212.4	216.2	216.3	217.5	212.3	3.9
Onset of disability (abs.)	18428	18717	18157	18292	16250	16452	16311	16424	16208	16307	13149	15311	16115	-12.6
Rate per 10,000 children aged 0–17 years	22.8	23.4	22.8	22.9	21.4	21.6	21.4	21.6	21.3	21.5	17.5	20.5	21.9	-3.9
Nervous system disorders														
Overall disability (abs.)	30445	30233	29944	29684	25897	26119	25935	25885	25579	25422	24876	24370	22956	-24.6
Rate per 10,000 children aged years	37.7	37.8	37.6	37.1	34.1	34.3	34.1	34.0	33.6	33.5	33.0	32.7	31.2	-17.2
Onset of disability (abs.) 0–17	2502	2579	2432	2439	2028	2160	1918	1819	1847	1818	1472	1687	1854	-25.9
Rate per 10,000 children aged 0–17 years	3.1	3.2	3.1	3.1	2.7	2.8	2.5	2.4	2.4	2.4	2.0	2.3	2.5	-19.4
Cerebral palsy														
Overall disability (abs.)	17020	16780	16393	16147	14039	14012	13900	13699	13461	12608	12570	12326	11126	-34.6
Rate per 10,000 children aged 0–17 years	21.1	21.0	20.6	20.2	18.5	18.4	18.3	18.0	17.7	16.6	16.7	16.5	15.1	-28.4
Onset of disability (abs.)	905	958	887	897	708	772	620	592	601	595	498	555	514	-43.2
Rate per 10,000 children aged 0–17 years	1.1	1.2	1.1	1.1	0.9	1.0	0.8	0.8	0.8	0.8	0.7	0.7	0.7	-36.4

* CGR — Compound Growth Rate 2022/2010 in %

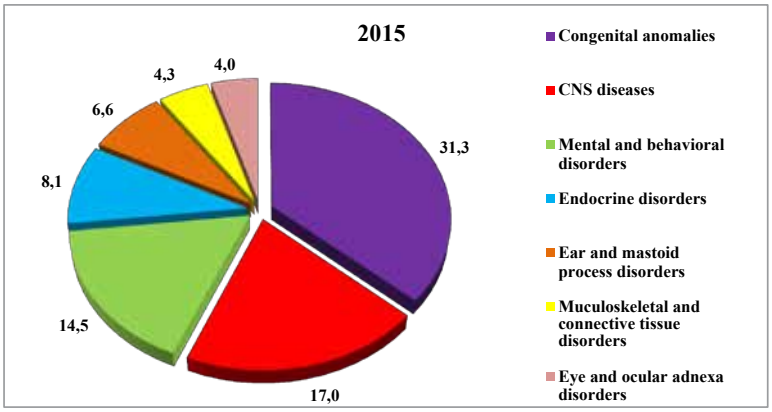

Fig. 2. Structure of the causes of overall disability in children aged 0–17 in Ukraine in 2015

The dynamic analysis of the overall children disability rate in Ukraine, conducted across leading causes, indicates that between 2015 and 2022, there was an increase in the overall disability rate due to mental and behavioral disorders (by 51.6%, from 28.1 to 42.6 per 10,000 of child population) (Table 2). Additionally, there was an increase in the overall disability rate due to endocrine disorders, eating disorders, and metabolic disorders (by 38.7%, from 16.3 to 22.6, primarily driven by type 1 diabetes), and a decrease in the overall disability rate due to nervous system disorders (by 9.0%, from 34.3 to 31.2, respectively), congenital malformations, deformations, and chromosomal abnormalities (by 5.1%, from 63.1 to 59.9, respectively), and diseases of the ear and mastoid process (by 11.9%, from 13.4 to 11.8, respectively).

Table 2

Causes of overall disability in children aged 0–17 years in Ukraine

Classes of diseases	Rate per 10,000 children aged 0-17 years				Compound growth rate 2022/2015 (in %)
	2015	2020	2021	2022	
Some infectious and parasitic diseases	4	3.8	3.6	3.1	-22.5
Neoplasms	7	7.7	7.8	7.4	5.7
Diseases of the blood and blood-forming organs	2	2.1	2.1	2	0.0
Endocrine diseases and eating disorders	16.3	22	22.9	22.6	38.7
Mental and behavioral disorders	28.1	37.4	39.4	42.6	51.6
Diseases of the central nervous system	34.3	33	32.7	31.2	-9.0
Diseases of the eye and ocular adnexa	8.1	7	6.8	6.6	-18.5
Diseases of the ear and mastoid process	13.4	13.2	12.9	11.8	-11.9
Diseases of the circulatory system	1.9	1.9	1.9	1.9	0.0
Diseases of the respiratory system	3.7	3	2.8	2.8	-24.3
Diseases of the digestive system	2.5	2.9	3	3	20.0
Diseases of the skin and subcutaneous tissue	0.9	1	1	1.1	22.2
Diseases of the musculoskeletal system and connective tissue	8.7	9.6	9.8	9.5	9.2

Table 2 (continuance)

Diseases of the genitourinary system	3.5	3.8	3.8	3.7	5.7
Congenital anomalies (birth defects)	63.1	63.9	63.3	59.9	-5.1
Injuries, poisoning, and certain other consequences of external causes	4.1	3.6	3.3	3	-26.8
Total	201.6	216.3	217.5	212.3	5.3

3. Analysis of the disability incidence rate

In Ukraine, in 2022, disability status was assigned for the first time in 16,115 children, with a disability incidence rate of 21.9 per 10,000 children. Throughout the period from 2010 to 2022, the disability incidence rate remained relatively stable, fluctuating between 20 and 23 cases per 10,000 children. An exception was observed in 2020 with a lower value of 17.5, possibly associated with the onset of the COVID-19 pandemic.

The structural distribution of the main causes of first-time disability changed over the observation period due to an increase in the relative proportion of mental and behavioral disorders, which took the first place in 2022 with a relative weight of 33.5%. Congenital anomalies ranked second (18.2%), nervous system disorders ranked third (11.5%), endocrine disorders, eating and metabolic disorders ranked fourth (10.9%), and diseases of the musculoskeletal system and connective tissue ranked fifth (6.4%).

4. Analysis of disability in the child population due to nervous system disorders in Ukraine

Nervous system disorders (NSDs) are one of the dominant causes of disability in children aged 0–17 years. In 2022, the population of disabled children due to NSDs was 22,956 individuals or 31.2 per 10,000 children aged 0–17 years (Table 2). The initial recognition of disability due to nervous system disorders occurred in 1,854 children in 2022, representing a rate of 2.5 per 10,000 children aged 0-17 years (Table 2).

In 2022, NSDs accounted for every 7th case of disability in children in Ukraine, constituting the third-ranking cause (with a relative weight of 14.7%) in the overall disability structure. It ranked behind only congenital anomalies (28.1%) and mental and behavioral disorders (20.1%) (Figure 1). In 2015, NSDs held the second position (with a relative weight of 17.0%) in the structure of overall disability in children aged 0–17 years (Figure 2).

In the structure of first-time disability, NSDs occupied the third-ranking position, accounting for every 9th case of disability in children from 2020 to 2022 and every 7th case in 2010 and 2015 (Table 3).

Table 3

The relative weight of nervous system disorders (NSDs) in the structure of first-time and overall disability in children aged 0–17 years inclusive in Ukraine in 2010–2022

Indicator	2010	2015	2020	2021	2022
The relative weight of NSDs in the structure of overall disability, %	18.4	17.0	15.3	15.0	14.7
The relative weight of NSDs in the structure of first-time disability, %	13.6	13.1	11.2	11.0	11.5

Analyzing the causes of disability within each disease class plays a significant role in justifying opportunities for preventing disability development and determining rehabilitation needs.

It has been determined that half (48.5% in 2022) of all cases of children's disability due to NSDs are attributed to cerebral palsy (CP), and among children first recognized as disabled individuals, CP is the cause of disability in almost every fourth case (27.7% in 2022) (Table 4). The number of children with disability due to CP in Ukraine in 2022 was 11,126 individuals, or 15.1 per 10,000 children aged 0–17 years. The first instance of disability due to CP was established for 514 children, or 0.7 per 10,000 children aged 0–17 years.

Table 4

The relative weight of CP in the structure of first-time and overall disability due to nervous system disorders in children aged 0–17 years inclusive in Ukraine from 2010 to 2022

Indicator	2010	2015	2020	2021	2022
The relative weight of CP among all cases of disability due to nervous system disorders, %	55.9	53.6	50.5	50.6	48.5
The relative weight of CP among first-time disability due to nervous system disorders, %	36.2	35.7	33.8	32.9	27.7

The dynamic analysis revealed a unidirectional trend towards decreasing rates of first-time and overall disability in the child population due to CP from 2010 to 2022. Overall disability during this period decreased by 28.4% (from 21.1 to 15.1 per 10,000 children aged 0–17 years), and first-time disability decreased by 36.4% (from 1.1 to 0.7 per 10,000 children aged 0–17 years).

5. Conclusions

Disability in the child population due to NSDs poses a significant medical, social, and economic challenge. NSDs account for every 7th case of disability in children in Ukraine, ranking third in the overall disability structure among children (with a relative weight of 14.7% in 2022). In Ukraine, the population of individuals with disabilities due to this cause is nearly 23,000 children (31.2 per 10,000 children aged 0-17 years in 2022), requiring prolonged, often lifelong rehabilitation and socio-medical assistance. Every year, over 1,800 children (2.5 per 10,000 children aged 0–17 years) are newly recognized with disability due to NSDs.

Half (48.5% in 2022) of all cases of disability in children due to NSDs are attributed to cerebral palsy (CP). Among children newly recognized with a disability, CP is the cause of disability for nearly every fourth child (27.7% in 2022). The population of children with disabilities due to CP in Ukraine is over 11,000 individuals (15.1 per 10,000 children aged 0–17 years in 2022).

Prospects for further research

The obtained data on the rate of first-time and overall disability of the child population due to diseases of the central nervous system will contribute to the creation of an optimized model of rehabilitation assistance for children with this pathology and the implementation of modern rehabilitation technologies. A priority is the organization of the work of socio-medical

centers for the rehabilitation of children involving a multidisciplinary team of rehabilitation specialists, predominantly using non-drug methods aimed at restoring the functional systems of the body.

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