

# Design Against the Smoke

Charlot Magayi founder of Mukuru Clean Stoves

In Africa, household air pollution is linked to over 1 million deaths annually, with women and children disproportionately affected due to prolonged exposure while cooking with inefficient stoves. Determined to transform the unsafe cooking systems that trap millions of women and children in cycles of poverty and ill health, she founded Mukuru Clean Stoves, a social enterprise dedicated to reimagining cooking through safe, affordable, and sustainable design.



I am an entrepreneur, an innovator, a designer, and someone whose life has been shaped profoundly by fire. I grew up in Mukuru, one of the largest informal settlements in Nairobi. By the time I was ten years old, I had lost both my parents. At sixteen, I became a teenage mother, which meant I had to leave school in order to find a way to provide for myself and my daughter.

Like millions of women across the developing world, I cooked over an open fire. One day, when my daughter was just two years old, that fire caused a terrible accident. She was badly burned. That moment changed our lives forever.

What harmed her was not only the flames, but also a system, a system in which the poorest families have only got access to the most dangerous forms of cooking, a system where women and children breathe toxic smoke in exchange for a meal.

From that day, I resolved to change things. I founded Mukuru Clean Stoves to rewrite the script of possibility for my community. My aim was simple yet radical: to change the way people cook and to ensure that no mother, teenage or otherwise, would ever again watch her child suffer as I had.

## The Hidden Killer in the Kitchen

Cooking over open fires or traditional stoves may seem like an ordinary act, but it is in fact a silent killer. Household air pollution is responsible for around four million deaths every year worldwide,

more than HIV, malaria and tuberculosis combined. The health consequences are devastating, yet the environmental damage is equally alarming. Families relying on firewood and charcoal contribute to deforestation and climate change, all while exposing themselves to hazardous smoke.

Women and children bear the greatest burden. They spend countless hours collecting firewood, hours that could be spent studying, earning an income, or building a better life. Then they spend even more hours inhaling smoke in poorly ventilated homes. For me, design was the tool that could break this cycle.

## Design as a Lifeline

At Mukuru Clean Stoves, we asked ourselves: what if design could save lives? For us, design is about solutions that keep families safe. We chose to work with recycled metal, collected in local markets by young people, and we trained local women and youth to manufacture stoves that reduce household air pollution by up to 90%.

## Clean Energy, Driven by Women

We also repurpose agricultural waste to produce a clean fuel that does not release toxic smoke. But perhaps most importantly, we place women at the centre of everything we do. Women are not only the most affected by unsafe cooking, they are also the best placed to deliver solutions.

They build the stoves, they sell them in local markets, and they promote them within their communities. Because they understand the problem first-hand, they can advocate for the solution with authenticity and conviction.

## Tested in the Real World

A stove sitting unused in the corner of a home changes nothing. That is why we apply human-centred design. We test our stoves in model villages, alongside the very families who will rely on them. In this way we ensure the stoves meet the cultural norms, cooking styles, and everyday realities of households across Kenya and beyond. Since our founding in 2017, we have distributed over 700,000 clean cookstoves across Kenya, Ghana and Uganda. This means more than 3.5 million people are now breathing cleaner air while cooking. Reports show a 40% reduction in burns among children under five, alongside a reduced reliance on local forests. Our stoves protect not only families, but also the planet we all share.

## Recognition and Innovation

In 2022, everything changed when Mukuru Clean Stoves won the prestigious Earthshot Prize. Alongside the recognition came a £1 million award and international partnerships that allowed us to dream bigger. Out of this support grew one of our proudest innovations: the world's first mosquito-repelling clean stove. Research showed that many malaria infections occurred in the evening, just before people went to bed under mosquito nets.

By developing a stove that repels mosquitoes while cooking, we were able to link two of Africa's most urgent health issues, malaria and household air pollution, and provide a single, innovative solution.

## The Next Frontier

Our mission is not simply to replace open fires with cleaner stoves, but to change perceptions of clean cooking altogether. We are committed to designing alongside communities, respecting cultural traditions while introducing technology that saves lives. The future we imagine is one where no child grows up in a smoke-filled home, where cooking is not a health hazard, and where sustainable design is woven into daily life. Design, at its best, is not a luxury. It is a necessity. It is the means by which communities can thrive, families can remain healthy, and futures can be secured.

## Inspired by Industry

Mukuru Clean Stoves shows how design can save lives by tackling real human challenges like household air pollution. This links to the 'Inspired by Industry: Washing Machine Project', where students explore how thoughtful design can ease the burden of handwashing clothes in unsafe conditions. Together, these contexts highlight "Designing for Good".



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