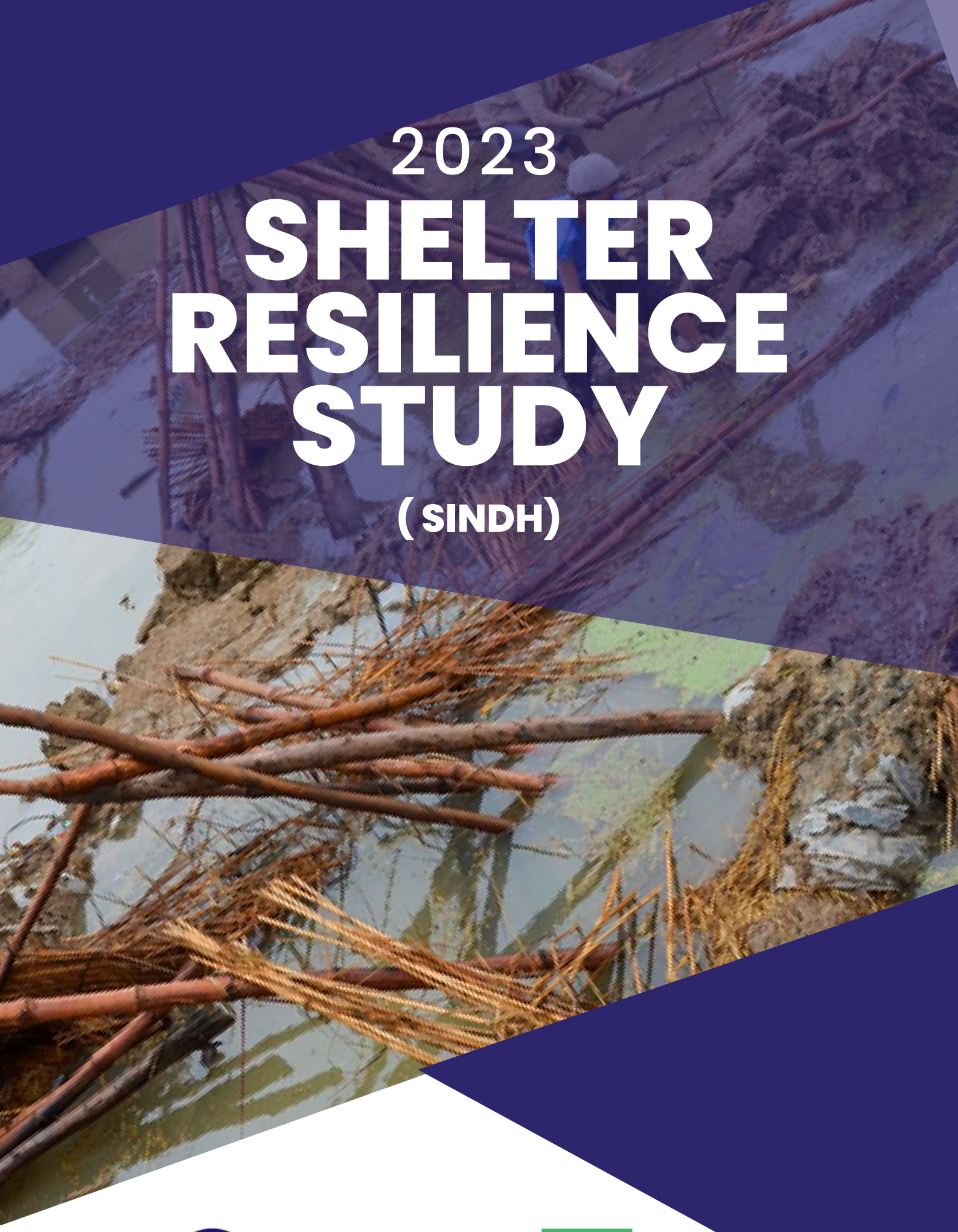
2023

SHELTER RESILIENCE STUDY

(SINDH)



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Disclaimer and Credits:

The Shelter Resilience Study, Sindh Pakistan, has been authored through the collaborative efforts of ACTED's MEAL Team, specifically the Research & Development Unit led by Ali Hassan, Manager MEAL. The study acknowledges the valuable contributions of Mr. Yousif, the technical advisor, ACTED's Engineers, Tatheer Zehra and Sobia Sheraz for their diligent work in data collection, analysis, and report preparation.

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Working in Pakistan since 1993, ACTED has extensive experience in humanitarian and relief interventions. ACTED's mission is to support vulnerable populations affected by wars, natural disasters and/or economic and social crises, and to accompany them in building a better future. The following report is based on the research conducted by the Research and Development Unit, MEAL. The study is expected to provide significant insights into the design and execution of flood-resilient shelters, as well as contribute to the development of best practices in shelter construction and resilience of communities living in flood-prone areas in the south and north parts of Sindh province of Pakistan.

The findings, conclusions, and recommendations provided in this study are based on the available information at the time of its completion. The views and opinions expressed in this study are those of the author and do not necessarily reflect the views of the ACTED.

Preamble

Pakistan is among the countries most vulnerable to "naturally induced" disasters -both climate-related and geophysical. Since 2010-2022, storms and heavy monsoon rains in Pakistan have caused widespread flooding and landslides across the country that affected 68 million people and damaged or destroyed millions of homes.

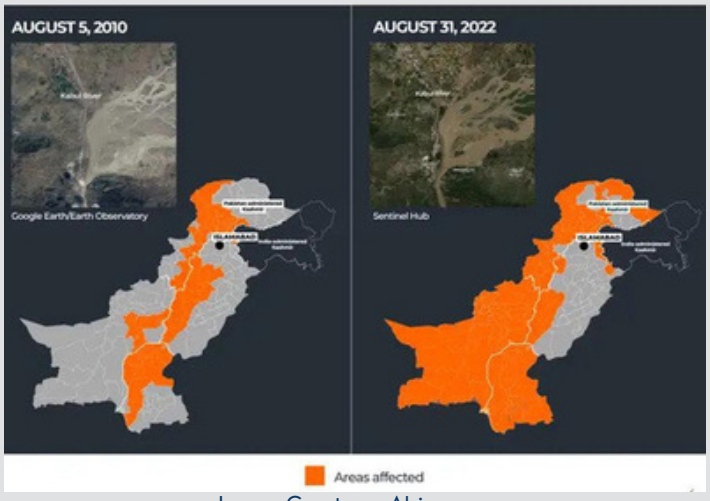


Image Courtesy: Al jazeera
mapping-the-scale-of-destruction-of-the-pakistan-floods

ACTED since the 2010 floods, seeks to build the resilience of local communities and authorities by providing them with training on community disaster risk management and infrastructure building/rehabilitation with financial support from different donors. As a result, the target communities take steps to identify recurring risks and adapt local development practices in order to mitigate their impacts. In addition, ACTED engineers oversee the integration of 'Build Back Better' techniques into the construction and rehabilitation of basic infrastructure and housing.

This study focused on a comparative analysis of the four traditional types of shelters (namely Mud Brick, Fire Brick, Loh Kat (bamboo structure) and Lime Stabilized) to ascertain their resilience and sustainability. The study aimed to examine the community's understanding of resilience techniques and recommendations for future improvement.

The tool of the quantitative and qualitative mix was designed for the study and included both Household (HH) Assessments as well as Focused Group Discussions (FGDs). The FGDs were conducted with community focal persons, the elderly and persons with special needs. 100 HHs were selected randomly for the research. Further, the sample was divided equally into four different models by using 95/10 approach and to compliment the findings, ACTED also conducted three FGDs .

The main challenge of the research was the selection of right beneficiaries and to avoid this risk the list was provided to data collection team.
Moreover, since the study was very technical, ACTED engaged engineers in data collection.

Executive Summary

The recent heavy rainfall, floods, and landslides in 2022 have caused significant damage to the housing infrastructure in Pakistan, with over 2 million homes being damaged or destroyed, making it the largest housing loss in any disaster in the region. The floods were triggered by extreme monsoon rains that started in mid-June 2022 and caused Pakistan's worst flooding in a decade. The floods affected millions of people, causing devastation and leading to the inundation of an area of approximately 38,500 km with water, which is equivalent to over twice the area of the 2010 floods. In response to these disasters, various humanitarian organizations constructed shelters in the affected regions since 2010. However, following the recent floods, a research study was carried out by ACTED, which had three primary objectives.

The first objective was to evaluate the performance of shelters constructed in different parts of Sindh in North and South from 2010-2022.

The second objective was to record the evidence-based findings of the research on flood-resilient shelters.

While the third objective was to make recommendations in a shelter guide that would inform best practices in the design and implementation of flood-resilient shelters in the province of Sindh, Pakistan.

The study aimed to develop a futuristic shelter design guide that would further contribute to enhancing the resilience of communities living in flood-prone areas in the south and north parts of Sindh province of Pakistan. The study is expected to provide valuable insights into the design and implementation of flood-resilient shelters and contribute to the development of best practices in the construction of shelters in Pakistan.

Shelter Types

Mud Brick

These shelters have mud bricks made of mud mixture (clay, sand & water) mixed with a binding material and air dried

Fire Brick

These shelters use fire bricks made in Kilns with high compressive density and thermal insulation properties

Loh Kat

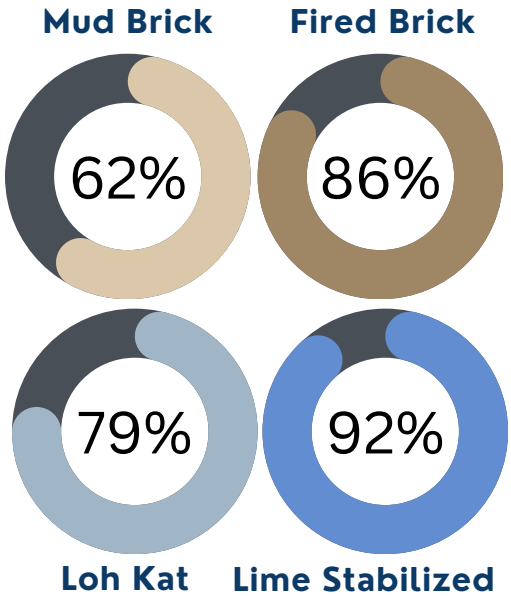
These are made of bamboo / timber frame with clay, sand & straw and can resist small scale flood events

Lime Stabilized

This technique uses lime to stabilise soil for construction, improving flood resistance and durability of shelters

Families Still Living in Shelters Constructed by ACTED

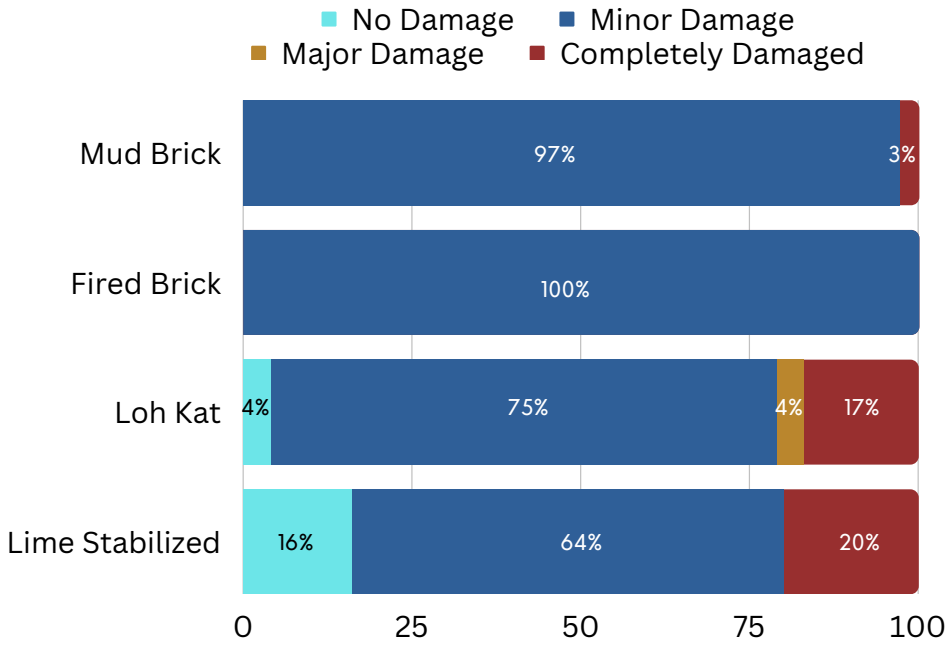
It was seen that a large number of HHs are still living in shelters built by ACTED even after the 2022 Floods. It indicates that major portion of the shelters are still usable though extent and specifics of their damage varies.



Shelter Damages - Floods 2022

Current Status of Shelters Constructed by ACTED

The study reveals that most shelters experienced minor damages due to floods. Almost 20% of Loh Kat and Lime Stabilized shelters received major or complete damage. 4% & 16% respectively of same types remained safe.



Classification of Shelter Damages

No Damage
Shelter with no damages and currently livable.

Major Damage
Shelter with damaged roof or more than 2 walls damaged partially and repairable.

Minor Damage
Shelter with minor damages (repair through plaster of walls or roof needed only and currently liveable).

Completely Damaged
Shelters walls and roof completely collapsed.

Shelters' Resilience

83.25%

Households are performing regular maintenance of Shelters

Average Lifespan of a Shelter with Normal Repairs

Mud Brick
5-6 Years

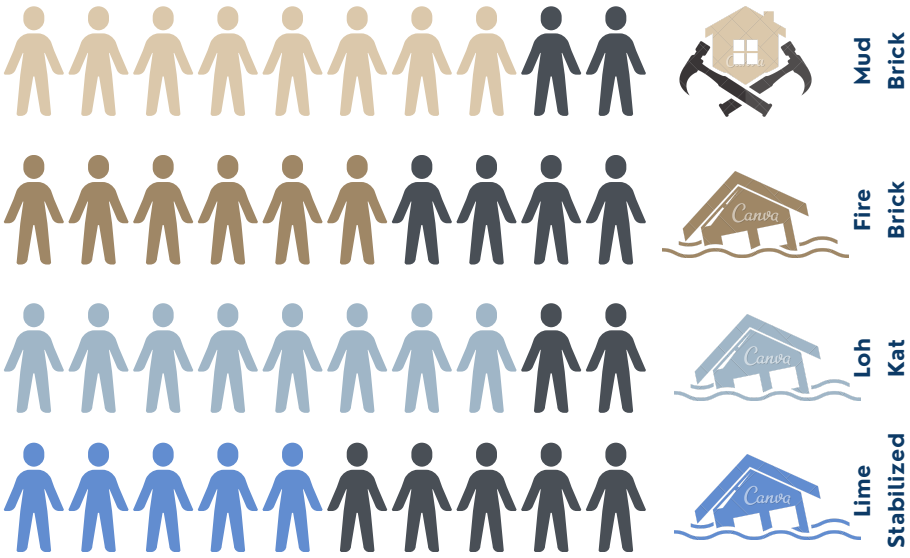
Fired Brick
10-15 Years

Loh Kat
2-3 Years

Lime Stabilized
7-8 Years

Dominant Reason of Shelter Damages

It was observed that HHs in Mud Brick shelters identified not following regular repair / maintenance as the major reason of shelter damage while HHs of all other types identified excessive flooding and shelters submerged in water being the dominant reason of damage.



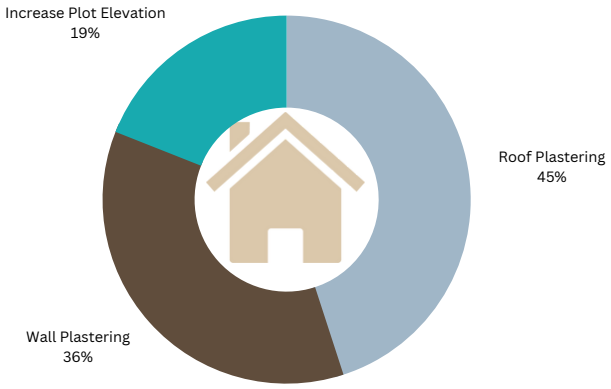
Training on Disaster Resilient Shelter

92.5%

Households were given training by ACTED on construction of resilient shelters

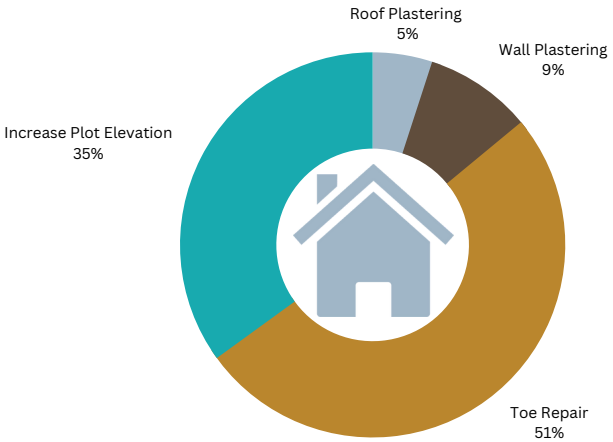
Measures to Increase Durability of Shelters

Mud Brick

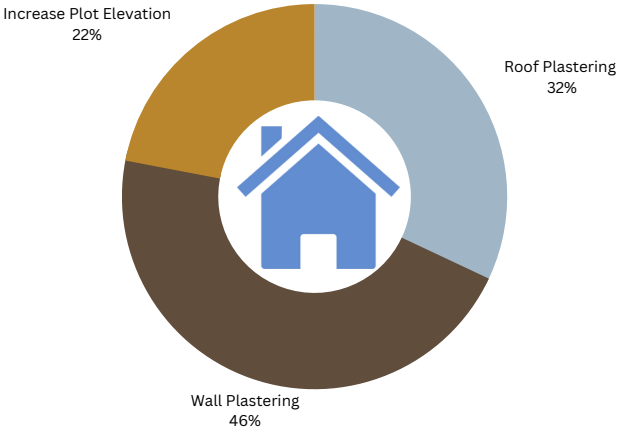


Fire Brick

Loh Kat



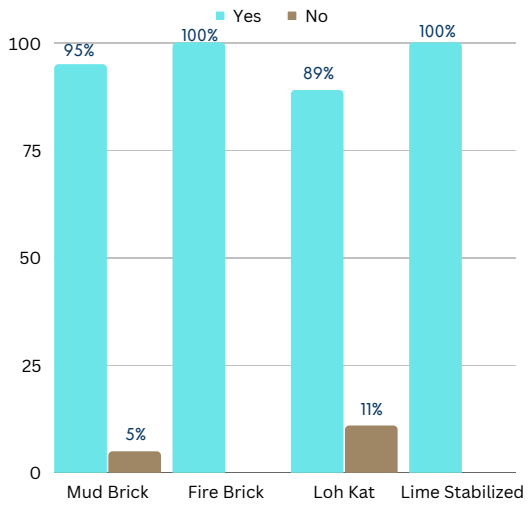
Lime Stabilized



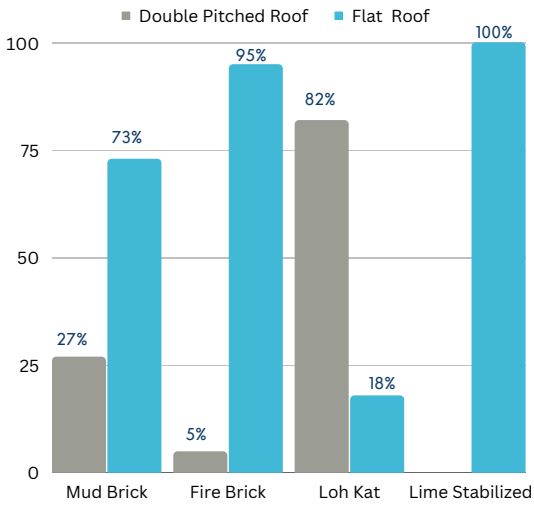
Majority of HHs were found aware of the evolving techniques to enhance resilience of shelters. However, not performing regular repair of the shelters especially plastering of roofs & walls was the overwhelming reason of damage resulting in cracks and immersion of rain water. Foundation of the shelters and low elevation of plots were observed as other weak areas which requires focus to build sustainable shelters.

Analysis of Construction Techniques

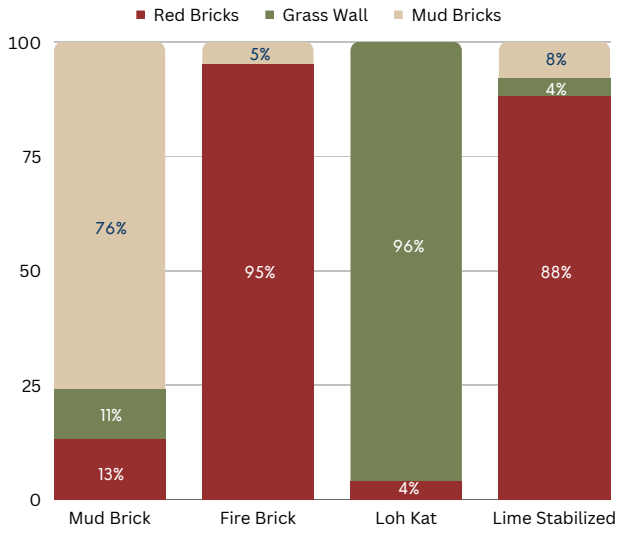
Toe Constructed at the Base of Shelter



Type of Roof



Wall Types of Shelters



Dominant Maintenance Routine

54% carry out maintenance after rains

55% follow annual maintenance routine

71% confirmed bi-annual schedule

72% perform annual maintenance

Analysis of construction techniques revealed that maximum shelters have toe constructed at the base and majority of them have double-pitched roof design. Wall types have many variations including fire & mud bricks as well as grass walls, bushes and bamboos along with mud dominantly used for plastering in villages. There are no set maintenance routines and people often follow reactive repair post rains.

Conclusion and Recommendations

It is concluded that Fire Brick and Mud Brick models were more resilient following the Loh Kat and Lime Stabilized shelters. The study shows that no major damage is observed in Fire Brick Model while the rest of the three models have experienced some percentage of major damages. However, all types suffered minor damages which indicates the need of a regular maintenance of shelters.

We hope that this study would be able to highlight the need to design more robust and resilient shelters for flood-prone areas of Sindh. It would also provide an opportunity to industry experts to come up with a sustainable and futuristic shelter design.

As per recommendations of ACTED technical team and community feedback, following measures are recommended to enhance resilience and sustainability of shelters in flood prone areas of Sindh:

- Conformance to Disaster Risk Reduction (DRR) framework while planning construction of future shelter projects keeping in view risks and vulnerabilities of current housing infrastructure.
- Appropriate site selection with maximum possible elevation in the respective area.
- Construction of raised foundation with 1.5 to 2 Ft height along with flood-resistant floor design of shelters.
- Use of flood-damage resistant materials like Lime to strengthen structural bonding and Damp Proof Course (DPC) etc. to prevent moisture in shelters.
- Use of cement with bricks instead of mud in walls and plastering.
- Guidelines for community on flood-resistant roof design with proper anchoring and drain / spout.
- Training of community to construct flood-resistant shelters.
- Fire Brick Shelters with recommended foundation, roof & walls design considerations may be a better investment than Loh Kat and Mud Brick due to its enhanced life (3 to 4 times).
- Periodic follow-up maintenance support to HHs.
- Engagement of industry professionals / architects / engineers to design cost-effective shelter design for future projects.

References

1. https://www.aljazeera.com/news/longform/2022/9/16/mapping-the-scale-of-destruction-of-the-pakistan-floods

2. Pakistan: ACTED's Emergency Flood Response and Resilient Recovery Plan - ACTED/

3. Pakistan: Flood Response Baseline Assessment - Sindh Province (October 2022) - Pakistan | ReliefWeb

4. Improved Shelters for Responding to Floods in Pakistan Phase 1: Study to Develop a Research Methodology July 2014. 61283 Study_to_Develop_a_Research_Methodology .pdf (publishing.service.gov.uk)

5. International Organisation for Migration. Flood Resilient Shelter in Pakistan Phase 2:Evidence-Based Research October 2017 https://pakistan.iom.int/sites/g/files/tmzbdl1121/files/documents/flood-resilient-shelter-in-pakistan-report_0.pdf

6. SRSO |Flood-2022

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