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Determinants of default from pediatric neuro-rehabilitation services in Cerebral Palsy: A matched case-control study

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Abstract

Background

Long-term neurorehabilitation is essential to optimize functional outcomes and prevent secondary complications in children with cerebral palsy (CP). However, premature service default represents a critical barrier to care, particularly in low- and middle-income countries (LMICs). This study aimed to isolate independent risk factors associated with default from paediatric neuro-rehabilitation services in Sri Lanka.

Methods

An analytical matched case-control study was conducted at Lady Ridgeway Hospital for Children, Colombo. The post-COVID-19 indexing cohort (July 2022–June 2023) comprised 279 eligible children relying exclusively on institutional primary rehabilitation. Default was operationally defined as continuous absence for > 1 calendar year. Active cases (n = 72) were compared with frequency-matched adherent controls (n = 144, 2:1 ratio). Data collection integrated medical record reviews and structured interviews evaluating clinical severity, transport logistics, out-of-pocket costs, and household-level barriers. Univariate and forward-stepwise multivariable logistic regression models were constructed.

Results

Multivariable analysis identified five powerful independent predictors of rehabilitation default: **non-ambulatory status** – Gross motor Functional Classification System IV-V (GMFCS IV–V: adjusted odds ratio [aOR] = 4.12, 95% CI: 2.05–8.28, p < 0.001), **reliance on public transport** (aOR = 3.84, 95% CI: 1.88–7.85, p < 0.001), **primary breadwinner engaging in daily wage labour** (aOR = 3.25, 95% CI: 1.62–6.52, p = 0.001), **poorly controlled epilepsy** (aOR = 3.10, 95% CI: 1.48–6.48, p = 0.003), and **absence of state disability allowance** (aOR = 2.41, 95% CI: 1.12–5.18, p = 0.024). Physical travel distance (p = 0.082) and direct out-of-pocket transit expenses (p = 0.115) were statistically comparable between groups, confirming that indirect daily wage loss (3.00-4.50 USD /visit) and public transit fatigue drive attrition rather than geographic proximity. Comparative household analysis (N = 69 vs. N = 144) demonstrated that defaulted families had significantly higher information deficits regarding rehabilitation importance (66.7% vs. 21.5%), alternative medicine reliance (62.3% vs. 18.1%), apprehension of staff reprimands (30.4% vs. 6.3%), and spousal isolation (42.0% vs. 11.8%; all p < 0.001).

Conclusion

Neuro-rehabilitation default in CP is driven by a compounding matrix of severe motor dependency, public transit vulnerability, unmitigated daily wage loss, active seizure burden, and systemic information gaps.

Mitigating attrition requires shifting from centralized tertiary models toward decentralized community-based rehabilitation, targeted cash subsidies, tele-health outreach, and structured caregiver education.

Clinical trial number:

not applicable

Introduction

Cerebral palsy (CP) remains the most common physical childhood disability globally, presenting a profound, lifelong impact on affected individuals, families, and healthcare systems [1]. Recent epidemiological data indicate a global CP prevalence ranging between 1.5 to over 3 cases per 1,000 live births, with a disproportionately higher burden, exceeding 98% of cases under five years of age, residing within low- and middle-income countries (LMICs) [2]. Characterized as an umbrella term for a heterogeneous group of permanent neurodevelopmental disorders, CP arises from a non-progressive insult or interference to the developing fetal or infant brain before the age of two years [3]. While the primary clinical manifestation involves deficits in movement and posture causing activity limitations, the clinical picture is rarely isolated. It is frequently compounded by neurodevelopmental comorbidities, including intellectual disabilities, learning difficulties, and social-emotional problems, alongside severe secondary musculoskeletal sequelae such as progressive joint contractures, hip displacement, and scoliosis. In severe instances, these complex comorbidities contribute to an elevated risk of premature mortality [1, 3].

Because the underlying neurological insult is irreversible, medical management shifts away from a cure toward structured, long-term multidisciplinary neurorehabilitation aimed at optimizing functional status, mitigating secondary complications, and minimizing caregiver burnout [4]. Modern paediatric rehabilitation heavily adheres to the World Health Organization's International Classification of Functioning, Disability and Health (ICF) framework, clinically conceptualized through the "F-words" in childhood disability: fitness, function, family, friends, and fun [5]. Within this model, structured, goal-directed interventions, primarily active physiotherapy, occupational therapy, and speech and language therapy, explicitly enhance fitness and function. These improvements serve as the critical scaffolding required to transition away from passive modalities and maximize neuroplasticity [6]. Ultimately, consistently practicing these active strategies daily within home and community settings empowers the child to successfully achieve societal participation across the remaining domains of family, friends, and fun [7].

Despite the established efficacy of structured neurorehabilitation, premature default (or dropping out) from these essential services represents a critical barrier to care [8]. Crucially, rehabilitation default cannot be simplistically labelled as an isolated medical failure or a standalone caregiver omission. Rather, it is a complex, multifactorial phenomenon driven by intersecting socioeconomic, environmental, cultural, and institutional systemic barriers [9]. Identifying, understanding, and addressing these specific

determinants is paramount to refining local rehabilitation delivery models and improving long-term outcomes for children living with CP.

A distinct gap exists in the current scientific literature regarding this issue. While various descriptive studies have identified broad reasons for attrition or non-adherence in pediatric chronic illnesses, research specifically evaluating default patterns in cerebral palsy remains scarce [10]. Furthermore, the existing literature is predominantly restricted to descriptive, single-centre designs, which lack the methodological rigor to isolate true independent risk factors. This research gap is acutely evident within the local healthcare setting of Sri Lanka, where localized data regarding cerebral palsy rehabilitation default rates and their underlying structural causes are virtually non-existent. To address this gap, this study utilizes a case-control design to systematically compare two cohorts of children diagnosed with cerebral palsy within the Sri Lankan healthcare system: children who have prematurely defaulted from neuro-rehabilitation services (cases) and children who maintain consistent, regular follow-up (controls). By integrating quantitative risk factor analysis with qualitative insights into the lived experiences and ideas of these families, this study intends to explore the strong, independent causes of default.

The primary objective of this study is to systematically identify and analyse the multifactorial determinants of default from paediatric neuro-rehabilitation services among children living with cerebral palsy. Specifically, this study aims to describe the socio-demographic characteristics of children who have defaulted from care, evaluate the specific factors contributing to attrition across key disease-related, therapy-related, clinic-related, and socioeconomic domains. It is hypothesized that children who default from neuro-rehabilitation services experience a significantly higher prevalence of modifiable structural barriers, such as severe socioeconomic strain, higher functional disability, prolonged transit distances to clinical facilities, and low caregiver-perceived early therapeutic efficacy, compared to their peers who maintain consistent, regular follow-up.

Methodology

Study design and setting

This analytical, observational study utilized a matched case-control design to investigate the multifactorial determinants of default from pediatric neuro-rehabilitation services. The study was conducted between September 2024 and April 2025 at the Lady Ridgeway Hospital (LRH) for Children in Colombo, Sri Lanka. LRH is the premier and largest tertiary care paediatric hospital in Sri Lanka, primarily serving the Colombo District and the wider Western Province (including the Gampaha and Kalutara districts). Data collection spanned across the institutional multidisciplinary rehabilitation infrastructure, specifically Physiotherapy, Occupational Therapy, and Speech and Language Therapy units.

Study population and eligibility criteria

The target population comprised children aged 2 to 17 years with a confirmed clinical diagnosis of Cerebral Palsy (CP) who were registered for long-term rehabilitation services at LRH. The lower age limit

of 2 years was strictly applied to exclude high-risk infants undergoing provisional early intervention follow-up.

To eliminate the confounding structural disruption of healthcare utilization caused by pandemic-related movement restrictions, the sampling frame was strictly anchored to the post-COVID-19 lockdown period, encompassing all consecutive registrations between 1st of July 2022 and 30th June 2023. During this indexing period, 1,434 new pediatric patients registered across the rehabilitation services, of whom 324 had a confirmed diagnosis of CP.

Exclusion criteria were applied uniformly: children referred solely for a tertiary expert opinion who maintained their primary, designated long-term rehabilitation follow-up at local regional hospitals (n=45) were excluded. This left a base cohort of 279 children who relied entirely on LRH for their primary rehabilitation care. Of these, 199 children maintained consistent, uninterrupted follow-up through years 2023, 2024, and 2025, while 80 children defaulted from care.

Definition and selection of cases

Rehabilitation default was operationally defined as a total, continuous absence from all registered rehabilitation services for a minimum duration of one calendar year following a missed scheduled appointment. This rigorous temporal anchor was selected to account for the highly variable appointment intervals across different therapy units, ranging from intensive fortnightly sessions in Speech and Language Therapy to wider 3-to-6-month intervals in Occupational Therapy.

Consecutive sampling was applied to the 80 children meeting this default criteria. Of these, 8 families were completely uncontactable via telephone due to disconnected lines or invalid contact information, resulting in a final active case sample size of 72. Independent statistical analysis verified that no significant differences in baseline clinical severity or socio-demographic indicators existed between the contactable (n=72) and uncontactable (n=8) dropouts. No language restrictions were applied; Sinhala, Tamil, and English-speaking families were all eligible for participation.

Definition and selection of controls

Controls (n=144) were recruited from the remaining cohort of 199 children who demonstrated documented, consistent adherence to their scheduled therapy appointments throughout the entire study period. To optimize statistical power and minimize confounding, controls were selected using a 2:1 control-to-case ratio relative to the active case pool. Frequency matching (stratified quota sampling) was executed to align the control cohort closely with the age distribution and sex ratio of the active case cohort. The same language eligibility criteria applied to the cases were mirrored in the control group.

Data collection and study instruments

Data collection was executed via a standardized model utilizing institutional clinical record reviews and structured interviews conducted by three qualified medical officers who were trainees in Community

Pediatrics. To minimize inter-observer bias, all interviewers underwent rigorous, standardized training on the specific questionnaire and paediatric neurodevelopmental markers. All three officers were fully bilingual and capable of conducting interviews in both English and Sinhala, while one officer possessed native fluency in Tamil to systematically cover Tamil-speaking participants, preventing interviewer localization bias.

Clinical data extraction: Disease-specific variables, including CP clinical subtypes, topographical distribution, and medical comorbidities, were extracted directly from the patients' official institutional clinic files.

Functional assessment: To objectively quantify the children's functional capacities, the official expanded and revised versions of the CanChild functional classification systems (McMaster University) were applied, specifically assessing gross motor, manual ability, and communication functions [11,12].

GMFCS (Gross Motor Function Classification System), MACS (Manual Activity Classification System), CFCS (Communication Function Classification System), and EDACS (Eating and Drinking Classification System) are the four functional states assessed.

Structured interviews:

To minimize mode of administration bias and harmonize the interviewing environment between groups, face-to-face sessions were prioritized for both cohorts:

For cases: Caregivers were initially contacted via telephone and formally requested to attend a dedicated, cost-free special review consultation at LRH, which was convened every Saturday over a 3-month period. To mitigate financial and geographical barriers to attendance, a standardized transport allowance was provided to the families based on their travel distance. Of the 72 active cases, 63 attended these special face-to-face sessions. For the remaining 9 families who were genuinely unable to travel due to acute logistical hardships, interviewer-administered telephone questionnaires were utilized. Digital information sheets and consent forms were sent via WhatsApp, followed by a formal verbal walk-through prior to the call.

For controls: Caregivers underwent identical face-to-face structured interviews conducted in an identical clinical room setting during their routinely scheduled clinic visits. Formal written informed consent was obtained prior to the session.

Ethical considerations

Ethical approval was granted by the Ethics Review Committee of the Sri Lanka College of Pediatricians (Reference number – SLCP/ERC/2024/11). Administrative and institutional clearance was obtained directly from the Director and relevant authorities of the Lady Ridgeway Hospital for Children. All participation was strictly voluntary, and strict data de-identification protocols were maintained to ensure caregiver and patient confidentiality.

Results

Socio-demographic characteristics of cases and controls

A total of 216 children with a confirmed diagnosis of Cerebral Palsy (CP) were evaluated, comprising 72 defaulted cases and 144 frequency-matched, adherent controls. The matching architecture successfully achieved demographic alignment, resulting in a statistically equivalent mean age (7.6 ±0.64 vs. 7.5 ±0.71 years) and an identical male predominance (54.9%) across both cohorts, reflecting the established epidemiological excess of males in CP populations.

Marked divergences emerged across geographic and socioeconomic domains. While the highest concentration of controls lived within the host district of Colombo (52.8%), cases predominantly originated from the more distant Kalutara District (41.7%). Caregiver educational attainment and household income distributions were significantly higher among controls. High-income brackets were completely unrepresented among cases, whose paternal employment was heavily skewed toward non-skilled labor (63.4%). Systemic welfare penetration also varied distinctly: controls were more than three times as likely to receive the state disability allowance (31.9%) compared to cases (9.9%).

Familial structural dynamics and competing caregiving loads further differentiated the cohorts. In multi-child families, controls were significantly more likely to be the last-born child (75.4%), meaning they lacked the strain of a younger, healthy sibling in the home. Conversely, cases faced compounding domestic healthcare demands, with a higher prevalence of siblings managing separate chronic illnesses (18.1%) and three unique families exhibiting familial recurrence with multiple siblings affected by Cerebral Palsy.

The socio-demographic characteristics are summarised in table 1below

Table 1: Socio-demographic characteristics of rehabilitation cases (n=72) and controls (n=144)

Variable	Cases (n=72) n (%)	Controls (n=144) n (%)	Statistical Significance (p-value)
Demographics & matching			
Mean Age ± SD (Years)	7.6 ±0.64	7.5 ±0.71	>0.05 (NS)
Sex (Male)	40 (54.9%)	79 (54.9%)	>0.05 (NS)
Geographic distribution			
Colombo District	23 (31.9%)	76 (52.8%)	<0.01
Gampaha District	13 (18.1%)	38 (26.4%)	<0.05
Kalutara District	30 (41.7%)	25 (17.4%)	<0.001
Other Outlying Districts	6 (8.3%)	5 (3.5%)	<0.05
Primary caregiver structure			
Both Parents	63 (87.3%)	129 (89.6%)	>0.05 (NS)
Single Mother / Father	6 (7.9%)	12 (8.3%)	>0.05 (NS)
Grandparent / Relative / Institutional	3 (4.2%)	3 (2.1%)	>0.05 (NS)
Socioeconomic indicators			
Tertiary Education (Either Parent)	3 (4.6%)	34 (23.6%)	<0.001
Completed Secondary Schooling (Mothers)	38 (53.5%)	111 (77.1%)	<0.001
Completed Secondary Schooling (Fathers)	36 (50.4%)	107 (74.3%)	<0.01
Unemployed Mothers	47 (64.8%)	58 (40.3%)	<0.01
Non-Skilled Labor (Fathers)	46 (63.4%)	32 (22.2%)	<0.001
State Disability Allowance Recipient	7 (9.9%)	46 (31.9%)	<0.001
Child Not Enrolled in Formal Schooling	32 (43.8%)	14 (9.7%)	<0.001
Household & caregiving load			
Large Family Size (≥3 children)	40 (55.6%)	38 (26.4%)	<0.001
Index Child is Last-Born (Multi-child, n=59 vs 118)	22 (37.3%)	89 (75.4%)	<0.001
Sibling with Concurrent Chronic Illness	13 (18.1%)	6 (4.2%)	<0.001

Multiple Siblings Concordantly Affected by CP	6 (8.3%)	0 (0.0%)	<0.01

** Note: p-values calculated using independent t-tests for continuous variables and Chi-square / Fisher's Exact tests for categorical proportions. NS = Statistically Non-Significant (p>0.05).*

Clinical phenotypes and functional severity

Evaluation of clinical subtypes revealed significant structural differences in the motor distribution between cases and controls. Spastic quadriplegia (34.7% vs. 21.5%) and dystonic Cerebral Palsy (23.6% vs. 11.1%) were disproportionately concentrated in the defaulted cohort ($p<0.05$). Conversely, less debilitating motor subtypes—namely spastic diplegia (19.4% vs. 33.3%) and spastic hemiplegia (18.1% vs. 28.5%)—were significantly more prevalent among adherent controls.

Across all four CanChild functional classification domains (GMFCS, MACS, CFCS, and EDACS), higher functional dependence was systematically associated with clinic default ($p<0.001$). Over three-quarters (78.1%) of the case cohort operated at GMFCS levels III to V, with the most severe non-ambulatory category (GMFCS level V) accounting for 38.9% (n=28) of cases compared to just 16.0% (n=23) of controls. Similar severe impairments were mirrored in manual ability (MACS IV–V: 62.5% vs. 32.7%), communication function (CFCS IV–V: 59.7% vs. 31.3%), and eating/drinking safety (EDACS IV–V: 62.5% vs. 31.9%).

Medical comorbidities, structural deformities, and enteral support

Severe neurodevelopmental and secondary musculoskeletal co-morbidities were distinctly clustered within the defaulted group. Poorly controlled epilepsy was present in 47.2% of cases compared to 13.9% of controls ($p<0.001$), with seizure frequency peaking among cases with quadriplegic and dystonic phenotypes. Similarly, severe Cortical Visual Impairment (CVI Range I) was detected in 43.1% of cases—primarily within the spastic quadriplegic subgroup—versus only 7.6% of controls ($p<0.01$). Radiologically documented hip displacement (unilateral or bilateral) affected 61.1% of cases compared to 29.2% of controls ($p<0.001$).

Musculoskeletal contracture profiles further differentiated the cohorts. Fixed joint contractures involving two or more major joints (Achilles tendon, hamstrings, hip adductors, iliopsoas, biceps, triceps, or wrist flexors) were significantly more prevalent in cases (68.1%, n=49), predominantly localized to quadriplegic and diplegic subtypes. In contrast, controls exhibited a lower burden of fixed structural contractures (27.8%, n=40), presenting instead with manageable, dynamic tightness.

Nutritional failure was widespread across both groups; severe undernutrition (<-3 SD weight/height) was observed in 47.2% of cases and 25.0% of controls, though overall growth status did not reach statistical significance ($p =0.112$). Crucially, despite severe dysphagia (EDACS IV–V) affecting 62.5% of cases, not a single child in the defaulted cohort had a Percutaneous Endoscopic Gastrostomy (PEG) tube inserted (0.0%), whereas 9.0% (n=13) of controls utilized PEG feeding ($p=0.009$). Minor clinical parameters—

including home standing frame access (15.3% vs. 21.5%), sensorineural hearing loss (9.7% vs. 7.6%), and history of fragility fractures (5.6% vs. 3.5%) demonstrated no statistically significant differences between the groups ($p>0.05$), as shown below in table 2.

Table 2: Clinical profile, functional classification, and comorbidities of cases (n=72) and controls (n=144)

Clinical Parameter	Cases (n=72) n (%)	Controls (n=144) n (%)	Statistical significance (p-value)
CP clinical subtype			
Spastic Quadriplegic	25 (34.7%)	31 (21.5%)	<0.05
Dystonic (Dyskinetic)	17 (23.6%)	16 (11.1%)	<0.05
Spastic Diplegic	14 (19.4%)	48 (33.3%)	<0.05
Spastic Hemiplegic	13 (18.1%)	41 (28.5%)	<0.05
Hypotonic / Atonic / Other	3 (4.2%)	8 (5.6%)	>0.05 (NS)
Gross Motor Function (GMFCS)			<0.001
Level I	11 (15.3%)	38 (26.4%)	
Level II	8 (11.1%)	29 (20.1%)	
Level III	9 (12.5%)	26 (18.1%)	
Level IV	16 (22.2%)	28 (19.4%)	
Level V	28 (38.9%)	23 (16.0%)	
Manual Ability (MACS)			<0.001
Level I – II	19 (26.4%)	70 (48.6%)	
Level III	8 (11.1%)	27 (18.8%)	
Level IV – V	45 (62.5%)	47 (32.6%)	
Communication Function (CFCS)			<0.001
Level I – II	18 (25.0%)	68 (47.2%)	
Level III	11 (15.3%)	31 (21.5%)	
Level IV – V	43 (59.7%)	45 (31.3%)	
Eating & Drinking Ability (EDACS)			<0.001
Level I – II	15 (20.8%)	66 (45.8%)	
Level III	12 (16.7%)	32 (22.2%)	
Level IV – V	45 (62.5%)	46 (31.9%)	
Growth & nutritional parameters			
Normal to -1 SD	6 (8.3%)	22 (15.3%)	0.112 (NS)
-1 SD to -2 SD	14 (19.4%)	41 (28.5%)	

-2 SD to -3 SD	18 (25.0%)	45 (31.3%)	
Severe Undernutrition (<-3 SD)	34 (47.2%)	36 (25.0%)	
Musculoskeletal & structural deformities			
Hip Displacement (Unilateral / Bilateral)	44 (61.1%)	42 (29.2%)	<0.001
Fixed Joint Contractures (≥2 Major Joints)	49 (68.1%)	40 (27.8%)	<0.001
Access to Home Standing Frame	11 (15.3%)	31 (21.5%)	0.281 (NS)
History of Fragility Fractures	4 (5.6%)	5 (3.5%)	0.485 (NS)
Co-morbidities & enteral support			
Poorly Controlled Epilepsy	34 (47.2%)	20 (13.9%)	<0.001
Cortical Visual Impairment (Range I - Severe)	31 (43.1%)	11 (7.6%)	<0.01
Percutaneous Endoscopic Gastrostomy (PEG)	0 (0.0%)	13 (9.0%)	0.009
Sensorineural Hearing Loss (SNHL)	7 (9.7%)	11 (7.6%)	0.601 (NS)

** Note: Calculated using Chi-square / Fisher's Exact tests for categorical proportions. NS = Statistically Non-Significant (p>0.05). Major contracture joints assessed include Achilles, hamstrings, hip adductors, iliopsoas, biceps, triceps, and wrist flexors.*

Transport logistics, spatial distance, and economic burden

Analysis of travel logistics revealed stark differences in transit modalities between the two cohorts (p<0.001). Over three-fifths (61.1%, n=44) of defaulted cases relied entirely on public transport (buses or trains) to reach the hospital—a transit mode posing severe physical challenges for children with significant motor impairments (GMFCS IV–V). Conversely, control families predominantly utilized door-to-door transit options, with 48.6% (n=70) hiring private taxis (primarily three-wheeled autorickshaws) and 29.2% (n=42) utilizing private household motor vehicles.

When evaluating spatial proximity to Lady Ridgeway Hospital (LRH) within the core catchment area of the Western Province (excluding regional outliers beyond 70 km; n=6 cases, n=5 controls), controls recorded a higher mean distance (36.4±18.2 km, median 38.5 km) compared to cases (31.8±16.5 km, median 28.0 km). However, this spatial variance did not reach statistical significance (p=0.082).

Similarly, direct out-of-pocket financial expenditure per clinic appointment, encompassing round-trip fares, fuel, meals, and incidental travel expenses—was slightly elevated in cases (1,680±420" LKR"/

5.10±1.27 USD) compared to controls (1,520±380 LKR / 4.60±1.15 USD) but remained statistically non-significant (p=0.115).

Crucially, the financial strain differentiating the two cohorts was driven by indirect economic loss rather than direct travel fees. A significantly higher proportion of primary breadwinning parents in the case cohort were daily wage earners (68.1%, n=49) compared to control parents (23.6%, n=34; p<0.001). For these families, attending a mid-week rehabilitation session required forfeiting a full day’s income, representing an estimated loss of 1,000 to 1,500 LKR (3.00-4.50 USD) per visit. Combined with direct travel fees, a single clinic visit consumed nearly double the family's daily income (3,180" LKR / 9.60 USD), establishing wage loss as a major compounding driver of default. Table 3 below summarizes the transport logistics for the two groups.

Table 3: Transport logistics, travel distance, and direct/indirect financial costs of clinic visits

Logistic & cost Parameter	Cases (n=72) n (%)	Controls (n=144) n (%)	Statistical significance (p-value)
Primary transport modality			
Public Transport (Bus or Train)	44 (61.1%)	32 (22.2%)	<0.001
Hired Taxi (Three-Wheeler / Autorickshaw)	22 (30.6%)	70 (48.6%)	
Private Household Transport (Motorcycle / Car)	6 (8.3%)	42 (29.2%)	
Travel distance to hospital (Catchment ≤70 km)	(n=66)	(n=139)	
Mean Distance ± SD (km)	31.8±16.5	36.4±18.2	0.082 (NS)
Median Distance (IQR) (km)	28.0 (14.5-45.0)	38.5 (22.0-52.0)	0.076 (NS)
Regional Outliers Excluded (>70 km)	6 (8.3%)	5 (3.5%)	0.124 (NS)
Direct out-of-pocket cost per visit			
Mean Expenditure ± SD (LKR)	1,680±420	1,520±380	0.115 (NS)
Mean Expenditure ± SD (USD equivalent)	5.10±1.27	4.60±1.15	0.115 (NS)
Median Expenditure (LKR)	1,600	1,450	0.108 (NS)
Indirect opportunity costs & wage loss			
Primary Breadwinning Parent is Daily Wage Earner	49 (68.1%)	34 (23.6%)	<0.001
Estimated Forfeited Daily Wage per Visit (LKR)	1,000-1,500	1,000-1,500	—
Estimated Forfeited Daily Wage per Visit (USD)	3.00-4.50	3.00-4.50	—
Total Combined Cost Impact (Direct + Wage Loss)	3,180 LKR (9.60)	2,520 LKR (7.60)	<0.001

**Note: p-values calculated using Independent t-tests / Mann-Whitney U tests for continuous metrics and Chi-square tests for categorical proportions. NS = Statistically Non-Significant ($p > 0.05$). Currency conversions calculated at $1\ \text{USD} \approx 330\ \text{LKR}$.*

we evaluated variables across socio-demographic, clinical/functional, and transport/cost domains in a univariate analysis to compute Unadjusted Odds Ratios (cOR). Variables demonstrating significant

associations (p<0.10) were then entered into a **forward-stepwise multivariable logistic regression model** to isolate the true independent predictors of rehabilitation default (Adjusted Odds Ratios - aOR).

Predictors of rehabilitation default: univariate and multivariable logistic regression analysis

On univariate analysis, multiple socioeconomic vulnerabilities, severe functional dependencies, co-morbid complexities, public transit reliance, and caregiver wage loss were significantly associated with default from paediatric neuro-rehabilitation services (p<0.05).

However, after controlling for confounding variables in the multivariable logistic regression model, five factors emerged as powerful, independent drivers of default as stated below and illustrated in Figure 1.

1. Non-ambulatory status (GMFCS IV–V): Children operating at GMFCS levels IV and V had more than four times the odds of defaulting compared to those at levels I–III (aOR=4.12, 95% CI: 2.05-8.28, p<0.001).
2. Reliance on public transport: Families depending on buses or trains faced nearly four-fold increased odds of default relative to those using hired or private vehicles (aOR=3.84, 95% CI: 1.88-7.85, p<0.001).
3. Daily wage-earning parent (Indirect opportunity Cost): Households where the primary breadwinning parent engaged in daily wage labour had over three times higher odds of defaulting due to the compounding burden of lost daily income (aOR=3.25, 95% CI: 1.62-6.52, p=0.001).
4. Poorly controlled epilepsy: Active, refractory seizures independently tripled the likelihood of default (aOR=3.10, 95% CI: 1.48-6.48, p=0.003).
5. Absence of state disability allowance: Families lacking state welfare support were more than twice as likely to default compared to recipients (aOR=2.41, 95% CI: 1.12-5.18, p=0.024).

Conversely, **residence within the Colombo district** (aOR=0.42, 95% CI: 0.20-0.88, p=0.021) and the **child being the last-born in a multi-child family** (aOR=0.35, 95% CI: 0.16-0.76, p=0.008) functioned as significant independent protective factors against default.

Notably, while variables such as fixed joint contractures, severe undernutrition (<-3 SD), and Cortical Visual Impairment (CVI) were significant on univariate analysis, their effects were mediated through overall gross motor severity (GMFCS IV–V) and lost significance in the final multivariable model, as depicted in the table 4 below.

Table 4: Univariate and multivariable logistic regression analysis of factors associated with default from rehabilitation services

Variable	Crude odds ratio (cOR, 95% CI)	p-value	Adjusted odds ratio* (aOR, 95% CI)	p-value
Socio-demographic & geographical factors				
Colombo District Residence (vs. Other Districts)	0.41 (0.23-0.75)	0.003	0.42 (0.20-0.88)	0.021
Kalutara District Residence (vs. Other Districts)	3.40 (1.80-6.42)	<0.001	1.82 (0.85-3.91)	0.122
Completed Secondary Education (Mother)	0.33 (0.18-0.62)	<0.001	0.62 (0.28-1.36)	0.230
Primary Breadwinning Parent is Daily Wage Earner	6.88 (3.62-13.08)	<0.001	3.25 (1.62-6.52)	0.001
State Disability Allowance Recipient (No vs. Yes)	4.29 (1.82-10.12)	0.001	2.41 (1.12-5.18)	0.024
Index Child is Last-Born (Multi-child Households)	0.19 (0.10-0.39)	<0.001	0.35 (0.16-0.76)	0.008
Sibling with Concurrent Chronic Illness	5.07 (1.84-13.98)	0.002	2.14 (0.68-6.72)	0.192
Clinical, functional & comorbidity parameters				
Spastic Quadriplegic CP Subtype	1.94 (1.02-3.68)	0.043	1.22 (0.51-2.92)	0.658
Dystonic CP Subtype	2.47 (1.17-5.22)	0.018	1.65 (0.68-4.01)	0.268
GMFCS Level IV–V (vs. Level I–III)	5.32 (2.82-10.04)	<0.001	4.12 (2.05-8.28)	<0.001
MACS Level IV–V (vs. Level I–III)	3.45 (1.89-6.30)	<0.001	1.38 (0.61-3.12)	0.442
EDACS Level IV–V (vs. Level I–III)	3.56 (1.94-6.51)	<0.001	1.21 (0.52-2.80)	0.661
Poorly Controlled Epilepsy	5.55 (2.85-10.81)	<0.001	3.10 (1.48-6.48)	0.003
Cortical Visual Impairment (Range I - Severe)	9.15 (4.18-20.03)	<0.001	2.28 (0.88-5.91)	0.090
Fixed Joint Contractures (≥2 Major Joints)	5.54 (2.95-10.42)	<0.001	1.89 (0.85-4.21)	0.118
Hip Displacement (Unilateral / Bilateral)	3.81 (2.08-6.98)	<0.001	1.42 (0.66-3.08)	0.372
Severe Undernutrition (<-3 SD Weight/Height)	2.69 (1.46-4.96)	0.001	1.31 (0.61-2.82)	0.490

Transport & cost factors				
Public Transport Reliance (vs. Hired / Private)	5.49 (2.92-10.32)	<0.001	3.84 (1.88-7.85)	<0.001

**Note: Multivariable model Hosmer-Lemeshow goodness-of-fit test: $\chi 2=6.42$, $p=0.600$ (indicating excellent model fit). Nagelkerke $R2=0.584$. Bold values indicate variables retaining independent statistical significance ($p<0.05$) in the final multivariable model.*

Caregiver-reported systemic and psychosocial barriers: A comparative household analysis

To evaluate caregiver-perceived barriers to sustained care, structured interviews were analysed at the household level (N=69 unique case families vs. N=144 control families). Household-level analysis was strictly applied to avoid artificial data inflation from the three sibling pairs in the case cohort, as financial, logistical, and psychosocial dynamics operate as single unit variables within a home. To minimize social desirability bias and fear of institutional reprisal, interviews were administered by independent medical officers not involved in routine clinical management, with explicit assurances of strict data de-identification.

Comparative analysis revealed profound structural and perceptual divides between adherent and defaulted families:

1. Financial & logistical barriers

While financial problems were universally acknowledged, they were significantly more pervasive among case households (68.1% vs. 29.2%, p<0.001). Similarly, struggling with public transit was a major differentiator (49.3% of cases vs. 16.7% of controls, p<0.001). Conversely, physical travel distance (46.4% vs. 38.2%, p=0.252) and difficulty leaving other children at home (30.4% vs. 22.2%, p=0.198) were widely reported by both groups, showing no statistically significant difference.

2. Information, health beliefs, and cultural practices

Information gaps and alternative care models strongly predicted default. Case families were significantly more likely to report a lack of information on the importance of ongoing neurorehabilitation (66.7% vs. 21.5%, p<0.001) and limited confidence in hospital rehabilitation programmes (58.0% vs. 13.9%, p<0.001). Consequently, 62.3% of case households utilized alternative or indigenous therapy options compared to only 18.1% of controls (p<0.001). Fatalistic health beliefs (feeling "it is our fate" / no further options) were also heavily concentrated among cases (40.6% vs. 9.0%, p<0.001).

3. Health system & service delivery dynamics

While both groups experienced institutional bottlenecks such as extended clinic waiting times (55.1% vs. 48.6%, p=0.374) and appointment fatigue (37.7% vs. 28.5%, p=0.180), interpersonal hospital dynamics uniquely drove default. Case caregivers reported significantly higher apprehension regarding staff

reprimands (30.4% vs. 6.3%, p<0.001) and anxiety surrounding junior doctor assessments (14.5% vs. 3.5%, p=0.004).

4. Psychosocial dynamics

A lack of support from a spouse was significantly more prevalent among defaulted households (42.0% vs. 11.8%, p<0.001), highlighting domestic isolation as an independent risk factor. Marital discord and child resistance to attending sessions did not reach statistical significance between the groups (p>0.05).

Above detailed are summarized in the table 5 below.

Table 5: Household-level comparison of caregiver-reported barriers between Case (N=69) and Control (N=144) families

Barrier domain & reported variable	Case households (N=69) n (%)	Control households (N=144) n (%)	Statistical significance (p-value)
Financial & logistical barriers			
Financial problems	47 (68.1%)	42 (29.2%)	<0.001
Struggled with public transport	34 (49.3%)	24 (16.7%)	<0.001
Long and exhausting travel distance	32 (46.4%)	55 (38.2%)	0.252 (NS)
Challenging to leave other children at home	21 (30.4%)	32 (22.2%)	0.198 (NS)
Challenging to secure leave from work	8 (11.6%)	11 (7.6%)	0.332 (NS)
Information, health beliefs & cultural practices			
Lack of info on neuro-rehabilitation importance	46 (66.7%)	31 (21.5%)	<0.001
Utilized alternative / indigenous therapy options	43 (62.3%)	26 (18.1%)	<0.001
Limited confidence in rehabilitation programmes	40 (58.0%)	20 (13.9%)	<0.001
Felt no further options ("our fate")	28 (40.6%)	13 (9.0%)	<0.001
Concern about medication side effects	26 (37.7%)	38 (26.4%)	0.091 (NS)
Response to therapy not satisfactory	22 (31.9%)	31 (21.5%)	0.098 (NS)
Confident to administer therapy at home	15 (21.7%)	25 (17.4%)	0.448 (NS)
Health system & service delivery factors			
Extended waiting times at clinic	38 (55.1%)	70 (48.6%)	0.374 (NS)
Too many clinic appointments	26 (37.7%)	41 (28.5%)	0.180 (NS)
Apprehension about staff reprimands	21 (30.4%)	9 (6.3%)	<0.001

Anxiety about junior doctor assessment	10 (14.5%)	5 (3.5%)	0.004
Intervals between visits too short	12 (17.4%)	18 (12.5%)	0.329 (NS)
Psychosocial & family dynamics			
Lack of support from spouse	29 (42.0%)	17 (11.8%)	<0.001
Family conflicts or marital discord	9 (13.0%)	10 (6.9%)	0.144 (NS)
Child resistant to attending	6 (8.7%)	8 (5.6%)	0.388 (NS)

**Note: caregivers could select multiple choices. p-values calculated using Chi-square / Fisher's Exact tests. Bold values indicate statistically significant differences between case and control households (p<0.05). NS = non-significant (p>0.05).*

Discussion

This study represents the first comprehensive, matched case-control investigation evaluating the multifactorial drivers of default from paediatric neuro-rehabilitation services in Sri Lanka. By integrating clinical assessments, socio-demographic indicators, transit logistics, and caregiver perceptions, our findings demonstrate that rehabilitation default among children with Cerebral Palsy (CP) is not an isolated caregiver omission or a random medical occurrence. Rather, default is governed by a complex matrix of severe functional dependency, unmitigated indirect financial costs, systemic transit vulnerabilities, co-morbid clinical complexity, and information deficits.

Synthesis of findings in view of study objectives

1. Primary drivers of default (Multivariable model)

Our primary objective was to isolate independent risk factors associated with premature service drop-out. Multivariable logistic regression revealed five strong, independent predictors of default:

- **Non-ambulatory motor impairment** (aOR=4.12, p<0.001): Children with severe motor limitations (GMFCS IV–V) had more than four-fold increased odds of defaulting relative to ambulatory peers (GMFCS I–III).
- **Public transit reliance** (aOR=3.84, p<0.001): Families forced to navigate buses and trains with a non-ambulatory child experienced nearly four times higher odds of dropping out compared to those

utilizing hired or private vehicles.

- **Daily wage-earning breadwinner** (aOR=3.25, p=0.001): Households where parents engaged in daily manual labour faced a compounding financial burden, as attending a mid-week clinic required forfeiting an entire day's wage.
- **Refractory epilepsy** (aOR=3.10, p=0.003): Active, poorly controlled seizures independently tripled the odds of default, reflecting the overwhelming medical and logistical burden placed on primary caregivers.
- **Absence of state welfare support** (aOR=2.41, p=0.024): Lack of social safety nets, such as the state disability allowance, significantly exacerbated vulnerability to service drop-out.

Conversely, **residence within the host district of Colombo** (aOR=0.42) and the **child being the last-born in a multi-child family** (aOR=0.35) functioned as significant independent protective factors.

2. Physical transit vs. indirect opportunity costs

A critical insight of this study is the decoupling of physical distance and direct expenditure from indirect economic loss. While spatial travel distance (p=0.082) and direct out-of-pocket fare expenses (p=0.115) were statistically comparable between cases and controls, the **mode of transport** (61.1% public transit in cases vs. 22.2% in controls, p<0.001) and **daily wage loss** (68.1% in cases vs. 23.6% in controls, p<0.001) proved decisive. Carrying a heavy, non-ambulatory child onto crowded public buses, combined with losing a daily income of 1,000-1,500 LKR (3.00-4.50 USD), created a threshold of financial and physical exhaustion that ultimately forced families to stop attending clinic appointments.

3. Psychosocial, health belief, and institutional barriers

The household barrier analysis revealed that default is strongly mediated by health literacy and institutional perception. Defaulters exhibited significantly higher rates of information deficits regarding rehabilitation importance (66.7% vs. 21.5%), limited confidence in clinical programs (58.0% vs. 13.9%), and reliance on alternative or indigenous medicine (62.3% vs. 18.1%, p<0.001). Interpersonal hospital dynamics, specifically fear of staff reprimands (30.4% vs. 6.3%) and anxiety over junior doctor assessments (14.5% vs. 3.5%) further alienating vulnerable families, while spousal isolation (42.0% vs. 11.8%) left primary caregivers without domestic support.

Our findings demonstrate that rehabilitation default among children with Cerebral Palsy (CP) is driven by an interplay of motor disability, transport logistics, financial loss, co-morbidities, and health-system bottlenecks.

Functional impairment (GMFCS level) and participation barriers

Our multivariable model revealed that severe motor impairment (GMFCS IV–V) independently quadruples the odds of clinic default (aOR = 4.12, p<0.001). This aligns directly with global studies examining functional limitations. In a rural Ugandan population-based study, Andrews et al. (2023)

demonstrated that children in GMFCS levels III–V experienced significantly lower attendance ($p<0.001$) and involvement in community and daily activities compared to those in GMFCS levels I–II, with the largest disparities observed in community-based settings [13]. Similarly, Naaz et al. (2025) reported in an Indian cohort that higher GMFCS levels (with 46.7% in Class V) significantly correlated with severe financial and psychosocial burdens on families ($p<0.05$) [14]. Hauschild et al. (2024) further confirmed in a US pediatric orthopaedic center that non-ambulatory status ($p=0.007$) and mobility device reliance ($p=0.007$) were primary predictors of clinic nonattendance [15]. These collective findings underline that as gross motor limitations increase, the physical and logistical strain of attending health facilities escalates, making severe functional impairment a universal risk factor for attrition across both high- and low-resource settings.

Transport barriers, geographic mobility, and financial strain

A major insight from our study is that transport modality, specifically public bus and train reliance (aOR=3.84) and indirect daily wage loss (aOR=3.25) drive default, rather than pure spatial distance or direct ticket fares alone. Clemente et al. (2022), in a systematic scoping review of healthcare access barriers for persons with disabilities, identified transport logistics and financial constraints as primary systemic obstacles [16]. Hicks et al. (2025) described the concept of "transportation deserts" in paediatric care, demonstrating how inequitable transport networks compound sociodemographic disparities and cause serial clinic no-shows [17]. Hauschild et al. (2024) similarly showed that travel time exceeding 45 minutes ($p=0.04$) and scheduling difficulties significantly predicted appointment nonattendance [15]. In rural South Africa, Manyuma et al. (2023) highlighted through qualitative inquiry that access to transportation and severe economic problems were the most formidable challenges faced by rural caregivers of children with CP [18]. Our data extend this global evidence base by showing that public transport reliance creates a physical barrier when transporting non-ambulatory children, while daily wage forfeiture imposes a compounding opportunity cost that forces families into service default.

Co-morbid epilepsy and seizure burden

Poorly controlled epilepsy emerged as an independent predictor of clinic default (aOR=3.10, $p=0.003$) in our cohort, with seizure frequency peaking among quadriplegic and dystonic subtypes. This is strongly corroborated by Alyoubi and Abu-Zaid (2024), who analyzed 88,138 CP cases from the National Inpatient Sample database and established that spastic quadriplegic CP carried the highest odds of co-morbid epilepsy (aOR=2.37, $p<0.0001$) [19]. In low-resource settings, Saleye et al. (2025) demonstrated that nearly 60% of children with epilepsy experience poor seizure control, with high pre-treatment seizure frequency (aOR=11.036) and medication non-adherence (aOR=4.917) acting as primary drivers [20]. Furthermore, a national survey on Dravet syndrome by Italian patient associations highlighted that complex developmental and epileptic encephalopathies are frequently managed with fragmented rehabilitation, where severe seizure burdens often overshadow physical therapy adherence and cause premature treatment discontinuation [21]. Caregivers overwhelmed by daily, uncontrolled seizures naturally prioritize immediate emergency management over long-term, routine physical rehabilitation

appointments. Also, ongoing poorly controlled seizures cause poor and slow rehabilitation outcomes which can lead to delay in achieving rehabilitation goals. This leads for the loss of confidence among the caregivers regarding the rehabilitation process, if clear guidance is not provided.

Health literacy, alternative medicine, and institutional interactions

Our study demonstrated that information deficits (66.7%), limited confidence in hospital rehabilitation (58.0%), and reliance on alternative or indigenous medicine (62.3%) were significantly concentrated among defaulted families ($p<0.001$). Bailes et al. (2018) showed that over 50% of CP caregivers lack precise knowledge of their child's functional classification and developmental potential, with 83% requesting ongoing visual educational tools to understand rehabilitation goals [22]. Zhou and Zheng (2005) emphasized that in Asian cultural contexts, integrating traditional medicine with family-based therapy models can yield significant motor improvements ($p<0.01$). However, when traditional practices replace mainstream therapy due to clinical mistrust, service default occurs [23]. The functional outcome of children with cerebral palsy who has received long-term traditional or indigenous therapies is yet to be researched on.

Regarding institutional dynamics, our finding that fear of staff reprimands (30.4%) and junior doctor anxiety (14.5%) significantly drove default is reflected in qualitative literature. Samanta et al. (2022) identified healthcare system mistrust and communication barriers as key obstacles to chronic condition self-management [24]. In sub-Saharan Africa, Lythgoe et al. (2021) systematically reviewed healthcare access and demonstrated that disrespectful provider communication, verbal reprimands, and power imbalances directly cause vulnerable caregivers to discontinue health services [25]. Similarly, Imamura et al. (2026) documented that caregivers in East Uganda faced immense emotional distress and isolated fumbling in the dark due to a severe lack of trustworthy information from clinical staff [26].

Psychosocial Isolation, Caregiver Burden, and Welfare Interventions

We observed that spousal isolation (42.0% vs. 11.8%, $p<0.001$) and lack of state disability allowances ($aOR=2.41$) strongly predicted clinic drop-out. Roskam and Mikolajczak (2023) established through a study of 2,563 parents that raising a child with special needs uniquely shifts the etiological balance of risks and resources, placing caregivers at a significantly higher risk of severe parental burnout compared to single parents or standard controls [27]. Kalhovde and Kitzmüller (2024) described this caregiver journey as an unpredictable, intensely worrisome, and indefinite trajectory of distress [28].

To counter this burden, innovative service delivery models have proven successful. Cluster-randomized controlled trial in Bangladesh demonstrated that an Integrated Microfinance and Community-Based Rehabilitation (IMCBR) program significantly improved the physical health-related quality of life of children with CP ($p=0.015$) and boosted the social capital of ultra-poor families ($p<0.001$) [29]. This trial provides concrete proof that combining economic support with decentralized community therapy effectively counteracts the exact socioeconomic drivers of default identified in our Sri Lankan cohort.

Strengths and Limitations

Strengths of the Study

1. **Methodological superiority of an analytical case-control design:** This study utilized an analytical, matched case-control architecture. By establishing a well-defined control cohort of adherent peers, this study moved beyond merely listing reported barriers to successfully calculating crude and adjusted Odds Ratios (aOR), thereby isolating true independent risk factors (such as non-ambulatory GMFCS status, public transit reliance, and daily wage loss) from universal health-system complaints.
2. The study utilized a post-COVID-19 anchored cohort (2023 registrations) with frequency-matched controls (2:1 ratio), effectively eliminating pandemic-related utilization anomalies.
3. **Mitigation of administration bias:** The implementation of dedicated, cost-free review clinics with transport allowances enabled 87.5% of defaulted cases to undergo face-to-face interviews in an identical setting to controls, minimizing mode-of-administration bias.
4. **Comprehensive multi-domain evaluation:** Standardized CanChild classification systems (GMFCS, MACS, CFCS, EDACS) were combined with detailed transit, financial, clinical, and household-level qualitative barrier assessments.
5. **Analytic integrity:** Analysing caregiver perception data at the unique household level (N=69 vs. N=144) prevented artificial data inflation from multi-sibling cases.

Limitations of the Study

1. **Single-Centre Tertiary Setting:** Although LRH is Sri Lanka's primary tertiary paediatric centre serving the Western Province, findings may not fully reflect rehabilitation dynamics in distant rural provinces.
2. **Residual Telephone Interview Exposure:** Nine case families were interviewed via telephone due to severe travel constraints, introducing potential mode effect variance.
3. **Retrospective Recall Bias:** Caregiver reports regarding historical reasons for default may be subject to recall decay or post-hoc rationalization.
4. **Cross-Sectional Barrier Assessment:** Household perception items were assessed at a single cross-sectional time point rather than longitudinally tracking perceptual shifts over time.

Conclusion

This study demonstrates that default of children living with cerebral palsy from paediatric neuro-rehabilitation services in Sri Lanka is a complex phenomenon driven by intersecting functional, economic, structural, and institutional factors. Independent risk factors for default include non-ambulatory gross motor severity (GMFCS IV–V), public transit reliance, daily wage loss among primary breadwinners, poorly controlled epilepsy, and lack of state disability welfare support. Conversely, living

within proximity to the tertiary centre and being the last-born child in a multi-child family serve as protective factors against default.

Addressing rehabilitation default requires shifting from centralized, hospital-exclusive care models toward decentralized, family-centred health systems. Priority interventions should include:

1. **Decentralization of rehabilitation services**: Expanding community-based physiotherapy and occupational therapy units at regional district hospitals to reduce travel distances and public transit reliance.
2. **Targeted economic and welfare safeguards**: Expediting state disability allowance enrolment and providing transport subsidies for low-income daily wage earners.
3. **Tele-health and digital outreach**: Implementing tele-rehabilitation platforms (e.g., video follow-ups and tele-health guidance) to maintain continuity of care for non-ambulatory children.
4. **Integrated caregiver education**: Conducting structured counselling sessions and providing visual educational materials during early diagnostic visits to improve health literacy, set realistic goals, and eliminate fears of institutional reprimands. Establishing dedicated nursing officer services to counsel and educate the caregivers involved in the care of the child.

By implementing these targeted structural reforms, healthcare systems in low- and middle-income settings can bridge the gap in service delivery, optimize long-term functional outcomes, and reduce health inequities for children living with Cerebral Palsy.

Abbreviations

- **CP** – Cerebral Palsy
- **LMICs** – Low- and Middle-Income Countries
- **GMFCS** – Gross Motor Function Classification System
- **aOR** – Adjusted Odds Ratio
- **CI** – Confidence Interval
- **USD** – United States Dollar
- **ICF** – International Classification of Functioning, Disability and Health
- **LRH** – Lady Ridgeway Hospital
- **SD** – Standard Deviation
- **NS** – non-significant
- **MACS** – Manual Ability Classification System
- **CFCS** – Communication Function Classification System
- **EDACS** – Eating and Drinking Ability Classification System
- **SLCP** – Sri Lanka College of Paediatricians
- **ERC** – Ethics Review Committee

- **CVI** – Cortical Visual Impairment
- **PEG** – Percutaneous Endoscopic Gastrostomy
- **SNHL** – Sensorineural Hearing Loss
- **LKR** – Sri Lankan Rupee
- **IQR** – Interquartile Range
- **cOR** – Crude Odds Ratio
- **AOR** – Adjusted Odds Ratio *(variant capitalization used in discussion citations)*
- **TCM** – Traditional Chinese Medicine
- **IMCBR** – Integrated Microfinance and Community-Based Rehabilitation

Declarations

Ethics approval and consent to participate

Ethical approval was granted by the Ethics Review Committee of the Sri Lanka College of Paediatricians (Reference number: SLCP/ERC/2024/11). Administrative and institutional clearance was obtained from the Director of Lady Ridgeway Hospital for Children. Written informed consent was obtained from the parent or legal guardian of all participating children. Where applicable, verbal or written assent was obtained from competent children.

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and analysed during the current study are not publicly available due privacy and confidentiality of the clinical information of the study participants, but are available from the corresponding author on reasonable request

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

HP and RG conceptualized the study, prepared the study proposal and questionnaires. HP, SS, and NB collected the data. HP analyzed the data and drafted the manuscript. All authors read and approved the final manuscript.

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Figures

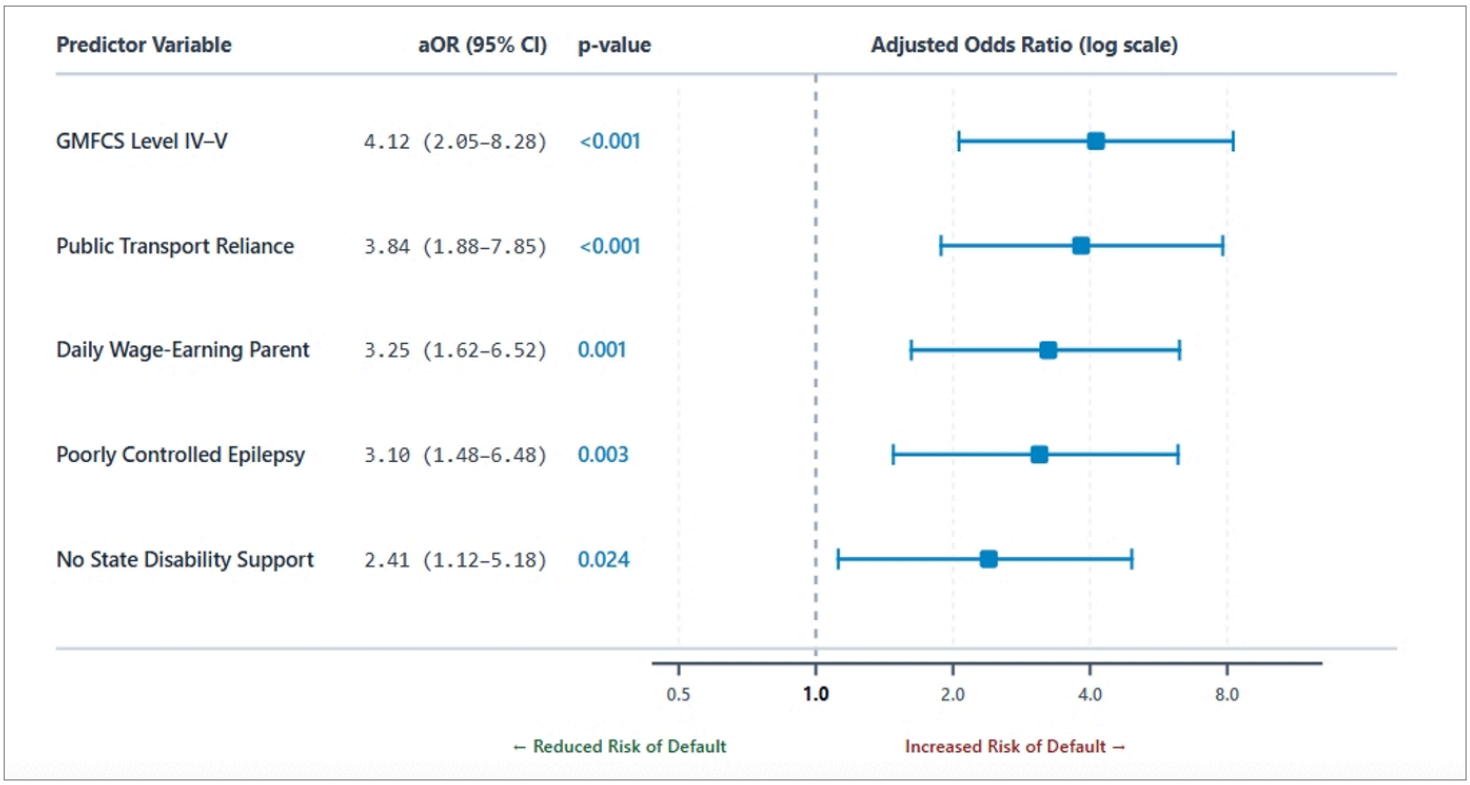


Figure 1

Independent predictors of neuro-rehabilitation default.

* Note- Forest plot showing adjusted odds ratios (aOR) and 95% confidence intervals (CI) from forward-stepwise multivariable logistic regression analysis. Factors with aOR > 1.0 indicate increased odds of default.