



PHYSIOTHERAPISTS AWARENESS AND UNDERSTANDING THE RELATION BETWEEN CLIMATE CHANGE AND HEALTH

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Abstract: Major barriers to global health are posed by climate change, such as its impact on medical practice. Little is understood about the attitudes and awareness of Pakistani physiotherapists with regard to climate change and its health impacts. This research seeks to evaluate their beliefs, knowledge, and behaviors toward climate change and its health impacts. A cross-sectional design involving a structured questionnaire adapted from the body of existing literature was employed. The required sample size was calculated with OpenEpi. Data collection was carried out with the Saravana Kumar questionnaire, which was sent over social media platforms connected to Pakistani physiotherapists, professional networks, and email. Twenty-three items on health-related knowledge, attitudes, and behaviour, in addition to climate change, were included. Applying both descriptive and inferential statistics, the data were summarized and analyzed through SPSS 23. Out of the 320 registered physiotherapists who responded, 83.5% concurred that climate change has a negative effect on health. Though 90.3% of the respondents believed that climate change was already impacting the health of their patients, only 15% of them reported being "moderately knowledgeable" about its influence on health. Two of the greatest challenges to the combat against climate change were a lack of time and lack of awareness. Despite this, 78.4% of them reported that they would prefer to gain a better understanding of climate change and health as part of their continuing education and professional development, and 71.2% of them supported professional associations' campaigning efforts to tackle health issues related to climate change. Pakistani physiotherapists are aware of climate changes impact on health and support measures to reduce its effects. Strategies to address these challenges include enhancing physiotherapy education on climate-related health issues and leveraging professional organizations for advocacy and policy guidance.

Key words: Physiotherapists, climate change, health, environmental health, survey

INTRODUCTION

Significant long-term shifts in regional or global climate patterns are referred to as climate change. Predictable and occasionally recurrent atmospheric and oceanic conditions are referred to as global and regional climate patterns. Temperature, precipitation, and weather are all impacted by these changes (Susanta *et al.* 2015). A substantial change in the average weather over a long period of time is referred to as climate change (Susanta *et al.*, 2015). Human health is seriously threatened by climate change. It affects all facets of human existence, including society, the economy, and healthcare, as well as the environment and natural systems (Marinucci *et al.* 2014). Both directly and indirectly, climate change affects human health. Its effects are diverse and affect social, mental, and physical well-being. The risk of heat-related illnesses and injuries, such as heat exhaustion, heat stroke, and dehydration, increases with rising ambient temperatures (Quam *et al.* 2017). As a

result of changing environmental conditions and rising temperatures, viral infections, such as dengue fever, are on the rise. In the last 110 years, the number of vectors that carry dengue has grown by 9.5%. These worrying patterns highlight how urgently climate mitigation and flexible public health measures are needed (Carlson, 2024). Millions of people have already died as a result of climate-related causes today. The biggest worldwide chance to improve public health, though, is through initiatives to slow down climate change, which could save millions of lives annually. Furthermore, lifestyle-related mitigation strategies for climate change also have important health implications (WHO. 2021). Temperatures are rising twice as quickly worldwide, which is linked to an increase in the frequency and intensity of weather-related natural disasters. Natural gases, oil, coal, deforestation, and fossil fuels are the primary contributors to the current climate crisis. These elements have an impact on greenhouse gases

(GHGs), including nitrous oxide (N₂O), carbon dioxide (CO₂), and methane (CH₄). The "greenhouse effect" is caused by these gases trapping heat from the atmosphere (Climate and Health Alliance, 2021; Pielke, 2004). Over the past few decades, Pakistan has seen a notable increase in temperature. Since the 1960s, the average annual temperature has risen by roughly 0.5°C. The average temperature is expected to increase by an additional 1.3°C to 1.5°C by 2050 (Pielke, 2004). Climate change is becoming a more harsh reality for nations like Pakistan. Due to rising temperatures, there has been a notable rise in deaths from heat stroke, dehydration, and other causes. According to the World Bank, 1700 people lost their lives and 12,000 were injured in 2022 (Pielke, 2004). The World Bank projects that the combined risks of extreme climate-related events, environmental degradation, and air pollution will cause Pakistan's GDP to drop by at least 18 to 20% by 2050. In addition to the increased prevalence of respiratory illnesses brought on by air pollution, the increased incidence of heart conditions brought on by extreme heat and poor air quality, and the increased risk to mental health due to livelihood impacts from climate change, conflict, and migration, this will obstruct efforts to reduce poverty and advance economic development. Human activities like burning gas and fossil fuels for transportation, heating, and electricity are the main source of greenhouse gas emissions that contribute to rapid climate change (Maric and Nicholls, 2019). Globally, 4.4% of greenhouse gas emissions come from the healthcare sector (Alshehri *et al.*, 2017). Pakistan is the fifth most climate-vulnerable nation, despite making up only 0.88% of global greenhouse gas emissions. Pakistan is the fifth most climate-vulnerable nation, despite making up only around 0.88% of global greenhouse gas emissions (Pielke, 2004). In Pakistan, the spread of infectious diseases has been made worse by climate change, with chikungunya becoming a growing concern. Although this virus was initially discovered in rodents in 1983, 8,521 suspected cases were reported nationwide between 2016 and 2018, mostly in Sindh and Baluchistan (Amiri, 2021; Ghanchi, *et al.* 2021). Indirect effects of climate change include worsening air quality, altered infectious disease transmission, threats to food and water, and psychological effects. Direct effects include the increased frequency and severity of extreme weather events (such as heat waves, floods, and bushfires). About 3.6 billion people currently reside in regions that are extremely vulnerable to climate change. According to the Lancet Commission, air pollution will cause seven million deaths annually and climate change will cause over 250,000 deaths annually between 2030 and 2050. Cardiovascular and respiratory disorders are linked to air pollution (World Health Organization, 2021). This is a concerning sign of the pervasive direct and indirect effects of climate change on health (World Physiotherapy. Climate change and health 2022)

MATERIALS AND METHODS

Study design

An assessment of registered physiotherapists' knowledge, attitudes, and practices regarding climate change and its effects on physiotherapy was carried out using a cross-sectional survey. Those who were actively practicing in clinical or non-clinical settings were recruited using a convenience sampling technique. Participants had to meet the requirements for inclusion, which included being a registered physiotherapist who was at least eighteen years old and actively practicing. Participants under the age of 18 or those not actively practicing were not allowed to participate in the study.

Sample size

The sample size was calculated using Open Epi software with a confidence interval of 95 % a population proportion of 50% and an estimated population size of 320. The target population consists of registered physiotherapists currently practicing in clinical, academic, or non-clinical roles.

Data Collection procedure

Google Forms was utilized to conduct an online structured questionnaire utilized in data collection. In order to cover a large and diverse population of physiotherapists, the survey link was distributed on social media, email, and professional networks. Apart from demographic data (age, gender, years of practice, years since graduation, province of practice, and practice setting), the questionnaire also addressed issues such as knowledge and perception of climate change, perceived effects of climate change on patient health, attitudes towards whether climate change applies to physiotherapy or not, obstacles to climate-responsive care, and perceived physiotherapist roles in climate activism and readiness. In addition, respondents were questioned about their personal experiences with climate change and their level of trust in different information sources. Face and content validity were evaluated by experts in environmental health and physiotherapy to guarantee the instrument's validity and reliability. In order to improve the questionnaire's clarity and applicability, ten to fifteen physiotherapists participated in a pilot study. The study's questionnaire, "Australian physiotherapists' knowledge and views on the relationship between climate change, health, and physiotherapy," was modified from Savana Kumar's work. Relevant sections were changed to fit the local context and research goals with the proper permissions. SPSS version 2.3 was used to analyse the data. While inferential statistics, such as chi-square tests, were used to find correlations between participant responses and demographic characteristics, descriptive statistics, such as frequencies and percentages, were used to summarize the data.

Ethical approval

The present study was conducted after approval from Pakistan institute of rehabilitation and medical sciences Ethics Review Committee (ER number: PGCERC/2024-03/10).

Statistical Analysis

SPSS software version 23 was used to analyze the data. Frequencies and percentages will be taken out for all categorical values. To determine whether two categorical variables, demographic variables, and perspectives are associated, the chi-square test will be used as a test of significance. A p-value of less than 0.5 will be regarded as significant.

RESULTS

A total of 320 out of 383 registered physiotherapists (83.5%) were evaluated during the study period. Of these, 45.9% (n = 147) were women and 54.1% (n = 173) were men (Fig1). Sindh had the largest percentage of physiotherapists (57.8%; n = 185), followed by Punjab (32.2%) (n = 103), Baluchistan (5.3%) (n = 17), and Khyber-Pakhtunkhwa (4.7%) table 1).

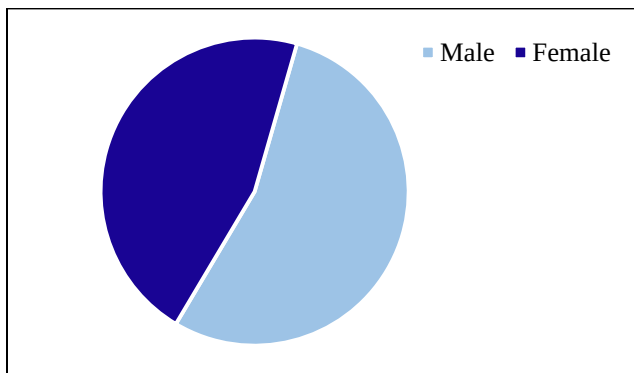


Figure 1: Frequency of PT in climate change

Current practice location (province) in Pakistan (%)	
Sindh	57.8 (185)
Punjab	32.2 (103)
Baluchistan	5.3 (17)
KPK	4.7 (15)

According to research, 48.1% of physiotherapists (153/320) believe that human activity is primarily to blame for climate change. Of them, 27.8% name humans as the main contributors and 20.3% think that human activity is solely to blame. Furthermore, 27.5% believe that both natural environmental changes and human activity are equally responsible for climate change.

On the other hand, 10% of Pakistani physiotherapists believe that natural factors are to blame for climate change, while 14% say that "natural changes in the environment" are to blame. Just 0.3% of people completely reject climate change (Table 2). It was also found that significant correlation between physiotherapy and climate change (Table 2). This implies that physiotherapists are cognisant of how climate change affects the health of their patients. They are aware of the health impacts of climate change in many parts of Pakistan, such as Khyber Pakhtunkhwa (KPK), Punjab, Sindh, and Baluchistan.

Physiotherapists' awareness of climate change and its effects on human health were found to be statistically significantly correlated by chi-square analysis. Physiotherapists in practice today are much more conscious of heat injury, vector-borne infections, and air pollution.

According to chi square statistical analysis, in next 10-20 years physiotherapists are significantly aware of air pollution, vector borne infection or heat injury ($P = 0.000$). The majority (71%) were between 25 and 35 years of age, and 58% had 1 to 5 years of professional experience. Most respondents (66%) were working in clinical settings.

A significant majority (83.5%) agreed that climate change affects human health, and 90.3% thought it was already having an impact on their patients' health. But only 15% thought they knew enough about how climate change affects health.

The biggest barriers identified were lack of knowledge (67%) and time constraints (52%). Despite this, 78.4% of participants said they would like to learn more about the relationship between climate change and health, and 71.2% supported the advocacy efforts of professional organizations. Years of experience and awareness levels were significantly correlated ($p < 0.05$), according to chi-square statistical analysis. According to gender differences, female physiotherapists felt less at ease discussing the health risks of climate change with their patients. Participants used scientific journals (53%) and WHO resources (49%) more than social media (17%).

DISCUSSION

With broad effects on the environment and human health, climate change has become a major public health concern. By evaluating Pakistani physiotherapists' awareness and understanding of the relationship between health and climate change, this study filled a major vacuum in the literature. Overall, the findings show that while physiotherapists demonstrate a basic understanding of climate change, there is still a notable deficiency in applied knowledge and readiness, especially in rural and underserved areas.

According to our survey, 48.1% of physiotherapists attributed the majority of climate change to human activity, while 83.5% of them recognized it as a continuous phenomenon. Only a small percentage of respondents felt "very knowledgeable" about the health effects of climate change, despite this awareness, underscoring the necessity of professional education and training. Our results were consistent with those of Linya Chi's 2024 study, which found that 19% of participants were present. This points to a significant and crucial knowledge gap in the field of physical therapy.

Female physiotherapists and physiotherapists in urban setups, especially Sindh and Punjab, indicated greater levels of awareness and participation. Availability of information, institutional, and exposure to climate-related health complications such as heat-related illnesses and respiratory disorders may all contribute to this gender and

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geographic inequality. Previously there was minimal information on therapist and their intervention in environmental change thus therefore which is important and necessary. Physiotherapists in Pakistan also do not have adequate information in the management of vector-borne caused by the disease such as chikungunya. Chikungunya, which is transmitted by mosquitoes, is frequently associated with joint pain and stiffness. With little awareness and resources, it is hard to offer proper care, particularly in regions with poor health care services. Interestingly, younger physiotherapists in the one- to three-year experience group were more involved in managing conditions such as heatstroke (45.3%) and air pollution (43.1%). The specialized clinical experience these professionals required to manage intricate conditions such as chikungunya, asthma, and COPD, all of which are on the increase because of environmental shifts was not available. These findings underscore the imperative need for ongoing training, especially among professionals in the early stages of their careers.

The study also identified that organizational support is essential in enabling readiness. The most trusted source of information was the World Health Organization (WHO), but local organizations such as the Pakistan Physical Therapy Association were less credible, which implies that local support and policy guidance should be reinforced. Of notable concern are the socio-economic factors such as resource limitations, poor infrastructure and low formal education and awareness messages that were always cited as challenges in climate-health responsiveness. This was best illustrated in the rural areas where healthcare unavailability exacerbates health issues of climate-related concern. Yet, regardless of the involvement, these experts still suffer from immense challenges such as the limited availability of resources and specialized training. In LMIC countries like Pakistan, where healthcare infrastructure is already under pressure due to financial limitations and infrastructural shortages, this is especially disconcerting. In such environments, physiotherapists have an important function in addressing climate change's negative health consequences by providing low-cost interventions which will ease the burden from overstressed healthcare systems. Today, respiratory complications leading to repeated episodes of asthma attacks and pneumonia are the predominant problems in all the provinces of Pakistan. These problems can be managed with physiotherapy, which is cost-effective in LMIC nations on (medicine and doctor visit) cost and improves quality of life. It is usually difficult to treat heat illnesses like heatstroke and dehydration, particularly where there are extreme temperatures and lacking good medical facilities. Overall, the findings indicated that although Pakistani physiotherapists know about climate change, this has not yet been translated into appropriate preparedness or actualization in practice. Creating a climate resilient health system entails heightening awareness throughout all regions and

segments, enhancing institutional capacity, and incorporating climate change into professional training.

	Climate change heat-related effects	Climate change vector-borne infection	Climate change injuries and illness	Climate change air pollution	Climate changes allergic sensitization
Gender					
Male	32/320	28/320	10/320	71/320	70/320
Female	115/320	35/320	28/320	68/320	40/320
X ²	82.590	50.222	55.281	8.990	43.929
P- value	0.000	0.000	0.000	0.011	0.000
Experience Years					
0	2/320	0/320	2/320	1/320	2/320
1-3	145/320	63/320	36/320	138/320	108/320
X ²	2.369	0.514	1.743	3.842	3.842
P- value	0.306	0.774	0.418	0.146	0.146
Working setting					
Outpatient	24/320	24/320	6/320	9/320	9/320
Community	1/320	1/320	2/320	2/320	3/320
Hospital	25/320	25/320	20/320	112/320	84/320
Academic	9/320	9/320	6/320	10/320	8/320
Other clinical	4/320	4/320	4/320	6/320	6/320
X ²	115.945	53.276	52.682	137.503	72.696
P- value	0.000	0.000	0.000	0.000	0.000
Current practice					
Sindh	68/320	58/320	32/320	76/320	47/320
Punjab	47/320	3/320	3/320	60/320	61/320
Baluchistan	17/320	2/320	3/320	3/320	2/320
KPK	15/320	0/320	0/320	0/320	0/320
X ²	80.592	181.933	138.961	114.105	109.106
P- value	0.000	0.000	0.000	0.000	0.000

CONCLUSIONS

The role of physiotherapists in mitigating the adverse health impacts of climate change in Pakistan is evidenced by this research. There are significant gender and geographic disparities, with urban regions leading in climate-related health efforts and female physiotherapists contributing highly in certain regions. Effective responses are, nonetheless, constrained by budgetary constraints and insufficient healthcare infrastructure, especially in rural and disadvantaged regions. Young physiotherapists are more engaged in managing new health issues, including the impact of air pollution and heat-stroke illnesses, but they often lack skills to handle conditions like asthma, COPD, pneumonia, and vector-borne diseases. It is essential to build physiotherapists' capacity by focused training, policy assistance, and resource allocation to mitigate these challenges. To reduce the impact of climate change on health and enhance healthcare outcomes in Pakistan, there will be a need to enhance training programs, health resources, and public health awareness.

LIMITATION AND RECOMMENDATIONS

It should be noted that there are several limitations to be considered when interpreting the results. The study's single focus on Pakistani physiotherapists can potentially limit representation of the opinions of the broader medical community. Most participants expressed limited familiarity with the relationship between climate change and health effects. This lack of understanding may have affected their capacity to give detailed or precise answers. The study was carried out within a scarce resources environment, below-average economic levels, and poor healthcare infrastructure, which could have limited the scope and

depth of research. The results were founded on self-reporting of awareness and knowledge, which can be prone to error or bias. The study did not contain deep insights into certain interventions or tactics applied by physiotherapists to combat climate change health problems. The activities of local organizations, like the Pakistan Physical Therapy Association were not investigated enough, and a gap existed regarding the ways in which professional associations could raise awareness and provide training. Create training programs that enable physiotherapists to manage better the health issues triggered by the climate, including respiratory diseases, vector-borne diseases, and heat-related diseases. reviews specific actions physiotherapists can take to minimize the adverse impacts of climate change on health, especially where there are few resources. Conduct research to track how physiotherapists' education, knowledge, and practice change over time, especially as the impacts of climate change intensify. Address how physiotherapists can assist with emerging health issues related to climate change, such as mental health impacts and weather-related injuries.

Conflict of interest

Authors declare no conflict of interest.

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Submitted on	15-09-2025
Revised on	30-09-2025
Accepted on	14-10-2025