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Unmet Need for Physiotherapy and Its Determinants Among Children with Neuromusculoskeletal Disorders in Rural Sindh, Pakistan

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ABSTRACT:

Background

Children with neuromusculoskeletal disorders may require timely and sustained physiotherapy to improve mobility, functional independence, and participation in daily activities. This study assessed the unmet need for physiotherapy, healthcare-seeking behavior, and factors associated with physiotherapy utilization among children with neuromusculoskeletal disorders in rural Sindh, Pakistan.

Methods

A cross-sectional study was conducted among 240 caregivers of children with neuromusculoskeletal disorders in selected rural communities of Sindh, Pakistan. Data were collected using a structured questionnaire. For this analysis, unmet need was operationally defined as the absence of previous physiotherapy utilization among children identified as requiring or potentially benefiting from physiotherapy. Associations were assessed using chi-square tests, followed by multivariable binary logistic regression.

Results

The mean age of the children was 8.1 ± 3.6 years, and 137 (57.1%) were male. Of the 240 children, 142 (59.2%) had previously utilized physiotherapy, whereas 98 (40.8%) had never

received physiotherapy, representing the operationally defined unmet need in this study. Government health facilities were the most common initial healthcare source (52.5%), followed by private providers (29.6%). Transportation difficulties were associated with lower odds of utilization (AOR 0.54, 95% CI 0.31–0.94, $p=0.030$).

Conclusion

A substantial proportion of children in the study had never accessed physiotherapy despite having conditions that could benefit from rehabilitation. Strengthening referral pathways, providing caregiver education, and expanding affordable, geographically accessible rehabilitation services may help reduce unmet rehabilitation needs in rural Sindh.

INTRODUCTION

Neuromusculoskeletal disorders in childhood encompass a broad range of congenital, developmental, neurological, musculoskeletal, and acquired conditions that can impair movement, communication, functional independence, and participation in everyday activities. These conditions may require long-term rehabilitation and multidisciplinary care, with physiotherapy playing an important role in improving mobility, muscle strength, motor function, and functional independence. Early and continued access to appropriate rehabilitation can help children achieve their developmental potential and reduce the long-term consequences of disability. The World Health Organization (WHO) recognizes rehabilitation as an essential health service across the life course and emphasizes its integration into health systems as part of universal health coverage (1).

Despite its importance, access to rehabilitation remains inadequate worldwide. WHO estimates that approximately one in three people globally live with a health condition that could benefit from rehabilitation, while many low- and middle-income countries have insufficient capacity to meet this need (2). Rehabilitation services are frequently concentrated in secondary and tertiary facilities, creating geographic and financial barriers for populations living in rural and remote areas. WHO therefore emphasizes decentralized, community-based, and primary-care-integrated rehabilitation approaches to improve equity, accessibility, and timeliness of care (3).

Unmet need for physiotherapy arises when a child requires or could benefit from rehabilitation but does not receive appropriate services. It may also occur when the services received are insufficient to address the child's rehabilitation requirements. However, non-utilization and unmet need are not necessarily equivalent: children who have never received physiotherapy may differ in their clinical needs, while previous service users may still have unmet needs because of interrupted treatment, inadequate treatment frequency, or limited-service availability. Therefore, assessing unmet need requires consideration of clinical requirements alongside actual access to and use of rehabilitation services.

For children with neuromusculoskeletal disorders, access to physiotherapy is influenced not only by service availability but also by caregiver recognition of the child's condition, perceived need for treatment, knowledge regarding rehabilitation, referral practices, affordability, transportation, distance to services, family support, and cultural perceptions of disability. Evidence from low-resource settings demonstrates that making rehabilitation services available does not necessarily ensure their utilization. In Bangladesh, referral uptake among children with disabilities was reported to be 47%, with household income and maternal literacy among factors associated with uptake (4). Evidence from rural South Asia also suggests that child characteristics, diagnosis, family circumstances, and rehabilitation service organization can influence patterns of therapy utilization (5).

Caregiver-related factors are particularly important because parents or other family members frequently make healthcare decisions for children. Studies of families caring for children with cerebral palsy have identified accessible healthcare facilities, rehabilitation services, health information, financial support, and practical assistance as important determinants of care experiences (6). Transportation difficulties, financial constraints, inadequate health services, and limited access to appropriate facilities can further restrict participation in rehabilitation (7). Inadequate caregiver knowledge and limited understanding of the potential benefits of

physiotherapy may also contribute to delayed treatment initiation or discontinuation. The situation is particularly relevant in Pakistan, where rehabilitation services continue to face limitations related to infrastructure, financing, workforce capacity, referral systems, and equitable access. Previous work examining rehabilitation services in Pakistan has identified inadequate funding, healthcare infrastructure limitations, workforce shortages, and social and cultural barriers as important challenges to disability care (8). A qualitative study of public-sector rehabilitation services in Karachi identified inadequate referral mechanisms, insufficient information and guidance, limited equipment, transportation costs, environmental barriers, and caregiver-related constraints as barriers affecting rehabilitation service utilization (9). These challenges may be amplified in rural communities, where rehabilitation facilities and trained professionals may be geographically concentrated and families may need to travel considerable distances to obtain specialized care (10,11). Although existing literature has examined disability and rehabilitation challenges in Pakistan, evidence remains limited regarding the extent of unmet physiotherapy need and its socioeconomic, geographic, caregiver-related, and health-system determinants among children with neuromusculoskeletal disorders in rural Sindh. In particular, understanding the relationship between healthcare-seeking behavior, referral pathways, caregiver awareness, and actual physiotherapy access is important for identifying where children are lost along the pathway from recognition of a health problem to receipt of rehabilitation. A context-specific assessment of these factors can inform interventions to improve early identification, referral completion, affordability, transportation, and the geographical distribution of rehabilitation services. Such evidence may also help strengthen community-based rehabilitation and the integration of physiotherapy into primary healthcare and rural health services. Therefore, this study aimed to assess the operationally defined unmet need for physiotherapy, healthcare-seeking behavior, and factors associated with physiotherapy utilization among children with neuromusculoskeletal disorders in rural Sindh, Pakistan. The study specifically examined the relationship of caregiver awareness, household socioeconomic status, distance to rehabilitation facilities, transportation difficulties, caregiver education, and referral practices with physiotherapy utilization.

METHODOLOGY

A cross-sectional study was conducted to assess unmet need for physiotherapy, healthcare-seeking behavior, and factors associated with physiotherapy utilization among children with neuromusculoskeletal disorders living in rural communities of Thatta, Sindh, Pakistan. The study was conducted in selected rural areas from January 2026 till June 2026 where access to specialized rehabilitation services was limited. The study population comprised caregivers of children aged 0–18 years who had a documented or clinically identified neuromusculoskeletal disorder requiring or potentially benefiting from physiotherapy. A total of 240 eligible caregiver–child pairs were included. Participants were recruited through community-based identification and referrals from available primary healthcare facilities and rehabilitation services using a purposive or consecutive sampling approach, depending on the accessibility of eligible participants. Children whose caregivers were unable to provide reliable information, those with incomplete clinical or utilization information, and families who were not permanent residents of the selected rural communities were excluded. Data were collected using a structured interviewer-administered questionnaire developed from the study objectives and relevant literature on pediatric rehabilitation access and healthcare-seeking behavior. The questionnaire was reviewed by experts in public health, pediatric rehabilitation, and physiotherapy for content validity and was pretested among a small group of caregivers from a comparable population who were not included in the final analysis. Necessary modifications were made to improve clarity, cultural appropriateness, and comprehension. The questionnaire collected information on the child's age, sex, type and duration of neuromusculoskeletal condition, functional limitations, and previous healthcare use, as well as caregiver age, education, occupation, household socioeconomic characteristics, and place of residence. Healthcare-seeking information included the first source of care sought after recognition of the child's condition, the type of healthcare provider consulted, the time taken to seek professional care, referral for physiotherapy, and reasons for seeking or not seeking rehabilitation services. The primary outcome was physiotherapy utilization, which was used to estimate the operationally defined unmet need for services. Children were classified as physiotherapy users if their caregivers reported that they had received physiotherapy from a trained physiotherapist. Children who had never received physiotherapy were classified as having an unmet need when they belonged to the study population identified as requiring or potentially benefiting from rehabilitation. Thus, the proportion classified as having unmet need represented the proportion of eligible children who had never accessed physiotherapy; it did not independently establish the clinical appropriateness, intensity, or adequacy of treatment required by each child. Additional information was collected regarding the frequency and duration of

physiotherapy, type of facility accessed, travel distance, transportation arrangements, treatment expenditure, continuity of care, and perceived benefits of therapy. Caregiver awareness was assessed using questions addressing the purpose and potential benefits of physiotherapy, the importance of early intervention, and the need for continued rehabilitation. An awareness score was generated from the relevant items and categorized into adequate and inadequate awareness according to a predefined scoring criterion established during questionnaire development. Potential barriers to physiotherapy utilization were assessed using structured questions covering geographic, financial, informational, transportation, caregiver, and health-system factors. Geographic accessibility was assessed according to the reported distance between the household and the nearest rehabilitation facility and categorized as ≤ 10 km or >10 km. Transportation difficulty was recorded when caregivers reported problems related to the availability, cost, travel time, or accessibility of transportation. Household socioeconomic status was assessed using predefined indicators of household assets and socioeconomic characteristics and categorized into low, middle, and high socioeconomic groups. Information was also collected on the availability of physiotherapists, waiting time, referral practices, perceived service quality, and affordability of treatment. Data was entered, cleaned, and analyzed using IBM SPSS Statistics version 30. Continuous variables were summarized using means and standard deviations, while categorical variables were presented as frequencies and percentages. The proportion of children who had never received physiotherapy was calculated to estimate the operationally defined unmet need, and healthcare-seeking patterns and reported barriers were summarized descriptively. Associations between physiotherapy utilization and categorical explanatory variables were initially examined using the chi-square test or Fisher's exact test, as appropriate. Variables considered clinically relevant or demonstrating an association with physiotherapy utilization in bivariable analysis were entered into a multivariable binary logistic regression model. Physiotherapy utilization was specified as the dependent variable, while caregiver awareness, distance to rehabilitation services, socioeconomic status, transportation difficulties, caregiver education, child's age and sex, physiotherapy referral, and other relevant variables were considered potential independent determinants. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were reported to quantify the strength and direction of associations. Model fit and multicollinearity were assessed using appropriate diagnostic procedures. Statistical significance was considered at a two-sided p-value of <0.05 . Ethical approval was obtained from one of the institutes of Thatta from institutional ethical review committee before commencement of the study. Participation was voluntary, and written informed consent was obtained from the child's parent or legal guardian before data collection. Caregivers were informed about the purpose of the study, their right to decline participation or withdraw at any stage, and the confidentiality of the information provided.

RESULTS

A total of 240 caregiver–child pairs were included in the analysis. The mean age of the children was 8.1 ± 3.6 years, and 137 (57.1%) were male. Of the 240 children, 142 (59.2%) had previously utilized physiotherapy services, whereas 98 (40.8%) had never received physiotherapy. The sociodemographic and clinical characteristics of the study participants are presented in Table 1.

Table 1. Sociodemographic and clinical characteristics of children with neuromusculoskeletal disorders and their caregivers (n=240)

Characteristic	n (%) / Mean $\pm$ SD
Child characteristics	
Age, years	8.1 ± 3.6
Age 0–5 years	55 (22.9)
Age 6–10 years	101 (42.1)
Age 11–18 years	84 (35.0)

Male	137 (57.1)
Female	103 (42.9)
Duration of condition ≥ 2 years	151 (62.9)
Functional limitation present	198 (82.5)
Caregiver characteristics	
Mother	161 (67.1)
Father	53 (22.1)
Another caregiver	26 (10.8)
Formal education	143 (59.6)
No formal education	97 (40.4)
Household socioeconomic status	
Low	103 (42.9)
Middle	91 (37.9)
High	46 (19.2)

The most frequently reported initial source of healthcare was a government health facility (126, 52.5%), followed by private healthcare providers (71, 29.6%). Twenty-eight caregivers (11.7%) initially sought care from traditional or informal providers, while 15 (6.3%) reported other sources. A total of 154 (64.2%) caregivers reported receiving a formal recommendation or referral for physiotherapy, whereas 86 (35.8%) did not report a physiotherapy referral. Healthcare-seeking patterns are summarized in Table 2.

Table 2. Healthcare-seeking behavior among caregivers of children with neuromusculoskeletal disorders (n=240)

Healthcare-seeking characteristic	n (%)
First source of healthcare	
Government health facility	126 (52.5)
Private healthcare provider	71 (29.6)
Traditional/informal provider	28 (11.7)
Other	15 (6.3)
Received physiotherapy referral/recommendation	
Yes	154 (64.2)

No	86 (35.8)
Sought care within 1 month of recognizing the problem	
Yes	132 (55.0)
No	108 (45.0)
Consulted more than one healthcare provider	
Yes	91 (37.9)
No	149 (62.1)

Of the 240 children, 142 (59.2%) had utilized physiotherapy services, while 98 (40.8%) had never received physiotherapy. Among the 142 physiotherapy users, 83 (58.5%) attended government rehabilitation facilities, 43 (30.3%) attended private facilities, and 16 (11.3%) accessed community-based or other rehabilitation services. Among users, 96 (67.6%) had attended sessions for at least three months, while 46 (32.4%) had received physiotherapy for less than three months or discontinued treatment. These findings indicate that non-utilization and continuity of care were distinct concerns: some children had never accessed physiotherapy, while some previous users had not maintained treatment for three months. The pattern of utilization is presented in Table 3.

Table 3. Pattern of physiotherapy service utilization among study participants

Physiotherapy utilization	n (%)
All eligible children (n=240)	
Ever utilized physiotherapy	142 (59.2)
Never utilized physiotherapy	98 (40.8)
Among physiotherapy users (n=142)	
Government rehabilitation facility	83 (58.5)
Private rehabilitation facility	43 (30.3)
Community-based/other service	16 (11.3)
Physiotherapy ≥ 3 months	96 (67.6)
Physiotherapy < 3 months/discontinued	46 (32.4)
Reported perceived benefit from physiotherapy	118 (83.1)
Reported difficulty maintaining regular attendance	61 (43.0)

Caregiver awareness of physiotherapy was variable. Overall, 128 (53.3%) caregivers demonstrated adequate awareness, while 112 (46.7%) had inadequate awareness. Among caregivers with adequate awareness, 98 (76.6%) reported physiotherapy utilization, compared with 44 (39.3%) among those with inadequate awareness ($p < 0.001$). The most frequently reported barriers were distance

from rehabilitation facilities (117, 48.8%), transportation difficulties (106, 44.2%), treatment costs (98, 40.8%), inadequate caregiver awareness (88, 36.7%), and limited availability of physiotherapists (76, 31.7%). Other barriers included difficulty maintaining regular attendance, caregiver time constraints, inadequate information regarding available services, long waiting times, and perceived inadequate service quality. Participants could report more than one barrier. These findings are presented in Table 4.

Table 4. Reported barriers to physiotherapy service utilization (n=240)

Reported barrier	n (%)
Distance from rehabilitation facility	117 (48.8)
Transportation difficulties	106 (44.2)
Cost of treatment	98 (40.8)
Lack of caregiver awareness	88 (36.7)
Limited availability of physiotherapists	76 (31.7)
Difficulty maintaining regular attendance	69 (28.8)
Caregiver time constraints	61 (25.4)
Lack of information about available services	57 (23.8)
Long waiting time	41 (17.1)
Perceived inadequate quality of services	34 (14.2)

Bivariable analysis demonstrated significant associations between physiotherapy utilization and caregiver awareness, distance to rehabilitation services, socioeconomic status, transportation difficulties, caregiver education, and physiotherapy referral. Children whose caregivers had adequate awareness, those living closer to rehabilitation facilities, and those from higher socioeconomic households were more likely to utilize physiotherapy. Transportation difficulties were associated with lower utilization. The bivariable associations are presented in Table 5.

Table 5. Bivariable associations between selected determinants and physiotherapy utilization (n=240)

Determinant	Physiotherapy utilized, n (%)	Not utilized, n (%)	p-value
Caregiver awareness			
Adequate	98 (76.6)	30 (23.4)	<0.001
Inadequate	44 (39.3)	68 (60.7)	
Distance to facility			
≤10 km	91 (68.4)	42 (31.6)	0.002
>10 km	51 (47.7)	56 (52.3)	

Socioeconomic status			
Low	48 (46.6)	55 (53.4)	0.018
Middle	57 (62.6)	34 (37.4)	
High	37 (80.4)	9 (19.6)	
Transportation difficulty			
Yes	50 (47.2)	56 (52.8)	0.003
No	92 (68.7)	42 (31.3)	
Caregiver formal education			
Yes	94 (65.7)	49 (34.3)	0.012
No	48 (49.5)	49 (50.5)	
Physiotherapy referral			
Yes	111 (72.1)	43 (27.9)	<0.001
No	31 (36.0)	55 (64.0)	

In the multivariable logistic regression model, adequate caregiver awareness, shorter distance to rehabilitation services, higher socioeconomic status, and absence of transportation difficulties remained independently associated with physiotherapy utilization. Children whose caregivers had adequate awareness had more than twice the odds of utilizing physiotherapy compared with those whose caregivers had inadequate awareness (AOR 2.41, 95% CI 1.38–4.20, $p=0.002$). Living within 10 km of a rehabilitation facility was also associated with higher utilization (AOR 2.18, 95% CI 1.25–3.81, $p=0.006$). Higher socioeconomic status was associated with greater odds of utilization (AOR 1.89, 95% CI 1.08–3.31, $p=0.026$). In contrast, transportation difficulties were associated with approximately 46% lower odds of physiotherapy utilization (AOR 0.54, 95% CI 0.31–0.94, $p=0.030$). The adjusted associations are shown in Table 6.

Table 6. Multivariable logistic regression analysis of determinants of physiotherapy utilization

Determinant	AOR	95% CI	p-value
Adequate caregiver awareness	2.41	1.38–4.20	0.002
Distance to facility ≤ 10 km	2.18	1.25–3.81	0.006
Higher socioeconomic status	1.89	1.08–3.31	0.026
Transportation difficulties	0.54	0.31–0.94	0.030
Caregiver formal education	1.42	0.84–2.40	0.188
Child age, per year increase	1.03	0.96–1.10	0.401
Male sex	1.16	0.69–1.96	0.570
Physiotherapy referral	1.71	0.96–3.04	0.068

DISCUSSION

This study examined the operationally defined unmet need for physiotherapy, healthcare-seeking behavior, and determinants of physiotherapy utilization among children with neuromusculoskeletal disorders in rural Sindh, Pakistan. The principal finding was that 98 (40.8%) of the 240 children had never received physiotherapy, despite belonging to a population identified as requiring or potentially benefiting from rehabilitation. Government health facilities were the most frequently reported initial source of healthcare (52.5%), while the principal reported barriers included distance from rehabilitation facilities (48.8%), transportation difficulties (44.2%), treatment costs (40.8%), inadequate caregiver awareness (36.7%), and limited availability of physiotherapists (31.7%). After adjustment for measured factors, adequate caregiver awareness, shorter distance to rehabilitation services, and higher socioeconomic status were positively associated with physiotherapy utilization, whereas transportation difficulties were associated with lower utilization.

The finding that approximately two-fifths of eligible children had never accessed physiotherapy indicates a substantial gap between potential rehabilitation need and service access in the study population. Nevertheless, this proportion should be interpreted as an operational estimate based on previous non-utilization, rather than a comprehensive clinical assessment of unmet need. Children who had previously attended physiotherapy could also have residual unmet needs if their treatment was interrupted, insufficient, or inappropriate for their functional requirements. Future assessments should therefore distinguish between never accessing rehabilitation, discontinuing treatment, and receiving inadequate rehabilitation.

Rehabilitation is recognized by the WHO as an essential health service that should be integrated across healthcare levels and made accessible throughout the life course. Global estimates indicate that a substantial proportion of the population could benefit from rehabilitation, while unmet need remains particularly important in low- and middle-income settings (1,2). For children with neuromusculoskeletal disorders, failure to access appropriate rehabilitation may restrict opportunities to improve function and participation and may contribute to longer-term disability-related challenges (6,7). These findings support the need to assess not only whether rehabilitation facilities exist but also whether children can reach and continue using the services they need.

The predominance of government health facilities as the initial source of healthcare highlights the important role of the public sector in first-contact care for rural and economically disadvantaged populations. However, 35.8% of caregivers did not report receiving a physiotherapy referral or recommendation. This suggests a potential gap between initial healthcare contact and linkage to rehabilitation. Previous research from Bangladesh has demonstrated that referral provision does not necessarily guarantee uptake, with financial circumstances, caregiver education, and other access-related factors influencing service use (4,15,16). In rural Sindh, systematic screening for rehabilitation needs, clear referral protocols, and follow-up after referral may help identify children who remain outside the rehabilitation system.

Caregiver awareness emerged as one of the strongest determinants in the present study. Children whose caregivers demonstrated adequate awareness had more than twice the odds of physiotherapy utilization compared with those whose caregivers had inadequate awareness (AOR 2.41, 95% CI 1.38–4.20, $p=0.002$). Caregivers often recognize functional difficulties, seek professional care, arrange transportation, attend appointments, and support treatment continuity (6,17). Limited awareness of the benefits of physiotherapy or uncertainty about where to obtain services may delay access or contribute to discontinuation. Caregiver counselling should therefore explain the purpose of physiotherapy, the importance of early assessment, realistic functional goals, and the availability of local or referral-based services. Because the study was cross-sectional, however, the observed association cannot establish whether awareness preceded service utilization or increased through previous contact with rehabilitation professionals.

Geographic accessibility was another important determinant. Children living within 10 km of a rehabilitation facility had more than twice the odds of physiotherapy utilization compared with those living farther away (AOR 2.18, 95% CI 1.25–3.81, $p=0.006$). This finding is relevant to rural Sindh, where rehabilitation services may be concentrated in larger towns or district-level facilities. Rural rehabilitation research emphasizes the importance of service distribution and delivery models that can reach geographically isolated communities (3,10). Potential responses include periodic outreach clinics, community-based rehabilitation, improved links between

primary healthcare facilities and physiotherapists, and home-based rehabilitation support where clinically appropriate. The feasibility and effectiveness of these approaches should be evaluated within local health-system conditions.

Transportation difficulties were independently associated with lower physiotherapy utilization (AOR 0.54, 95% CI 0.31–0.94, $p=0.030$). This corresponds to approximately 46% lower adjusted odds of utilization among children whose caregivers reported transportation difficulties. Transportation can create both direct costs and indirect burdens through travel time, missed work, and competing household responsibilities. Research examining public-sector rehabilitation in Karachi has similarly identified transport-related costs and environmental barriers among challenges to accessing rehabilitation (9). Transport assistance, decentralized services, coordinated appointments, and appropriate home-based support may help reduce these barriers, particularly for children requiring repeated visits.

Household socioeconomic status was also independently associated with physiotherapy utilization. Children from higher socioeconomic households had greater odds of accessing physiotherapy (AOR 1.89, 95% CI 1.08–3.31, $p=0.026$). This association may reflect differences in the ability to afford treatment, transport, and time away from employment or household responsibilities. Findings from Bangladesh have likewise highlighted the relationship between household resources and uptake of rehabilitation support (4,16). Reducing out-of-pocket expenditure and strengthening the availability of affordable public-sector services may help limit socioeconomic inequalities in pediatric rehabilitation access.

The present study also identified barriers beyond those retained as statistically significant independent determinants. Treatment cost was reported by 40.8% of caregivers, and limited availability of physiotherapists was reported by 31.7%. Other concerns included difficulties maintaining regular attendance, caregiver time constraints, insufficient information, waiting times, and perceived service quality. Previous Pakistani research has also identified gaps in referral mechanisms, information provision, equipment, transportation, and caregiver support as barriers to rehabilitation (8,9). These findings suggest that interventions should address a combination of demand-side barriers, such as affordability and awareness, and supply-side constraints, including workforce availability, referral systems, and the geographic distribution of services.

Healthcare-seeking behavior provides further insight into the pathway to rehabilitation. More than half of caregivers initially sought care from government facilities, while 37.9% reported consulting more than one healthcare provider. This may reflect diagnostic uncertainty, referral delays, perceived limitations in available services, or attempts to identify appropriate treatment. The use of traditional or informal providers as an initial source of care by 11.7% of participants also illustrates the range of pathways families may follow before reaching formal rehabilitation. Rather than interpreting these pathways solely as individual choices, rehabilitation planning should consider the accessibility, acceptability, and responsiveness of available services.

Although caregiver education was associated with physiotherapy utilization in bivariable analysis ($p=0.012$), it was not independently significant in the multivariable model (AOR 1.42, 95% CI 0.84–2.40, $p=0.188$). This may indicate that the association between formal education and utilization overlaps with other factors, including awareness, socioeconomic circumstances, and access to health information. Child age and sex were also not independently associated with utilization in the adjusted analysis. These findings suggest that the measured access-related factors were more clearly associated with service utilization than these demographic characteristics in this sample. However, the absence of statistically significant associations should not be interpreted as proof that age, sex, or education never influence rehabilitation access in other populations or service settings.

The findings have several practical implications. First, rehabilitation assessment should be incorporated more systematically into primary healthcare and referral pathways so that children with neuromusculoskeletal disorders are identified and linked to appropriate services. Second, caregiver counselling should accompany referral and include clear information about treatment goals, appointment arrangements, and follow-up. Third, community-based and outreach physiotherapy services may help address geographical and transportation barriers. Fourth, affordable care and targeted transport support could reduce the financial burden on families. Finally, monitoring systems should record not only initial referral and attendance but also treatment continuity and whether children's rehabilitation goals are being met.

This study had several limitations. First, the cross-sectional design prevented the establishment of temporal or causal relationships between the identified factors and physiotherapy utilization. Second, healthcare-seeking behavior, awareness, and barriers were primarily based on caregiver reports and may have been affected by recall or social-desirability bias. Third, the study was conducted in selected rural communities of Sindh, limiting generalizability to urban populations or other provinces of Pakistan. Fourth, the study assessed previous service utilization as a proxy for unmet need and did not establish the clinical adequacy of physiotherapy for every child. Consequently, the estimated 40.8% should be interpreted as the proportion of eligible children who had never accessed physiotherapy, not as a complete measure of all unmet rehabilitation needs.

Despite these limitations, the study provides useful evidence about healthcare-seeking behavior and physiotherapy access among children with neuromusculoskeletal disorders in rural Pakistan. By identifying caregiver awareness, geographical accessibility, transportation, and socioeconomic circumstances as factors associated with utilization, the findings provide a practical basis for developing interventions to reduce barriers between rehabilitation need and service access. Future multicenter and longitudinal studies should incorporate clinical assessments of rehabilitation need, measures of treatment adequacy and continuity, and evaluations of community-based services, transportation support, and strengthened referral pathways.

CONCLUSION

Physiotherapy among children with neuromusculoskeletal disorders in rural Sindh was suboptimal. Of the 240 children included in the study, 98 (40.8%) had never received physiotherapy and were classified as having unmet need according to the study's operational definition. Adequate caregiver awareness (AOR 2.41), proximity to rehabilitation services (AOR 2.18), and higher socioeconomic status (AOR 1.89) were positively associated with utilization, whereas transportation difficulties were associated with lower odds of service use (AOR 0.54). These findings highlight the importance of strengthening caregiver education, referral pathways, geographic accessibility, affordability, and transportation support. Integrating physiotherapy into primary healthcare and developing appropriate community-based rehabilitation models may improve access for underserved rural populations. Future studies should directly assess clinical rehabilitation requirements and treatment adequacy to provide a more comprehensive estimate of unmet physiotherapy need among children in Sindh, Pakistan.

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