



# Prioritization of key areas of the resilience in children with cerebral palsy strategy based on the analytical hierarchy process



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## ABSTRACT

**Background:** Children with cerebral palsy (CP) often require various forms of support to fulfill their basic rights and achieve a good quality of life. This research aimed to identify strategies to enhance the resilience and sustainability of children with CP.

**Methods:** This research used the analytic hierarchy process (AHP) developed by T. Saaty. We identified key elements, such as social, economic, and environmental factors, that enhance resilience in children with CP. This study used expert respondents, including the government, academics, the community, the private sector, society, and people with CP.

**Results:** The research results indicated that the main strategies were strengthening central and regional regulations, updating integrated data, enhancing the ecosystem of inclusive disability services, increasing the quantity and quality of medical and educational personnel, massive social movements related to disabilities, and building inclusive areas. The government plays a key role in determining policies that would have an overall impact. The potential for the sustainability of children with CP could be realized by paying attention to the key factors crucial for the sustainability of children with CP.

**Conclusion:** According to this study, local governments should be better equipped to create policies based on reliable disability data. Teachers and medical staff should also get continual training on how to help children with CP. To ensure the strategy's durability, stakeholder collaboration using the Penta Helix approach must be institutionalized. This study suggested that we should increase the public advocacy through social movements and the media to end stigma and promote inclusive public space design.

**Keywords:** analytical hierarchy process, cerebral palsy, disability, inclusion, resilience, sustainability.

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## INTRODUCTION

People with disabilities often face difficulties and issues that limit their rights in life, including social, economic, environmental, policy, and law enforcement rights.<sup>1,2</sup> In addition, they also face fundamental protection issues such as accessibility to facilities and healthcare services, economic independence, education, employment, limited social engagement, and high levels of discrimination.<sup>3,4,5</sup>

One of the disability conditions that has not received attention is cerebral palsy (CP).<sup>6</sup> Social involvement is reduced among people with CP.<sup>7</sup> They often avoid participating in activities, joining organizations, or feeling alienated from society.<sup>8</sup> Their social involvement may be restricted by several factors, including

functional and environment restrictions, ignorance of available services, and the stigma attached to impairments.<sup>7</sup> Parental and sibling support are the main sources of family and social support, helping children with everyday tasks.<sup>9</sup>

This condition is truly concerning to campaign for equality and shared strength to continue living comfortably and beautifully for CP patients. A significant challenge to create a space that can maintain inclusiveness of anyone without exception, including people with cerebral palsy. Previous research related to children with CP has not focused on more holistic problem-solving strategies to eliminate, reduce, avoid, and resolve the root problems.<sup>10-13</sup> The researchers argued that a comprehensive and in-depth study was needed to create the systems, resilience patterns, and sustainability of children

with CP. Resilience is the ability to meet basic life needs that come from within, and inclusiveness is related to acceptance and openness, which are closely related to equality for all.<sup>14</sup> This is a basic concept that needs to be built, especially for people with CP disabilities.

Further research was needed to analyze strategies for enhancing the resilience of children with cerebral palsy. These strategies would serve as a reference and became onestep to empower individuals with disabilities. Therefore, this research aimed to analyze strategies for enhancing the resilience of children with CP.

## METHODS

This study designed a model to provide a foundation for developing inclusive resilience for children with cerebral palsy

through a mixed-method approach. The primary data referred to the penta helix model involving five entities, including government, practitioners, academics, society, and community. The penta helix concept is related to multidisciplinary collaboration, complex problem-solving, and high suitability.<sup>15,16</sup> All data met the ethical standards of the Review Committee of the School of Environmental Science, Universitas Indonesia, No. KET-081/UN2.F13.D1.KE1/PPM.00/2024.

This study used the analytical hierarchy process (AHP) to determine the priority components of the resilience inclusion model for children with CP. Priority data were collected from 12 expert respondents with relevant expertise and experience. The traditional validity and reliability tests were not used in AHP, but the consistency ratios served as the basis for assessing the stability of responses at each stage of the process.

Operationalization began with collecting key elements at each stage through open-ended interviews with respondents. The data were grouped into a four-stage structure of factors, actors, criteria, and alternative strategies. This was followed by distributing a questionnaire using a quantitative approach and pairwise comparison values. In AHP, the inconsistency value must not exceed 0.10 to ensure reliable results.

## RESULTS

The AHP structure in this inclusion research was developed based on findings from expert interviews and consists of four main stages, including factors, actors, criteria, and alternative strategies. The hierarchy was intended to form a logical framework guiding efforts to enhance the resilience of children with CP. Achieving this goal required careful attention to elements managed by relevant actors, including meeting specific criteria and implementing appropriate strategies. To ensure data accuracy and reliability, an inconsistency threshold of less than 10% was applied to maintain consistency throughout the analysis and reduce potential bias in prioritizing elements. The structured analysis results were presented below.

**Table 1. Factor Processing**

Factor	Value (%)	Sequence	Inconsistency (%)
Government Policy	38.9	1	8.08
Database	28.1	2	
Health	15.2	3	
Social	8.9	4	
Infrastructure	5.7	5	
Education	3.2	6	

**Table 2. Actor Processing**

Actor	Value (%)	Sequence	Inconsistency (%)
Government	41.47	1	7.49
Society	29.61	2	
Medical Staff	14.90	3	
Community	9.40	4	
Academics	4.61	5	

**Table 3. Criteria Processing**

Criteria	Value (%)	Sequence	Inconsistency (%)
Physics	52.57	1	2.80
Mental	29.74	2	
Death	17.70	3	

**Table 4. Strategy Processing**

Alternative Strategy	Value (%)	Sequence	Inconsistency (%)
Strengthening Regulations	35.93	1	8.79
Update Data	24.48	2	
Inclusive Service Ecosystem	15.72	3	
Quantity of Human Resources	10.11	4	
Quality of Human Resources	7.42	5	
Social Movement	4.2	6	
Inclusive Design	2.21	7	

At the first level of the AHP hierarchy are key factors that support inclusion for children with CP. These include government policies, a disability database, social and infrastructure conditions, education, and health. As shown in Table 1, the inconsistency value is 8.08%, which falls within the acceptable range, indicating consistent responses from the 12 expert participants.

The second level highlights the actors responsible for promoting inclusion. These include the government, society, medical personnel, community members, and academics. Table 2 shows an inconsistency value of 7.49%, confirming the consistency of expert responses at this stage.

The third level outlines the criteria representing the desired outcomes of inclusion, specifically improvements in physical and mental conditions of children with CP, along with reduced mortality. As indicated in Table 3, the inconsistency

value is 2.80%, well below the threshold, demonstrating strong agreement among the experts.

The fourth level addresses strategic alternatives to achieve inclusive resilience. These strategies include strengthening regulations, updating data systems, enhancing inclusive services, initiating social movements, applying inclusive design, and improving the quality and quantity of medical and educational personnel. According to Table 4, the inconsistency value is 8.79%, within the acceptable range, supporting the reliability of expert input at this level.

## DISCUSSION

### Factor

The inclusion of resilience for children with CP disabilities can be achieved if supported by government policies, with a value of 38.9%. Government policies play a key

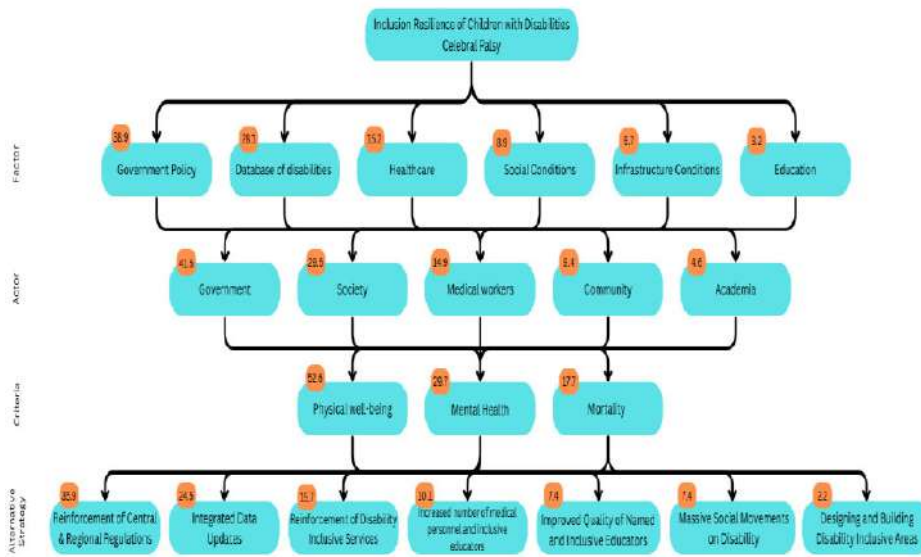


Figure 1. AHP inclusion structure to enhance resilience in cerebral palsy children.

role in realizing inclusion and resilience for children with disabilities through regulations, inclusive education programs, social protection, and assistive technology support. However, the effectiveness of these policies depends on cross-sector coordination, community engagement, and sustained efforts to address social stigma. With these measures, a more inclusive and empowering environment for all children without exception will be created. This result aligns with several studies that indicate government policies play a key role in achieving disability inclusivity.<sup>17</sup>

The next factor that plays an important role and is still an issue that needs to be addressed is the disability database, with a score of 28.1%. The disability database is important in creating inclusion and resilience for children with disabilities. By collecting accurate and comprehensive data, this database can provide the necessary insights to design effective interventions and support inclusive policies. The disability database acts as a basis for fostering social inclusion and building the resilience of kids with impairments, as well as a tool for gathering information. Accurate data may help us better understand their needs, empower families, promote inclusive policies, and create evidence-based solutions. These initiatives are essential to guarantee that children of individuals with disabilities have equal opportunities to flourish in society. This outcome supports

Kusumaningrum assertion that a database may serve as a basis for creating and promoting inclusive policies.<sup>18</sup>

The following important factor is related to healthcare services, with a value of 15.2% ranking third among the important factors in achieving resilience inclusion for children with CP disabilities. This becomes a crucial issue for children with CP disabilities to achieve resilience. These findings are based on the fact that the number of human healthcare resources is still very low, and the quality is still not up to standard. In addition, access to disability services remains a problem due to limited access and a tendency to be convoluted, as well as accessibility that is still far from being inclusive to reach those health services. This is in line with the research by Adugna, which states that healthcare services are a significant issue in the resilience of disabilities, both in terms of accessibility and the inadequacy of healthcare personnel, who require adequate training in terms of quality.<sup>19</sup> Additionally, the cost of healthcare services, which is still considered expensive when done outside of government hospitals, creates a dilemma for families with disabilities due to the high healthcare needs such as physiotherapy, occupational therapy, and speech therapy that must be regularly performed and have become primary needs for children with CP disabilities. This requires solutions such as expanding primary care services and integrating rehabilitation services into the healthcare

system, as well as easily accessible and centralized services, affordable costs, or community empowerment through free therapy.

The fourth factor, the main factor in achieving resilience inclusion for children with CP disabilities, is the social factor, with a value of 8.9%. People with disabilities are considered powerless by the general public, and their own belief that they are weak and helpless becomes an obstacle for them to be resilient in life. This finding aligns with Gufron and Rahman<sup>15</sup>, that social stigma has always been a major issue for people with CP.<sup>20</sup> This poses a significant challenge for all levels of the country to empower disabilities, especially CP, in order to realize the Golden Generation of 2045.<sup>20</sup>

The fifth factor important in achieving resilience inclusion for children with CP disabilities is infrastructure, with a value of 5.7%. These results are consistent with the research by Parris, Schalkwyk, & Ernstzen, which found that 6.7% of disabilities experience difficulties participating in life at home and in the community.<sup>21</sup> Infrastructure becomes a barrier for children with CP to engage in physical activities, affecting their motivation to participate in various activities.<sup>22</sup> Therefore, it is important to support people with CP in re-engaging in physical activities, offering programs, and enhancing opportunities for participation in physical activities.<sup>22</sup>

The final factor contributing to achieving resilience inclusion for children with CP disabilities is education, valued at 3.2%. Education for children with CP requires structured and holistic support strategies, including curriculum adjustments, the development of physical and occupational therapy programs, and the use of special learning aids. This approach must consider academic, physical, and emotional aspects to facilitate optimal development. Challenges in the inclusive education system remain a significant issue, primarily due to limited access, with only 49,647 children with disabilities out of approximately one million able to receive an education because the availability of special schools is still limited in both major cities and remote areas. In addition, there is a need to increase the quantity

and quality of inclusive educators because the current number is still very lacking. Collaboration between schools and families is also necessary as the frontline in creating educational inclusion because, with reasonable cooperation, an inclusive learning environment will be created with adaptive learning programs. With a comprehensive approach and support from various parties, education can become the primary catalyst in building resilience and inclusion for children with CP, enabling them to develop their optimal potential. This makes inclusive education a solution that must be provided for children with disabilities, especially those with CP, to allow them to learn alongside regular students, reduce the impact of exclusivity, open broader access to education, and offer more comprehensive support. These findings are consistent with the research of Angraini and Putri, that education is a crucial factor in building inclusion and resilience for children with CP disabilities.<sup>23,24</sup>

#### Actor

The inclusion of resilience for children with CP disabilities can be realized, of course, with the presence of very important actors. The leading actor plays a crucial role in the government, with a value of 41.47%. Policies, laws, and government strategies can have a significant impact on the lives of children with disabilities if formulated and implemented correctly with several supporting programs such as access to healthcare services and suitable early interventions like screening and early detection of disabilities, inclusive education, social protection and support (inclusive economy, community integration), adequate infrastructure for disabilities, and monitoring and accountability (program evaluation, data improvement, and program determination). The role of the government is vital in creating a supportive environment and a responsive healthcare system that enhances the resilience of children with CP. These findings are very much in line with several research results that indicate the government plays a crucial role in fostering resilience and inclusion for children with CP through a comprehensive policy framework and

support system.<sup>25,26</sup>

The next actor with an important role in the community, with a score of 29.61%, ranking as the second most important factor in creating inclusive resilience for children with CP disabilities. The social aspect of living alongside the community is an important aspect that enables children with CP to achieve a truly independent life, thereby being able to endure and be sustainable. Social needs are the urge to connect with others and sustain connections. Positive interactions with others, particularly in the broader population, are necessary to address the social requirements of those with cerebral palsy (CP) disability who have physical limitations. Another significant issue is the stigma that develops in society. The eradication of negative stigma will strengthen the resilience of sustainable inclusion, and fostering an inclusive and equitable environment for everyone will depend on raising public understanding of the potential and rights of individuals with cerebral palsy. Only by taking these actions will society be able to recognize the important contributions that any person, regardless of physical condition, may make. These findings align with the research by Levitt, which states that if barriers to resilience in people with CP disabilities, particularly societal stigma, can be minimized, it will reduce the dependency of people with CP on others, enabling them to be independent in their activities, socialize easily due to increased confidence, and integrate with society in general.<sup>27</sup>

The third actor who plays an important role in creating resilience inclusion for children with CP disabilities is the medical staff, with a score of 19.90%. Medical personnel, including doctors, nurses, physiotherapists, occupational therapists, speech therapists, medical social workers, and other medical staff, play a crucial role as essential healthcare providers for children with CP. They provide medical care and support the emotional and social needs of the patients and their families. The lack of medical personnel services to accompany children with CP remains an unresolved issue. In addition, the lack of adequate training for healthcare workers is also a barrier because these medical

professionals provide sensitive services and require a unique understanding of children with CP disabilities. The role of medical personnel in community programs involving CP children's participation in social activities will enhance their interaction with peers. This is important for their social development. Medical professionals also play a role in advocacy to ensure that children with CP have access to necessary healthcare services, including rehabilitation and therapy. Thus, medical professionals serve as providers of healthcare services and as advocates for social inclusion and resilience builders for children with CP and their families. These findings align with several studies that indicate the active involvement of medical personnel in various aspects of the lives of children with CP is crucial for creating an environment that supports optimal growth and development for children with CP.<sup>28,29,30</sup>

The fourth actor who plays an important role in creating resilience inclusion for children with CP disabilities is the community, with a score of 9.40%. An inclusive community can provide a supportive environment where children with disabilities, especially those with CP, feel accepted and have the opportunity to interact with their peers. Research shows that participation in social activities is essential for children's emotional and social development, including those with disabilities, especially CP.<sup>33</sup> Communities can provide significant emotional support for families of children with CP. Support groups, locally and online, allow parents to share experiences, receive practical advice, and find valuable resources. This support helps parents and provides a sense of togetherness for children. The community also plays a role in designing public facilities such as playgrounds and recreational spaces with accessibility, enabling children with CP to participate actively.<sup>32,33,29</sup>

The fifth actor who plays an important role in creating resilience inclusion for children with CP disabilities is academics, scoring 4.61 for medical personnel. In this context, academics play an important role in creating inclusion and resilience for them. According to Padhy<sup>30</sup>, teachers' knowledge of disabilities and the number

of inclusive teachers are significantly lacking, creating obstacles in providing appropriate support for disabilities.<sup>30</sup> Inclusive education is an approach that allows children with disabilities, including CP, to learn alongside children without disabilities in the same environment. Research shows that students with disabilities can achieve academic performance equivalent to their peers in non-inclusive classes if given the proper support. Academics can develop and implement inclusive learning strategies, such as communication aids, multisensory approaches, and peer-based interventions. This increases students' engagement with CP and strengthens the sense of belonging in the classroom. Additionally, academics can train teachers on the best ways to support students with CP. This includes understanding their unique needs and ways to create a supportive learning environment. By creating a positive and inclusive environment, academics can help boost the self-confidence of students with disabilities, making them more capable of facing academic and social challenges. The role of academics is crucial in creating resilience inclusion for children with CP. Through inclusive education, teacher training, parental involvement, and emotional and social support, academics help children with CP reach their academic potential and build a foundation for long-term success in their lives. Thus, these efforts benefit the individual and enrich the educational community as a whole.<sup>30,34</sup>

### Criteria

With a rating of 52.57%, the main objective of resilience for kids with CP difficulties is to improve their physical health so they can live. These results are very similar to those of Jawed & Mowry's<sup>13</sup> study, which emphasizes the significance of physical health for children with CP disabilities because they have the right to live to adulthood, making it more crucial than ever to figure out how to support them. The clinical practice recommendations for CP were updated in 2022.<sup>13</sup> The clinical practice recommendations for cerebral palsy were substantially updated in 2022 by the American Academy of Paediatrics (AAP) and the American Academy

of Cerebral Palsy and Developmental Medicine (AAPDM). The changes provided more avenues for future clinical research, especially in creating and executing therapies, as a foundation for evaluating their efficacy in light of their inclusion in evidence-based therapy for kids with cerebral palsy. This supports the conclusion that physical fitness is the first step towards a sustainable existence for children with cerebral palsy.

The secondary objective is to enhance the mental health of children with cerebral palsy difficulties, achieving a score of 29.74%. Mental health is crucial for fostering resilience in children with cerebral palsy and their families. Children with cerebral palsy encounter not only physical obstacles but also considerable risks of mental health illnesses, including anxiety, behavioral issues, and social difficulty. Within the framework of resilience inclusion, mental health emerges as a primary priority, as it underpins the whole development of children. Children with cerebral palsy exhibit a greater frequency of mental health issues than their non-disabled counterparts. Studies indicate that as much as 57% of children with cerebral palsy encounter mental health illnesses, such as anxiety and behavioral issues.<sup>35</sup> Social factors such as bullying and difficulty in building friendships exacerbate this condition. However, good social support can reduce those risks, including participation in activities and positive emotional relationships. Mental health also plays an important role in improving the quality of life for children with CP. Interventions that focus on strengthening social relationships, managing emotions, and controlling stress have proven effective in building resilience in these children. These findings align with several studies that mental health results from resilience and strengthens their ability to adapt to daily challenges.<sup>36,37</sup>

The third objective is the mortality rate of children with CP disabilities, which is 17.70%. Resilience inclusion for children with CP aims to improve their quality of life and indirectly reduce mortality. Resilience inclusion aims to create a supportive environment for children with CP, both physically and emotionally. By ensuring

access to inclusive education, healthcare services, and family and community support, these children can live healthier and longer lives. These measures can significantly reduce the mortality rate due to complications related to CP based on several existing studies.<sup>38,39</sup>

### Alternative Strategy

The inclusion of resilience for children with CP disabilities can be realized, of course, by requiring appropriate alternative strategies. Based on the study results, the primary alternative strategy is strengthening regulations at both the central and regional levels, with a value of 35.93%. This becomes a key element in realizing the inclusion of resilience for children with CP disabilities. Harmonization between central and regional policies is necessary to ensure consistent implementation. For example, the Regulation requires each sub-district to have at least one inclusive school. At the same time, the local government is responsible for ensuring the presence of Disability Service Units (DSUs) at the local level. However, implementation on the ground often encounters obstacles due to a lack of coordination. Although regulations are already in place, there is a need for regulatory strengthening strategies for resilience inclusion, namely the enhancement of local institutional capacity. Regional governments need to strengthen institutional capacity by establishing Disability Service Units (DSUs) in every district/city to support inclusive education effectively. DSUs can function as a center for identifying the needs of children with CP and providing local policy recommendations. Another strategy for strengthening efforts is public outreach and education; the government should improve the dissemination of regulations to the community to increase awareness of the rights of individuals with disabilities. This can be achieved via public campaigns or training programs for families of children with cerebral palsy.<sup>40</sup> Another significant strategy involves the allocation of adequate budgets; for instance, regulations require sufficient budget allocations to ensure inclusive educational facilities, teacher training, and accessible learning resources in

both formal and special schools. Regular monitoring and evaluation are essential; central and regional governments must periodically assess the Regulation's implementation to ensure its effectiveness and address any challenges relevant rules and legislation pose.

Strengthening regulations at both the central and regional levels is a strategic step in achieving resilience inclusion for children with disabilities such as CP. Strong regulations provide legal protection and encourage better policy implementation through policy harmonization, local capacity building, public outreach, and continuous monitoring. Thus, children with CP can enjoy equal rights in education and social life.

The second alternative strategy is updating disability data, with a value of 24.48%. Updating data related to disabilities, especially for children with CP, is a key factor in achieving inclusion and resilience. Updating accurate and detailed data on children with CP is crucial to ensure that their needs can be met inclusively. Up-to-date data enables the government, organizations, and society to understand the prevalence of CP in various regions, including the distribution of age, gender, and severity of disability. In addition, it is a basis for identifying special needs, such as assistive devices (e.g., specialized wheelchairs) and necessary medical rehabilitation or therapy services.<sup>41</sup> Good data is also used to design evidence-based policies to support inclusive education, accessibility of healthcare services, and economic empowerment for people with disabilities.

Inclusion means ensuring that children with CP can fully participate in social, educational, and economic life without discrimination. Data updates serve as the foundation for inclusive education; accurate data helps schools and educational institutions understand the number of students with CP and provide appropriate facilities and teaching methods. Inclusive education allows children with CP to learn alongside their peers without barriers. In addition, data updates impact inclusive healthcare services; with detailed data, healthcare facilities can offer physiotherapy, occupational therapy, or other medical interventions tailored to

children's individual needs. Up-to-date data also impacts social empowerment, supporting family and community empowerment programs to help CP children develop their social skills and independence.<sup>42</sup>

Updating data related to child disabilities, especially in cases of CP, is a fundamental step in achieving social inclusion and resilience. With accurate data, the government and stakeholders can design more effective policies to support inclusive education, adequate healthcare services, and social empowerment for children with CP. This improves their quality of life and strengthens the resilience of families and communities as a whole.<sup>42,43</sup>

The third alternative strategy involves enhancing the disability inclusion service ecosystem, which holds a value of 15.72%. Enhancing the ecosystem of inclusive services for children with disabilities, particularly those with cerebral palsy, is a crucial measure for promoting inclusion and resilience. This is important because children with CP often face physical, social, and psychological challenges that require a holistic, human rights-based approach. Children with CP have motor limitations that affect mobility, self-care, and social participation. These barriers often make them dependent on others and reduce their opportunities to participate equally in education, work, or community life. Therefore, inclusive services become key to overcoming these barriers through an approach focused on accessibility, empowerment, and equality.<sup>44</sup>

The inclusive service ecosystem encompasses services across facilities such as healthcare, education, and entertainment venues, including the provision of sign language interpreters for those with speech difficulties. Inclusive access to education allows children with CP to receive equal learning rights. The government has been striving to establish inclusive schools and ULD to support the education of children with disabilities. The resilience of children with CP does not only depend on physical services but also psychosocial support. Parents and the surrounding environment play an important role in building children's self-confidence with CP through acceptance,

supportive parenting, and stigma reduction.<sup>8,45</sup>

The fourth alternative option involves enhancing inclusive medical and educational professionals, with a value of 10.11%. Augmenting the quantity of inclusive medical and educational professionals is a crucial technique for attaining full inclusion for children with impairments, particularly those with cerebral palsy. Children with cerebral palsy frequently have difficulties in physical function, communication, and cognitive abilities. They necessitate medical assistance, including physiotherapy, to enhance motor abilities and aids such as wheelchairs or other supportive apparatus. Furthermore, they require educational services customized to their specific requirements, including a personalized curriculum and an inclusive pedagogical strategy.

In Indonesia, a notable imbalance exists between the population of children with disabilities and the available educators and healthcare professionals. The population of pupils with disabilities rose by 15% from 2021 to 2023, although the rise in the number of instructors was just 5% over the same timeframe. The distribution of Special Schools (SLB) is inequitable, with over fifty percent situated on the island of Java, whilst rural regions are deprived of inclusive education.<sup>46</sup> Referring to the Basic Education Data of 2023, the number of regular teachers trained to assist people with disabilities is only 10,244, while the number of special assistant teachers is only 4,695. On the other hand, the number of special schools (SLB) in Indonesia has reached 40,165, with a total of 135,874 students. Unfortunately, the 2,326 special schools have to serve 152,756 students.<sup>47</sup> This indicates an imbalance in the inclusive education system to provide adequate services for students with disabilities. In Jakarta, special schools for children with CP are still very few, and in terms of cost, they are still not affordable because the fees are very high. Teachers in inclusive schools play an important role in providing adaptive learning, supporting students' emotional development, and facilitating social interactions. On the other hand, medical professionals such as physiotherapists help children with CP

achieve physical independence through regular therapy. Collaboration between teachers and medical professionals is essential to ensure a holistic approach to the needs of children with CP.<sup>42,46,48</sup>

Strategies that may be employed include educating everyday educators to become inclusive instructors and augmenting their competencies in addressing the issues of inclusive education. Furthermore, expanding specialized education programs and primary health initiatives, including physiotherapy, occupational therapy, and speech therapy at universities, is essential, along with increasing quotas, to cultivate more proficient medical and educational professionals. Moreover, the government should allocate medical professionals and educators to rural locations and offer incentives for those wanting to assist in neglected regions. This will mitigate the disparity in access to education and healthcare services for children with disabilities in those regions. Additionally, offering specialized learning tools and accessible facilities can enhance the educational experience for children with cerebral palsy. Educational technology can also overcome physical barriers and enhance student engagement in the learning process. The most important thing is that cooperation between the government, educational institutions, local communities, and international organizations is crucial to creating an inclusive education and health ecosystem that supports children with CP. For example, training programs by institutions such as UNFPA have successfully empowered teachers in various regions of Indonesia to support students with disabilities.<sup>49,50</sup>

Increasing the number of inclusive medical personnel and educators is a strategic step to achieving inclusive resilience for children with disabilities such as CP. By ensuring the availability of adequate educational and health services and collaboration among stakeholders, these children can develop optimally according to their potential. This strategy creates equal opportunities and builds a more inclusive society in the future.<sup>48</sup>

The fifth alternative strategy is improving the quality of medical and inclusive educational staff, with a value

of 7.42%. Improving the quality of medical and educational staff is one of the alternative strategies for supporting the resilience of children with CP. Several important aspects regarding people with disabilities in this strategy are, first, the professional competence of educators and medical personnel. In this case, developing adaptive learning strategies is very important. The development of specific professional skills is also a key focus in developing inclusive educators and child-specific medical personnel. There is also a need to build collaborative relationships between regular teachers, exceptional teachers, and medical personnel with other medical colleagues. Secondly, another area of concern is the comprehensive skills of medical and pedagogical professionals. Educators must be able to design individual curricula, develop specialized assessment tools, provide adaptive service facilities, and offer continuous teaching. Medical professionals specializing in inclusion, particularly for children, should be given up-to-date and ongoing certification. Some recommendations related to the quality of educators and medical personnel include first, continuous training such as periodic competency enhancement programs for both inclusive teachers and medical personnel specializing in children's disabilities, special workshops on inclusive education and medical personnel specializing in children's disabilities, as well as certification in teaching children with disabilities and medical personnel specializing in children's disabilities. Second, regarding multidisciplinary collaboration, in this case, cooperation between medical professionals and educators is key; a holistic approach needs to be prioritized in handling children with CP and continuous support from various parties. These findings are consistent with several studies that state that the quality of medical and educational personnel is an important factor in improving the resilience of children with CP.<sup>51,52</sup>

The sixth alternative strategy is a massive social movement related to disabilities, with a value of 4.2%. The disability social movement is a strategic effort to drive systemic change and achieve social inclusion for people with disabilities, particularly children with CP.

This aims to encourage regional policies related to ensuring a decent standard of living, creating inclusive cities that are friendly to minority groups, and empowering people with disabilities towards independence. Some things that can be done in this strategy include mass actions and peaceful campaigns, using social media for public education, government policy advocacy, and personal and institutional empowerment. Social movements have proven to be a significant strategic alternative in achieving inclusion and resilience for children with CP, with a holistic approach beyond traditional medical interventions.

The seventh alternative strategy is to design and build inclusive disability areas, with a value of 2.21%. Designing the environment with inclusive and universal principles is a comprehensive strategic approach to supporting the development and resilience of children with CP. Several key aspects in developing inclusive areas include comprehensive physical accessibility. The design of inclusive areas must consider several aspects for the ease and comfort of individuals with disabilities, particularly those with CP, namely: 1) Ramps with a gentle slope (maximum nine degrees), 2) Wide and flat pedestrian paths, 3) Paths with signs and markings, which must include guiding tiles and warning tiles located in front of vehicle traffic lanes, at entrances and exits, connecting pedestrian environments and buildings, and guiding from public spaces to public transport. In addition, signs and markers are needed for the direction and destination of public restrooms along pedestrian paths, special disability parking, facilities, place names, public telephones, and ATMs. 4) Special facilities such as safe handrails, wide doors for wheelchairs, disability toilets, and parking areas for disabilities. Public spaces must provide accessibility by technical guidelines for facilities and disabilities, thus requiring genuine collaboration from all stakeholders in designing and building inclusive areas. These findings are consistent with several studies that indicate designing and building inclusive areas is necessary for children with CP to survive.<sup>53</sup>

Based on the research results analyzed

using the analytical hierarchy process (AHP) approach, it was found that strengthening regulations at both the central and regional levels is the main priority in building the resilience of children with Cerebral Palsy (CP). This strategy is followed by the importance of updating data on people with disabilities and strengthening the ecosystem of inclusive services (Figure 1). This finding is consistent with previous studies<sup>18,19</sup>, emphasizing that effective and data-based policies are the primary foundation for guaranteeing the rights of children with disabilities. The results show that government actors, with a central role in policy, budget, and cross-sector coordination, are the most dominant elements in realizing inclusion strategies. This finding is in line with the literature, which states that the success of disability policies is highly dependent on political will and state institutions<sup>27,45</sup>. Thematically, the results of this study integrate structural dimensions (policy and data), instrumental (human resources), and cultural (social movements and inclusive design), which, when compared to other studies, show a more comprehensive approach to resilience. Thus, the resilience strategy for children with CP does not only rely on health or education services but also on the transformation of social systems and collaborative governance.

This study is limited to a relatively small number of expert respondents (12 expert) for a large condition, so the results must be generalized carefully. In addition, using the AHP method does not allow for causality analysis and only emphasizes priorities based on perception. The study also did not include direct voices from children with CP or their families, so the perspective of service users was not fully accommodated.

## CONCLUSION

This study identifies key strategies to enhance the resilience of children with CP, including strengthening central and regional regulations (35.93%), updating disability data (24.48%), and developing inclusive service ecosystems (15.72%). The government is the primary actor (41.47%), supported by the community, medical personnel, academics, and civil society.

Main influencing factors are government policies (38.9%), health services, social conditions, infrastructure, and education. The primary objectives are improving physical (52.57%) and mental (29.74%) conditions and reducing mortality (17.7%).

The study argues that resilience cannot be built in isolation but requires a cross-sectoral (pentahelix) collaboration involving government, community, academia, civil society, and media/business. It recommends strengthening local government capacity, improving data accuracy, training for educators and medical staff, institutionalizing stakeholder collaboration, and promoting inclusive public advocacy. Limitations include a small sample of expert respondents (12), the AHP method's inability to analyze causality, and the absence of input from children with CP and their families.

## ETHICAL CONSIDERATION

This research has obtained research permission from the Ethics Review Committee of the School of Environmental Science, Universitas Indonesia, with registration number: KET-081/UN2.F13.D1.KE1/PPM.00/2024, and each informant has agreed to participate in this research.

## CONFLICT OF INTEREST

Regarding the publishing of this paper, the author states that there is no conflict of interest.

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## AUTHORS CONTRIBUTIONS

ADP design study, data acquisition, literature research, and manuscript writing; RP, JS, and DP collected data; BMBA and JWC participated in manuscript revisions.

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