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Impacts of Extreme Weather Conditions on Daily Wage Labors: A Case Study of Karachi

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Abstract

Climate change has manifested as a primary catalyst of extreme weather patterns in Karachi. The rise in temperature has disturbed the conventional climate cycle, leading to extended periods of drought, heat waves, and erratic rainfalls. These extreme weather patterns are a direct result of wide-ranging climate unpredictability intensifying local vulnerabilities. Besides that, the expansion of cities, lack of sustainable infrastructure, and poor governance have increased the effects of extreme weather. The extreme weather conditions experienced in Karachi can be seen as a tangible outcome of the global climate crisis, experienced by locals. This study examines the impact of extreme weather conditions on daily wage labors in Karachi from 2015 to 2022. It evaluates the impacts of extreme weather conditions on the socio-economic status, personal well-being, and livelihood of daily wage labors. The study employs mixed method approach. The findings indicate that extreme weather conditions adversely affect the socio-economic status, mental health, and physical well-being of the workers. The results of the study provide experimental evidence for policymakers to develop targeted strategies and policies. The study recommends climate-resilient urban planning and promotes social and climate justice for Karachi's disadvantaged daily workers.

Keywords: Daily Wages, Heat Wave, Urban Flooding, Karachi, Pakistan.

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Introduction

Climate change has emerged as a significant driver of extreme weather patterns in Karachi. Rise in temperature has disrupted the traditional climate cycle leading to prolonged period of dry spells, heat waves and erratic rainfalls. These extreme weather patterns are direct manifestation of broader climate variability amplifying local vulnerabilities. Pakistan was one among the most affected countries by extreme weather events in 2022. (Adil et.al, 2025)

Pakistan is ranked as the eighth most climate-vulnerable country (Eckstein, Künzel, Schäfer, & Winges, 2021). Though, Pakistan contributes less than 1% to global carbon emissions, its vulnerability is projected to intensify in the future. The impacts are already evident, with country experiencing severe climate-related events such as recurring heatwaves, floods, and droughts.

Karachi is a hub for domestic commerce, industry, trade, and has a major port that facilitates domestic and international trade. Karachi covers an area of approximately 591 square kilometers (228 square miles), it is one of the most populous cities in Pakistan. (Chaudhry 2015). In Karachi, rapid urbanisation, inadequate and poor infrastructure and governance issues has multiplied the effects of climate change making city more susceptible to climate-induced extremes. The severe weather conditions experienced in Karachi can be understood as a tangible outcome of the global climate crisis translated into local realities.

The research investigates into the living conditions of workers who earn on a daily basis. Daily wage labors are individuals who work daily and receive wages throughout the day, and typically lack stable or permanent work. Their income varies depending on the nature, duration, and availability of work, making them highly uncertain and vulnerable to seasonal and economic fluctuations. (Anwar et al., 2023).

In Karachi, daily wage labors work both as skilled and unskilled workers. Mostly are migrated from other cities and are living in informal or rented housing with limited access to basic necessities and social security. Majority are illiterate and only understand the local dialect. Their daily wages normally range from 500 to 2500 Pakistani rupees (PKR) which is often inadequate to meet the basic needs of their families, supporting their socio-economic condition.

Karachi has faced frequent extreme weather conditions. Particularly urban floods and extreme heat waves. In 2020 and 2022, urban flooding caused by unpredictable monsoon rains and inadequate drainage systems, disrupted livelihoods and damaged property. It further results in exposed serious organizational shortcomings. Similarly, higher temperatures and extended heat spells in 2015 and later, stressed public health facilities, threatened vulnerable communities, and increased socio-economic hardships. Collectively, these threats exacerbate climate change and its impact even more towards urban localities, and turning weather conditions into complex crises for the Karachi.

This research aims to examine firstly, the effects of climate change in Karachi on the well-being of daily wage labors. Secondly, the effects of extreme weather phenomena on living patterns and the livelihoods of daily wage labors.

Literature Review

Climate change is a global challenge and its impact on the world is quite disproportionate. Pakistan, as a developing country, faces significant vulnerabilities vis-à-vis climate change. These vulnerabilities span from northern highlands to southern plains. Scott and Ku (2021) identified climate change impacts in a report to the UN Security Council. Their study examines the risks and

vulnerabilities associated with climate change and offers recommendations for addressing them, including adapting existing tools and guidelines, prioritizing security considerations, promoting preventative strategies, and strengthening coordination and capacity building for effective responses to climate-related challenges. Similarly, Ali et al. (2018) examine the causes of climate change, particularly greenhouse gas emissions, and analyze trends in the heat index over the past decade. Their study identifies the root causes of climate change and highlights potential social conflicts stemming from climate-related challenges in both rural and urban areas. Ashraf (2021) studied the challenges of climate change in Pakistan within the framework of global initiatives like the Paris Agreement, 2015. The study identifies the critical climate risks and advocates for the effective management strategies, awareness and practical solutions to deal with the climate crisis in Pakistan.

The impact of climate change on vulnerable population and daily workers is also studied by Birch et.al (2019). Their research includes key insights from case studies of over hundred cities including New York, Rome, Sydney, Naples etc. The findings suggest addressing urban challenges by effective planning and management. Similarly, Maitre et al. (2018) observe the impact of climate change and extreme weather events on employment, highlighting the negative impacts of rising temperatures and severe weather on labor productivity, particularly for employed workers. The study focuses on extreme weather challenges and their impact on income and labor efficiency. It also examines climate change adaptation strategies that create new employment opportunities, protect workers' livelihoods, and support the transition to a climate-resilient economy. The report also proposed policy guidance, social dialogue, and consultation based on ILO recommendations, and uses advanced tools to assess the relevance of adaptation strategies to employment. It also informs local policymakers and shares best practices and lessons learned to maximize the positive employment impacts of climate change adaptation.

Pakistan's vulnerability to climate-related natural disasters has been studied by Memon (2015). The study analyzes impacts and socio-economic challenge related to floods, droughts, heat waves and tropical cyclones, particularly, for the agricultural sector and women. It emphasizes the need for awareness, improved preparedness, and the establishment of a comprehensive disaster management framework to mitigate human and economic losses. Furthermore, the study found that temperatures are rising throughout the Pakistan, resulting in extreme weather phenomena from the northern highlands to the lower Indus River basin. Similarly, Pervaiz and Zaigum (2015) examined the impacts of extreme climate change on water demand across sectors in Pakistan. Their study evaluated climate change-related risks, country-level demand across sectors, and future demand projections. The authors examine the increasing threat of extreme weather events, such as heat waves and tropical cyclones, in the 21st century. The findings reveal that due to expected and unexpected rises in temperature, Pakistan will have water shortages in future. Climate change will make things more difficult. More water will be needed than usual for agricultural and household uses because of extreme weather.

The World Bank and Asian Development Bank's report (2021) examines the extreme climate events in Pakistan. The report focuses on the impacts of climate change on key resources such as water, coastal areas, land, and soils, as well as on critical sectors such as energy, urban development, and agriculture. It also projects future climate conditions and associated risks, such as heat waves, droughts, floods, and other natural disasters. The study recommends adapting climate urgencies into national development plans through targeted adaptation approaches, improving climate adaptation systems, early warning mechanisms, resilient infrastructure,

sustainable water and sanitation systems, and strengthening the flexibility of the agriculture and energy sectors to extreme weather conditions.

Campbell-Lendrum and Wheeler (2018) investigate the relationship between extreme weather conditions and public health. They highlight the major health impacts of climate change and the potential actions for mitigation. The study indicates health threats associated with climate change, focusing on management, governance, and capacity development within health systems. Furthermore, it recommends active involvement of the health sector in climate adaptation for the Paris Agreement, consolidating NGO participating, alongside increasing economic expansion and financial growth in climate change and health adaptation.

Keeping in mind the challenges of climate change in developing world, significant researches have been conducted on Pakistan's vulnerabilities to climate change. Parry's (2016) study investigates Pakistan's exposure to climate hazards and the restraints that bound the adaptability of organizations, groups, and administrations. This study also suggested key recommendations, such as improving climate resilience, empowering stake holders and inter organizational collaborations. It also includes emphasizing national adaptation policies, and its effective implementation.

In Karachi, urban flooding has arisen as one of the major crises, exposing the vulnerabilities of the city due to inadequate infrastructure and mismanagement. Urban flooding in Karachi is getting worse by blocked drains from encroachment and waste, inadequate drainage systems, poor urban planning, and heavy monsoon rains. It leads to clogged drains, traffic congestion, and even major damage to homes and livelihoods, converting seasonal rainfall into an urban disaster. (Ali & Zia, 2020)

A special report of the Ministry of Planning & Development assessed the post-flood requirements and responses. The study emphasizes approaches for building Pakistan more resilient towards climate change through collective, both national and international responses. The study aligns both approaches with the management's vision for recovery. (Ministry of Planning & Development: Special Initiative, 2022). The findings on economic disturbance, infrastructure damage, and recovery urgencies can be related to Karachi's urban experience.

The impacts of the 2020 floods in Karachi are also examined by Nizamani, Khan & Hussain (2020). The study revealed major destruction caused by floods to residential and commercial units, significant public infrastructure, mainly schools and roads. It discovered key challenges to urban planning, including poor drainage, solid waste management issues, illegal land grabs, and administrative lacks. The authors make specific recommendations to discourse these challenges and offer concrete solutions to improve Karachi's urban resilience and disaster preparation.

The Health Nutrition and Development Society (HANDS, 2020) investigates the impacts of 2020 urban flood. The study reveals the effects of flooding on infrastructure, health, livelihoods, and housing. It also recommends mitigating disaster impacts, administrative actions, controlling unauthorized settlements, and implementing policies to improve flood management during the monsoon.

A comprehensive assessment of the impact of the 2022 floods in Karachi, Pakistan is prepared by OCHA's Humanitarian Affairs Team. The report details the significant loss of life, widespread material damage, destruction of livelihoods, and severe damage to roads and critical infrastructure. It outlines domestic and international response efforts to address the impact of the floods on key sectors including agriculture, food security, education, health, nutrition, and protection. The report also assesses humanitarian needs for shelter, non-food items, water, sanitation, hygiene practices,

and identifies response gaps, constraints, and limitations that impact the delivery of effective humanitarian assistance (OCHA, 2022).

Similar to urban flooding, heat waves is another climate hazard for Karachi with equally devastating socio-economic and health consequences. In 2015, a heatwave killed at least 1200 people, largely aged, sick, and homeless. According to the Edhi Foundation, which operates Karachi's primary mortuary, the majority of the city's deceased were working-class residents from impoverished districts, including old and young individuals. (The Guardian, 2018). In 2018, a heatwave killed 65 people in just three days in the city. (Irfan, 2023). Heat waves have strain public health system, endanger vulnerable populations and intensify socio-economic stress. Daily labors are highly vulnerable group affected by high temperatures. Informal sector workers face significant risks from working in extreme heat, lacking cooling resources like shade and air ventelation. In Pakistan, the issues are compounded by frequent power outages and limited access to electricity, affecting around 25% of the population, many of whom live below the poverty line. (Rasool, et. al, 2024)

Kjellström et al. (2019) provides a global perspective, by analyzing heat waves as an extreme climate event and provide a global assessment of increasing heat exposure and its impacts on labor markets and worker health. The study examines high temperatures, its impact on labor productivity, the impact of urban heat islands, and the increasing vulnerability of disadvantaged workers across the region. Regional and country-level estimates for Africa, the Americas, the Arab States, Asia-Pacific, Europe, and the Central Asia are presented, along with current and projected heat levels and labor market trends. The authors also evaluate employment and labor policies to balance climate change mitigation with heat-related risk mitigation. Key recommendations include strengthening workplace adaptation measures, improving labor standards and regulatory frameworks, improving infrastructure and building standards, accelerating rural transformation, and expanding social security systems to support workers and their families.

Chaudhry et.al (2015) examine the serious health risks related to heat waves (including life-threatening illnesses such as heatstroke) and consider their broader impact on community resilience. This study emphasizes the need for quick alert systems to mitigate the impacts of heat waves and other extreme weather conditions in the future. It suggests an inclusive heat wave warning framework, including investigation, warning facilities, communication, information broadcasting, and response mechanisms. The study also offers specific recommendations for readiness and resilience against heat waves in Karachi.

Khan (2017) investigates the impacts of the 2015 heat wave and emphasizes the need for effective policies and strategies. The study features the most vulnerable populations, including the elderly, women, and children. It stresses the importance of building organizational capacity, developing strategic actions, and enhancing effective responses to mitigate the long-term impacts of extreme heat waves. Another study by Hanif. (2017) inspects the socioeconomic impacts of the heat wave of 2015 in Sindh Province. The study presents an overview of Pakistan's temperature profile and analyzes the impact of heat waves on labor productivity and public health. It reveals significant impacts of 2015 heat waves on both social and economic aspects of daily life and highlights the disproportionate impact on vulnerable groups, including workers, and addresses the broader social and economic challenges posed by the heat wave.

The multifaceted risks of climate change to Pakistan's socioeconomic development are clearly addressed by Kapoor et al. (2021). Using climate projections and spatial analyses the study identifies highly vulnerable groups, including women, children, and people with disabilities,

farmers, urban slum dwellers, and migrants. The study examines health impacts, including mortality, chronic and non-communicable diseases, vector-borne diseases, water and sanitation risks, and salinity. The implications of climate change policies, institutional capacity, and the integrity of life and health outcomes are also explained.

Research Methodology

This study adopts a mixed-methods approach, incorporating both qualitative and quantitative methods to examine the relationship between extreme climate conditions and the livelihoods of daily wage earners in Karachi. As an exploratory investigation into the impacts of climate change on daily wage labors, it aims to generate preliminary evidence to guide subsequent research. Primary data of the study were collected directly through field surveys and in-depth interviews. The survey was conducted across seven districts of Karachi, using a purposive sampling method by selecting 140 respondents. Secondary data were also collected from local and international reports on climate change and its impacts, as well as reviewed scientific journal articles. Additionally, in-depth interviews with experts were conducted to gather more detailed information on the impact of extreme weather on daily wage labors. The following professionals were interviewed:

1. Dr. Shahrukh Shahnawaz (Member, Climate Committee, Department of Climate Change, Government of Sindh, interviewed on March 12, 2025)
2. Mehmood Alam Khalid (Editor – *Ferozan*, interviewed on March 25, 2025)
3. Erum Saleem Khan (Co-Convener – Asia Pacific Greens Federation (APFG) and Co-Chairperson– Greens Pakistan, interviewed on March 26, 2025)
4. Mirza Maqsood (Paralegal Trainer, Pakistan Institute of Labour Education & Research (PILER) Karachi, interviewed on April 7, 2025)
5. Nasir Mansoor (General Secretary – National Trade Union Federation, interviewed on April 25, 2025)

Results and Discussion

Table 1: *Occupation of the Respondents*

S.No.	Occupation of the Respondents	Frequency	Percentage
1.	Construction labor	29	21%
2.	Drivers (Bus, rickshaw, bicycle rickshaw)	22	16%
3.	Greengrocer	17	12%
4.	Tailors & apparel worker	14	10%
5.	Freight worker	11	8%
6.	Bricklayer and stoneworkers	11	8%
7.	Poultry seller	6	4%
8.	Painter	4	3%
9.	Waste collector	4	3%
10.	Dockyard worker	4	3%
11.	Gardener	4	3%

12.	Others (maid, carpenter, plumber, waiter etc.)	14	11 %
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Source: *Field Survey Data, 2025*

Table 2: *Wages Earned by the Respondents*

S.No	Amount Earned (PKR)	Frequency	Percentage
1	PKR 500 to 1000	42	30%
2	PKR 1001 to 1500	67	48%
3	PKR 1501 to 2000	23	16%
4	PKR 2001 to 2500	8	6%
Total:-		140	100

Source: *Field Survey Data, 2025*

Table 3: *Migration Status of the Respondents*

S.No	Status	Frequency	Percentage
1	Natives	2	1%
2	Migrated	138	99%
Total:-		140	100

Source: *Field Survey Data, 2025*

Table 4: *Frequency of Extreme Weather Conditions Experienced by Respondents*

S.No.	Experience	Frequency	Percentage
1	Every day	30	21%
2	A few times per week	26	19%
3	Weekley	39	28%
4	Occasionally	28	20%
5	None	17	12%
Total:-		140	100

Source: *Field Survey Data, 2025*

Table 5: *Extreme Climate Conditions Experienced by Respondents*

S.No	Experience	Frequency	Percentage
1	Heat wave	84	60%
2	Urban inundation	67	48%
3	Excessive rain occurrence	44	31%
4	Prolonged dry spell	18	13%

Source: *Field Survey Data, 2025*

Table 6: *Heat-related Sickness Reported by Respondents*

S.No	Sickness	Frequency	Percentage
1	Heat exhaustion	87	62%
2	Acute heat illness (Thermal shock)	67	48%
3	Nausea	70	50%
4	Fever	46	33%
5	Hyperpigmentation and Erythematous patches	14	10%

Source: *Field Survey Data, 2025***Table 7:** *Work Disruption during Severe Weather Conditions*

S.No	Work suspension	Frequency	Percentage
1	Always	15	11%
2	Sometimes	30	21%
3	Rarely	45	32%
4	Never	50	36%
Total:-		140	100

Source: *Field Survey Data, 2025***Table 8:** *Extreme Weather Conditions and its Effects on the Daily Routine of the Respondents*

S.No	Effects	Frequency	Percentage
1	Limited work duration	48	34%
2	Impaired physical capacity	35	25%
3	Use of safety shield	28	20%
4	Reduced access to work	30	21%

Source: *Field Survey Data, 2025***Table 9:** *Economic Impacts of Extreme Climate Conditions*

S.No	Impacts	Frequency	Percentage
1	Loss of livelihood	61	44%
2	Increase healthcare cost	39	28%
3	Increase expenses due to protective measures	20	14%
4	Increase financial insecurity	20	14%

Source: *Field Survey Data, 2025*

Table 10: *Effects of Extreme Climate Conditions on Personal Life*

S.No	Effects	Frequency	Percentage
1	Increased stress & anxiety	50	36%
2	Limited or no access to clean water	44	31%
3	Increased displacement	30	21%
4	Limited access to nutritious food	17	12%

Source: *Field Survey Data, 2025*

Table 11: *Respondents Perception of Personal Well-being*

S.No	Responses	Frequency	Percentage
1	Very negative	30	21%
2	Negative	25	18%
3	Neutral	55	39%
4	Not negative	30	21%

Source: *Field Survey Data, 2025*

Table 12: *Safety Practices in Response to Severe Weather Conditions*

S.No.	Measures Adapted	Frequency	Percentage
1	Schedule rest with hydration	35	25%
2	Adjust work schedule	30	21%
3	Utilization of protective shields	35	25%
4	Refrain from physical tasks	40	29%

Source: *Field Survey Data, 2025*

Table 13: *Awareness and Support*

S.No	Awareness and Support	Frequency	Percentage
1	Experiential knowledge exchange	63	45%
2	Access to climate resilient facilities	30	21%
3	Help from NGOs	42	30%
4	Awareness & support from social media	5	4%

Source: *Field Survey Data, 2025*

Discussion

The research identifies daily wage labors in Karachi as highly vulnerable to extreme weather conditions caused by climate change. The demographic data, socio-economic status and the impact of Karachi's extreme climate conditions on daily wage labors are discussed as follows:

A. Demographic Profile of the Respondents

The occupational profile of respondents illustrates the diverse composition of the study sample. Construction laborers form the largest group, accounting for 21% of participants. Drivers follow

at 16%, while greengrocers represent 12%. Tailors and apparel workers make up 10%, and freight workers, bricklayers, and stonemasons together comprise 8%. Poulterers account for 6%, whereas painters, waste collectors, and dockyard workers each contribute 4%. The remaining 11% includes carpenters, domestic maids, and plumbers.

A significant 51% of the total respondents are in the age group of thirty- one to forty years. 28% of the total respondents are in the age group of 20 to 30 years. 21% in forty - one to fifty years. This result shows that the majority of the daily wage labors are above thirty-one years of age in the study. Out of the total respondents, a significant 96% were male and 4% were female.

The amount of money respondents earned daily is varied. A significant 48% earn daily one thousand to fifteen hundred rupees. With 30% of the daily wage labors earn wages from five hundred to one thousand rupees. Whereas, 16% earn fifteen hundred to two thousand rupees. Only 6% of respondents are those who earn two thousand to two thousand five hundred rupees, respectively. Furthermore, 43% of the labors live in urban areas of Karachi, 37% in slums, and 21% reside in rural areas of Karachi. The number of dependents on respondents also varies as 57% are those having more than five dependents in their family. Whereas, 43% of the labors have less than five dependents to support. Majority of the respondents, 94%, live in rented houses. While, 6% live in informal housing, none own the houses they live in. The results show mixed responses regarding availability of basic necessities. With a significant 93% respondents have access to electricity, for 57% water is easily available. 36% respondents have availability of gas for cooking in their homes. 32% have facility of healthcare, and only 29% respondents have access to sanitation.

The study reveals that 99% of respondents migrated to Karachi from other parts of Pakistan, and only 1% were born in the city. This demographic trend reflects the wider process of urbanization, as highlighted by Hasan, et al (2015). This trend makes densely populated areas, redesigns social arrangement, and focusses political and economic power within megacities. Karachi demonstrates these dynamics, its migrant population has expanded so substantially that it now surpasses the city's native Sindhi and Balochi communities. (Hasan, Ahmed, Raza, Sadiq-Polack, Ahmed, & Sarwar, 2015)

On the inquiry of the number of years residing in Karachi, the results reveal 34% of the respondents are residing in Karachi for five to ten years, similarly, the same percentage of respondents are residing in Karachi for ten to fifteen years. While 21% are those who have been living in Karachi for sixteen to twenty years. 4% of the respondents stated that they have been residing in Karachi for twenty-six to thirty years, and a similar percentage share that they have been residing in Karachi for thirty or more years and only 3% said they are living in Karachi for twenty-five years.

A. Experience of Extreme Weather Conditions

Climate Change is adversely affecting various sections of society in the city, with daily wage labors being particularly worst off. In Karachi extreme weather events such as urban flooding, erratic rainfall, heat wave disproportionately impacts vulnerable communities especially daily wage labors. The respondents of the study share their various experiences related to extreme weather conditions. 60% of the respondents reported that they experience heat wave, 48% urban flooding, 31% reported experiencing heavy rainfall while working. Drought and dryness have been experienced by 13 % of the respondents.

'Karachi's extreme climate conditions are causing serious health risks for workers especially daily wage labors' E. Saleem opines while discussing the plight of labors. Dehydration, skin diseases,

with other sicknesses like diarrhea and gastroenteritis are risks to worker health. In addition to physical health problems, extreme climate conditions like scorching heat, sudden heavy rainfall, and flooding in cities have serious psychological impacts, leading to stress and anxiety due to fear of income loss and difficulty in meeting basic needs. Extreme heat not only causes physical fatigue but also poses serious mental health problems for vulnerable groups. (E. Saleem, personal communication, March 26, 2025) Similarly, N. Mansoor highlights that climate change is a global issue and its adverse effects are more harmful for the disadvantage groups of the society. In Karachi, extreme weather events such as heat waves and urban flooding disproportionately impact vulnerable communities, particularly daily wage labors. (N. Mansoor, personal communication, April 25, 2025)

The inquiry into experience of any extreme climate conditions revealed diverse perception among respondents. A substantial proportion (43%) reported with increase in the frequency of heat waves. 25% responded that they experienced a change in precipitation pattern, while 18% confirmed increase in the frequency of tropical cyclones. 14% reported change in air quality.

Due to harsh weather, working hours of the labors are compromised, too. Limited hours mean less work or prolonged period to complete the task. When asked specifically about the impacts of extreme climate conditions on the daily routine of the labors, 34% responded with a reduction in working hours, 25% reported difficulty in performing physical activities, and 21% responded with limited working opportunities. 20% responds the use of protective shields.

B. Impact on Health and Well-Being

Exposure to heat can caused severe health problem for instance Diarrhea, eye and skin diseases, heat stroke, kidney injury (- Székely, Carletto, & Garami 2015) and often worsen sleep pattern causing insomnia and related issues. (Minor, et. al 2022).

The perception of daily wage labors regarding the impacts of climate change resulting in extreme weather conditions on their well-being revealed varied responses. A large group of 39% reported negative impact to some extent. Contrary to that, 21% reported very negative impacts on their well-being while, 18% responded that extreme climate conditions negatively affect their well-being. A small group of 21 % stated that they had been never impacted by the extreme weather conditions. These findings suggest that perception among daily wage labors are diverse ranging from very negative to no impact reflecting how climate change is experienced within the labors' community.

Dr Shahnawaz, opines that extreme climate conditions have adversely affected daily wage earners, particularly the health risks they encounter while working in such environments. These workers face various health issues such as heatstroke, dehydration, and other related conditions. As unemployment increases among daily wage earners, it ultimately leads to anxiety, depression, and even domestic violence because they cannot fulfil basic needs such as food. They also faced mental issues due to financial instability. He further articulates that in addition to personal and financial issues there is one more aspect — not considering worker's human beings. Their de-humanisation and lack of essential workplace facilities exacerbate their hardships. (Dr. S. Shahnawaz, personal communication, March 12, 2025)

Heat-related sickness is a major issue for labor working outdoor, 62% of the respondent's report that they experience heat exhaustion, whereas 50% are those who experience vomiting, 48% respondents reported heat stroke. 33% had fever, and 10% respond that they had skin issues such as dark and red patches with itching. Similarly, responses vary based on individuals' experiences

with the frequency of extreme weather conditions. 28% respond experiences of extreme climate conditions once a week. Whereas, 21% reported they daily encounter harsh conditions, and 20% responds rarely experience of extreme climate conditions while working. However, 18% responded indicated they experienced extreme weather several times a week. 12% never experienced extreme climate conditions while working. While sharing the effects of extreme climate conditions on personal life, 36% respondents reported increased stress and anxiety, 31% responded lack of access to clean water and sanitation. Whereas, 21% reported increase displacement. 12% responds with a decrease in food security and non- availability of nutritious food.

Mirza Maqsood works closely with labors in Karachi. Sharing insights, he revealed that depression is a common issue among daily wage earners. He also witnessed increased intolerance and domestic violence within this group. These phenomena are indication of mental health issues in the society. The situation becomes worse when daily wage workers, after a long day of striving for employment, find themselves without work and unable to provide food for their families, leading to increased violence within households. (M. Maqsood, personal communication, April 7, 2025)

C. Impact on Livelihood and Work

Extreme weather conditions erode the economic stability of daily wage labors either by causing a loss of livelihood or minimizing their opportunities to earn. Their dependence on day-to-day earning makes them vulnerable, especially during harsh weather conditions. The study reveals negative effects on the income of daily wage labors. The results show that 32% of respondents reported half or more reduction in income due to extreme weather, while 29% experienced a quarter to half reduction. Furthermore, 18% reported less than quarter reduction in income, and 21.6% reported no economic impact on their daily wages. In response to the inquiry on the economic impacts of extreme climate conditions, 44% of the respondents reported reduced income either due to lack of opportunity or loss of livelihood. 28% responds with increased expenses for healthcare. 14% responds with increased expenses due to protective equipment and safety measures, and the same percentage responds increased financial insecurity as economic impacts.

Extreme climate conditions have significantly disturbed the lives of daily wage labors. Survey results showed that 34% of respondents reported reduced working hours, 25% had difficulty engaging in physical activity, and 20% reported they had become more dependent on protective clothing and equipment. Furthermore, 21% of respondents fear that severe weather would reduce work opportunities and increase competition among daily wage labors.

An important financial issue of daily worker is highlighted by M.A Khalid. He explains that theses labors faced challenges of unavailability of work and income instability. Displacement due to human and natural disasters towards cities, particularly Karachi has resulted in population growth and increased the financial risks for the workers. The migration influx has created a competition among daily labors compelling them to accept lower wages. Whereas those who are unable to work on low wages due to pressure from family or any health-related issue faced difficulties in maintaining income stability. (M.A Khalid, personal communication, March 25, 2025).

D. Resilience Strategies: Awareness, Adaptation and Mitigation Practices

Adaptation measures or strategies mean adapting to a changing environment. An adaptation strategy is a systematic plan that aims to reduce risk by identifying and implementing appropriate approaches (Biswas & Rahman, 2023), while mitigation measures are actions taken to reduce,

prevent, or minimize the risk, damage, and adverse consequences associated with harsh climate conditions. (Cardenas & Chivata, 2024)

The study examines mitigation measures adopted by daily wage workers during extreme conditions. The findings indicate that 29% of respondents avoid strenuous activities, 25% rely on protective shields, and another 25% cope by taking breaks for rest and staying hydrated. 21% reported adjustment in their working schedule during extreme climate conditions.

Regarding the suspension of work under extreme climate conditions, 36% of respondents reported that they never stop working, 33% said they rarely and, 14% indicated they sometimes suspend work. Only 7% share that they often halt their activities. These results indicate the compulsion on workers to continue work in harsh weather condition.

Discussing the hurdles to improve adaptive measures, Khalid further explains that various cities around the world have implemented smart city initiatives with effective adaptation strategies. However, strict enforcement of environmental friendly measures has been lacking in Karachi, he suggested the need for strict laws for environmental protection. (M.A Khalid, personal communication, March 25, 2025)

The study explores adaptation strategies among daily wage labors, revealing that 21% benefit from climate-resilient infrastructure, 30% receive financial support for climate-related losses from NGOs, while only 4% report receiving community-based support against extreme climate conditions. The study also stresses the combined role of non-governmental organizations (NGOs) and the private sector in climate mitigation, particularly by promoting investments in climate resilience towards vulnerable populations.

With Regards to support and assistance at time of extreme weather conditions, the findings reveal varied sources of assistance. Almost half of the respondents (45%) informed gaining awareness through knowledge shared by others. While 30% stated acquired assistance from non-governmental organizations. In addition, 21% reported the access to climate-resilient infrastructure, and only a few numbers of respondents (4%) consider social media as a source of information and support. These results reveal that informal knowledge sharing remains the dominant mode of adaptation. While organizational support plays a secondary role, underlining the need to reinforce adaptive strategies.

N. Mansoor is quite vocal that it is the responsibility of the government, not the NGOs or the private sector, to help and support the daily wage earners in difficult situations, such as severe weather conditions. He believes that it is the government's duty to initially introduce legislation and then enact on those policies that assist daily wage earners. To deal with the environmental issues in the city, Mansoor suggest that the government should limit carbon emissions. He advocates for planting local trees in the city, enforcing strict laws against removal of green belts and implementing policies to encourage afforestation in commercial areas and residential neighborhoods. He believes that city should be planned with eco-friendly architecture, ensuring health and safety measures. (N. Mansoor, personal communication, April 25, 2025).

Conclusion

The significant threats and socio-economic vulnerabilities faced by daily wage labors during extreme weather conditions has been investigated in this study. From 2015 to 2022, climate change had a devastating impact on daily wage labors in Karachi. Beginning with the intense heat wave of 2015, subsequent extreme heat waves disrupted work patterns, caused serious health problems, and reduced incomes for daily wage labors. The key findings reveal that weather-related work

disruptions worsened the socio-economic condition of the daily wage earners and increased financial insecurity, while reduced working hours reduced income, increased stress, and anxiety among the workers. Low wages, rented housing, lack of social security, and lack of access to basic amenities further intensify hardships. Thus, the extreme climate conditions during this period significantly impacted the health, livelihoods, and financial stability of the daily wage labors of Karachi.

Recommendations

The study proposes comprehensive recommendations to improve the well-being and socio-economic conditions of Karachi's daily wage labors, who are vulnerable to extreme weather.

- At the individual level, labors should take precautions, including drinking lots of water, wearing suitable clothing and avoiding unsafe areas during floods in the city.
- Employers must provide basic services such as flexible working hours, a safe and comfortable working environment, clean drinking water, food and protection from intense heat.
- From an institutional and policy perspective, the government and private sector should construct relief centers, strictly administer labor and safety laws, and launch emergency financial assistance programs for daily labors during extreme climate conditions.
- Daily labors must register with social security and welfare organizations, including national databases, to receive legal protection, medical services, and income support. Special attention should be given to unregistered, migrant, and home-based workers through necessary cooperative agreements and awareness-raising activities.
- The study recommends to encourage community participation, public awareness campaigns, and early warning systems based on reliable climate information. Long-term resilience includes investing in climate-resilient infrastructure, such as improved drainage systems, green spaces, eco-friendly homes, smart cities, and water resource management solutions, to combat flooding and rising temperatures.
- Lastly, effective collaboration between government agencies, NGOs, the private sector, experts, and local communities is recommended as it is essential to develop and implement climate resilience and labor protection strategies.

Conflict of interest

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