Physiotherapist workforce density and childhood disability burden: an ecological analysis of rehabilitation-amenable conditions across countries

Densidade da força de trabalho de fisioterapeutas e carga de deficiência na infância: uma análise ecológica das condições propícias à reabilitação em diferentes países

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Date of first submission: November 30, 2025
Last received: May 13, 2026
Accepted: July 13, 2026
Associate editor: Ana Paula Cunha Loureiro

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Abstract

Introduction: Inequities in the rehabilitation workforce across the globe may lead to inequitable access to rehabilitation services for children with disabilities. In the Middle East and North Africa (MENA), uneven distribution of physiotherapists may contribute to differences in childhood disability burden. **Objective:** To examine the ecological association between physiotherapist density and rehabilitation-amenable childhood disability burden in 10 MENA countries, using years lived with disability (YLD) among children. **Methods:** A cross-sectional ecological regression analysis was conducted using publicly available data from the World Physiotherapy Census and Global Burden of Disease estimates. Physiotherapist density was defined as the number of physiotherapists per 10,000 population. Childhood disability burden was measured as YLD rates per 100,000 children aged 0–14 years for selected rehabilitation-amenable conditions. Multivariable ordinary least squares regression was used to explore the association between physiotherapist density and childhood YLD rates, adjusting for economic development, physician density, and urbanization. **Results:** Physiotherapist density showed a significant negative association with childhood YLD rates ($\beta = -220$; $p = 0.031$; adjusted $R^2 = 0.54$). Each additional physiotherapist per 10,000 population was associated with a 220-point lower YLD rate per 100,000 children. Economic development was also negatively associated with childhood YLD rates, whereas urbanization and physician density were not significant predictors. **Conclusion:** Higher physiotherapist density was associated with lower country-level childhood YLD rates for selected rehabilitation-amenable conditions. Because this ecological cross-sectional study cannot establish causality, the findings should be interpreted as hypothesis-generating and require confirmation through longitudinal, subnational, and service-level research.

Keywords: Disabled children. Public health workforce. Rehabilitation services. Health resources accessibility. Ecological and environmental phenomena.

Resumo

Introdução: *Desigualdades na força de trabalho em reabilitação em todo o mundo podem levar a um acesso desigual a serviços de reabilitação para crianças com deficiência. No Oriente Médio e Norte da África (MENA), a distribuição desigual de fisioterapeutas pode contribuir para diferenças na carga de deficiência infantil.* ***Objetivo:*** *Examinar a associação ecológica entre a densidade de fisioterapeutas e a carga de deficiência infantil passível de reabilitação em dez países da região MENA, utilizando a métrica de anos vividos com deficiência (YLDs) entre crianças.* ***Métodos:*** *Realizou-se uma análise de regressão ecológica transversal utilizando dados disponíveis publicamente do Censo da World Physiotherapy e estimativas do estudo Carga Global de Doenças. A densidade de fisioterapeutas foi definida como o número de fisioterapeutas por 10.000 habitantes. A carga de deficiência infantil foi medida pelas taxas de YLD por 100.000 crianças de 0 a 14 anos para condições selecionadas passíveis de reabilitação. Utilizou-se regressão multivariada de mínimos quadrados ordinários para explorar a associação entre a densidade de fisioterapeutas e as taxas de YLD infantil, ajustando-se para desenvolvimento econômico, densidade de médicos e urbanização.* ***Resultados:*** *A densidade de fisioterapeutas apresentou uma associação negativa significativa com as taxas de YLD infantil (β = -220; p = 0,031; R² ajustado = 0,54). Cada fisioterapeuta adicional por 10.000 habitantes associou-se a uma redução de 220 pontos na taxa de YLD por 100.000 crianças. O desenvolvimento econômico também apresentou associação negativa com as taxas de YLD infantil, enquanto a urbanização e a densidade de médicos não foram preditores significativos.* ***Conclusão:*** *Uma maior densidade de fisioterapeutas associou-se a taxas mais baixas de YLD infantil em nível nacional para condições selecionadas passíveis de reabilitação. Visto que este estudo ecológico transversal não permite estabelecer causalidade, os achados devem ser interpretados como geradores de hipóteses e requerem confirmação por meio de pesquisas longitudinais, subnacionais e em nível de serviço.*

Palavras-chave: *Crianças com deficiência. Força de trabalho em saúde pública. Serviços de reabilitação. Acessibilidade a recursos de saúde. Fenômenos ecológicos e ambientais.*

Introduction

The World Health Organization (WHO) and partners have identified rehabilitation as an international health priority, a key part of the 'Rehabilitation 2030' plan.[1]

Workforce–outcome relations are hence key to maximizing equitable child health outcomes. Rehabilitation is increasingly recognized as a global health priority.[2] Countries with higher physiotherapist (PT) to population ratios have long been observed to show lower burdens of disability in children for conditions that respond to physical rehabilitation. Cross-national datasets such as the World Physiotherapy Annual Membership Census[3] and the Global Burden of Disease (GBD)[4] estimates were used to quantify workforce density (physiotherapists per 10,000 population) and age-standardized years lived with disability (YLDs) (ages 0–14) for rehab-amenable causes; descriptive analyzes in prior work showed a consistent inverse relationship between PT density and pediatric YLD rates (e.g., lower YLDs in countries with > 6 PTs/10,000 and higher in countries with < 3 PTs/10,000). These aggregate trends were illustrated using scatterplots and basic ecological regressions, offering preliminary evidence that worker supply and child disability load exhibit inverse relationships at the national level.[4,5]

Several multivariable ecological analyzes have been performed to explore the persistence of the PT density effect after adjustment for broad confounders, as well as descriptive patterns. PT density was still a strong negative predictor of childhood YLDs when adjusted gross domestic product (GDP) per capita, urbanization, and doctor density were considered, reflecting an independent association between the capacity for physiotherapy services and the disability burden. The need for rehabilitation is significant and on the rise. Workforce indicators can be tracked at scale using pooled data sources,[2,6] as per major international policy agencies and syntheses.[2,4] These findings allude to a theoretical, policy-specific relationship: that when rehabilitation workforce capacity is greater, pediatric populations may show lower measured disability burden at the country level. According to the WHO "Rehabilitation 2030: A call for action"[1] and Systematic Assessment of Rehabilitation Situation[7] framework, strengthening rehabilitation workforce capacity is essential for equitable health system performance. Early pediatric rehabilitation ensures functional gains across the life course.

The Middle East and North Africa (MENA) are an exceptional case for ecologic study since the region includes the full array of health-system capacities and economic intensities, rendering it exemplary for studies on the equity in rehabilitation. However, there are still significant gaps and limitations. First, the ecological study design through which these country-level associations were

derived cannot infer causality and as with all ecological studies, the ecological fallacy warns that the associations seen at the level of countries might not hold at the level of individuals or facilities. Second, workforce counts, and density measures are usually derived from professional membership registers or administrative returns that differ in coverage and definition among countries; thus, measurement error is likely in the exposure (PT density). Methodological synthesis and scoping reviews have demonstrated that workforce characterizations vary across countries[2,6] and therefore make cross-country comparisons difficult.[8,9] It was not always possible to account for this heterogeneity in secondary analysis, and some countries reported censused clinical headcounts and others reported nominal membership.

There are also outcomes and unmeasured confounding limitations. GBD calculations for YLD are derived through modeling, which is dependent on the specific definitions of causes, the inputs used for prevalence, and the assigned weights for disability. GBD YLD estimates are modeled measures that depend on cause definitions, prevalence inputs, disability weights, and statistical assumptions; therefore, some uncertainty in the outcome measure is unavoidable. Health system (financing, access to pediatric specialty care responsibility for early detection programs), social determinants (nutrition, education) and rehabilitation service organization (rural/urban distribution, task-sharing, pediatric specialization) factors are generally not entirely reflected in country level covariates and thus residual confounding may have persisted. More recent systematic reviews and ecological studies have demonstrated that rehabilitation workforce supply is related more to country wealth and health spending than to model demand alone, suggesting that observed associations might partly represent wider development gradients rather than direct effects of the workforce.[10]

Importantly, and putting the practical implication up front, investment in physiotherapy capacity is a plausible policy priority, but its effect on childhood functioning requires longitudinal evaluation. Consequently, policymakers should treat the evidence as suggestive but actionable: while past cross-sectional records demonstrated inverse associations between PT density and pediatric YLDs, stronger longitudinal and subnational analyses are needed to confirm causality and to identify the service-delivery features that drive impact. Mixed-methods and panel designs have been underused but have the potential to show whether workforce increases preceded declines in YLDs in specific settings; researchers have begun to explore these approaches and have already documented system-level bottlenecks and enablers. In short, the body of evidence has signaled a meaningful relationship between physiotherapy supply and child disability burden, and it has created a clear agenda for better measurement, causal inference, and policy translation.[4,11]

This study investigated the hypothesis that nations with greater PT workforce densities (exposure) will have lower age-standardized YLD rates for conditions amenable to physical rehabilitation in children aged 0-14 years (outcome). A larger number of PT per 10,000 people is linked to a reduced burden of pediatric impairments, according to the directional and inverse expected connection. The hypothesis was tested by conducting ecological analyses and validating hypothesis by assessing if relevant associations were significant following adjustment for socioeconomic and health system factors.

Methods

The goal of this ecological study was to determine if there was an association between childhood disabilities for conditions which can be physically rehabilitated and countries with high PT densities. The study was executed using a cross-sectional ecological design with countries as the unit of analysis. Such designs are particularly useful for the study of health system indicators and population-level outcomes in a cross-national context.[5]

At an earlier stage, the research team had identified two global datasets to serve as the primary data sources. Physiotherapy workforce density (licenses per ten thousand head of population among active, licensed PT) was sourced from the World Physiotherapy Annual Membership Census 2024 Global Report, which includes standardized cross-country data from national member societies.[4]

Pediatric disability burden was assessed using YLD rates per 100,000 children aged 0–14 years, available from the GBD 2021 Results Tool, produced by the Institute for Health Metrics and Evaluation.[4] For the purposes of this ecological analysis, "rehabilitation-amenable childhood disability burden" was operationalized as a composite country-level proxy based on GBD 2021 YLD estimates among children aged 0–14 years. The included causes were selected because they commonly involve functional limitations for which physiotherapy or multidisciplinary rehabilitation may contribute to assessment,

functional management, prevention of secondary complications, or participation improvement. These categories included childhood neurological and congenital conditions such as cerebral palsy-related motor impairment, spina bifida, congenital musculoskeletal deformities including clubfoot, and selected pediatric musculoskeletal impairments where available in the GBD cause hierarchy. Cause-specific YLD rates were extracted for children aged 0 to 14 years and aggregated to generate a composite YLD rate per 100,000 children for each country. Therefore, the selected causes were treated as a composite rehabilitation-amenable proxy outcome rather than as a direct measure of physiotherapy need, service use, service coverage, or treatment effectiveness.

Inclusion of countries was based on availability of data for physiotherapy workforce density alongside pediatric YLDs for the same year or the closest year. For this analysis, ten countries from the MENA region were eligible. As these countries differ structurally and socioeconomically, further covariates were added,[12] which include GDP per capita, urbanization (percentage of total population), and physician density (per 10,000 population), and were retrieved from the World Bank Development Indicators and WHO Global Health Observatory. Confounders (GDP per capita, urbanization, and physician density) were selected based on prior global ecological studies showing their influence on disability burden.[10,13] PT density followed World Physiotherapy's definition of 'practicing physiotherapists' to ensure cross-country comparability. The prior global analyses have validated the use of these indicators for mitigating confounding bias in ecological studies.[14]

Data cleaning included aligning workforce and burden metrics to common currencies. PT density was standardized to per 10,000 population. YLDs were standardized and represented as rates per 100,000 children. GDP per capita was transformed to reduce skewness. Descriptive statistics were calculated and are displayed in this manuscript in tables (summary statistics, country profiles) and figures (scatter plots). PT per capita and YLD rates were analyzed for bivariate relationships using Pearson's correlation. In testing the PT workforce density's independent impact, a one-way OLS regression model was constructed with pediatric YLD rate and PT density as the dependent and independent variables, respectively. GDP per capita, physician density, and urbanization served as covariates. Normality, linearity, homoscedasticity, and multicollinearity were tested.

Variance inflation factor values less than 2.5 ascertained absence of multicollinearity. Adjusted R^2 with beta values and their significance, alongside other metrics, formed the primary criteria for model evaluation. Findings are presented with confidence intervals.

Best practice guidelines were followed for ecological and cross-country studies, focusing on clear criteria for the data source, inclusions, and the analysis workflow.[15] Since all data was publicly available, aggregated, and de-identified on the country's level, formal approval was not needed by institutional nor by international guidelines. The study was reported in accordance with the STROBE checklist for cross-sectional studies.[16,17]

Results

The assessment of physiotherapy workforce capacity and childhood disability across the ten included MENA countries revealed substantial heterogeneity (Table 1). PT density ranged from 1.9 per 10,000 population in Iraq to 7.5 per 10,000 in Qatar. Overall, low-income countries exhibited the lowest physiotherapy supply and the highest rates of childhood YLD, whereas high-income Gulf countries demonstrated higher workforce availability and substantially lower YLD values.

This pattern suggests regional ecological inequality: nations with relatively fewer physiotherapists per 10,000 populations continually showed higher childhood YLD rates, while nations with improved access to the physiotherapy workforce showed lower YLD rates. These findings suggest an inverse ecological association between physiotherapist workforce density and childhood YLD rates in the included countries.

A moderate negative correlation was observed between childhood YLD rates and PT workforce density among the ten MENA countries (Pearson's $r = -0.52$, $p < 0.05$), as presented in Figure 1. Countries with lower PT density tended to cluster at the higher end of childhood YLD burden, whereas countries with higher PT density tended to show lower YLD rates. This pattern supports the hypothesized inverse ecological association between PT workforce density and childhood YLD rates for selected rehabilitation-amenable conditions. The multivariable regression model showed an independent negative association between PT density and childhood YLD burden after adjustment for GDP per capita, urbanization, and physician density (Table 2).

Table 1 - Descriptive characteristics of included countries (2021)

Country	PT density	YLD	GDP per capita	Urbanization (%)	MD/physicians
Egypt	2.1	9,500	3,875	43	28
Algeria	3.0	9,200	4,200	73	19
Tunisia	3.2	8,800	4,000	70	23
Morocco	2.4	9,400	3,500	63	17
Iraq	1.9	9,800	4,800	71	6
Saudi Arabia	5.5	8,200	23,000	84	26
United Arab Emirates	6.8	7,200	43,000	86	27
Qatar	7.5	6,800	60,000	99	30
Bahrain	6.0	7,000	25,000	89	29
Jordan	4.2	8,500	5,000	91	20

Note: PT = physiotherapists per 10,000 population; YLD = years lived with disability per 100,000 children (0-14 years old); GDP = gross domestic product; MD = medical doctors/physicians per 10,000 population. Physicians refer to medical doctors as reported in international health workforce datasets.

Table 2 - Multivariable regression analysis of the association between physiotherapist density and childhood YLD burden after adjustment for GDP per capita, urbanization, and physician density

Predictor	β coefficient	Standard error	95% CI	p-value
Physiotherapist density (per 10,000)	–220.00	85.00	–405 to –35	0.031*
GDP per capita (per $100)	–0.35	0.12	–0.59 to –0.11	0.008 **
Urbanization (%)	–15.00	12.00	–42 to 12	0.240
Physicians (per 10,000)	–8.00	7.00	–23 to 7	0.300

Note: YLD = years lived with disability; GDP = gross domestic product; CI = confidence interval. *Significant. **Highly significant.

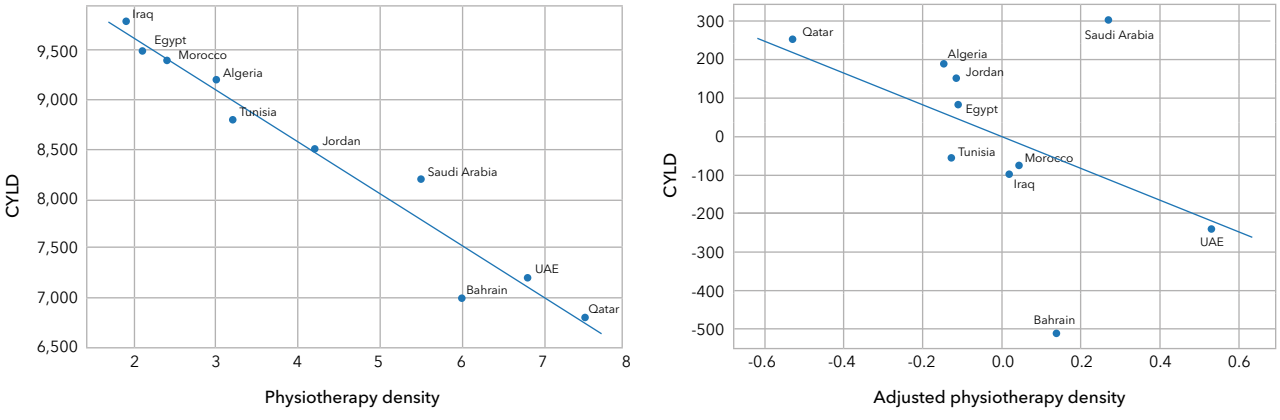

Figure 1 - Ecological (chart on the left) and adjusted (chart on the right)* association between physiotherapist density, per 10,000 population, and childhood years lived with disabilit (CYLD) rate, per 100,000 children (0–14 years), across the included Middle East and North Africa countries.

Note: *Association after controlling for gross domestic product per capita, urbanization, and physician density. UAE = United Arab Emirates.

Urbanization and physician density contributed little additional explanatory power and were not statistically significant. The overall model explained more than half of the variation in rates of pediatric YLD between countries, and the partial regression plots (Figure 1) illustrated that the independent effect of PT workforce availability was still present, after adjusting for structural and socioeconomic factors. Taken cumulatively, the findings support the concept that physiotherapy capacity may be an important country-level marker associated with childhood disability burden at an ecological level, albeit not ignoring the important roles played by broader domains of health and economic context.

Discussion

This study examined the ecological association between PT workforce density and childhood disability burden, measured using YLD rates for selected rehabilitation-amenable conditions. Across the 10 included MENA countries, higher physiotherapist density was associated with lower childhood YLD rates. Because the study used a cross-sectional ecological design, these findings should be interpreted as country-level associations rather than evidence of causality.

Our findings align with Htwe et al.[10] and Jesus et al.,[13] who demonstrated inverse relationships between rehabilitation workforce supply and disability burden. This suggests that greater physiotherapy workforce availability may be associated with lower measured disability burden, although causal effects cannot be inferred from this design.

The findings were consistent with the hypothesized inverse ecological association between PT density and childhood YLD rates. Countries with fewer than three PT per 10,000 population tended to have higher rates of childhood YLD, and countries with more than six PT per 10,000 population tended to have lower rates of YLD. The scatterplot demonstrated a moderate negative correlation, which was confirmed in multivariable regression, where PT density was independently and negatively associated with childhood disability burden when adjusted for GDP per capita, urbanization, and physician density. These results indicate that PT density may be a country-level workforce indicator related to the burden of childhood disability amenable to rehabilitation. Moreover, the negative association found with GDP per capita suggests that more general economic and structural factors may be relevant to explain variations in the burden of childhood disability between countries. Our results are consistent with previous ecological studies that found negative correlations between the availability of the rehabilitation workforce and the level of disability among populations.[13,18] As an example, Jesus et al.[18] showed that the supply of the workforce significantly predicted the burden of disability among high-income settings.

Similarly, our findings indicated that greater physiotherapy service capacity in each country was associated with lower childhood YLD rates.[19] In agreement with our study, Kaewsawang et al.[20] noted that the distribution of the physiotherapy workforce significantly dictates access to the service, adding that inequities among regions are fueled by the gaps among the density workforces.

Other evidence exists however that suggested workforce supply is not fully responsible for explaining population disability levels. For example, a recent systematic review by Htwe et al.[9] noted that barriers to rehabilitation delivery included factors such as access to a service, financing and cultural determinants that influence delivery. Our study corroborated both views: while PT density explained a portion of the variance in YLD rates, it is likely that other aspects of unmeasured systems and social factors played an important role in the remaining differences.

Even if the correlation between PT density and outcomes among the disabled seems stable, some studies indicate that data quality issues could affect it.[8,20] Conradie et al.[8] reported that cross-country estimates of the workforce tend to differ from one country to another given the inconsistent reporting mechanisms and definitions, where the result is biased associations. If physiotherapy workforce density was either overestimated in high-income Gulf countries or underestimated in low-income context, it may reflect in the strength of the association. The limitation in measurement reinforces the need for improved surveillance of the workforce across countries.[21] Apart from workforce volumes, qualitative research points out organizational and system-level obstacles leadership, workload, and interprofessional coordination – that influence the implementation of person-focused rehabilitation care.[22] They can impede the provision of effective childhood rehabilitation across the MENA region.

The key implications of the current findings can be reasoned in several ways. Firstly, greater physiotherapy

availability may reflect better access to early rehabilitation from pediatric musculoskeletal and neurological conditions, which limits long term disablement. Secondly, physiotherapy workforce growth may also be indicative of strengthening systems, where health systems and education in a country invest in both strengthening rehabilitation and improvements in disabled outcomes. Thirdly, PT acting in preventative roles are likely to limit worsening of acute childhood conditions to chronic disabling status.

These processes are compatible with the WHO's 'Rehabilitation 2030' strategy, which calls for the inclusion of rehabilitation under the universal health coverage frameworks.[11] Strengthening rehabilitation capacity is aligned with Sustainable Development Goal 3, which aims to ensure healthy lives and promote well-being for all.[1] Regional cooperation through WHO Regional Office for the Eastern Mediterranean's initiatives could strengthen workforce mobility, capacity-building, and cross-border training to address disparities in pediatric rehabilitation coverage.

Several limitations should be acknowledged. First, the ecological cross-sectional design of this study prevents causal inference, and the observed country-level associations should be interpreted as hypothesis-generating. Associations observed at the national level may not apply to individuals, facilities, or subnational populations. Second, the outcome variable was a composite proxy derived from modeled GBD YLD estimates for selected rehabilitation-amenable conditions. This measure does not directly capture rehabilitation need, access, service utilization, quality of care, or functional improvement after physiotherapy. Third, GBD estimates rely upon various "inputs" such as definitions of cause, prevalence, disability weights and modeling assumptions, which can differ between countries. Fourth, physiotherapy workforce data and YLD estimates were not perfectly synchronized temporally, which may have introduced bias. Fifth, despite adjustment for GDP per capita, urbanization, and physician density, residual confounding is likely because rehabilitation financing, pediatric service organization, early detection systems, education, and social determinants were not fully captured. Finally, the small number of countries included limited model stability and the ability to conduct more complex adjustments or sensitivity analyses.

However, the observed inverse ecological association has relevant policy implications. The findings support continued attention to pediatric rehabilitation workforce planning in low- and middle-income MENA countries, especially those with fewer than three PT per 10,000 population. Such countries may benefit from assessment of pediatric rehabilitation workforce needs, financing, integration with child health programs, and barriers to service access. The findings also highlight the need for stronger rehabilitation information systems to improve the measurement of workforce supply, service coverage, and childhood disability outcomes.

Latest reviews have highlighted the importance of embedding rehabilitation under primary health care to increase coverage and continuity of care.[16] Future research should use longitudinal or panel ecological designs to examine temporal relationships and should include subnational and mixed methods approaches to identify structural barriers and facilitators to effective pediatric rehabilitation.

Conclusion

This ecological cross-sectional analysis found that higher PT workforce density was associated with lower childhood YLD rates for selected rehabilitation-amenable conditions across the included MENA countries. The association remained after adjustment for GDP per capita, urbanization, and physician density; however, the findings should not be interpreted as evidence of causality.

The results are best viewed as hypothesis-generating and suggest that rehabilitation workforce capacity may be an important marker of health-system readiness for addressing childhood disability. Countries with low PT density may benefit from further assessment of pediatric rehabilitation workforce needs, service coverage, and barriers to access. Future longitudinal, subnational, and mixed-methods studies are needed to determine whether changes in physiotherapy workforce capacity are followed by measurable improvements in childhood disability outcomes.

Acknowledgments

Special appreciation is extended to the teams behind the World Physiotherapy Annual Membership Census and the GBD study for making their data publicly accessible, which enabled this research.

Author contribution

AHM was responsible for all stages of the study and for the approval of the final version of the manuscript.

Data availability statement

The findings are based on existing data from publicly available sources. Specifically, the data are from the World Physiotherapy Annual Membership Census 2024 Global Report.[3] Childhood disability burden (Years Lived with Disability, YLDs) data were retrieved from the Global Burden of Disease 2021 Results Tool from the Institute for Health Metrics and Evaluation.[4] Socioeconomic and demographic covariates were from the gross domestic product per capita, urbanization and physician density collected from World Bank Development Indicators, and the World Health Organization Global Health Observatory. All these datasets are open access, and publicly available.

References

1. World Health Organization. Rehabilitation 2030: a call for action: 6–7 February 2017, Executive Boardroom, WHO Headquarters, meeting report. Geneva: World Health Organization; 2017.

2. Heinemann AW, Feuerstein M, Frontera WR, Gard SA, Kaminsky LA, Negrini S, et al. Rehabilitation is a global health priority. Eur J Phys Rehabil Med. 2020;56(2):129-30. https://doi.org/10.23736/s1973-9087.20.06284-x

3. World Physiotherapy. Annual membership census 2024: global report. London: World Physiotherapy; 2024 [cited 2025 Oct 17]. Available from: https://world.physio/sites/default/files/2025-01/AMC2024-Global-report.pdf

4. Institute for Health Metrics and Evaluation. Global Burden of Disease (GBD) Data and Tools Guide. Seattle (WA): IHME; 2024 [cited 2025 Oct 17]. Available from: https://www.healthdata.org

5. Tolonen H, Reinikainen J, Koponen P, Elonheimo H, Palmieri L, Tijhuis MJ. Cross-national comparisons of health indicators require standardized definitions and common data sources. Arch Public Health. 2021;79:208. https://doi.org/10.1186/s13690-021-00734-w

6. Bright T, Wallace S, Kuper H. A systematic review of access to rehabilitation for people with disabilities in low- and middle-income countries. Int J Environ Res Public Health. 2018;15(10):2165. https://doi.org/10.3390/ijerph15102165

7. Kleinitz P, Sabariego C, Cieza A. WHO Systematic Assessment of Rehabilitation Situation (STARS): results of the field testing in Jordan, Myanmar, Sri Lanka, Solomon Islands, Laos, Haiti, and Guyana. International Journal of Environmental Research and Public Health. 2021;18(21):11549. https://doi.org/10.3390/ijerph182111549

8. Conradie T, Berner K, Louw Q. Rehabilitation workforce descriptors: a scoping review. BMC Health Serv Res. 2022;22(1):1169. https://doi.org/10.1186/s12913-022-08531-z

9. Sixel TRS, Bernardo D, Medeiros AA, Bousquat A, Mota PHS, Schmitt ACB. The rehabilitation workforce in Brazil. Arch Public Health. 2024;82(1):25. https://doi.org/10.1186/s13690-024-01156-4

10. Htwe O, Yuliawiratman BS, Tannor AY, Nor Asikin MZ, Soh E, DE Groote W, et al. Barriers and facilitators for increased accessibility to quality rehabilitation services in low- and middle-income countries: a systematic review. Eur J Phys Rehabil Med. 2024;60(3):514-22. https://doi.org/10.23736/S1973-9087.24.08122-1

11. Negrini S. Introduction to the special section "Rehabilitation 2030: A call for action" by the World Health Organization (WHO). Eur J Phys Rehabil Med. 2017;53(2):151-2. https://doi.org/10.23736/S1973-9087.17.04765-7

12. Kleinitz P, Sabariego C, Llewellyn G, Taloafiri E, Mangar A, Baskota R, et al. Integrating rehabilitation into health systems: A comparative study of nine middle-income countries using WHO's Systematic Assessment of Rehabilitation Situation (STARS). PLoS One. 2024;19(2):e0297109. https://doi.org/10.1371/journal.pone.0297109

13. Jesus TS, Landry MD, Hoenig H, Dussault G, Koh GC, Fronteira I. Is physical rehabilitation need associated with the rehabilitation workforce supply? An ecological study across 35 high-income countries. Int J Health Policy Manag. 2022;11(4):434-42. https://doi.org/10.34172/ijhpm.2020.150

14. Maulik PK, Darmstadt GL. Childhood disability in low- and middle-income countries: overview of screening, prevention, services, legislation, and epidemiology. Pediatrics. 2007;120 (Suppl 1):S1-55. https://doi.org/10.1542/peds.2007-0043B

15. Suleman M, Ali R, Kerr DJ. Health diplomacy: a new approach to the Muslim world? Glob Health. 2014;10:50. https://doi.org/10.1186/1744-8603-10-50

16. Waterworth CJ, Smith F, Kiefel-Johnson F, Pryor W, Marella M. Integration of rehabilitation services in primary, secondary, and tertiary levels of health care systems in low- and middle-income countries: a scoping review. Disabil Rehabil. 2024;46(25):5965-76. https://doi.org/10.1080/09638288.2024.2317422

17. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. J Clin Epidemiol. 2008; 61(4):344-9. https://doi.org/10.1016/j.jclinepi.2007.11.008

18. Dutka JT, Gans BM, Bracciano A, Bharadwaj S, Akinwuntan A, Mauk K, et al. Delivering rehabilitation care around the world: Voices from the field. Arch Phys Med Rehabil. 2023; 104(9):1385-93. https://doi.org/10.1016/j.apmr.2023.03.009

19. Kanniappan V, Rajeswari AJ, Lawrence PEP, Sundar S. Understanding the perspectives of paediatric physicians on physiotherapy in paediatric rehabilitation in Chennai, India: a qualitative approach. J Prev Med Public Health. 2024;57(2):157-66. https://doi.org/10.3961/jpmph.23.426

20. Kaewsawang S, Chongsuvivatwong V, Vongsirinavarat M. Capacity of physiotherapy workforce production in Thailand: public–private mix, secular trend, and geographic distribution. Physiother Res Int. 2016;21(2):127-32. https://doi.org/10.1002/pri.1629

21. Persson L, Sjöström R. A compulsory school in need of a physiotherapist: an interview study. Int J Adolesc Youth. 2024; 29(1):2341939. https://doi.org/10.1080/02673843.2024.2341939

22. Fernandes JB, Vareta D, Fernandes S, Almeida AS, Peças D, Ferreira N, Roldão L. Rehabilitation workforce challenges to implement person-centered care. Int J Environ Res Public Health. 2022;19:3199. https://doi.org/10.3390/ijerph19063199