CLIMATE CHANGE ASSESSMENT

I. BASIC PROJECT INFORMATION

Project Title:	Punjab Nursing and Health Workforce Reform Program
Total Project Cost ($ million)**:**	255.0
Country and location:	Pakistan
Sector:	Health; Information communication technology (ICT)
Subsector:	Health sector development and reform; ICT strategy and policy, and capacity development
Project climate risk rating:	High

Source: Asian Development Bank.

II. SUMMARY OF CLIMATE CHANGE FINANCE

	Project Finance	Climate Finance	
Source	**Amount** ($ million)	**Adaptation** ($ million)	**Mitigation** ($ million)
Asian Development Bank			
Ordinary capital resources (concessional loan)	150.0	45.19	21.23
Counterpart financing			
Government	105.0		
Total	**255.0**	**45.19**	**21.23**

Source: Asian Development Bank.

III. SUMMARY OF CLIMATE RISK SCREENING AND ADAPTATION ASSESSMENT

A. Describe the Climate Risk Faced by Project Component(s) or Climate Risk of the Wider System in Which the Project is Located

1. **Climate change and location-dependency** will require adaptation of the facilities design to ensure their continued functionality under a wider range of extreme climate conditions, reduce the impact of climate and climate change impacts on the health sector, and on the residential and learning environment of the Centers of Excellence, including the thermal comfort of rooms. This is in line with the Punjab Health Sector Strategy 2019–2028, which prioritizes the availability of skilled human resources, quality healthcare services, and improved governance; and the National Health Vision 2016–2025, which prioritizes universal access to affordable quality essential health services, and delivered through resilient and responsive health system.[1] Highlighting the need for improved nursing capacities are the increase in the overall vulnerability of the population due to more extreme weather conditions, increased food insecurity and increased risk of negative health outcomes. The increased frequency and intensity of drought, heat and flood conditions and their cascading impacts will also impact the distribution of disease vectors, with an additional expansion of the presence of vector-borne diseases already in the country, such as malaria, dengue and chikungunya, which are endemic.[2]

2. **Rising temperatures, increased frequency of drought and reduced precipitation increase negative impacts on health outcomes.** The primary cause for this vulnerability comes from insufficient technical capacity and health service capacity, as well as an inadequate, and poorly informed, healthcare system, with insufficient health monitoring systems, in particular, for climate-related risks. In mid-July 2025, for example, unusually intense monsoon rains triggered flash floods and urban flooding in northern and upper Punjab, including Rawalpindi, Lahore, Chakwal, and Jhelum. Over 100 lives were lost across the

[1] Government of the Punjab. 2019. *Punjab Growth Strategy 2023*; and Government of Pakistan. 2015. *National Health Vision 2016–2025.*

[2] WBG and ADB. 2021. *Climate Risk Country Profile: Pakistan*

province, and key services and infrastructure were temporarily disrupted. The impact of climate change on human health can present itself in the form of both direct and indirect effects. Apart from displacement and forced migration, flooding results in indirect effects on health in the form of decreased food production, malnutrition, and outbreak of infectious diseases. Water- and vector-borne diseases follow disasters, such as floods. Floods result in contamination of freshwater with the development of ponds of stagnant water giving rise to dengue, malaria and hepatitis. Heat waves generate negative health outcomes for all population segments, in particular for climate vulnerable populations (over 65, outdoor workers, very young and those with cardiovascular and pulmonary diseases). The combination of poor air quality with the increase in heat-related events is expected to significantly increase the number of deaths, particularly among the elderly and children. Changing weather patterns have also increased food insecurity and crop damage, such as those that occurred as a result of the destructive locust attack in May 2020. Individually and in combination these are expected to generate negative health outcomes, which requires the consideration and integration of climate risks into design of both the educational and residential aspects of the Centers of Excellence to enable improved nursing capacity to address these challenges.

3. **An increase in flooding and other extreme events** may limit access to facilities by impacting transportation infrastructure while increasing physical injuries and incidence of water and food-borne diseases as well as exacerbating psychosocial health issues.

4. **Extreme weather events can significantly impact health facilities** raising the likelihood of temporary or prolonged closures.

5. **Pakistan faces rates of warming far higher than the global average, with average temperatures already increasing since 1940 and future climate projections suggesting warming could exceed 4.5°C in some locations by the end of this century.** Over the 1981–2005 period, temperatures in Pakistan increased faster than the global average (0.39°C compared to the global average of 0.17°C). 34.1% of the country is classified as hyper arid, 28.8% as arid, 30.8% as semi-arid, with less than 7% classified as sub-humid or humid.[3]

6. **Historically, droughts, floods, wind-, sand-, and dust-storms, have caused significant impacts across the country.** For example, the 2022 floods, caused by heavier than usual monsoon rains and melting glaciers that followed a severe heat wave, affected 33 million people, left more than 2.1 million people homeless, injured 12,867 people, and caused 1,730 deaths (of which 647 were children).[4]

7. **Pakistan's population is highly vulnerable to climate impacts due to high poverty levels, and high dependence on agriculture,** which is highly sensitive to the changing patterns of climate in terms of time and location, as well as increased land and habitat degradation. In 2023, 36.9% of the population was considered food insecure.

8. **Nursing in Pakistan, and Punjab province in particular, remains an undervalued profession, with a majority female workforce shaped by deep-rooted social and cultural biases that hinder its recognition as a respected career choice.**[5] **Punjab province faces an acute shortage of nurses.** Pakistan's female labor force participation is among the lowest in South Asia, with only 21% of women engaged in formal employment. Societal attitudes continue to prioritize medicine and engineering over nursing, reinforcing the perception that nursing is a lesser profession. Projections show that at current nursing levels and current nursing production levels, the expected gap in nurses in Punjab province is projected to be over 400,000 nurses by 2030. Additionally, the lack of clear career progression, inadequate working conditions, low salaries, and insufficient housing for nurses discourage new entrants into the field. Limited training opportunities, weak career progression pathways, and chronic under-investment in nursing education have led to a significant shortfall, while the outmigration of experienced nurses, especially heightened during and post-COVID-19, has exacerbated the situation, with reports indicating that half of all new graduate nurses leave the country every year, exacerbated by the loss of nursing capacity, which

[3] Nazeer, A, et al. 2022. Changes in the hydro-climatic regime of the Hunza Basin in the Upper Indus under CMIP6 climate change projections. Scientific Reports, 12(1): 21442

[4] Government of Pakistan. 2022. *Pakistan Floods 2022: Post-Disaster Needs Assessment.*

[5] ADB. 2024. Concept Note: *Pakistan Punjab Nursing and Health Workforce Reform.*

occurs after major events, such as the floods of 2022.

9. **Recent evidence suggests that Asia is on a trajectory to exceed the impacts of the highest emission scenario (SSP5-8.5) by 2060**.[6] The rise in temperatures, which increases the risks of droughts and flooding. In some regions of Punjab province, this will be accompanied by an increase in annual precipitation, an increase in the frequency and intensity of extreme rain events, which will result in higher flooding and landslide risks. In some areas of the province, the rise in temperatures will be accompanied by a decrease in annual precipitation, and an increase in the frequency and intensity of droughts events.[7] The increased frequency and intensity of major climate-related hazards such as storms (sand and dust storms, windstorms, thunderstorms), droughts, and extreme heatwaves are expected to exacerbate conditions. Heatwaves are not only expected to increase, their duration is also expected to double, which will lead to an increase in mortality.[8] Sand and dust storms have doubled in frequency and intensity since 1990, and Pakistan's population is considered the most vulnerable in the world to the impacts of sand and dust storms. Sand and dust storms will worsen air quality, which already exceeds WHO guideline values for mean concentration of PM2.5 by a factor of five. The increased frequency and intensity of drought, heat and flood conditions will also impact the distribution of disease vectors, with an additional resurgence and expansion of communicable and vector-borne diseases already in the country, such as malaria, dengue and chikungunya, which are endemic to the country.

10. **Rising temperatures, increased frequency of extreme events, and an increasingly variable climate and cascading events have emerged as a significant factor affecting population vulnerability, as well as public health and healthcare delivery.** Strained healthcare systems, resources and frontline workers, especially nurses, are already facing an increasing the burden of vector-borne diseases, heat-related illnesses, psychosocial issues and natural hazard-related healthcare demands that are increasingly nullifying progress made on healthcare in recent decades. These impacts are expected to increase even further as the high prevalence of fast-onset natural hazards (e.g., floods, landslides, storms) and slow-onset events (e.g., droughts, environmental degradation and pollution) will continue to negatively affect healthcare and its provision. The challenges the nursing workforce faces in addressing these impacts requires enhanced preparedness, resilience, and adaptive skills to respond to climate-induced health crises.

B. Describe the Climate Adaptation Measures Supported by the Project

Climate adaptation measures supported by the project for Output 2: High quality facilities for nursing sector established, include:

Newly constructed inclusive, low-carbon and resource efficient, climate change and disaster resilient health infrastructure, including hostels (dormitories) and nursing schools based on the integration of a series of green and passive building measures into their design. These measures include an improved thermal environment (for example, with wall and window insulation), reduced energy and resource use (for example, with energy efficient lighting, low emissivity glass, resource efficient fittings, shade, water resource efficiency), as well as changes to physical design (such as daylighting, higher walls for improved air flow, ground source heat and cooling pumps, reflective roofs, natural ventilation, and facilities for remote consultations). Where possible and appropriate, nature-based solutions, such as tree planting and landscaping for shade and heat mitigation and edible food garden to promote healthy diets will also be integrated into the site and building design.

Source: Asian Development Bank.

[6] Tabari H. 2020. Climate change impact on flood and extreme precipitation increases with water availability. Scientific Report 10:13768.

[7] ADB. 2025. Climate and Disaster Risk and Vulnerability Assessment for Punjab Nursing and Health Workforce Reform Project, Pakistan.

[8] WBG and ADB. 2021. Climate Risk Country Profile: Pakistan.

IV. CLIMATE ADAPTATION PLANS WITHIN THE PROJECT

Adaptation Activity	Target Climate Risk	Estimated Adaptation Cost ($ million)	Adaptation Finance Justification[9]
DLI 1: At least 800 nursing professionals graduated from COE degree programs and specialized courses	All climate and environmental risks, in particular the impacts of rising temperatures and increasing frequency of extreme events, in particular floods, and poor air quality	1	Under this DLI, climate- and environmental-related health risks to enhance the knowledge and skills of nurses in anticipating, recognizing, and addressing climate- and environmental-related health issues (linked to the OneHealth framework) will be incorporated into the training methods and curriculum. The DLI will contribute to better and more effective care for conditions sensitive to and aggravated by climate and environmental change (e.g., zoonoses, heat stress and air, water quality).. Climate finance was calculated using a proportional approach and estimated as 13% of the total cost allocated to DLI 1 to cover curriculum development and training elements of the modules.
DLI 5: Three (3) climate resilient and gender-sensitive efficient COEs for nursing education constructed	All climate and environmental risks, in particular the impacts of rising temperatures and increasing frequency of extreme events, in particular floods, and poor air quality	44.19[10]	Under this DLI, newly constructed low-carbon, climate change and disaster resilient COEs will meet LEED Gold certification standards.[11] This will include adaptation measures, such as passive and active building design measures; optimization of water and energy supply systems (including daylighting, LED lighting, solarization, heat pumps, greywater recycling, low flow plumbing fixtures and rainwater harvesting); increased resource and material use efficiency, floodproofing of

[9] ADB. 2023. Guidance Note on Counting Climate Finance at ADB: An Update. July 2023.

[10] Adaptation costs are calculated as half of the annualized reductions in water, energy or material use over 20 years plus installation cost, where available: (i) floodproofing measures for ground floor and mechanical systems at $3.7 per ft^2 (ii) 10% of each COE site will have pervious pavement at a cost of $7 m^2, (iii) greywater recycling system, estimated at $300,000 per location, will reduce the wastewater treatment load, (iv) Savings due to use of low flow plumbing fixtures (30% reduction), estimated at $2.2 million per year for 20 years (based on water cost of Rs 10.4); (v) Savings due to use of rainwater harvesting system, estimated at $250,000 per year for 20 years (based on water cost of Rs 10.4).

[11] The aim is that the COEs will meet LEED Gold certification standards, with LEED Silver certification as an acceptable minimum.

Adaptation Activity	Target Climate Risk	Estimated Adaptation Cost ($ million)	Adaptation Finance Justification[9]
			ground floor and mechnical systems, improved ventilation and indoor air quality, and implementation of zero waste policies. Improved site orientation and use of nature-based solutions (such as green roofs, pervious pavments and tree planting to provide thermal comfort) are also considered. Sesimic resilience will also be included in structure design, if appropriate. The DLI will contribute to better and more effective learning environment for nursing students.

Note: There is significant overlap between adaptation and mitigation measures for the COEs
COE = Center of Excellence, DLI = disbursement-linked indicator, LED = light-emitting diode, LEED = Leadership in Energy and Environmental Design.
Source: Asian Development Bank.

V. CLIMATE MITIGATION PLANS WITHIN THE PROJECT

Mitigation Activity	Estimated GHG Emissions Reduction (tCO_2e/year)	Estimated Mitigation Cost ($ million)	Mitigation Finance Justification
DLI 5: Three (3) climate resilient and gender-sensitive COEs for nursing education constructed	2,915 tCO_2e/year [12, 13]	21.23[14]	Under this DLI, the newly constructed low-carbon and climate resilient COEs will include mitigation measures, such as improved thermal envelope measures and energy efficiency measures (see details in footnote 20). In addition to decarbonization, these measures are expected to generate operating energy efficiencies of 35% compared to an equivalent standard local building.
Overall contribution of the project toward achieving the country's climate mitigation goals and ambitions			

[12] At present, the health sector in Punjab Province does not widely use green building and energy efficiency measures. Based on a baseline for an equivalent standard local building without any energy efficiency measures (BAU) vs. a Center of Excellence with mitigation measures, the potential emission reduction estimate is the most conservative that can be estimated while achieving the minimum standard of 35% reduction in energy use, water use, and embodied carbon in materials for the limited number of decarbonization measures listed. Additional decarbonization measures are possible and may be identified by Specialized Healthcare and Medical Education Department (SHC&MED) in its final (approved) architectural design.

[13] Absolute emissions are 5,415 tCO_2e/year. Relative emissions calculated as the sum of one-time emission reductions through annualized reductions of embodied GHG emissions plus annual GHG emission reductions from reduced energy use, based on the following assumptions: (i) each Center of Excellence (COE) will have a (total) building footprint of 122,000 ft^2 and will include four buildings, (ii) Embodied emission estimates for A1–B2 life cycle stages (per ISO EN 15978:2011 and ISO 21930:2017) based on the information included in standard material and manufacturer EPD specifications for the relevant measures, and (iii) Assumed building lifetime of 50 years. The measures include: (i) low-E double glazed windows with aluminum frames (embodied emissions of 141.9 $kgCO_2eq/m^2$ per window with frame) for 19,915 ft^2, assuming a 30% wall-to-window ratio, (ii) use of energy efficient LED lighting on 1,765,650 ft^2 for 20 years (0.91 $kgCO_2eq/m^2$ in embodied emissions compared to a baseline lighting scenario (of 50 foot-candles) derived from Chartered Institution of Building Services Engineers (CIBSE) "Lighting Guide 5: Lighting for Education," (iii) an extensive or semi-intensive green roof on 10% of the roof area (36,600 ft^2) and embodied emissions of 78.71 $kgCO_2eq/m^2$ (iv) rooftop monocrystalline 300-watt solar panels (assuming 0.5% annual degradation and microinverters) on the slanted roof area (157,845 ft^2) with the potential to generate 90.7 kW per year and embodied emissions of 615 $kgCO_2e/kWp$ for 25 years, (v) rainwater harvesting system for 6.6 million gallons per year, generating emission reductions of 0.285 $kgCO_2eq$/gallon, and (vi) 22" insulated brick cavity walls (exterior) with 4.5" of cotton batt insulation and fired clay bricks (156,874 ft^2), with embodied carbon of 302.52 $kgCO2eq/m^2$ for 25 years. The combination of these measures is expected to generate minimum operating energy efficiencies of 35% per year compared to a BAU building. Annual GHG emission reductions were estimated by assuming a reduction of 35% net to BAU energy consumption (100% electrical power from the grid) based on energy consumption of 180.6 kWh/m^2/year for the college buildings (interior floor area of 53,935.87 m^2 for the three COEs) and 107.5 kWh/m^2/year for the dormitories/hostels buildings (interior floor area of 110,157.99 m^2 for the three COEs).

[14] Mitigation costs are calculated on materials or system costs, where available, excluding installation costs: (i) low-E double glazed windows with aluminum frames at $18.28 per ft^2, (ii) energy efficient LED lighting at a cost of $11 ft^2, (iii) an extensive or semi-intensive green roof on 10% of the roof area of the three COEs, at an estimated cost of $1.1 million, (iv) rooftop monocrystalline 300-watt solar panels at an estimated cost of $80 per panel; (v) Cost of three rainwater harvesting system (for both rooftop and surface water collection) for total of 6.6 million gallons per year, estimated cost of $150,000, excluding installation; (vi) 22" insulated fired clay brick cavity walls (exterior) of class A bricks with 4.5" of cotton batt insulation at an estimated cost of $40.3 per ft^2.

Mitigation Activity	Estimated GHG Emissions Reduction (tCO_2e/year)	Estimated Mitigation Cost ($ million)	Mitigation Finance Justification
The project involves financing of three newly constructed low-carbon, climate change and disaster resilient COEs, which will include mitigation measures, such as improved thermal envelope measures (e.g., passive and active building design measures) and energy efficiency measures (e.g., daylighting, LED lighting, solarization, heat pumps). With the project, the three COEs have the potential to generate 90.7 kW per year from solar energy and will reduce GHG emissions by 2,915 tCO_2e/year (see details in footnotes 19 and 20). The measures are expected to generate minimum operating energy efficiencies of 35% per year compared to a typical higher education facility. This aligns with the country's NDC, which focuses on 60% energy generated from renewable energy resources by 2030. Without the project, the same amount of power to operate the COEs can be generated through continued use of fossil fuels and existing infrastructure.			

Note: There is significant overlap between adaptation and mitigation measures for the COEs.
COE = Center of Excellence, DLI = disbursement-linked indicator, GHG = greenhouse gas, LED = light-emitting diode, NDC = Nationally Determined Contributions, tCO_2e = tons of carbon dioxide equivalent.
Source: Asian Development Bank.

VI. PARIS AGREEMENT ALIGNMENT ASSESSMENT

A. Assessment of the Alignment with the Mitigation Goals of the Paris Agreement
Does the operation support universally aligned activities?
Yes. Support for the health sector is a universally aligned activity. The education and governance components (Outputs 1 and 3) are universally aligned. Output 2 is the COEs building component. As the COEs (Output 2) are designed and planned according to green building and energy efficiency approaches they are also considered a universally aligned activity.
Does the operation support universally nonaligned activities?
No. The program provides no support to any non-aligned activities (per the universally non-aligned list). Its focus is the health and education sectors.
Is the operation inconsistent with the country's national climate mitigation policy?
No. The program directly supports Pakistan's NDC commitments by addressing emissions in the building sector. By incorporating green building and energy efficiency standards (including rooftop solar energy), the project contributes to the national goal of a 50% reduction in projected emissions by 2030. The integration of solar power makes a tangible contribution to the NDC's target of sourcing 60% of energy from renewable sources.
Is the operation inconsistent with the country's national climate mitigation long-term strategy (or equivalent)?
No. The Government of Pakistan acknowledges that enhancing energy efficiency, conserving energy, and reducing demand are effective strategies to secure a reliable energy supply. These measures support the attainment of economic development objectives, lower carbon emissions and advance national climate mitigation efforts. The program directly supports these objectives by constructing LEED-certified COEs. The program's focus on creating a resilient and skilled workforce is consistent with the national policy's vision for long-term, climate-compatible development.
Is the operation inconsistent with global sector-specific decarbonization pathways?
No. Based on an IPCC Special Report,[15] the project is with consistent global and sector-specific decarbonization pathways by integrating energy efficiency, use of sustainable materials and water conservation measures in buildings associated with the health sector.
Does the operation prevent opportunities to transition to Paris-aligned activities, or primarily support or directly depend on nonaligned activities?

[15] IPCC. 2018. *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change.*

No. The program actively supports a transition to Paris-aligned activities. The construction of new infrastructure inherently involves emissions; however, the program design mitigates this risk by requiring a minimum of LEED Silver certification for the COEs. This ensures the integration of best practices in energy efficiency, sustainable materials and water conservation from the design stage. The inclusion of solar energy systems further reduces the operational carbon footprint and avoids locking in GHG-intensive patterns.
Is the operation and/or economic activity economically unviable, when taking into account the risks of stranded assets and transition risks?
No. There is limited/negligible risk of the COEs becoming stranded assets. There is low transition risk since the COEs will be designed and constructed using green building approaches and energy efficient technologies.
Result of the assessment of the alignment with the mitigation goals of the Paris Agreement
Aligned.

COE = Center of Excellence, LEED = Leadership in Energy and Environmental Design, NDC = Nationally Determined Contributions.
Source: Asian Development Bank.

B. Assessment of the Alignment with the Adaptation and Climate Resilience Goals of the Paris Agreement
Is the operation at physical climate change risk or does it exacerbate risks in the country?
Yes. The climate risk of the project is high. Pakistan is considered highly vulnerable to climate risk and the project supports physical infrastructure or activities that could be impacted by climate change. The project's health and capacity building interventions support training of nursing professionals to deal with climate-sensitive diseases, particularly vector or waterborne diseases as well as other health related impacts such as heat stress and exacerbation of non-communicable diseases, as an integral part of the policy. The enhancements to the nursing curriculum envisioned in this program will include a focus on climate-related diseases. Details of risks faced by the project are in Section IIIA.
If yes, are appropriate and sufficient actions taken to mitigate the risk?
Yes. Appropriate actions to improve the adaptive capacity of climate change and disaster-resilient nursing education and training facilities are an integral part of the project, and appropriate actions are being integrated into their design. Details are in Section IIIB.
Is the operation not inconsistent with relevant national adaptation policies and/or strategies?
Yes. The program is consistent with the Punjab Growth Strategy 2023, the Punjab Health Sector Strategy 2019–2028, which prioritizes the availability of skilled human resources, quality healthcare services, and improved governance; and the National Health Vision 2016–2025, which prioritizes universal access to affordable quality essential health services, and delivered through resilient and responsive health system.[16]
Result of the assessment of the alignment with the adaptation and climate resilience goals of the Paris Agreement
Aligned.

C. Paris Agreement Alignment Assessment Result
Aligned.

[16] Government of the Punjab. 2019. *Punjab Growth Strategy 2023*; and Government of Pakistan. 2015. *National Health Vision 2016–2025.*