Global Alliance for
Disaster Risk Reduction & Resilience
in the Education Sector

Towards Safer School Construction

A community-based approach

United Nations Educational, Scientific and Cultural Organization

ARUP

Save the Children

GFDRR Global Facility for Disaster Reduction and Recovery

risk RED risk reduction education for disasters

CASE STUDY

Some key principles in practice:
Trade-offs in post-disaster response

Country: Haiti

Organisation: Save the Children

Hazards: Earthquakes, flash floods, high winds

Summary: Reconstruction in the wake of the 2010 Haiti earthquake was extremely challenging, spanning many years and hundreds of organisations. In the complex and shifting post-disaster context, the international humanitarian organisation Save the Children was tasked with providing school buildings to get children off the streets and back into school. Amid conflicting pressures of time, resource constraints, internal organisational mandates and relations with the Haiti government, Save the Children made difficult trade-offs to complete their mission using community-based principles.

Country and hazard overview

In 2010, a devastating earthquake struck Haiti, damaging or destroying 80 percent of schools around the capital city Port-au-Prince. Nearly 250,000 people were killed, and one-third of the population displaced. Most documents from the past 204 years of Haitian governance were buried under rubble. Land tenure was almost impossible to determine and the Haitian MoE was overwhelmed by the crisis, despite good coordination. In this extremely difficult context, Save the Children – who was co-leading the Education Cluster with UNICEF while working alongside other NGOs and the MoE – rushed to respond.

Returning children to the classroom was the most pressing goal for Save the Children from both educational and child-protection perspectives. Aiming for immediate relief amid the post-disaster turmoil required Save the Children to make difficult trade-offs. Pressures from key stakeholders pushed and pulled the school construction program, sometimes in opposing directions.

A laudable success

The Education Cluster was run by Save the Children and UNICEF. Together, they coordinated the efforts of approximately 100 organisations.

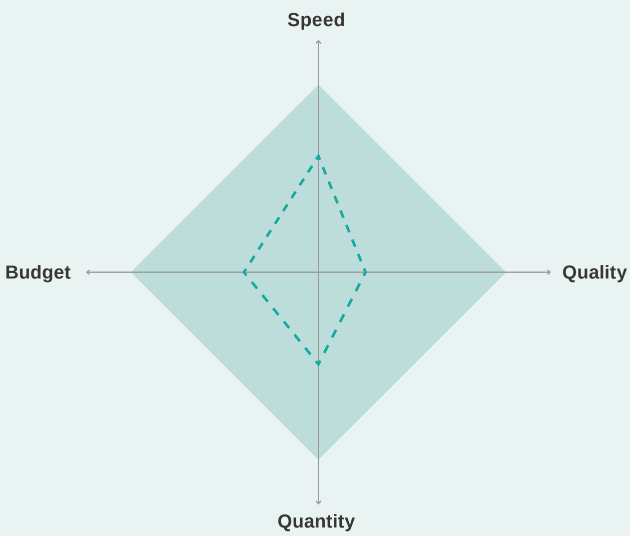
Collectively, the Haiti Education Cluster established more than 1,000 temporary learning spaces, trained more than 10,000 teachers in psychosocial support for children, facilitated the return to school of more than 1 million students, and undertook cholera-prevention activities in 20,000 schools.

Save the Children alone constructed at least 100 schools, helping thousands of children get off the street into their successful education programming that followed. Surveys indicate that community members were extremely grateful for Save the Children's efforts.

Key decisions or trade-offs:

- **Speed versus quantity.** Construction speed and cost versus building lifespan – to build semi-permanent or permanent?
- **Quality versus speed.** A consistent design for better compliance to safety standards and streamlined construction versus design diversity for increased functionality and tailoring to specific site characteristics.
- **Cost versus quantity.** Higher costs of site-specific design versus the economy of scale that comes with a consistent design template.
- **Quantity versus quality.** Breadth of school construction versus depth of community engagement – creating community "ownership" versus building more schools.

These conflicting considerations can be conceptualised by the project diamond: prioritising time, cost, quantity or quality can only be achieved at the cost of other factors.



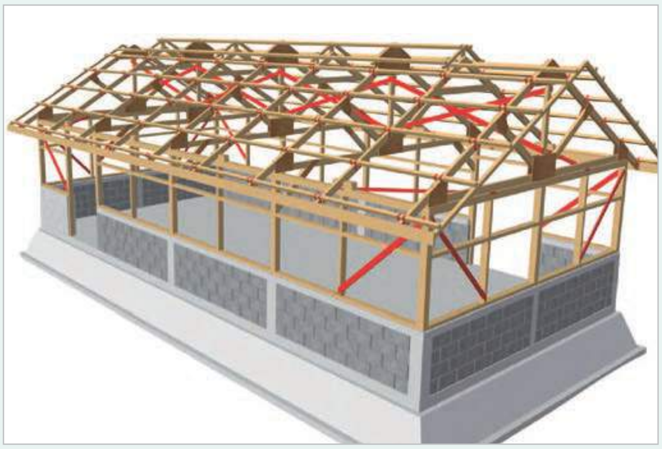
Many of the key trade-offs were made at the design stage, which in turn dictated the programmatic decisions that followed. Save the Children opted for a standardised school design and a semi-permanent structure in an attempt to optimise donor expectations for an immediate response, speed and cost.

A semi-permanent lifespan was seen as a middle ground. Donors were less inclined to lend money for permanent structures when the country was in the emergency and immediate recovery phase. Save the Children had its own goal to build a certain quota of schools and were contractually obligated to achieve those numbers. The Haitian MoE was also requesting temporary, immediate construction. Even as they drafted the design, they recognised that some building elements, in particular the plywood cladding, would require maintenance and replacement.

The semi-permanent school design was approved by the Haiti government through a protracted process, meaning the first schools were completed in June 2011 and the last schools in early 2013, three years after the earthquake. Initially, the short-term strategy made sense, but navigating the economic and political environment took so much time that the original argument for speed decayed. This left Save the Children with two key lessons about trade-offs in construction lifespan: the staff needed a shared definition of 'semi-permanent', and a well-communicated plan for upgrading schools to permanent structures when they degraded.

Ensure technical oversight and engage as partners

Many school construction projects functioned well with the standardised building footprint, while some required compromise to achieve sufficient classroom numbers. In the latter cases, school administrators made ad-hoc changes, some of which compromised safety and classroom function. A five-way memorandum of understanding (MOU) was established in an attempt to mitigate these changes. The MOU provided written agreement of roles and responsibilities of each stakeholder in advance, including school staff, MoE, Save the Children, the municipality and the local Parent-Teacher Association (PTA).



Schools were all single-story with 190-cm-high reinforced concrete skirt walls. The walls were topped with timber framing and clad with plywood. Corrugated metal was used for the roof. Graphic: Save the Children.

Because only a narrow gap existed between school buildings, the school staff cut doors into the gable-end walls of the buildings. The ad-hoc change removed bracing designed to help the building resist earthquakes and hurricanes. With doors only at the end of the long row of classrooms, building evacuation was also serious compromised. Photo: Bill Flinn.

When the site could not accommodate three standardised school building blocks, on-site engineers were able to improvise effectively, designing a staggered arrangement without compromising safety. Photo: Bill Flinn.

Both successful and unsuccessful examples of design modification show that technical management can make a huge difference in school safety. Having a suite of approved design alternatives can be a good option when on-site technical capacity is low, providing the site manager with reasonable flexibility. Further trainings and quality control can then be used to bolster the technical capacity of these local site managers. However, if further training is not possible, designs can be modified effectively if both qualified engineers and architects are on-site regularly.

Develop capacity and bolster livelihoods while building a culture of safety

To build community capacity and place disaster risk reduction at the forefront of all decisions, Save the Children formed Safer Construction and Disaster Risk Reduction Teams at each site. The process involved creating a detailed construction manual, posters of key concepts and models of rebar bending and lapping. They also held training sessions with builders and taught risk-analysis workshops to the school PTA and community members. Even with those strong steps, building risk reduction capacity during a humanitarian response was challenging.

Posters and a detailed training manual in Creole were used to communicate building schematics, material quality and the construction process. These materials were developed with the intention of helping Haitian engineers with on-site instruction. However, this communication style was not always in-sync with how local builders understood information. The team had more success with color-coded physical models showing the proper placement of steel reinforcement bars. Another challenge was that although training taught local contractors to identify high-quality sand and gravel, they often chose to purchase cheap, low-quality goods.

Significant training also was required to achieve the desired quality of construction. During site visits in the pilot phase, local engineers saw apparent high-quality construction but did not always have sufficient training to understand when external building elements were misleading. For them, if the required building elements were present then it passed the test but they did not always realise the quantity and placement of these elements was paramount in Haiti's high seismic and hurricane risk environment. For example, the lack of roof gable braces and sparse nailing patterns on timber frame connectors were not seen as problematic when they should have been.

While teaching local engineers about hazard-resistant design was a clear necessity in Haiti, additional benefits might have been gained by including skilled tradespeople, as well as other community members, in the earliest stages. These individuals could have assisted in some aspects of quality control, providing the double dividend of safer construction and increased community awareness on hazard-resistant construction techniques. Though it may seem unlikely that the community would spot what engineers would not, effective training from structural engineers with extensive knowledge on seismicity can increase community knowledge, aptitude and practice of safe design.

The community's long-term interest in the safety of their students might have provided extra motivation to ensure the school met top safety standards. Perhaps, just as valuable as a safer school, a more aware community may have increased demand for safer construction. Though the results may have been diffuse, the long-term impact would have been more important than any single building.

Design choice challenges

The construction typology of the school buildings was predominantly timber frame, while the modern vernacular of urban Haiti is reinforced concrete frame and concrete block. Haitians, after seeing heavy concrete walls crumble on friends and family, were fearful of rebuilding with masonry. This influenced Save the Children's initial design choice. However, those initial fears slackened over time, potentially warranting a design shift.

The construction of the concrete skirt wall provided some opportunity for training in hazard-resistant techniques, but the timber framing on the upper portions provided significantly fewer opportunities for Haitians to learn new techniques they could apply in their own homes. Learning opportunities would have been enhanced if masonry walls had been full height. These changes would not have significantly increased costs and may have dramatically increased the school's lifespan.

Key takeaways

The Save the Children experience in Haiti highlights the importance of applying key principles in safer school construction, and the challenges that come with this process. They were able to ensure the oversight of technical aspects and engage communities as partners to achieve and maintain safer schools on many sites. They were also partially able to develop the skills and awareness of local contractors and community. Supporting a culture of safety and building on local knowledge, however, proved more challenging during this complex humanitarian response.

- Periodically review decisions about the tradeoffs between 'time, quality, quantity and cost' to ensure the program remains relevant to shifting post-disaster reconstruction contexts.
- Where technical construction capacity is low but hazard risks are high, consider using visual and practical teaching approaches rather than printed guidance to engage local workers.
- Make the dissemination of risk reduction principles a deliberate goal of both private and public reconstruction projects.
- Look to lessons leant in other sectors – such as health and hygiene promotion and community-based shelter reconstruction – for effective education and behavioral change strategies that may be applicable to post-disaster safer school construction.

Students during a Disaster Reduction Drill at a school in Leogane Haiti. This school was built with Save the Children's support using innovative yet simple techniques that make it more hurricane and earthquake-resistant. Photo: Susan Warner/Save the Children.

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