



Heatwave Impact and Coping Strategies in Public Schools of Madhesh Province - A Perception Study

Report Summary


Background

Heatwaves have emerged as an increasingly prominent hazard. Climate projections indicate a future with more frequent warm days and prolonged hot spells, disrupting learning for millions of children worldwide. This trend is evident in Nepal, particularly in Madhesh Province, which is highly susceptible to heatwaves. However, limited data on this hazard's effects in Nepal make planned interventions challenging. Consequently, responses in Madhesh Province are largely based on past experiences. School closures and schedule adjustments serve as primary system-wide adaptation measures. Public schools, in particular, struggle to ensure students' physical, mental, and academic well-being amid this climate extreme due to limited resources. This study addresses this gap by examining the impact of heatwaves on children's education in Madhesh Province.

This study a) investigates how extreme heat disrupts school operations and education delivery, b) identifies specific vulnerability indicators of public schools to heatwaves, and c) assesses the existing adaptive practices in public schools for managing heatwave risks.

To achieve these objectives, a mixed-methods approach was adopted for data collection. Multistage random sampling was conducted, first by sampling the total number of public schools in Madhesh Province (3,466) using a 95% confidence interval and a 5% margin of error, and second, by applying proportionate sampling across districts with high and low hazard status. This yielded a sample of 347 public schools across 79 municipalities. Data were collected using semi-structured interviews and Focus Group Discussions (FGDs) just before the onset of summer in 2025, from February 7 to February 28. The questionnaire was divided into five thematic areas for detailed analysis. Representatives from the School Management Committee (SMC) were selected for interviews, while FGDs included teachers, parents, and gender-disaggregated student groups across all districts.

A validation workshop was conducted after collecting initial findings, involving representatives from the Office of the Chief Minister and the Council of Ministers, the Provincial Planning Commission (PPC), the Education Development Directorate (EDD), municipal education officers, and intergovernmental agencies, including the United Nations (UN). Feedback from the workshop was incorporated into the report to ensure contextual relevance, alignment with policy priorities, and reflection of multi-stakeholder perspectives for enhanced credibility and usability.

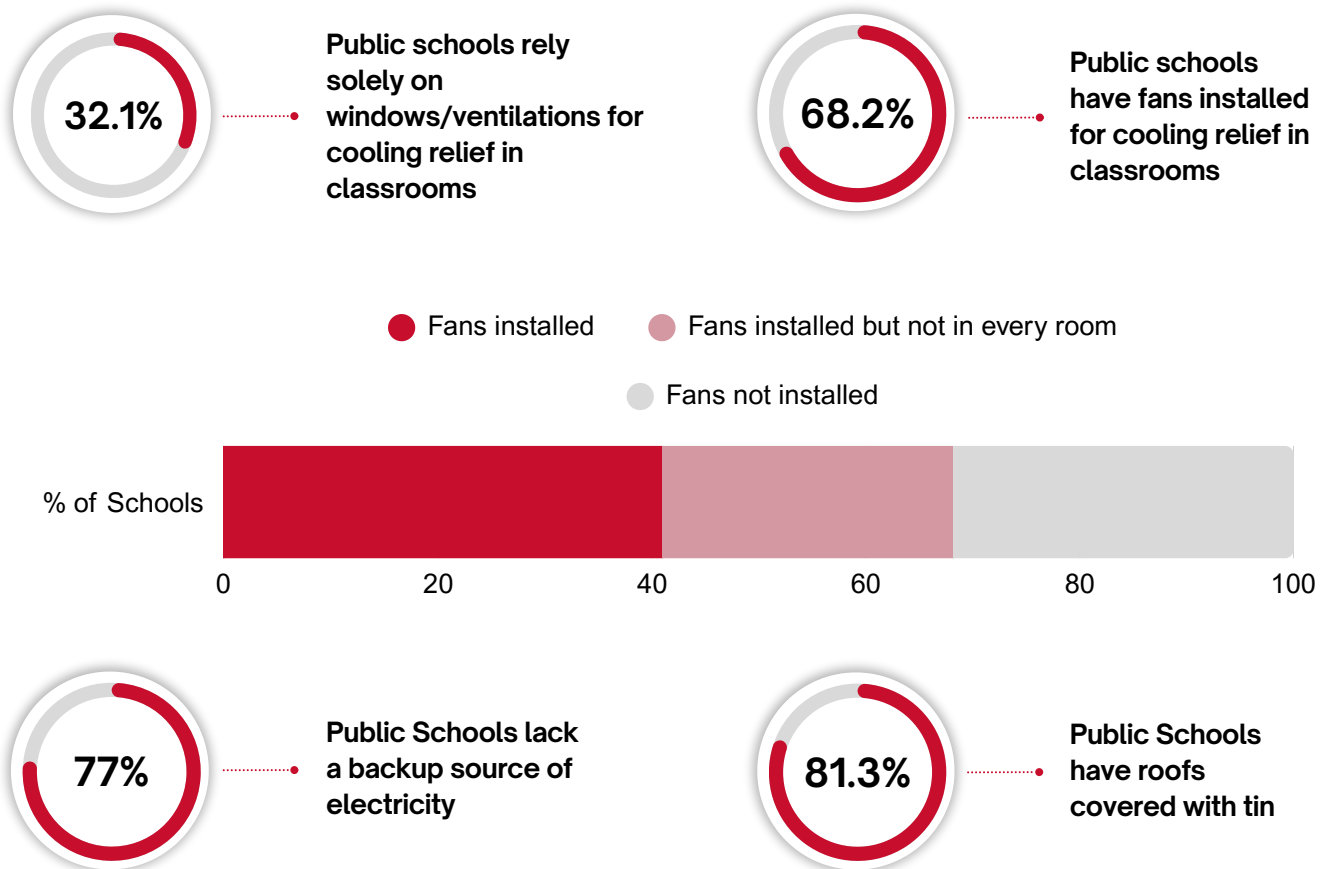


Key Findings

The study identifies six major criteria that disrupt the health and day-to-day learning experience of children. The criteria are listed below:

- Schools without a disaster management plan/ with no mention of heatwave in a disaster management plan
- Schools that have roofing made of tin
- Schools without adequate natural shade
- Schools with no in-house health center/ without sufficient clinical resources
- Schools where no training has been provided to students/staff to identify and deal with heat illnesses and emergencies
- Schools that can bear less than 25% of financial burden to implement heat-adaptive practices

Physical Infrastructure



These conditions reportedly have implications on the health of teachers and students, and the willingness to learn in a classroom environment. Tin-roofed buildings trigger discomfort by radiating heat into the classroom, which adds to the already exhausted students that arrive by traveling an average of 4 kms under the sweltering sun. Access to a limited number of drinking water sources adds to the burning sensation.

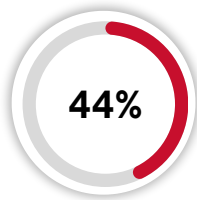
Health and Well-being



Public schools report having to deal with a heat-related health illness in the last 5 years



Public schools do not have an in-house health post or nursing station



Public schools do not have hydration breaks scheduled in their school routine

Most prevalent heat-related illnesses reported:

- Heat exhaustion
- Heatstroke
- Headache
- Eye burn
- Stomach issues

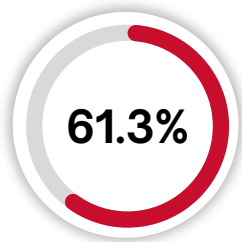
Primary school children reportedly suffer more from such heat-induced illnesses. Additionally, it was agreed my most that children with existing chronic health conditions, particularly epilepsy, find it harder than the rest to cope with the health effects. Mental health impacts were reported as well but it was mostly linked with physical health symptoms like headaches and heat stroke rather than psychological distress. While some measures were adopted to minimize adverse health outcomes, the measures seem inadequate.

Education

Average number of days schools remained closed during heatwaves: **10.87**

Average number of days boys missed classes during hot episodes: **25.02**

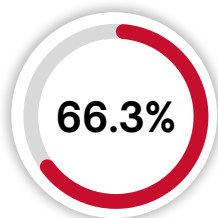
Average number of days girls missed classes during hot episodes: **28.71**



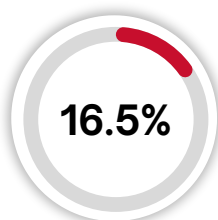
Public schools report a decrease in classroom engagements/learning during prolonged hot periods

Increase in absenteeism beyond the days of school closure has been linked with concerns from parents about the outdoor temperature, as they considered it unsafe to send their children to school. Additionally, the difference in the number of girls' and boys' absenteeism has been tied with societal norms that prioritize male education during crisis situations. Morning classes were adopted by 62.8% of schools to adapt to extreme heat, but even then, it was reported that the number of schooling hours decreased, and education was severely disrupted due to the discomfort caused by outdoor temperature.

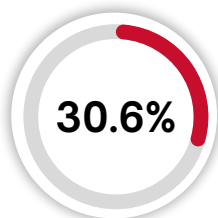
Environment and Surroundings



Public schools lack adequate natural shading within school premises



Public schools were located near water bodies



Respondents do not consider the school uniform to be weather adaptive

Even under cases where vegetation was present within school premises, it was reported that they were not dense enough to provide cooling relief. Respondents rendered water bodies ineffective for heat relief as no cooling effect was felt whatsoever. Rather, it was mentioned that some of these water sources dry up during the summer season. Moreover, 13% of public schools had given students and staff the liberty to choose their own clothing, showing better consideration for the local temperature, but in the remaining schools, that does not appear to be the case.

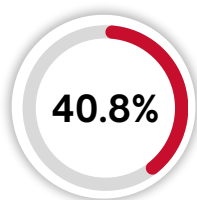
Resources and Adaptive Capacity



Public schools can cover less than 25% of the expense needed to implement heat-adaptive response measures



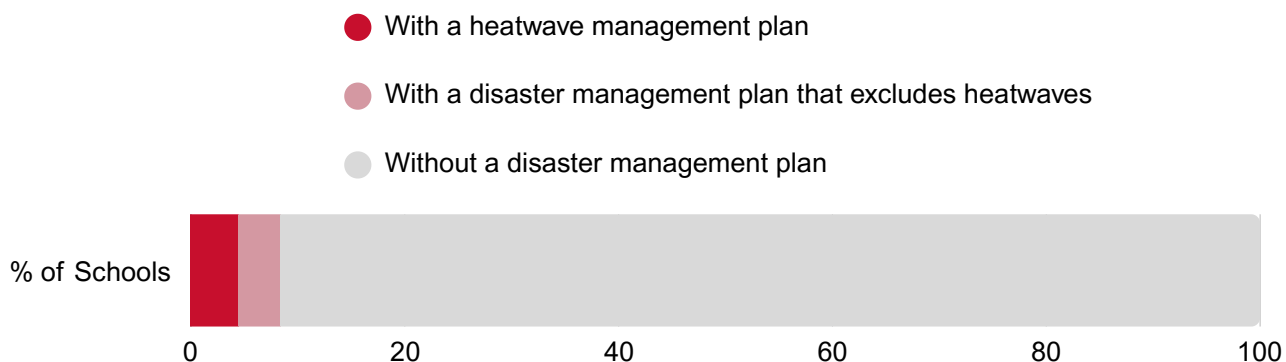
Public schools have no protocols in place to address extreme heat emergencies



Public schools have not prepared students to recognize, and respond to heat-related illnesses



Teachers are not trained to manage heat-related emergencies



Most public schools report communicating with local municipalities—both verbally and in writing—to implement heat preparedness measures yet no substantive action can be seen. School officials, parent groups, and children express a strong interest in receiving training to better prepare for and respond to heat wave emergencies.

Conclusion

Extreme heat severely disrupts school operations and education delivery in Madhesh Province. 58% of public schools and their students are highly vulnerable to its effects. While some adaptive measures to address health, academic, and operational challenges have been initiated, these stopgap solutions remain woefully inadequate to combat the escalating frequency and intensity of heat waves - both now and in the projected future.

Recommendations

Provincial Level

Research Initiatives for Data-Driven Planning

- Heat resilient infrastructure - Conduct research comparing indoor temperatures in the presence of various construction designs, materials, building ages, and locations. Integrate these findings into thermal model simulations under current and future climate scenarios to identify optimal infrastructure designs and cost-effective retrofit priorities.
- School schedule analysis - Evaluate learning outcomes, attendance rates, and teacher and student satisfaction to assess the feasibility of morning classes and inform better schedule adjustments.

Enhancing Medical Access

- Reinforce existing policies - Mainstream the “One School, One Nurse” program, with the Social Development Ministry leading the effort, building on the successful model established in Bagmati Province in 2018/2019.
- Develop emergency protocols - Establish frameworks for immediate emergency responses, including training school staff to manage heat-related emergencies effectively.

Strengthening Risk Communication

- Effectiveness – Local communities often struggle to interpret the temperature-based heat hazard categorizations issued by the DHM. The MoFE and MoIACL should support translating these categorizations into local languages and presenting them in user-friendly formats for the public.
- Accessibility - Disseminate short, clear warning messages in local languages through widely used media platforms to improve early warning outreach. As noted during discussions, many people currently receive early warnings via government agencies’ Facebook pages, making this an effective channel for targeted communication.

Provisions for Improving School Infrastructure

- Revise model school guidelines – Insert floor-area specifications based on building design codes to ensure classrooms are not congested and meet minimum bench-seating space requirements. Additionally, the term “disaster resilient infrastructure” should encompass multi-hazard considerations, including heatwaves, to enhance school adaptability to emerging threats.
- Budget allocation for school infrastructure - Prioritize context-specific retrofitting of school infrastructure, such as upgrading water, sanitation, and hygiene (WASH) facilities and implementing multi-hazard resilient reconstruction, through conditional grants under federal guidelines and special grants via provincial proposal systems.

Policy Inclusion

- Mainstream heatwaves in sectoral policies - Update education sector plans, policies, and frameworks to include heatwave preparedness and response measures. Issue clear directives to integrate heatwave risks into local disaster management frameworks, such as the Local Disaster and Climate Resilience Framework (LDCRF), DRR Strategic Action Plan and the Disaster Preparedness and Resilience Plan, ensuring alignment with local contexts.
- Mobilize data on heatwaves - Establish a centralized platform for heatwave-related data, as it is currently lacking. The MoIACL should ensure that data on heatwave-related losses, incidents, and research is easily accessible. The Bipad Portal can be leveraged to report critical data for informed planning, or a less technical platform can be developed to support timely decision-making for heatwave risks.

Municipal Level

Ensuring Safe School Commutes

- Short-term relief - Install shade structures made of local materials, such as bamboo or cloth canopies, at rest points or key sections of school routes. Distribute umbrellas or wide-brimmed hats to students in the most vulnerable schools.
- Long-term strategy – Develop vegetated pedestrian pathways along community routes to enable safer school commutes. This intervention would also provide community-level relief. Municipalities should ensure saplings are monitored during their initial growth years through community ownership, complemented by buried mesh fencing and regular clearing of grasses and shrubs to prevent snake bites, a major concern in Madhesh.

Establishing Shades Spaces

- Artificial shading – Provide temporary shade solutions, such as canvas canopies, to the most vulnerable schools for immediate cooling relief.
- Natural shading – Direct municipality funds toward creating naturally shaded areas that offer thermal comfort for students and the broader community. Develop patches of parks near public schools and rest stops (chautaras) equipped with clean drinking water to serve as respite areas and learning hubs during extreme heat periods.

Awareness of Heatwaves


- Training - Leverage support from development partners to organize knowledge-sharing and training sessions on heatwave threats and prevention strategies for public schools. Health teachers, as implemented in some institutions in Madhesh, can serve as key points of contact for sustaining the learnings from such trainings.
- Curriculum improvements - Revise the school curriculum to better integrate content on heatwave preparedness and response. Instruct schools to distribute reader-friendly heat action cards tailored to students' educational levels to ensure accessible, age-appropriate information.

School/Community Level

Sharing Responsibilities with Parents

- Risk prevention: Relay the municipality-led heatwave prevention training with parents and guardians and clearly explain the measures the school plans to take. Such an approach would enable multiplicative effects in training investments and also yield long-term social returns on investment.
- Schedule Readjustments: Take a participatory approach in creating student-centric learning schedules. Morning classes, for example, raise concerns about students arriving without having eaten, so it's important to discuss such topics openly. To make up for reduced learning time in morning-only schedules, explore the possibility of offering remedial classes in the evenings.

Safety-first Approach

- Develop a School Safety Plan: Introduce an effective disaster management strategy anchored in the CSS (Comprehensive School Safety) Framework to ensure safer learning environments, sustain educational continuity, and mitigate localized disaster risks. Tailor those guidelines to primary and secondary level students, considering their level of vulnerabilities. Development partners and NGOs can step in for technical support in this regard.
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- Keeping cool: Encourage students to wear light and white-colored clothing during hot periods, with more relaxed rules on school uniforms to better accommodate local temperatures. Additionally, arrange hydration breaks at least once every two learning sessions to ensure that children stay well-hydrated and are better prepared to cope with periods of extreme heat.

Upgrading School Facilities

- Grey Infrastructures: Target interventions that commensurate with school's financial capacities based on spatial variability of surface temperature and outdoor thermal discomfort. As an immediate relief measure, prioritize expansion of drinking water stations. Follow this by retrofitting the school infrastructure – such as installing false ceilings, applying reflective white paint, or developing green roofs. Frequently quality assure the adopted measures for effectiveness and sustainability.
- Green Infrastructures: Repurpose underutilized schoolyards as vegetated spaces. Introduce vertical greening systems on building facades to enhance urban greenery, improving microclimatic conditions through evapotranspiration and airflow regulation. Native plant species like *Bauhinia vahlii* (Bhorla) and *Coccinia grandis* (Ban Kakri) are recommended. Furthermore, promote plantation activities during special school occasions such as birthdays and anniversaries, accompanied by safety measures to mitigate potential risks of snake bites.

Development Partners

Policy Sensitization

- Develop concise, accessible technical briefs on heat adaptation and mitigation measures for dissemination to the Provincial Planning Commission (PPC) and municipal bodies. This will support the integration of relevant actions into provincial and municipal development plans. Local-level sensitization on heatwaves is critical to raise awareness among governing bodies about the hazard's severity, particularly its disproportionate impact on vulnerable populations like children, who face heightened risks due to school infrastructural limitations.

Evidence Generation

- Encourage think tanks, research agencies, and partner organizations to lead coordinated research efforts with the EDD and MoIACL to generate evidence for effective program and policy planning. Establish a provincial-level extreme heat standard for Madhesh to guide schools in implementing rapid adaptation measures. Define clear guidelines for data availability and dissemination. Once established, encourage the use of wet bulb temperature as a practical indicator for schools to identify critical heat thresholds, enabling efficient warning messaging with minimal resource requirements.