Last-Mile Medicine Packaging
Prototyping in Sierra Leone

Airbel Impact Lab

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Current Packaging

Cardboard cartons are used to hold medicine boxes together during transit from district medical stores to remote health facilities.

These cardboard cartons do not protect medicines from environmental factors such as temperature, humidity and water exposure.

While visibly soggy packaging indicates the penetration of water into cardboard boxes, the impact of exposure to excessive heat and humidity is neither detected nor measured.

Cartons at last-mile health facilities

Proposed Packaging

Samuel and Reginah drew inspiration from existing corrugated box patterns in other packaging industries, and designed a folding pattern that would ensure maximum strength and rigidity without permanent joinery.

They chose corrugated polypropylene structure hollow sheets for this design — a material used in transportation of vegetables and fruits. The material protects the box from moisture or wet conditions while providing high thermal insulation and compression resistance.

A render of the Karuru-Onyango Last Mile Medicines Packaging

Prototyping Journey

BUILD AND TEST

Assembled sheets into boxes + met district health authorities

Transported the original box with medicines on a motorcycle

Transported the box with medicines on a wooden boat

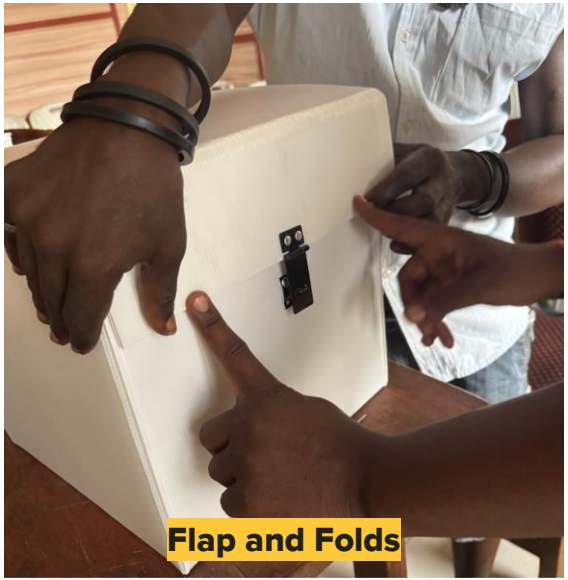
ITERATE AND TEST

Explored different forms and folds + tested seepage in a water container

Tested iterations with novice and experienced motorcycle riders

Iterated the design to improve bends and reduce gaps

Errors and Iterations | Form, Slits, Flap and Folds



Form | **Stability and Practicality**

~~1:3~~ > ~~1:1~~ > 2:3 ratio

The original form was lopsided for standard motorcycle platforms, particularly when used on smaller bikes. We explored the other extreme of a cube-like structure but this lacked stability because the rope did not secure it tightly enough during transit by motorbike.

A 2:3 width-to-length ratio provides a better fit on motorcycle platforms and is easier for people to carry.

Slits | **Addressing Water Seepage**

~~At the bottom~~ > ~~At the sides~~ > No slits

Though the box didn't soak up water like cardboard, water seeped in through the bottom slits used to secure the folds, as observed during boat testing, where internal boxes were damp. Repeated sealing weakened the slits further. We tried side slits, but the issue persisted.

We questioned whether the flaps needed to be secured at all, since the medicines inside the box naturally hold the flaps in place once filled.

Flap and Folds | **Improving Airtight Sealing**

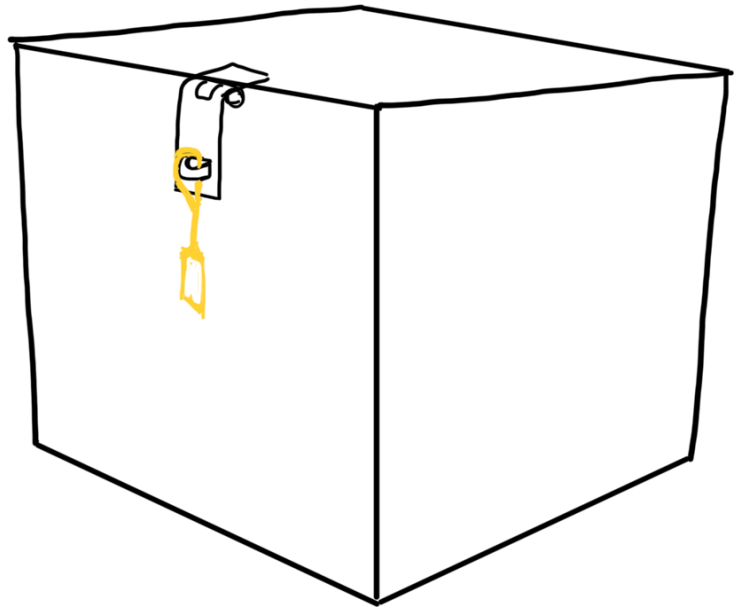
~~Flaps extended out~~ > Flaps tucked in

The flap covering the top left gaps and didn't seal properly. Attempts to modify bends for an airtight fit failed, as right-angle folds couldn't be achieved with the material. Moreover, the outward extended flap required a lock to secure the box (which may not always be available), and sharp edges posed an injury risk.

For the final design, we are switching to a thinner 2.5 mm sheet and tucking in the flap, while maintaining the hasp lock for security.

Next Steps

- from protection of medicines to protection of medicine boxes from environmental factors
- from 4 mm sheets to 2.5 mm sheets
- from a 1:1 ratio to a 2:3 ratio
- from slits at the bottom to no slits
- from flaps extended out to flaps tucked in
- from single size to 2 different sizes - medium and large



Thank you!



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