

# **Cold Box: Context**

- More than 1.5 million people globally lose their lives due to vaccine-preventable diseases each year (The Children's Hospital of Philadelphia 2014), again due in part to the lack of a health cold-chain that would deliver life-saving vaccines and other temperature-sensitive medicines to those who need it without compromising their safety and effectiveness, jeopardizing the realization of universal health.
- Estimates suggest that 25% of vaccines reach their destination with degraded efficacy mainly due to failures within the cold-chains. Logistical issues alone are responsible for 30% of all scrapped pharmaceutical products, and 20% of temperature-sensitive products are damaged due to broken cold-chains (Barrowclough 2020).
- Moreover 600 million people fall ill due to foodborne diseases, with around 420,000 of them dying annually, due in part to the lack of a food cold-chain that would ensure safety and quality of food consumed from farm to plate (Afshin et al. 2019; WHO 2022).
- Each day 25,000 people die from hunger, while the lack of effective refrigeration directly results in the loss of 526 million tons of food production annually (or 12% of the total food produced), which could feed an estimated 1 billion people (Holmes 2009, 25; IIF/IIR 2021).

# **Problem:**

Due to lack of electricity infrastructure, refrigeration of life-saving medicines and food is not often available in LMIC. Besides, vaccines, medicines and food are often spoiled by the time they reach the last mile due to long transport times. In many areas in LMIC, there is no limited to no access to the cold chain.

# **Our Innovation:**

EssentialTech is developing an efficient, off-grid mobile refrigeration solution - the ColdBox - to enable systemic change towards a healthier, economically, environmentally friendly viable cold chain for medicine, food and vaccines storage and transport. The end goal with this innovation is to support healthcare access needs and small businesses in vulnerable contexts and low resource settings.

Essentialtech's cold box relies on two aspects:

1. A refrigeration system without the use of electricity, based on adsorption cooling, using environmentally friendly material.

Sorption refrigeration systems function like classic compression refrigerators. However, instead of using electricity to function, they use low-grade heat (low temperature). Adsorption cooling consists of an adsorber, a condenser, an expansion valve and an evaporator. The adsorbent is a porous solid element which should exhibit a high capacity for adsorption with temperature variation, such as when exposed to heat.

2. Ergonomics to facilitate the transportation of the box.

The box is using Metallic Organic Frameworks (MOFs), insulation material (aerogels) and ABS plastic, injection moulded.



Source: DKSI, this is not the real picture of the Cold Box, this is a random box.

## **Your Goal:**

We want to deploy these Cold Boxes in Tanzania. Your objective is to show the positive impact you can generate with the successful deployment of these Cold Boxes as well as present a sustainable business model that ensures positive impact.