CASE STUDY

BANGLADESH 2019–2020 / ROHINGYA CRISIS

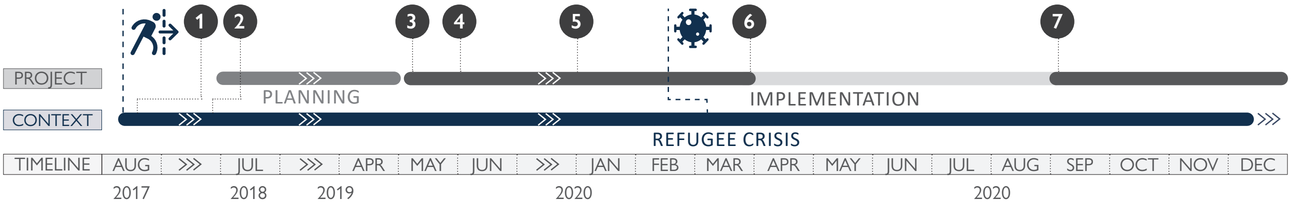
KEYWORDS: Disaster Risk Reduction, Site improvements, Site planning

CRISIS	**Rohingya Refugee Crisis, Cox's Bazar, 2017 onwards**
PEOPLE WITH SHELTER NEEDS	**289,660 HHs** (884,042 individuals)*
PROJECT LOCATION	Cox's Bazar, Bangladesh
PEOPLE SUPPORTED BY THE PROJECT	**563 HHs** (2,646 individuals) supported through the Mid-Term Shelters Program
PROJECT OUTPUTS	Usable area of the **Camp 20 extension** increased by **40%** **563 Mid-Term Shelters** constructed **620 Cash-for-Work participants** engaged per month
SHELTER SIZE	**21m²**
SHELTER DENSITY	**3.5m²** per person
DIRECT COST	**USD 828** per Single shelter (up to 5 member HH) **USD 1,067** per Mezzanine shelter (6+ member HH)
PROJECT COST	Approx. **USD 1,855** per HH (USD 1,500 shelter construction + USD 355 site development)

* Source: Joint Government of Bangladesh - UNHCR Population factsheet as of March 2021

PROJECT SUMMARY

To reduce congestion in the main Kutapalong-Balukhali refugee camp, two planned camps were created in 2018, accommodating 1340 and 995 households. Starting in 2019, the project team further developed the second camp, using flood modelling to demonstrate that the flood risk in the valley areas was low and could be mitigated with sustainable site improvement works, increasing the capacity of the camp by over 40% with minimal impact on the environment. Alongside this, the project team also developed a new Mid-Term Shelter design for use in these areas.



25 Aug 2017: Beginning of violence in Rakhine State which drove an estimated 655,500 Rohingya across the border into Cox's Bazar, Bangladesh.

1. **Aug 2017 - Mar 2018:** Kutapalong-Balukhali Expansion camp (pop. 460,000) formed by refugees self-settling close to pre-existing camps.
2. **Apr - Nov 2018:** Govt approval and subsequent construction of two new planned camps, with 1,340 and 995 shelters constructed in the first phase.
3. **May 2019:** Project approval to construct a further 539 shelters using a new mid-term shelter design in the second camp.
4. **Jun 2019:** First group of 12 shelters completed.
5. **Jan 2020:** Approval from local authorities for additional 1,611 shelter units.

11 Mar 2020: WHO declared the novel COVID-19 outbreak a global pandemic.

6. **Apr 2020:** Works temporarily stopped after completion of 563 units due to COVID-19.
7. **Sep 2020:** Restart of works.

Mid-Term shelters were constructed in the valley areas.

CONTEXT

For more background information on the Rohingya Crisis see the response overview in Shelter Projects 2017-18.

On 25th August 2017, a mass exodus of Rohingya refugees traveled from northern Rakhine State, Myanmar, to Cox's Bazar, Bangladesh. Over 712,000 individuals arrived during the first few months of the crisis, joining the 200,000 plus individuals who had arrived in previous influxes since 1978 – bringing the total population living in camps to more than 930,000 by August 2017.

SITE DEVELOPMENT AND SHELTER SITUATION

Following the 2017 influx, newly arrived refugees were accommodated in self-built, makeshift shelters made of bamboo, sticks, and low-grade plastic sheeting. These have been progressively upgraded with Shelter & NFI assistance, but conditions remain very challenging. Due to the rapid formation of the camps, they suffer from lack of site planning, low quality infrastructure and risks from landslides, flooding and fires. Families often reside in a single room shelter, with a covered area of 2 to 2.5m²/person on average, including cooking space. Such over-crowdedness exacerbates security, health, and protection risks.

With the distribution of upgrade shelter kits and tie-down kits, plus training and technical assistance, the immediate need to improve the robustness of the shelters to better withstand the climatic conditions expected during the monsoon/cyclone season, was partially addressed. The space per person however remained below the minimum desired of 3.5m² per person, and the extent to which DRR features, such as bracing, tie down, strong connections etc., were incorporated varied from household to household. The lifespan of the materials, and therefore of the shelters, was measured in months rather than years, compromising the sustainability of the shelter response on a mid-term perspective. The structural resistance of the shelter is of critical importance to reduce risk.

In early 2018, the Government of Bangladesh extended the boundary of the main Rohingya refugee camp in Cox Bazar district to create space for new arrivals and allow families to relocate from the most congested and high-risk areas of the camp. The topography in this area is very challenging for developing settlements, comprising steep, tightly knitted hills with almost no flat areas, so significant earthworks were required to create safe areas for shelter construction. However, by 2019 the Government had banned further cut-and-fill interventions, meaning that space had to be found in the leftover parts of the camp for new shelter developments.

PROJECT APPROACH

The primary goal of the project was to increase the capacity of the camp, accommodating families relocating from more congested, at-risk areas. The project also presented an opportunity to develop integrated shelter designs and site planning standards that could be followed for the eventual redevelopment of the entire camp. The Government restricted the use of permanent materials, as the camps are deemed to be temporary. Therefore, the Shelter/NFI Sector approach for the new areas was to construct Mid-Term Shelters.

The newly constructed shelters provided accommodation to families who were being relocated from other areas of the camp that were congested or faced disaster-risk.

Over-crowdedness in unplanned areas of the camps can exacerbate security, health and protection risks.

There was strong pressure from the Government to maximize the number of shelters that could be accommodated, as no further expansion of the camp would be allowed. Therefore, Site Management and Shelter/NFI Sectors and implementing actors advocated to the Government on the importance of maintaining minimum spatial standards and developed context-specific indicators for site planning. This advocacy was successful, in that the site plans were finally approved and pressure to maximize the shelter density were successfully countered, though the same standards were not formally approved by the Government for use across all the camps.

All site development activities and shelter construction was managed through Cash-for-Work (CFW), to provide income generating opportunity and skills training to the community, as well as to foster their ownership. The Site Management agency in the camp managed the recruitment and rotation of CFW labor for Shelter and Site Development teams, according to their requirements and ensuring that vulnerable families were included. At the outset, the intention had been to integrate the female Cash-for-Work participants into the regular activities. However, the women preferred to work in separate activities away from the men, such as producing bamboo crafts.

The Mid-Term Shelter strategy included stipulations that new shelters should be planned using a settlement approach, to ensure that the wider needs of the community were met. Site plans were prepared, setting out the access and drainage networks, shelter and WASH layouts, and providing space for community facilities and open areas for recreation and community gardens.

The shelters were intended for households relocating from other areas of the camp, due to flood or landslide risks, congestion, protection concerns, or to accommodate new infrastructure. This process was managed by the Site Management team, in coordination with Protection actors and local authorities. Therefore, completed shelters had to be available and handed over to Site Management before the eventual occupants arrived, which meant that shelter actors had to construct the shelters directly, rather than providing materials for the community to build their own shelters. Close coordination between Site Planning, Site Development, Shelter, WASH and Site Management teams in the camp was necessary for teams to work in parallel and avoid delays.

All the construction techniques, for both shelter and site development activities, were based on local common practices, well known also among the refugees. Skilled laborers were identified from within the camp to act as supervisors and to carry out the various skilled tasks. The shelters, and the civil infrastructure of the settlement were 100% built by the refugees themselves through Cash-for-Work, providing an important livelihoods support to the community. This opportunity was extended as widely as possible by systematically rotating laborers every 15 days.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Planning for Mid-Term Shelters was done as part of an integrated site planning and site development approach that ensured space was also provided for infrastructure, community facilities and open areas.

PROJECT IMPLEMENTATION

PHASE I : SITE PLANNING AND SITE PREPARATION

From the start, a 'whole settlement approach' to the project was taken, integrating Site Planning, Site Development, Shelter, WASH and Site Management.

By 2019, the only remaining land available for development in this area of the camp was in the valley floor. According to the 2018 flood risk map, these areas were flood-prone. However, there was no significant flooding in these areas during the 2018 monsoon, despite periods of very heavy rainfall, indicating that the original flooding assessment may have been overly conservative. Therefore, new flood models for all the camps were commissioned, which confirmed the engineering judgment that it would be safe to develop the valleys for shelter.

An initial drainage masterplan of the area was developed, creating catch drains around the edge of each shelter area to intercept water washing off the slopes, linked to primary drains through the center of each valley. Soil excavated in digging the primary drains was used to raise the level of the shelters. The project prioritized the use of environmentally sustainable DRR measures, such as using natural drains with earth bedding to promote water infiltration and reduce flood risks for downstream communities, and planting quick growing, deep-rooted grasses along the embankments and on slopes to prevent erosion. In addition to this, several actors carried out major tree plantation and reforestation activities across the camp, to restore the environment, protect the slopes from erosion, and reduce flooding.

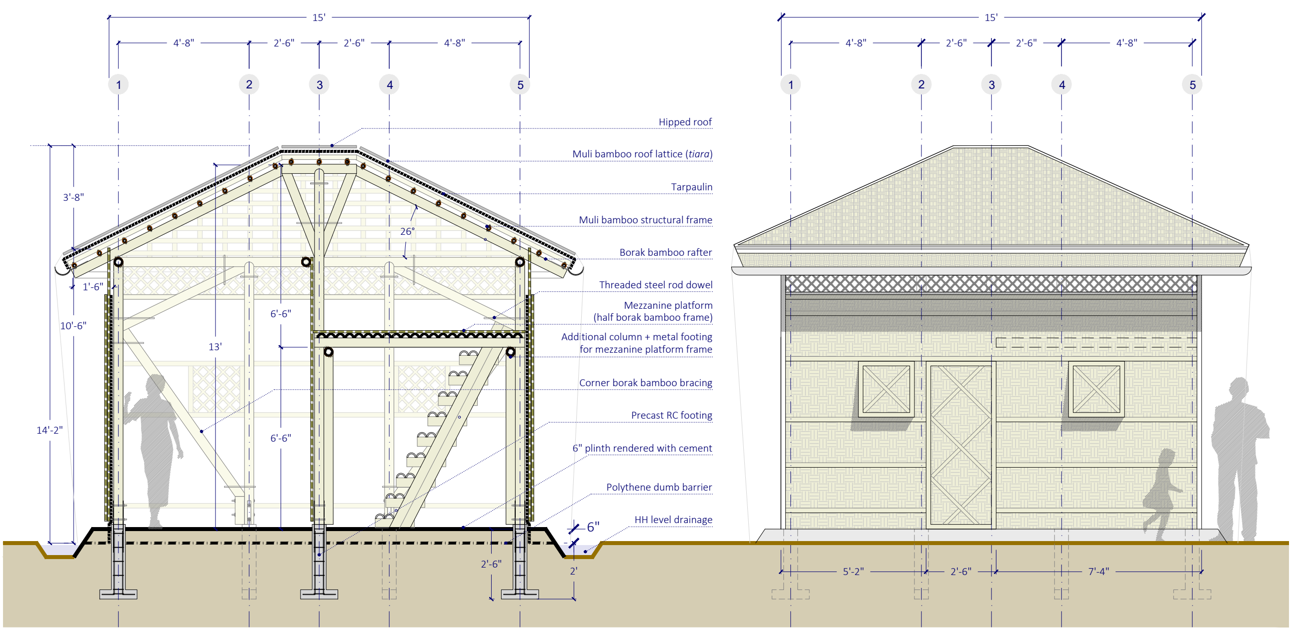
GBV risks were considered during site planning, including the placement and width of pathways, the segregation and placement of latrines, bathing spaces and water points, street lighting, and consideration of typically male-dominated spaces.

The project provided over 500 Mid-Term Shelter plots in these valleys, increasing the shelter capacity of the camp by 40% without requiring major earthworks, minimizing the impact on the environment.

PHASE II: SHELTER BLOCKS & WASH FACILITIES CONSTRUCTION

Upon completion of the site preparation works, the Site Planning team demarcated the allocated spaces for WASH and shelter blocks, which were then constructed in parallel. The WASH facilities (tube wells and gender-segregated latrines and bathing spaces) were constructed by local contractors. Soil excavated from the soak pits and latrine pits was used to raise the plinths of the shelters.

On average, 300 CFW laborers were engaged each day for the shelter construction. Laborers were set up in teams (based on needs, skills and experience), and assigned to a specific task as per the sequential process of the shelter construction and the support functions required. Each labor team received an initial orientation training when joining the program or performing a new task for the first time. This approach allowed the organization to engage unskilled laborers in a way that was both safe and productive, while ensuring that they were engaged on each task for enough time to develop skills. CFW teams also constructed catchment drains around the blocks and connected each block to the main drainage network, installed brick-paved access routes and bamboo bridges within and between blocks and implemented environmental restoration measures such as tree planting.



The Mid-Term Shelter design was based on local common construction techniques.

Focus Group Discussions ensured that the inputs of camp residents directly fed into the design of the Mid-Term Shelters.

MID-TERM SHELTER DESIGN

The shelter technical design was developed in parallel and in accordance to the guidance note prepared within the Technical Working Group of the Shelter/NFI Sector for the construction of Mid-term shelters in the camps. This included reference standards to be met such as the covered space and expected shelter lifespan to be considered, minimum figures for technical aspects such as the plinth height and the free head height to be respected, also roof slope and overhang, recommendations for the materials to be used in the different elements, and DRR features to be incorporated (bracing, wall protection for cooking space, tie-down), as well as considerations related to Protection (internal partition, lockable doors and windows), Health (cross ventilation), and a range of overall cost. The bamboo for the Mid-Term Shelters was treated in the Bamboo Treatment Facility. *For more information on the Bamboo Treatment Facility* *see case study A.11*.

Focus Group Discussion (FGDs) with participants living in the camp (selected to include both genders and a wide range in age and family size) were organized and moderated by Shelter and Communication with Communities (CwC) teams, in order to discuss the draft design of the Mid-Term Shelters and get the refugees' feedback, especially in terms of sufficiency of the proposed space, cooking area, and how the shelters should relate to each other. For the purpose of the FGDs, 3 shelter prototypes were built with the support of skilled carpenters among the refugees, testing also the technical solutions proposed as mentioned above.

The main findings from FGDs incorporated in the design:

Cooking/ Storage Space	Female participants requested a fire-resistant material behind the cooking wall to protect the bamboo.
Room to Room relationship	Female participants requested for the door of the private living space (bedroom) to be placed far from the entrance door noting security and privacy as their reasons.
Space requirement	The standard shelter size would not be comfortable for larger families. Participants liked the option of making the shelters higher to create additional mezzanine space for sleeping, which was incorporated for 20% of the shelters, assigned to families with six or more members. The site planning considered the locations less exposed to the wind for these slightly higher blocks. The structural performance of both designs against wind loading was reviewed by an external engineering consultant.
Shelter to shelter relationship	The option of swapping the layout symmetrically for the neighboring shelters was preferred, with the common wall separating cooking space and cooking space between neighbors, or bedroom and bedroom. Participants preferred to be assigned a shelter near their relatives, but didn't prefer internal connections with doors between shelters even if they were relatives.
Mobility and access	Specific obstacles in the shelter design for Persons with Disabilities, other than the level at the access to the raised plinth, to be solved with a ramp on an ad hoc need basis.

ENVIRONMENTAL IMPACT

As this project was a continuation of the organization's ongoing work in the camp, a specific Environmental Impact Assessment was not carried out. However, minimizing any negative environmental impacts of the project was a priority consideration at all stages of the project, from protecting what vegetation remained following the deforestation of the previous years, respecting existing community gardens in the site plans, planting alongside drains and on exposed slopes, and using natural drains to promote infiltration and reduce discharge rates and possible flooding downstream.

DISASTER RISK REDUCTION

Multiple approaches were taken in site planning, site development and shelter design to reduce disaster risk, including for example:

Heavy Rains and Floods	• Evidence-based site planning, using catchment area calculations, flood models and empirical data to ensure that the valleys were safe for development. • Natural drainage to reduce run-off speeds and promote infiltration, thereby reducing the risk of flash floods. • Individual HH level drainage connected to catchment or primary drainage. • Hipped roof, slope 20°, tarpaulin tightly fastened to roof structure to prevent ponding, gutter system. • Plinth of 6" over polythene layer as damp barrier, boundary protected with geotextile or sandbags to prevent its erosion.
Fire Hazard	• Maximum of six shelters per block. • Minimum of 6' space in between shelter blocks (from roof to roof). • Ensuring water/sand buckets areas close to shelter blocks. • Cement plastered wall for cooking space.
Strong winds	• Placing the shelters in the valleys reduced their exposure to winds. • Square shape of shelter, hipped roof, footings anchored 2.5' to the ground, ties and connections, bamboo bracing, tie-down, shelter cladding of bamboo weave mat as protection from flying objects.
Landslides	• Landslide risk maps and risk assessments to identify safe locations for construction. • Bioengineering used to stabilize loose slopes. • Integrated drainage network created to reduce erosion on slopes.

MAIN CHALLENGES

Removal of lean-to from shelter design. The initial shelter design included a lean-to connected to each shelter that would provide space for cooking and bathing. However, the local authority stipulated that the lean-to be removed (that bathing space should be removed entirely and the cooking space incorporated within the main structure). This resulted in a smaller living space and added complications of incorporating fire protection, adequate ventilation, and gray water drainage.

During the monsoon season, the soil in the valleys became saturated, creating lateral infiltration into the latrine pits, which required frequent desludging. In the new site plans, the latrine blocks have been located at a higher level, in terraces on the lower part of the hill slopes, accessible from the valleys. Where this is not possible, a combined system has been developed, using infiltration trenches in the dry season and a sealed storage tank during the monsoon season.

The Cash-for-Work system in place is based on a 15-day rotation of laborers. However, to ensure quality and progress, it was necessary to maintain a small team of skilled laborers who didn't rotate. These skilled laborers acted as team leaders, monitoring the works, guiding the unskilled laborers in their activities, and taking responsibility for the activities that required a high level of technical skill.

OUTCOMES AND WIDER IMPACTS

The additional shelters proved crucial in 2019 and 2020 to accommodate new arrivals in the camp as well as families relocated from other areas of the camp. The process undertaken, of using flood modeling to identify areas suitable for development, following a settlement approach to site planning and using environmentally sustainable infrastructure, has been continued in other areas of the camp.

Post Distribution Monitoring confirmed a high level of satisfaction with the shelters. The next stage of the project will be to replace the 1300 temporary shelters that were built on the surrounding hilltops when this area of the camp was first settled, in 2018.

Bamboo for the Mid-Term Shelters was supplied from the camp's Bamboo Treatment Facility.

All shelters were constructed by teams of camp residents through Cash-for-Work.

STRENGTHS, WEAKNESSES AND LESSONS LEARNED

STRENGTHS

√ **Integrating Site Planning, Site Development, Shelter and WASH from the start of the project** meant that adequate standards could be achieved in all areas, with competing priorities assessed by the full project team and balanced to maximize the benefit to the camp residents. This was in contrast to the majority of the camp, which was settled spontaneously, with the effect that shelters squeezed out almost all other considerations, such as public space and pathways.

√ **Specific camp-level coordination structures were developed** between the different project teams and with the local authorities and community representatives for implementing this project. These ensured smooth project implementation.

√ **The use of detailed flood models, engineering calculations and empirical data to determine safe areas for construction** allowed the project team to significantly increase the usable area within the camp.

√ **The shelter design was based on community feedback and locally available materials and techniques** which built upon the existing construction knowledge of the refugee community, adapted to the limitations of the context after 2 years of constant self-building of their whole camp. From the initial FGDs with skilled carpenters, their own ideas were incorporated into the design, for example for the mechanism of opening and closing the windows pulling from vertical ropes. FGDs and model shelters were used to invite feedback on the draft shelter design from the refugee communities and the design was adapted accordingly.

WEAKNESSES

x **Cash-for-Work can be an inherently inefficient modality, which doesn't incentivise sharing of skills within the teams or developing improved working practices.** The team has since developed a Cash-for-Work modality that incorporates increased skills training with an element of payment-by-results, while still maximizing livelihood-generating opportunities by frequently rotating Cash-for-Work participants.

x **Limited lifespan of shelters.** Shelters were designed to be more durable than the emergency shelters that had been built previously. However, the lifespan of shelters was limited by government restrictions on the materials that could be used. Using treated bamboo for the structural elements, plus precast concrete footings will ensure a significant lifespan for the main structure, but the cladding and roof, exposed to heavy rain and intense UV radiation, will need regular maintenance.

x **Challenges to scaling up of approach.** Development of the valleys demonstrated an approach that could be applied in other areas of the camp, as part of a camp-wide redevelopment. However, the scale of the camps, funding constraints and need for government approvals, means that it's not been possible to roll it out camp-wide as yet.

LESSONS LEARNED

- **The importance of accurate risk maps for site planning and revisiting past assumptions.** This proved important not only for the obvious reason of identifying risks so as to prevent harm, but also to prevent an overly conservative approach to risks, which can cause harm in other ways. Risk maps developed in 2017/18 erred heavily on the side of caution, which is understandable considering the limited information available at the time and the urgency of the situation. In retrospect this had various negative consequences, including that the opportunity to develop valley areas was missed and fewer families could be relocated from areas that were at genuinely high risk, while more expensive and environmentally damaging strategies were pursued instead. The proposed road network across the camp followed the ridgelines (which would have required a huge amount of cut and fill, at vast cost). This was later revised to follow the valleys, in light of the revised flood modeling.
- **The importance of first-hand experience and engineering judgment.** While the revised flood modeling was important to demonstrate that the flood risk in the valley areas was low, the project team already had a high degree of confidence that the areas were safe, considering their experiences from the preceding monsoon season (cross-checked against the rainfall data from that period) and field-level engineering flood risk assessments.
- **Site Planning teams should engage closely with different sectors on the design of their facilities and to understand their technical requirements.** This can support the effective use of space and inform any necessary trade-offs and balancing between competing priorities.