



EXTERNAL STAKEHOLDER REPORT

Climate-Resilient Schools in Uttarakhand

Strategic Program and Evidence Report

Protecting children from the impact of climate change to building climate resilient ecosystems in climate vulnerable geographies.

FOREWORD

A MESSAGE TO PARTNERS, POLICY MAKERS, DONORS, AND PUBLIC-HEALTH STAKEHOLDERS

Across climate-vulnerable geographies, the case for resilient school systems has never been more urgent. Schools sit at the intersection of child health, learning continuity, community confidence, and public infrastructure. When climate stress disrupts water access, sanitation, and hygiene conditions, the impact is immediate and deeply unequal for children. That is why the Climate-Resilient Schools initiative in Uttarakhand matters: it demonstrates that practical, school-centered action can help protect children from climate-linked health risks while strengthening the conditions for learning and wellbeing.

This report has been prepared for external stakeholders who are shaping the future of resilient development—government partners, civil-society leaders, funders, health institutions, and implementation collaborators. It brings together strategic program design and independent evidence to show what can be achieved when infrastructure, behavior change, and community partnership are addressed as one integrated agenda. The 3C framework—Campus, Curriculum, and Collaboration / Community—offers a practical model for moving from isolated interventions to systemic resilience.

Climate-resilient schools are more than safer buildings; they are front-line systems for protecting child health, reinforcing dignity, and sustaining educational opportunity in a changing environment

The independent evaluation highlighted in these pages adds important credibility to that proposition. It shows that resilient school environments can support stronger hygiene behavior, improve access to safe drinking water, and contribute to better child health outcomes. Just as importantly, it reinforces a broader principle: when schools are strengthened, the benefits extend beyond the classroom through households, communities, and local service systems.



At Reckitt, we believe healthier communities are built through everyday actions and behaviors. As environmental challenges increasingly impact health, access to water and the wellbeing of future generations, it is important to equip children with the knowledge and habits needed to navigate these realities. Through Dettol Banega Swasth India, our vision is to create lasting positive impact in communities, and the Dettol Climate Resilient Schools initiative is a strong example of this approach. The findings from AIIMS Rishikesh demonstrate how simple, consistent interventions can improve health outcomes while encouraging more responsible use of natural resources. This reflects our commitment to delivering Better Health in More Hands, Every Day.

Prof. Ravi Bhatnagar

Communications and Corporate Affairs Director
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WHY THIS REPORT?

It brings together strategic design, independent evidence, and scale-up implications in a format tailored for external decision-makers.

Front Matter

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Executive Summary

The convergence of climate change and pediatric public health presents an unprecedented, systemic challenge. Children are physiologically, immunologically, and socially more vulnerable to ecological shocks than adults. Globally, over **920 million** children are highly exposed to acute water scarcity, and **820 million** are subjected to recurring, high-intensity heatwaves. Within the precarious Himalayan ecosystem of Uttarakhand, the global crisis of climate change impact on community at large, particularly children is an immediate regional reality. Acknowledging that the education sector must be urgently positioned as a critical site for climate-proofing, the Dettol Climate Resilient Schools initiative was deployed in the highly vulnerable state of Uttarakhand.

The initiative operationalized the **3C Framework—Campus, Curriculum, and Collaboration/Community**—to directly address the intersection of environmental stress, hygiene behavior, and child health. To rigorously validate this model and bridge a global evidence gap regarding climate and hand hygiene, an independent, quasi-experimental impact evaluation was conducted over six months by the All India Institute of Medical Sciences (AIIMS) Rishikesh, tracking 412 students across Uttarkashi, Rudrapur, and Chamoli districts.

The results provide compelling proof of concept. Infrastructural and behavioral interventions in schools can successfully interrupt the transmission pathways of climate-sensitive diseases. Intervention schools dramatically outperformed non-interventional/control schools showcasing the protective power of combining physical structural upgrades with behavioral change communication.

The impact evidence demonstrates that structured school environments can function as "protective micro-environments" or physical shields. By actively redesigning school ecosystems, we can interrupt pathogen transmission pathways, improve water safety, enhance nutrition, and foster long-term behavioral resilience.

18.3%

Hand Hygiene
Compliance (vs 5.3% control)

71.4%

Hygiene
Knowledge Recall
(vs 30.6% control)

75%

Safe Drinking Water Access
(vs 36.4% control)

76.4%

Normal Height-for-Age
(vs 63.2% control)

Zero

Confirmed Waterborne Diseases

Key Takeaways

- **Infrastructure Protects Health:** Upgrading campus WASH (Water, Sanitation, and Hygiene) hardware ensures schools can withstand localized climate shocks, preventing hygiene breakdowns.
- **Education Drives Behavioral Immunity:** Embedding practical climate and hygiene science into the curriculum creates an immediate, lasting defense against pathogenic risks.
- **Schools Anchor Community Resilience:** Through documented "reverse learning," students bring climate-adaptive behaviors home, turning schools into powerful, self-sustaining hubs for regional public health protection.



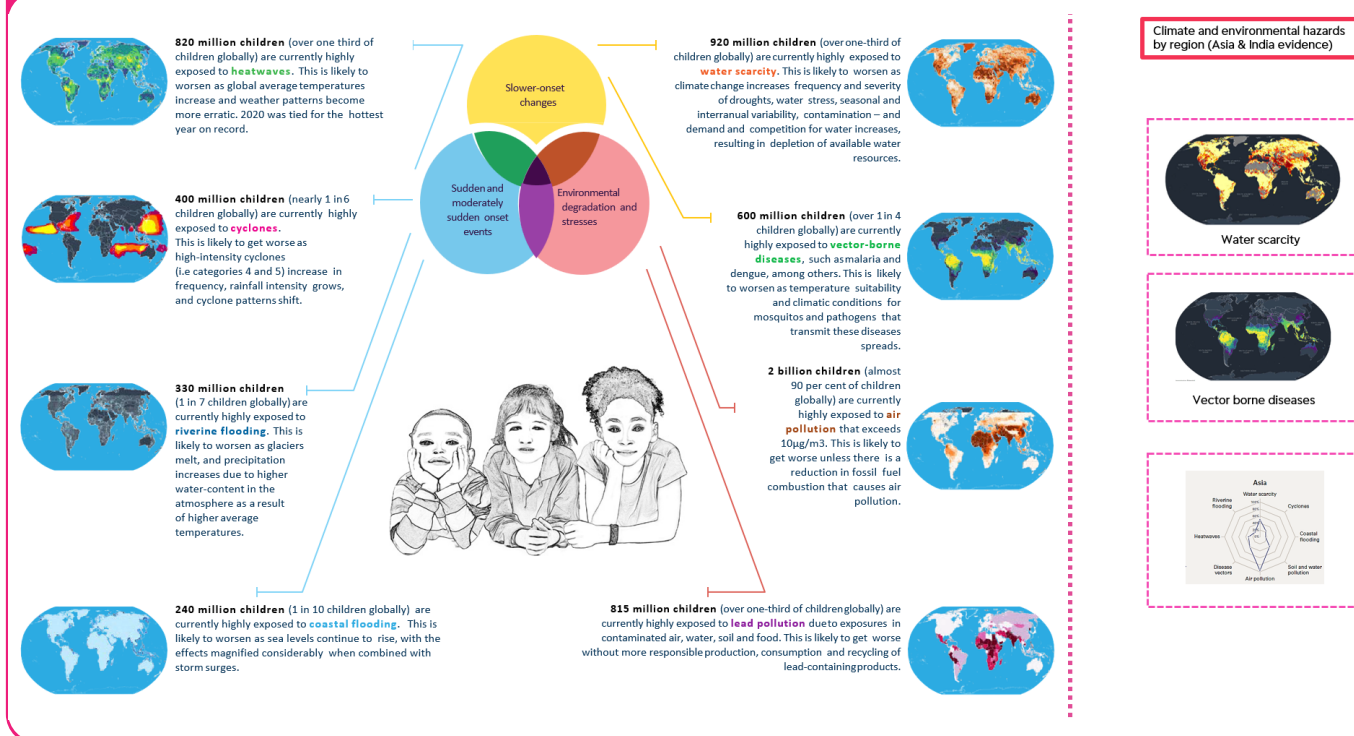
Section 1: The Global Pediatric Climate Change & Health Imperative

Climate change and environmental degradation pose an immediate, systemic threat to child development. To accurately frame localized interventions, we must first establish the immense scale of global environmental stress bearing down on the upcoming generation.

Large-scale metadata establishes a stark macro baseline for the physical, environmental, and pathological pressures currently impacting children worldwide:

- **920 Million** children are highly exposed to acute water scarcity.
- **820 Million** children are subjected to recurring, high-intensity heatwaves.
- **2 Billion** children routinely breathe unsafe levels of ambient air pollution.

Global & Regional (India) Evidence—Children's Exposure to Climate, Environmental Hazards, Shocks, and Stresses



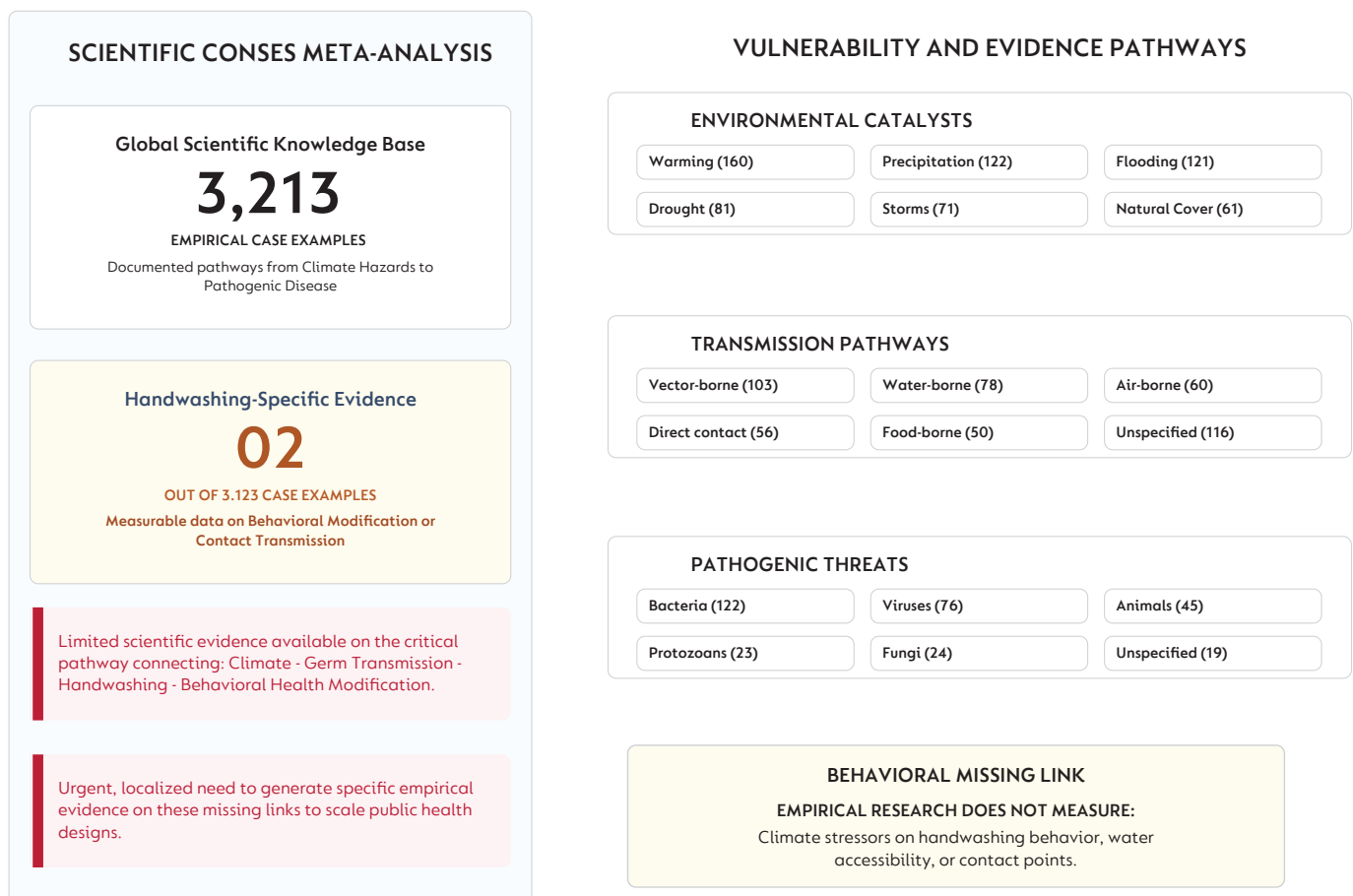
Furthermore, macro epidemiological statistics demonstrate that climate change is a primary driver of modern pathogenic risk. Out of all documented human pathogenic diseases known to science, a staggering **78% are explicitly aggravated by climate hazards**. When cross-referenced against official registries, **58% (218 out of 375)** of all recorded human infectious diseases globally have been actively aggravated by at least one major climate hazard. Over half of the global infectious disease burden is directly responsive to environmental volatility.

Section 2: Evidence Gap in Climate Change, Hygiene & Health Research Pathways

While the global parameters are stark, regional data for Asia and India points to a much more complex operational challenge. In these geographies, environmental hazards rarely occur in isolation. Instead, high population density, rapid urbanization, and distinct ecosystem fragilities create a compounding "risk cocktail."

For children in this landscape, the overlap of severe atmospheric pollution, chronic water scarcity, and climate-driven disease vectors creates a multiplier effect on poverty and systemic vulnerability.

MAPPING THE DISCONNECT: EVIDENCE GAPS IN CLIMATE-HEALTH PATHWAYS



Despite this reality, a profound paradox exists within current public health literature. A meta-analysis reveals a massive disconnect: out of 3,213 empirical case examples demonstrating how climate hazards explicitly implicate pathogenic disease, only a negligible subset (2 out of 3,213) provide specific data points on how these pathways intersect with handwashing behavior and germ transmission.

Current research effectively bridges the gap between major climate hazards and disease-vector pathways, but it fails to map the behavioral changes—how climate change impacts actual hygiene practices at the institutional and community level.

Section 3: Uttarakhand as the Proving Ground

To build effective, scalable solutions against this climate crisis, interventions must be tested in high-vulnerability environments. Uttarakhand provides a profoundly challenging proving ground. Nestled in the fragile Himalayan ecosystem, the state is subject to intense, localized environmental stresses.

Flash floods, severe landslides, and seasonal water scarcity are recurring threats. In this environment, an unfortified institution is entirely at the mercy of the weather. By focusing the intervention on the high-altitude districts of Uttarkashi, Rudraprayag, and Chamoli, the initiative tested resilience frameworks against some of the most rigorous environmental realities in the nation.

CASCADING RISK PATHWAYS IN FRAGILE MOUNTAIN ECOSYSTEMS

STAGE 01

Environmental Shock Event

Extreme climate hazard (e.g., cloudburst, intense precipitation, or landslide) hits a fragile mountain terrain.

STAGE 02

Physical Infrastructure Disruption

Fragile, exposed school-level WASH installations sustain severe damage or become entirely choked by debris.

STAGE 03

Pathogen Exposure & Proximity

Water supplies are compromised; pathogen virulence increases, bringing contamination closer to children while hygiene behaviors break down.

STAGE 04

Compounded Clinical Outcome

Child immunity is compromised, triggering severe morbidity spikes (diarrhea, cholera), skyrocketing student absenteeism, and driving long-term stunting.

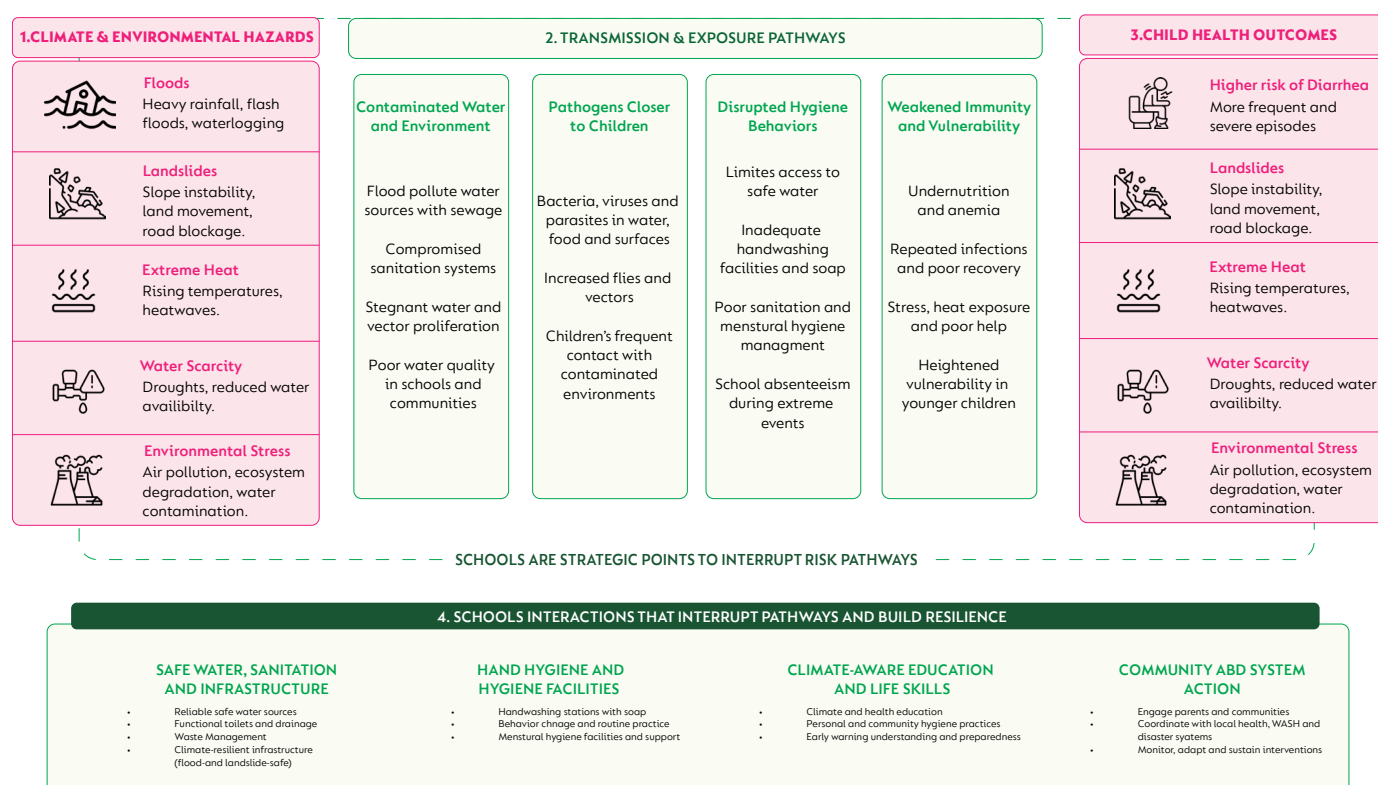
The logic of the underlying problem is straightforward yet devastating. Environmental shocks damage existing, often fragile, mountain WASH infrastructure. This physical damage leads directly to contaminated water sources and overwhelmed sanitation systems. Concurrently, the lack of functional WASH facilities completely disrupts baseline hygiene and sanitation behaviors, rendering children highly susceptible to rapid infection, driving up school absenteeism, and culminating in long-term developmental stunting.

Section 4: Why Schools Must Function as Public Health Infrastructure

Historically, schools have been viewed almost exclusively through an educational lens. However, the escalating frequency of environmental shocks necessitates a complete paradigm shift: **schools must be recognized and fortified as critical components of public health infrastructure.**

Children spend their most formative, physically developmental hours within these walls. If a school's WASH infrastructure cannot withstand a localized climate shock, the resultant breakdown in safe hygiene practices guarantees a sharp spike in preventable morbidities.

As per UNICEF CCRI 2021*, educational investments can reduce climate risk for around **275 million children**. This makes schools one of the most practical places to protect child health early and consistently.



To effectively safeguard children, interventions must shift away from traditional, siloed responses. They must be highly integrated—linking public health systems, educational frameworks, and climate-resilient institutional infrastructure into a single, cohesive line of defense.

Section 5: Reckitt's Strategic Role and Value Proposition

Recognizing this systemic gap, Reckitt, through its Dettol Banega Swasth India initiative, stepped forward to directly address the intersection of climate change, hygiene, and child health. Reckitt's strategic role is not merely as a funder, but as an architect of a highly integrated, evidence-backed public health solution.

Reckitt's differentiated value proposition lies in the fundamental understanding that building a robust water tank is futile if the community lacks the knowledge to maintain it; conversely, teaching handwashing is completely ineffective if the taps are perpetually dry due to climate-induced water scarcity. The wider child-impact framing shows that climate stress can interrupt nutrition, early childhood services, daily hygiene, and emotional wellbeing at home. If a school can protect routines, reinforce safe habits, and stay functional during disruption, it becomes a stabilizing space for children beyond the school day.

MACRO CLIMATE RISKS VS REGIONAL EMPIRICAL COHORT BASELINES

GLOBAL PEDIATRIC ENVIRONMENTAL EXPOSURE SCALE

920 Mn

WATER SCARCITY

Children facing severe water accessibility deficits globally.

820 Mn

HEATWAVE EXPOSURE

Children subjected to critical thermal and ambient stress spikes.

2 Bn

AIR POLLUTION

Children exposed to unsafe air pollution globally

600 Mn

VECTOR RISKPATH

Children vulnerable to changing geographic pathogen areas.

400 Mn

CYCLONE BELTS

Children tracking extreme regional weather and infrastructure harm.

330 Mn

RIVERINE FLOODING

Children exposed to riverine flooding

By combining hard infrastructure (engineering and hardware) with behavioral software (education and habit formation), Reckitt provides a holistic blueprint. The Dettol Climate Resilient Schools initiative is positioned to provide policymakers and global health stakeholders with a proven, scalable model that decouples extreme weather from childhood illnesses.

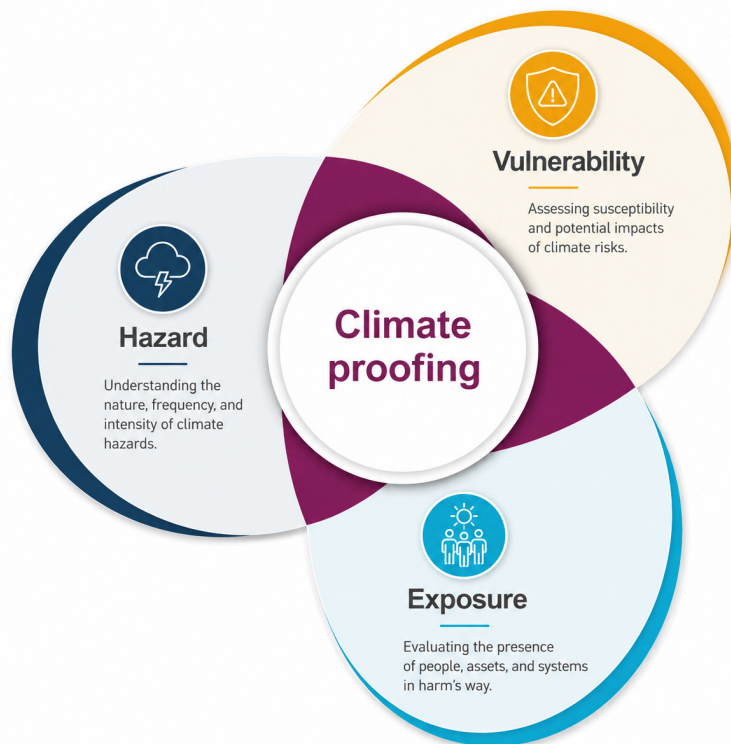
A Promising Idea: Educating every child on climate change

Climate change is the defining challenge of the next generation and any chance of addressing it requires that boys and girls develop the knowledge and skills required to care for the environment and climate. But not all education systems teach climate change, and where they do, what children are taught about climate change might not be relevant for their context – including how to prepare and respond to certain types of disasters. **Poor climate change education and the increased availability of misinformation online make it harder for children and young people to distinguish between fact and fiction.**

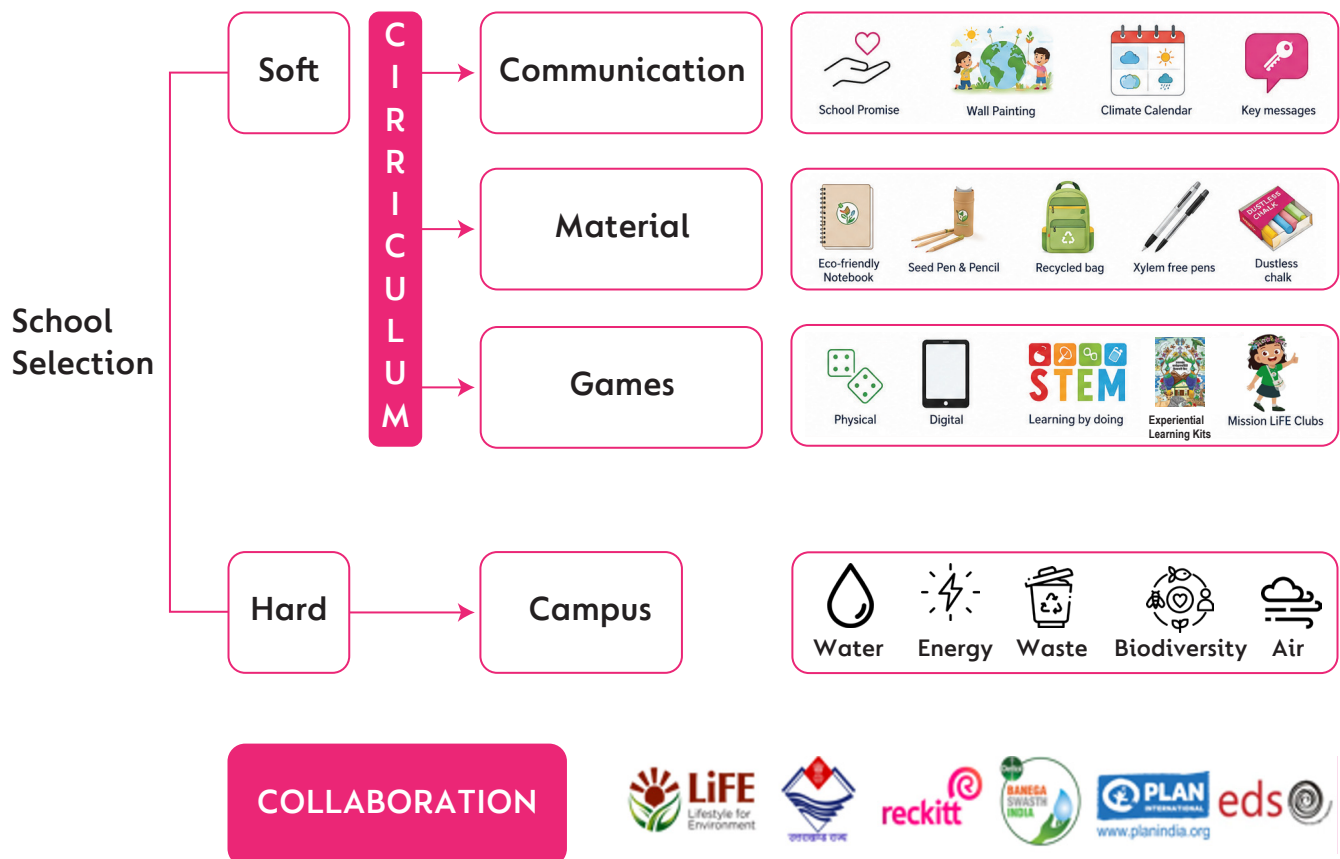
Despite the recognition of the importance of global climate change education, only 26 per cent of NDCs referenced education as a strategy for increasing the knowledge, skills, and capacity of primary and secondary school children to adapt or mitigate climate change. **Urgent action is needed to ‘climate proof’ the education sector and to produce information that is accurate and empowers children to become climate-conscious citizens who are actively involved in climate adaptation and mitigation.** According to recent research, if only 16 per cent of high school pupils in high- and middle-income nations received climate change education, carbon dioxide emissions would be reduced by approximately 19 gigatons by 2050. Ensuring that all children receive accurate and appropriate information about climate change, and the skills and training necessary to contribute creatively and find meaningful jobs in the growing green economy, will be crucial to address the climate crisis. Educating all children on climate change could include focused resources on:

- **The science – How the planet works, and how human activity is affecting the climate.** The lessons would strengthen Science, Technology, Engineering and Mathematics (STEM) education, and address not just the science behind solar panels and sea level rise, but topics like climate equity, intersectionality and the role of civic participation in solving problems.
- **Disaster response – What to do in case of flood, fire, hurricane, etc.** Elements of the curriculum should be adapted to local contexts (e.g., disaster preparedness modules relevant in a specific locality) and for different age groups. This includes school risk management and school safety programmes.
- **Environmental challenges – Understanding the relationship between the climate crisis and biodiversity loss, plastics, the hole in the ozone layer, etc.**
- **Solutions and action – Policies, processes and technologies; green skills; how to make change at home, in your wider community and around the world.** This could also include extracurricular activities focused on reforestation and environmental protection and school to-community linkages that also build civic responsibility and social cohesion.

A universal curriculum could create a common language for the next generation to discuss climate change, making it easier for them to communicate with one another. In this way, learning together helps foster a sense of solidarity between the children and young people to address climate change together



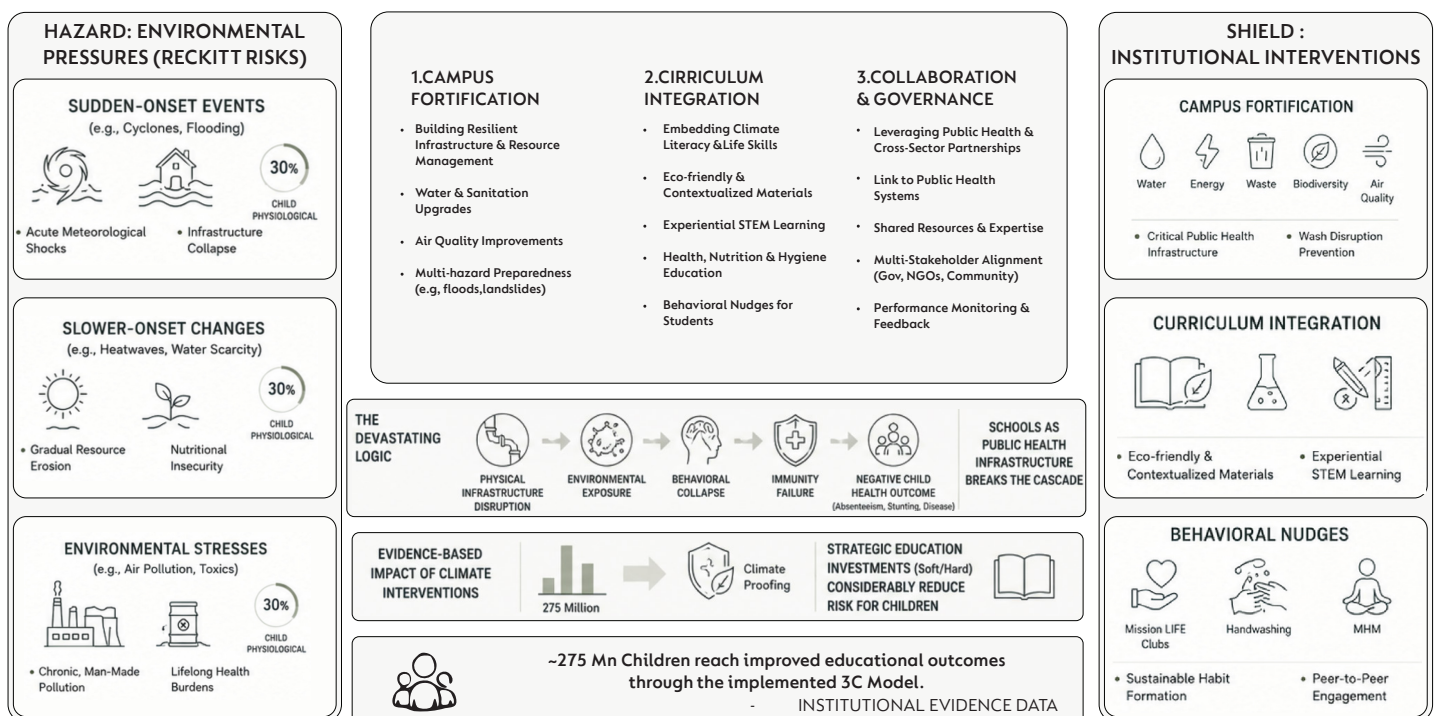
Reckitt's 3Cs Value Proposition



Section 6: The 3C Model — Campus, Curriculum, Collaboration

To operationalize this theory of change, Reckitt developed the 3C Model. This tri-pillar approach ensures a comprehensive defense against environmental shocks at the institutional level.

The Core Strategy: The 3C Model (Campus, Curriculum, Collaboration)



- **Campus (Hard Infrastructure):** Focuses on climate-proofing school buildings. This involves installation of solar energy systems with battery backup; restoration and connection of water supply pipelines to state schemes (Peyjal Nigam, Swajaldhara); installation of low-flow fixtures and push taps at handwashing stations; rainwater harvesting and greywater recycling systems; solid waste segregation infrastructure; school garden development; and upgradation of toilet facilities to low-flush systems
- **Curriculum (Behavioral Software):** Focuses on embedding climate-health education directly into student learning. This builds biodiversity sensitization and climate change consciousness through climate literacy modules using learning-by-doing pedagogy, activation of eco clubs, structured school-led intergenerational dialogue and student-driven climate adaptation activities., experiential STEM learning, and consistent hygiene behavior reinforcement.
- **Collaboration / Community (Systemic Sustainability):** Focuses on engaging stakeholders, forging school-community linkages, and institutionalizing support from provisional and local government to ensure long-term maintenance.

Section 7: Action on the Ground

While strategic frameworks establish institutional parameters, the operational viability of the 3C Model relies heavily on experiential, student-led field execution. During the pilot phase across targeted high-altitude districts, theoretical climate literacy was translated into localized, hands-on adaptation through four key multi-disciplinary workstreams:

FIELD WORKSTREAM	CAMPUS INTEGRATION (HARD)	CIRRICULUM LINK (SOFT)	SYSTEMIC COLLABORATION
Biodiversity & Mycological Tracking	Mapping native forests variants within immediate school boundaries	Hands-on botanical mapping & field journal preservatons.	Connecting local nutrition baselines with with community knowledge.
Hydrological Observation	Calibration & installation of low-cost DIY Rain Gauges	Micro-monsoon tracking, mathematical averaging & metrics.	Generating micro-level localized climate indicators.
Energy Literacy Workstream	Campus-wide Energy Audits to isolate systematic load leakage.	Engineering DIY Solar Cookers using incidence alignment.	Building resilience loops against regional grid failures.
Sustainable WASH Loops	Gravity-fed clay-poy drip irrigation systems on school grounds.	Closed-loop water conservation practices & monitoring.	Documenting ancestral water management via elder panels.

Action on Ground: A Multi-Disciplinary Environmental Action Program



Section 8: From Evidence Gap to Evaluation Logic

To move from identifying broad evidence gaps to empirically testing behavioral interventions, the framework isolated the physical variables directly impacting child health under climate duress.

78%

Empirical Climate Aggravation
223 distinct infectious human diseases are systematically intensified and accelerated by active climate hazards.

58%

Global Infectious Footprint
Over half of all human pathogenic threats (218 out of 375) are explicitly sensitive to global shifts.

1. Biological Proliferation Dynamics

Shifting climate variables speed up pathogen replication, expanding baseline bacterial and viral survival thresholds in youth ecosystems.

2. Proximity And Vector Acceleration

Extreme environmental shocks alter regional geography, pushing contaminated water tables and active vectors closer to school boundaries.

3. Pathogenic Virulence Upgrades

Thermal and hydrologic volatility filters for hardier biological strains, strengthening common water and food-borne pathogens.

4. Immunological Vulnerability Loop

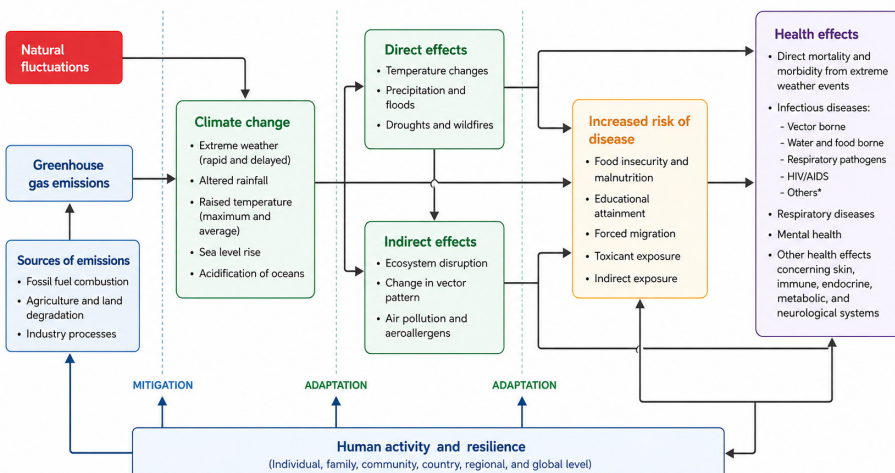
Extreme climate shocks cause physiological stress, leaving children highly vulnerable to contact-point contamination and transmission.

The logic model systematically connects global drivers with localized community health outcomes. In high-risk districts, data shows that bacterial growth rates (e.g., for food-borne pathogens) spike significantly higher (up to 18.5%) compared to low-vulnerability regions. Concurrently, regional water availability gaps make basic preventive hygiene physically impossible during peak germ multiplication months.

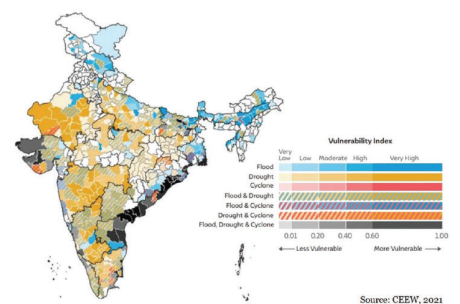
By evaluating how specific environmental shocks interact with biological agents—through pathogenic proliferation, proximity acceleration, and immunological impairment—the evaluation logic is set to test whether fortifying institutional hygiene and sanitation practices combined with climate change literacy can break the transmission chain before environmental exposure translates into negative clinical outcomes.

Building Evidence In Climate Change Impact On Health, Germs And Illness In India: An Expanded Framework

Climate Change And Child Health: An Expanded Framework



India's Climate Vulnerability Index



*Source: 1. Helldén D, Andersson C, Nilsson M et al. Climate change and child health: a scoping review and an expanded conceptual framework *The Lancet Planetary Health*, 5, e164-e175, 2. CEEW 2001

Section 9: Evaluation Design and Methodology

To objectively measure the efficacy of the 3C framework and validate Reckitt's blueprint, an independent impact evaluation was conducted by AIIMS Rishikesh. The study was designed to rigorously compare outcomes between schools that received the integrated climate-resilient WASH program (intervention) and those operating under standard conditions (control).

Study Demographics



A total of 412 government school students (Classes 1 through 10, mean age ~11.8 years) were evaluated. The control schools shared similar geographical and climatic conditions but did not receive specialized resilience upgrades.

Measurement Metrics

The research assessed outcomes across several vital areas:

- Knowledge, Attitudes, and Practices (KAP):** Pre-tested questionnaires evaluating hand hygiene and safe water knowledge.
- Physical Health & Nutrition:** Anthropometric measurements (stunting) and Hemocue screening for anemia.
- Infectious Disease:** Rapid Diagnostic Tests (RDTs) for waterborne pathogens and stool examinations.
- Qualitative Insights:** Focus Group Discussions (FGDs) with parents, teachers, and community stakeholders to understand behavioral shifts.

The explicit study objectives were to compare the proportion of students practicing essential hand hygiene, assess the availability of safe drinking water, screen for waterborne diseases, and comprehensively analyze health status, absenteeism, and health knowledge.

PARAMETERS	DESIGN DETAILS
Study Design	Quasi-experimental study comparing intervention and control groups.
Geography & Duration	Uttarkashi, Rudraprayag, and Chamoli districts (Uttarakhand) over a six month period
Sample Size	Total 412 students across classes 1-10 (203 intervention students/ 209 control students.)
Clinical & Physiological Tools	KIDSCREEN-10 Index, InBody120 anthropometrics, Hemocue 301, H2S Strip Testing.

Section 10: Key Findings and Interpretation

The rigorous evaluation period yielded decisive comparative data confirming the efficacy of the 3C model. The results prove that the framework significantly elevates health and infrastructure standards, with intervention schools demonstrating profound improvements over their control counterparts across almost every measured parameter.

Evaluated Performance Metric	Interventions Cohort	Control Cohort
Evaluated Hand Hygiene Compliance	18.3%	5.3%
Knowledge (6 steps of handwashing)	71.4%	30.6%
Safe Drinking Water Access	75.0%	36.4%
Nutrition (Normal height-for-age)	76.4%	63.2%
Waterborne Disease Detection	0 Confirmed cases	0 Confirmed cases
Severe cases of Anemia	Absent	Present

Behavioral and Physiological Impact: A 3.5x increase in the practice of essential hand hygiene demonstrates the successful translation of the 'Curriculum' pillar into active practice. The 'Campus' upgrades yielded dramatic infrastructural results, directly correlating with lower rates of stunting (76.4% normal height-for-age), zero confirmed waterborne disease cases and zero cases of severe anemia.

Furthermore, children in intervention schools demonstrated improved attention spans and Rasch wellbeing scores on the KIDSCREEN-10 index. In intervention schools, hygiene transformed from a prompted task (enforced by teachers) into an internalized, self-driven routine.

The school intervention did not stop at the campus boundary. It influenced homes, routines, and family conversations. At the same time, it makes clear that persistent climate and system-related barriers still shape what children can realistically do every day.

Reverse Learning

Children in intervention schools emerged as hygiene ambassadors. Families described children reminding adults to wash hands, use safer water practices, and treat hygiene as a habit rather than an occasional instruction.

Parents described children taking school lessons home and using them to improve family hygiene routines, especially after agricultural work, before eating or drinking water and after using washrooms. This mattered because it highlights a rural “forgetting curve”: under time pressure and heavy workloads, families may know what to do but struggle to do it consistently. The child-to-home pathway helped keep hygienic practices visible and consistent.

Section 11: Strategic Implications for Scale and Partnership

The evidence generated by the AIMS evaluation transcends the immediate project scope, offering profound implications for national and global policy. The core implication is that the structural and educational fortification of schools represents one of the most efficient mechanisms for localized climate adaptation.

Qualitatively, a powerful phenomenon emerged: reverse learning. Children acted as hygiene ambassadors at home, actively utilizing the lessons learned in the climate-resilient school to modify hygiene behaviors within their families. This continuous flow of knowledge from child to household acts as a self-sustaining engine for community health awareness, proving that schools serve as strategic nodes for community-wide behavioral change.



Water safety awareness remained an important advantage:

Intervention students were more likely to understand that clear source water may still be unsafe. Awareness of boiling water for safety was 56.2% in intervention schools versus and 43.1% in control schools. Water safety awareness remained an important advantage. Intervention students were more likely to understand that visibly clear source water may still be unsafe.

For Reckitt, its partners, and global health stakeholders, this data validates that funding school WASH infrastructure is not simply an educational expense, but a highly effective, scalable public health investment.

Section 12: Operational Realities, Sustainability, and the Road Ahead

Securing these gains on a larger scale requires navigating complex physical and logistical realities. Implementing high-standard infrastructure in the Himalayas is inherently difficult. The programme encountered severe environmental and logistical challenges, notably extreme weather disruptions characterizing the region. Flash floods and landslides resulted in frequent road closures, delaying material transport and restricting field visits.

These operational realities stress-test the model, proving its viability in the most challenging conditions. To ensure the longevity of the 3C framework moving forward, sustainability must be addressed systematically:

- **Policy Integration:** The model's long-term survival depends on formal integration with provincial-level education and health policies.
- **Dedicated Maintenance:** Capital expenditure is insufficient; recurring, dedicated WASH maintenance funds must be established to keep infrastructure operational post-shock.
- **Local Partnerships:** Collaboration with Grassroots Administration and parent-teacher associations remains vital for grassroots ownership and operational continuity.

Comparing outcomes between intervention schools (climate resilience WASH Program) and control schools

OUTCOME	INTERVENTION SCHOOLS	CONTROL SCHOOLS
Essential Hand Hygiene	18.3% 	5.3%
Safe Drinking Water Criteria Met	75% 	36.4%
Knowledge of 6 Handwashing Steps	71.4% 	30.6%
Normal Height-for-Age	76.4% 	33.2%



QUALITATIVE FINDING

“
Reverse Learning:
Children acted as
hygiene ambassadors
at home.
”



Across all measured outcomes, **intervention in schools outperformed control schools**, showing the positive impact of the climate resilient WASH programs.

Section 13: Strengths & Limitations

Strengths

- Novel contribution: First study of its kind in Global South and among the few examining climate-resilient school interventions.
- Adequate follow-up: ~1.5 years duration allows observation of medium-term changes in WASH-related outcomes and behaviours.
- Positive health signals: Absence of waterborne diseases and lower stunting prevalence in intervention schools indicate potential nutritional and health benefits.
- Behavioural impact: Evidence suggests sustained improvements in hygiene practices.
- Real-world relevance: Conducted in natural school settings across three districts, enhancing practical applicability.
- Contextual generalizability (within region): Findings are more relevant to diverse, similar settings due to multi-district implementation.

Limitations

- Study design limitation: Quasi-experimental with only endline assessment; no baseline comparability between intervention and control schools.
- Selection bias risk: Schools were purposively selected, not randomized; potential residual confounding from unmeasured contextual factors.
- Sample size constraint: Final sample (412 students) was smaller than planned due to logistical challenges in remote Himalayan regions, reducing statistical power.
- Limited causal inference: Cross-sectional measurement of health outcomes restricts ability to establish causality, especially for long-term indicators like nutrition and anemia.
- Incomplete water quality assessment: Testing was done at specific time points, not continuously; seasonal variations may be underrepresented.
- Observer bias potential: Lack of blinding due to visible interventions could influence observational assessments.
- External factors not captured: Household and community-level determinants (e.g., sanitation, water supply, governance) were not fully assessed.

Overall value retained: Despite limitations, the study provides substantial evidence using a mixed-methods approach for climate-resilient school interventions.

Section 14: Recommendations and Conclusion

Based on the robust evidence gathered, there is an urgent need to scale the 3C Model across other high-vulnerability geographies. Strategic realignment is required across multiple stakeholder levels:

- **For Policymakers:** Formally integrate climate-resilient WASH benchmarks into state education codes. Treat schools as permanent community health assets and critical public health infrastructure.
- **For Funders and Donors:** Shift away from siloed funding. Mandate that educational infrastructure grants include dedicated budget lines for climate-proofing and post-shock maintenance.
- **For School Systems:** Adopt experiential, locally contextualized STEM and climate curricula that empower students to become primary data collectors and community health ambassadors.
- **For Implementation Partners:** Ensure hard infrastructure upgrades are inextricably linked with behavioral software and community collaboration to guarantee long-term operational resilience.

This quasi-experimental study demonstrates that climate-resilient school interventions can play a significant role in improving hygiene behaviours, strengthening safe water access, and fostering healthier school environments in climate-vulnerable regions of Uttarakhand. By integrating WASH climate resilient infrastructure with behaviour change education and community engagement, intervention schools were able to achieve higher adherence to appropriate hand hygiene practices and better procedural knowledge among students.

Improved well-being scores and attention spans further indicate that enhanced school environments may positively influence children's overall development. The emergence of reverse learning—where children influence household behaviours, demonstrates the broader societal impact of school-based interventions.

Overall, the study underscores the importance of schools as critical platforms for delivering climate-adaptive public health strategies. The evidence suggests that such integrated interventions can build resilience, promote sustained behavioural change, and contribute to improved child health and well being. Scaling these models across similar vulnerable settings holds strong potential for advancing both public health and climate resilience objectives pertaining to children.

The Dettol Climate Resilient Schools initiative proves that the devastation of climate change on child health is not an inevitability. By treating the education sector as a primary line of defense, and combining precise infrastructure engineering with behavioral empowerment, we can protect the next generation from the escalating threat of environmental hazards.



**Healthier children. Stronger learning.
Climate-resilient schools and communities.**

Building a sustainable future, one school at a time.