

The supply and demand for rehabilitation health workforce in Saudi Arabia

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Abstract

Background: Adequate supply of rehabilitation health workforce is a prerequisite for enhancing access to rehabilitation care. However, there is a lack of comprehensive data regarding the supply of rehabilitation health workers in Saudi Arabia.

Aims: To determine the need for, and supply of, rehabilitation workforce, and investigate the relationship between rehabilitation workforce supply and rehabilitation needs in Saudi Arabia.

Methodology: This cross-sectional study measured the ratio of physiotherapists and occupational therapists per 10 000 population. Data were obtained from the Ministry of Health, family health survey and census data of the General Authority for Statistics and published literature. To assess the need for rehabilitation services, we computed a composite disability index based on 3 variables: count of individuals with physical disabilities, those with chronic diseases, and those aged ≥ 65 years. Determinants of the supply potential were population size, rural population percentage, and physician supply. Data were analysed using descriptive statistics and simple linear regression.

Results: The ratios of physiotherapists and occupational therapists working at the Ministry of Health facilities were 0.69 and 0.03 per 10 000 population, respectively. Overall rehabilitation health workforce ratio was 0.73 per 10 000. Supply varied across regions, from 0.4 for Riyadh to 2.5 for Al Jouf. Nine regions exceeded the overall ratio. Rehabilitation need index ranged from 0.144 in Najran to 0.212 in Aseer. No significant associations were found between rehabilitation workforce supply on one hand, and need and other potential determinants on the other hand.

Conclusion: The rehabilitation workforce supply in Saudi Arabia surpassed the regional and global averages, but was lower than the average for high-income countries. Workforce distribution varied by region across the country and was not related to need. It is important to consider the need for rehabilitation services and context-specific factors when determining the optimal size and distribution of the rehabilitation health workforce in Saudi Arabia.

Keywords: rehabilitation, health workers, physiotherapist, occupational therapist, Saudi Arabia

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Background

The global prevalence of disabilities currently stands at approximately 15%, affecting over a billion people (1). This number is expected to increase due to factors such as the ageing population, a rise in chronic health conditions and improved survival rates for life-threatening conditions (1–3).

The World Health Organization (WHO), mandated by Resolution WHA74.8, adopted by the 77th World Health Assembly in 2021, released the disability inclusion strategy to promote disability inclusion in the health sector (4). Recommendations from this resolution emphasise making persons with disability a priority in all health systems, with a focus on ensuring access to effective health care services for them, including rehabilitation (4). Accessible rehabilitation services are essential to address the needs of people with disabilities, maximize their ability to live, work, and learn and ensure their effective inclusion in society (1,5,6).

Approximately 7.1% of the Saudi Arabia population are disabled, with physical disabilities being notably

prevalent (7). Musculoskeletal conditions represent one of the leading causes of hospital visits, comprising 38% of visits to family practice clinics (8). Primary contributors to disability in Saudi Arabia include an ageing population, an increasing burden of chronic non-communicable diseases and the substantial impact of severe injuries due to road traffic accidents (8). In recent years, government and non-profit organizations have emerged as key players in the expansion of rehabilitation services in Saudi Arabia (9,10). Recently, as part of Saudi Arabia's Vision 2030 strategy, the Health Sector Transformation Programme was launched, which aims to enhance the quality and accessibility of health care services to all, including rehabilitation (8).

Effective delivery of rehabilitation services is only possible if there is an adequate supply of rehabilitation professionals per population (5,6). Improving access to rehabilitation services depends on ensuring an adequate ratio of rehabilitation professional to patients or cases, which in turn will increase the demand for and use of these services (12). To ensure the sufficiency of these

healthcare workers, it is recommended that their supply be determined according to the need for rehabilitation services (13).

One study assessing rehabilitation workforce supply in Saudi Arabia highlighted shortages in the numbers of physiotherapists and occupational therapists available for stroke rehabilitation care (14). However, we currently lack comprehensive data on the number of rehabilitation health workers for conditions other than stroke, particularly factors associated with low workforce supply for physical disabilities across various regions of Saudi Arabia. We assert that collection and analysis of such data is essential for planning an adequate and equitable supply of rehabilitation health workforce in the country.

Therefore, this study aimed to achieve 2 objectives: firstly, to assess supply and demand of rehabilitation health workforce (number of physiotherapists and occupational therapists per population) for people with physical disabilities. Secondly, to investigate the relationship between the need for rehabilitation and various potential demographic and health system factors, and the supply of rehabilitation health workforce.

Material and Methods

Sample selection and study design

In general, a full rehabilitation health workforce consists of a diverse range of professions, including physicians who specialise in physical medicine and rehabilitation, physiotherapists, occupational therapists, speech-language pathologists, prosthetic and orthotic practitioners, and psychologists and therapists who do social work related to mental disabilities (1). In this study we focused only on physiotherapists and occupational therapists per population, who were employed by the Saudi Arabia Ministry of Health.

We conducted a cross-sectional study in Saudi Arabia, the largest country in the Arabian Peninsula with a population estimated at 32 million. The country is divided into 13 administrative regions, each with its own capital city and governing structure. The Ministry of Health (MoH) is the main provider of health care services, delivering 60% of the total health services in the country. Health services at the regional level are planned and delivered by regional health directorates.

Evaluation of supply, demand and need for rehabilitation services in Saudi Arabia

To evaluate the supply of rehabilitation health workforce, we calculated the ratio of physiotherapists and occupational therapists employed at MoH facilities, both individually and collectively, per 10 000 population. To assess the need for rehabilitation services, we computed a disability index using 3 variables: (i) the number of people with physical disabilities; (ii) the number of people with chronic diseases and (iii) the number of persons 65 years old and above. We selected our variables based on Andersen's Behavioural Model of Health Services Use

(15) which posits that the use of health care services is influenced by 3 sets of factors: (i) predisposing factors (age, gender, education); (ii) enabling factors (income, insurance, distance to hospital or health centre); and (iii) need-related factors (chronic health conditions). Based on this same model, McFadden et al (2016) used prevalence rates of health and socio-demographic characteristics from the StatsCan's Canadian Community Health Survey in their study to examine the supply and demand for physiotherapy services in Saskatchewan, Canada (12).

We computed our tripartite disability index using principal component analysis. Using the 3 variables, principal component analysis extracted the data to a single component. Variable values were multiplied by their component loadings to assign weights, thus quantifying their relative importance in the disability index. Weighted contributions were then summed to obtain a unified disability index that captures the combined effects of the variables on disability.

We followed the methodology of Jesus et al (13), which used economic, demographic and rehabilitation health workforce supply-side variables as covariates that could influence the supply of rehabilitation workforce. Based on the equitable distribution of economic variables across regions in Saudi Arabia, we directed our attention towards demographic factors, particularly the population size and the proportion of rural inhabitants within each region. We calculated the ratio of physicians working in MoH regional health facilities per 10 000 population to reflect the overall levels of human resources and recruitment practices at the regional level.

Our study protocol was approved by the Central Institutional Review Board of the MoH of Saudi Arabia with approval number 1037761564.

We obtained MoH data for 2023 on the number of physiotherapists and occupational therapists and the number of individuals with physical disabilities in each region. We used the results of the 2017 family health survey conducted by the Saudi General Authority of Statistics to derive an estimate of the number of individuals with chronic diseases (16). The family health survey collected data from approximately 25 million individuals older than 15 years who resided in 24 012 households selected using a multistage, cluster, stratified sampling technique across all 13 regions of Saudi Arabia. In the family health survey, researchers asked participants about their diagnoses of 14 chronic diseases, including diabetes mellitus, cardiovascular diseases, cancers, respiratory diseases, kidney diseases, mental illness, musculoskeletal conditions and gastrointestinal diseases.

We extracted data on the population size of Saudi Arabia, the population size of each region, and the proportion of the population > 65 years from the Saudi General Authority of Statistics 2022 census data (17). To determine the percentage of the population living in rural areas, we used the proportion of people residing outside the 2 main cities in each region, as documented in existing literature (18). Then we retrieved data on the

number of physicians in all MoH health facilities in each region from the 2022 MoH annual statistical report (19).

Statistical analysis

All statistical analyses were conducted with SPSS version 21. We used descriptive statistics to estimate the ratios of rehabilitation health workforce and physicians per 10 000 population, using the population size of 2022 census as the denominator and workforce data as the numerator. We conducted simple linear regression analysis to evaluate the relationship between the supply (ratio of rehabilitation workforce per 10 000 population) as the dependent variable and the rehabilitation need (disability index) and other potential determinants of supply as the independent variables. We performed bootstrapping in the simple regression analysis to compensate for the small sample size (13 regions). The results of bootstrapping was based on 1000 iterations. We considered a *P* value of less than 0.05 as the threshold for statistical significance.

Results

Rehabilitation health workforce supply and need

We found a total of 2 225 physiotherapists for a population of 32 175 224 persons, yielding a ratio of 0.69 physiotherapists per 10 000 population. The total number of occupational therapists was 112, yielding a ratio of 0.03 occupational therapists per 10 000 population. Therefore, the combined rehabilitation health workforce was 2 337 professionals, with an average ratio of 0.73 per 10 000 population.

The supply of rehabilitation health workforce per 10 000 population varied widely across the 13 regions of Saudi Arabia, ranging from 0.4 (301/8 591 748) in Riyadh Region to 2.5 (148/595 822) in Al Jouf Region. Nine of the regions had rehabilitation workforce density above the average density of 0.73. The rehabilitation need expressed

by the disability index ranged from 0.144 in Najran Region to 0.212 in Aseer Region (Figure 1).

Factors influencing regional rehabilitation workforce availability

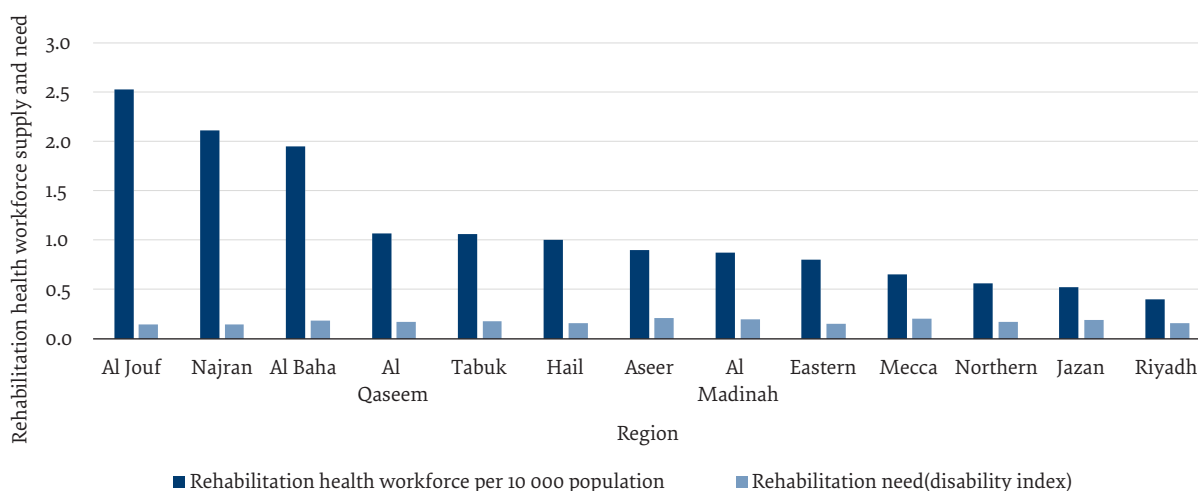
Our regression analysis examined the relationship between several independent variables and the supply of physical and occupational therapists. The results showed that the disability index had no significant impact on the supply of therapists (*P* = 0.607). However, there was a marginal negative relationship between the total population and therapist supply (*P* = 0.052). The percentage of the rural population and the ratio of physicians per 10 000 population did not show significant relationships with therapist supply (*P* = 0.760 and *P* = 0.387, respectively).

Discussion

We found that in Saudi Arabia the average ratio of the rehabilitation health workers employed by the Ministry of Health was higher than the global median ratio of 0.1 per 10 000 population (5). However, it was well below the average 15.7 rehabilitation health professionals per 10 000 population reported in 2019 in a study which focused on 35 high-income countries, including Saudi Arabia (13). Previous studies on the supply of rehabilitation health professionals in Saudi Arabia reported ratios of 1 per 10 000, which is comparable to our ratio despite differences in data sources and year of study (13). Regarding the supply of rehabilitation health workforce in the Saudi Arabia regions, there were wide variations; 9 of the regions had ratios higher than the overall average. All regions reported values which were below the average ratios reported in other high-income countries.

When compared to other countries in the Gulf Cooperation Council region, the ratios of physiotherapists per 10 000 population in Bahrain, Oman, and the United Arab Emirates (0.1, 0.3, and 0.4 per 10 000 population, respectively) were lower than that of Saudi Arabia (20),

Figure 1 Supply of rehabilitation health workforce and need for physical rehabilitation in Saudi Arabia



while Kuwait surpassed Saudi Arabia with a ratio of 1.2 per 10 000 population.

These comparisons aimed to contextualize Saudi Arabia's position regionally and globally. However, caution is necessary for several reasons. Firstly, differences in occupational classification and data sources across countries can affect the accuracy of comparisons (3,5,21). Secondly, while human resource ratios per population provide insights, they may not accurately reflect rehabilitation service needs (22). The absence of universally accepted benchmarks further complicates the assessment of workforce adequacy (2,5,22,23). Countries must gauge their rehabilitation workforce supply based on rehabilitation needs (13). In Saudi Arabia, the rehabilitation need estimator indicates substantial need for services, evident in the years lived with disability metric of 34.5 per 100 000 population, surpassing the average of Kuwait (28.4), despite a lower workforce density (24).

We did not observe a significant association between the need for rehabilitation services and the supply of rehabilitation workforce across the various regions of Saudi Arabia. Any study with a small sample size should be interpreted with caution, however, our study agrees with other published studies examining the association between rehabilitation need and workforce supply in high-income countries (5,13,11). Ecological studies suggest that demographic and economic indicators exert a greater influence on the supply of rehabilitation health workforce in high-income countries than the need for physical rehabilitation (13). Optimal physical therapy workforce supply, customized to meet the specific needs of each country, appears to be influenced by discipline-specific healthcare considerations and contextual factors that can vary not only between countries but also within the same country (2). We did not observe a significant association between the demographic variables, such as population size and the percentage of rural population, and the supply of rehabilitation health workers in Saudi Arabia. Our findings contradict the results of a previous ecological study conducted in high-income countries. That study indicated that as the population size and percentage of rural population decreased, there was an increase in the supply of rehabilitation health workforce (13). We also did not observe an association between the supply of physicians and the supply of rehabilitation health workforce across all Saudi Arabia regions.

Our results suggest that factors influencing the supply of rehabilitation workforce are unique to each local context. We suggest conducting an in-depth assessment of the local situation to identify these specific factors. Consequently, these identified factors, together with the need for rehabilitation services, should be incorporated

in planning for the optimal supply and distribution of rehabilitation health workforce throughout Saudi Arabia.

Our study revealed a substantial disparity in the ratios of types of rehabilitation health workers, with physiotherapists significantly outnumbering occupational therapists. This finding aligns with the results of a 2016 study conducted in Saudi Arabia, which quantified the workforce gap for occupational care of ischemic stroke patients as a way to estimate future staffing requirements. Occupational therapists have one of the lowest ratios per 10 000 population among all healthcare professionals in Saudi Arabia (14).

A shortage in the rehabilitation health workforce impedes effective multi-disciplinary rehabilitation. WHO recommends a diverse rehabilitation workforce to enhance care quality and health outcomes (25). Tailoring the workforce composition to local disability patterns in Saudi Arabia requires detailed studies (5,25).

This study has several limitations: Firstly, it only included a limited number of potential determinants in the regression analysis, affecting a comprehensive understanding of workforce supply factors. Secondly, data from different time points were used, assuming similar changes across Saudi Arabia's regions. Thirdly, the indicator focused solely on physiotherapists and occupational therapists, neglecting other relevant professions. Fourthly, data were limited to those provided by Saudi Arabia MoH, overlooking other sectors. Lastly, the small sample size used for the regression analysis may have reduce the statistical power and generalizability, however, this was mitigated by bootstrapping.

Conclusion

Saudi Arabia has a higher rehabilitation workforce supply than its neighbouring Gulf Cooperation Council countries and the global median but less than the average observed in high-income countries. The distribution of the workforce within Saudi Arabia regions is not associated with physical rehabilitation needs or other factors like population size, rural population percentage or physician supply. These findings emphasise the importance of considering both rehabilitation service needs and context-specific factors in determining the optimal size and distribution of the rehabilitation health workforce in Saudi Arabia.

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L'offre et la demande de personnels de santé en réadaptation en Arabie saoudite

Résumé

Contexte : L'amélioration de l'accès aux soins de réadaptation dépend de la disponibilité d'un nombre suffisant de personnels de santé spécialisés dans ce domaine. Cependant, on manque de données complètes concernant l'offre de personnels de santé en réadaptation en Arabie saoudite.

Objectifs : Déterminer les besoins et l'offre de personnels de réadaptation, et étudier la relation entre cette offre et les besoins de réadaptation en Arabie saoudite.

Méthodes : La présente étude transversale a permis de mesurer le ratio de physiothérapeutes et d'ergothérapeutes pour 10 000 habitants. Les données ont été obtenues du ministère de la Santé, tirées de l'enquête sur la santé de la famille et des données du recensement de l'Autorité générale des statistiques et de la littérature publiée. Afin d'évaluer les besoins de services de réadaptation, nous avons calculé un indice composite d'incapacité basé sur trois variables : le nombre de personnes souffrant d'incapacités physiques, celles souffrant de maladies chroniques et celles dont l'âge était supérieur ou égal à 65 ans. Les déterminants de l'offre potentielle étaient la taille de la population, le pourcentage de la population rurale et l'offre de médecins. Les données ont été analysées au moyen des statistiques descriptives et d'une régression linéaire simple.

Résultats : Les ratios de physiothérapeutes et d'ergothérapeutes travaillant dans les établissements du ministère de la Santé étaient respectivement de 0,69 et de 0,03 pour 10 000 habitants. Le ratio global de personnels de santé en réadaptation était de 0,73 pour 10 000. L'offre variait d'une région à l'autre ; elle était comprise entre 0,4 et 2,5 pour Riyad et Al Jouf, respectivement. Neuf régions dépassaient le ratio global. L'indice des besoins en réadaptation se situait entre 0,144 à Najran et 0,212 à Aseer. Aucune association significative n'a été constatée entre l'offre de personnels de réadaptation, d'une part, et les besoins et autres déterminants potentiels, d'autre part.

Conclusion : Les effectifs consacrés à la réadaptation en Arabie saoudite dépassaient les moyennes régionales et mondiales, mais se sont révélés inférieurs à la moyenne des pays à revenu élevé. La répartition des effectifs variait d'une région à l'autre du pays et n'était pas liée aux besoins. Il est important de tenir compte de la nécessité de services de réadaptation et de facteurs spécifiques au contexte lors de la détermination de la taille et de la répartition optimales des personnels de santé spécialisés en réadaptation en Arabie saoudite.

القوى العاملة الصحية المتاحة والمطلوبة في مجال إعادة التأهيل بالمملكة العربية السعودية

ريهام وصفي، فيصل العنزي، لمياء الزبيدي، منى حنين

الخلاصة

الخلفية: ان وجود عدد كاف من القوى العاملة الصحية في مجال إعادة التأهيل يعد شرطاً أساسياً لتعزيز إتاحة الرعاية التأهيلية. ومع ذلك، هناك نقص في البيانات الشاملة المتعلقة بالعاملين الصحيين المتاحين في مجال إعادة التأهيل في المملكة العربية السعودية.

الأهداف: هدفت هذه الدراسة الى تحديد المطلوب والمتاح من القوى العاملة في مجال إعادة التأهيل، ودراسة العلاقة بين القوى العاملة المتاحة في مجال إعادة التأهيل واحتياجات إعادة التأهيل في المملكة العربية السعودية.

طرق البحث: قاست هذه الدراسة المقطعية نسبتي المعالجين الطبيعيين والمعالجين المهنيين لكل 10000 نسمة. وجمعت البيانات من وزارة الصحة، ومن مسح صحة الأسرة، ومن بيانات التعداد الصادرة عن الهيئة العامة للإحصاء، ومن المؤلفات المنشورة. ولتقييم مدى الحاجة إلى خدمات إعادة التأهيل، قمنا بحساب مؤشر مركب للإعاقة بناءً على ثلاثة متغيرات: عدد الأفراد ذوي الإعاقات البدنية، والأفراد المصابين بأمراض مزمنة، والأفراد البالغة أعمارهم 65 عاماً فأكثر. أما المحددات الخاصة بالإتاحة المحتملة للقوى العاملة الصحية فكانت: حجم السكان، والنسبة المئوية لسكان الريف، والأطباء المتاحين. وقد خضعت البيانات للتحليل باستخدام الإحصاءات الوصفية والانحدار الخطي البسيط.

النتائج: بلغت نسبتي المعالجين الطبيعيين والمعالجين المهنيين العاملين في مرافق وزارة الصحة 0.69 و0.03 لكل 10000 نسمة على الترتيب. أما النسبة الإجمالية للقوى العاملة الصحية في مجال إعادة التأهيل، فبلغت 0.73 لكل 10000 نسمة. وتباينت القوى العاملة المتاحة باختلاف المناطق: من 0.4 في الرياض إلى 2.5 في الجوف. كما تجاوزت تسع مناطق النسبة الإجمالية. وتراوح مؤشر احتياجات التأهيل بين 0.144 في نجران و0.212 في عسير. ولم يُعثر على أي ارتباط ذي دلالة بين القوى العاملة المتاحة في مجال إعادة التأهيل من ناحية، وبين الاحتياجات وغيرها من المحددات المحتملة من ناحية أخرى.

الاستنتاجات: لقد وجد أن القوى العاملة المتاحة في مجال إعادة التأهيل بالمملكة العربية السعودية قد تجاوزت المتوسطين الإقليميين والعالمي، لكنها كانت أقل من المتوسط في البلدان المرتفعة الدخل. ورغم تباين توزيع القوى العاملة حسب المنطقة في أنحاء البلد فإنه لم يكن مرتبطاً بالاحتياج. ومن المهم مراعاة مدى الحاجة إلى خدمات إعادة التأهيل والعوامل الخاصة بالسياق عند تحديد الحجم والتوزيع الأمثلين للقوى العاملة الصحية في مجال إعادة التأهيل بالمملكة العربية السعودية.

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