

Using a pellet-based improved cookstove, India



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Scaling up clean cooking in India: What this means for nutrition, health, and beyond



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What we know:

Each day, millions suffer from inhaling hazardous smoke from inefficient, traditional cook stoves. Clean cooking solutions offer a promising alternative, emitting fewer pollutants, while being more efficient and environmentally sustainable.

What this adds:

Conventionally, the discussion around clean cooking has centred on its health and environmental benefits. This article explores some of the nutritional benefits of using improved cookstoves (ICS), such as increased dietary diversity, while highlighting additional challenges and opportunities to scaling up this practice drawing on a case study from India.

Globally, one in three individuals still rely on traditional cook stoves and/or open fires for cooking. Indoor air pollution has an impact on multiple health outcomes, including eye irritation, coughing, lung congestion, increased blood pressure, childhood pneumonia, lung cancer, and cardiovascular diseases (Kumar et al, 2023). Formaldehyde release from biomass combustion increases the risk of low birth weight, even at low levels, while use of kerosene and coal is linked to an increased risk of neonatal death (Epstein et al, 2013). Compounding this, the use of solid biomass fuels contributes to greenhouse gas emissions, deforestation, and habitat destruction (Brooks et al, 2016).

A range of clean cooking solutions, including improved biomass cookstoves, biogas/biogasifier systems, ethanol cookstoves, and liquified petroleum gas or electric stoves, are readily available (IEA, 2023). Technologies like pellet-based improved cookstoves (pellet ICS) offer advantages in areas where access to more expensive solutions such as liquified petroleum gas and electric systems is unattainable. Pellet ICS are more efficient than traditional cooking methods. They save time in terms of cooking and collecting firewood

(Jagger et al, 2019) and reduce smoke, but they also promise wider benefits. Environmental preservation, improved health, and enhanced social well-being – including opportunities for education, employment, and leisure (Jagger & Das 2018) – are all outcomes associated with this technology.

Recent studies also indicate potential direct and indirect impacts on nutrition-related outcomes (figure 1). ICS can increase dietary diversity (Anderman et al, 2015; Jada & Van Den Berg 2022) and the number of meals eaten per day (Fadly et al, 2023), and can improve the nutritional quality of food. Karanja and Gasparatos (2019) state that the consistent use of clean cooking stoves leads to a higher dietary diversity and consumption of nutritionally rich foods, thanks to easier temperature control and the ability to prepare previously avoided meals that required time-consuming preparation. Time saved on cooking and collecting firewood can lead to indirect benefits on both nutrition and well-being as women have more time for feeding and childcare activities, as well as income generating or employment opportunities (Jagger et al, 2019; Jagger & Das 2018). Freeing up time also enables girls to attend school (Karanja & Gaspara-

tos 2019), which in turn can help break the intergenerational cycle of malnutrition (Wodon et al, 2018).

Evidence also shows the potential for circular economy benefits from pellet ICS. Food waste or agricultural residues can be used as biomass feedstock, like in the case of cashew nut shells, or transformed into pellets and thus contribute to income generating activities and local employment across the clean cooking value chain (Babu et al, 2022).

Still, there are significant barriers to the successful scaling up of clean cooking technologies. For pellet ICS in particular, these include shortages of pellet production equipment and spare parts, costs of pellets compared with free charcoal or wood (Jagger et al, 2019), and cultural factors rooted in traditional cooking norms (Karanja & Gasparatos 2019). These are explored in the following case study from India.

Case study: The Clean Cooking Initiative

The Clean Cooking Initiative is a public-private partnership led by the Ecosense Appliances enterprise in collaboration with various Indian government ministries. The initiative has developed pellet ICS for rural communities that predominantly rely on traditional biomass-based cooking methods. The current pilot has reached approximately 500 households in the Indian states of Maharashtra and Gujarat. Stoves are distributed for free, while households are responsible for purchasing the pellets. To encourage pellet ICS uptake, a network of village agents has been established. Report-

ed findings in this article are based on regular household-level assessments carried out by the village agents at baseline, and then at three- and six-month intervals thereafter.

Household and individual benefits

The village of Kalsar is one of the pilot areas in Gujarat, where 200 households have received pellet ICS. Here, women traditionally travel to a nearby forest to collect firewood with their young daughters, spending up to four hours on collection. Each time, women collect up to 30–40kg of firewood, which they then carry home on their back and consume within the subsequent 3–4 days. When using pellet ICS, women reported saving up to two hours each time they collect firewood, freeing up time for other activities including (importantly) girls' education. They also reported saving up to 50 minutes per day of cooking-related time – including on the ignition of stoves, cooking time, and cleaning of utensils, kitchen walls, and floors (as pellet ICS do not emit smoke).

At baseline, almost all households in the project area reported eye irritation and coughing when using traditional cook stoves. Some women also mentioned suffering headaches. The portability of pellet ICS also allows movement inside or outside the house depending on the season, lessening the risk of these symptoms. Cooking outside with more space was also mentioned by users as being conducive to engaging the entire family in cooking. When cooking on traditional cook stoves, in a closed kitchen, it is often only women who are involved in the cooking activity. This segregation further entrenches detrimental social norms.

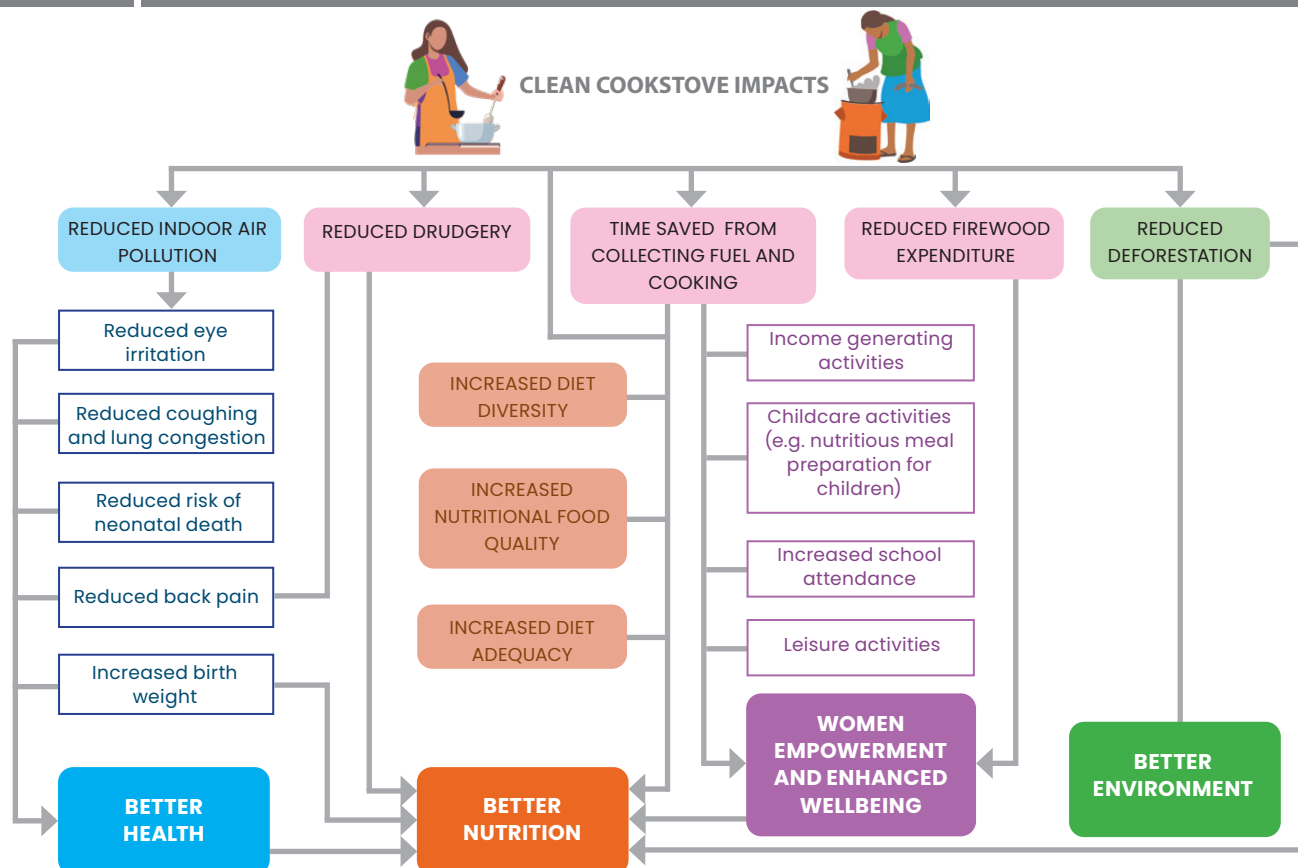
Community and environmental benefits

Babul trees grow in marginal lands around Kalsar village. They absorb ground water, creating water management challenges. The project utilised these Babul trees and agricultural crop residue to create pellets. A village-level production unit was established close to the local market, farms, and the forest to facilitate access. Around 500 kg per day of pellets are produced, creating employment for five people. By using Babul trees, broader deforestation is also limited. According to laboratory testing, each pellet ICS promoted by the Clean Cooking Initiative reduced carbon emission by five tonnes each year, along with a 60% reduction in firewood usage.

Challenges to uptake: Tradition vs. innovation

To understand the barriers rooted in traditional cooking norms in the village of Kalsar, the initiative conducted a behaviour and emotional study. The study conducted door-to-door visits of households relying on firewood for cooking to gain a better understanding of cooking practices, family dynamics, and potential financial barriers. The study highlighted the importance of several aspects to consider when promoting pellet ICS. Traditional cooking was strongly associated with preserving cultural identity and traditional tastes. On the contrary, switching to clean cooking technologies was associated with modern life and women working outside the home, which still carries negative bias in the community. Particular barriers were encountered from older

Figure 1 Pathways linking improved cookstoves to better nutrition



family members who fear changes in taste and food not being cooked properly.

“It not being our way of cooking” is a quote that captures the culture, habits, and values that oppose the new in favour of traditional practices. “The traditional cooking stove is free of cost” was another statement that was recorded, which does not account for the unpaid work that women spend in collecting firewood and cooking. This speaks to a lack of financial independence for women, who may be hesitant to ask husbands to invest in new cooking appliances for the house when the traditional method is free.

The campaign for change

To overcome these barriers, the Clean Cooking Initiative undertook a ‘campaign for change’ aimed at promoting the uptake of ICS within the community, emphasising health benefits and smoke and firewood reduction. The campaign involved various steps, from choosing community champions to undertaking promotional events during weekly markets and/or through community groups, schools, and individual visits. Some basic principles were applied: a focus on women being the change agent, including a mix of young girls through to elder women; community presence of the project team to promote familiarity and trust; product availability at a local store for purchase and after-sale services; and sustainable local production of biomass fuel as described above.

During household visits, the project team noticed that school-going children were interested in understanding the new cooking technology. As a result, they conducted demonstrations of pellet ICS in schools and gave reading material to the children to share with their parents. The project also designed a special pellet ICS to be used in a school canteen, cooking for 100 children at a time.

Lessons learned

In contexts grappling with the consequences of traditional cooking methods, the development of pellet ICS represents an important innovation. This technology brings various advantages, from saving women’s time to reducing harmful emissions and ensuring the safety of homes.



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However, traditional stoves remain popular, more often because of societal norms and emotional ties than challenges with affordability.

In this clash between old and new, the initiative has successfully used a behaviour change campaign to champion the adoption of pellet ICS. This campaign went beyond marketing the product; it discussed social behaviours and involved a wide range of groups, including school children, young women and men, married women and their husbands, and older family members. The campaign orchestrated awareness-building sessions at schools, community gatherings, and women’s homes, creating opportunities for potential users to witness the transformative impact of the pellet ICS. To increase the nutrition sensitivity of pellet ICS, additional campaigns could integrate healthy recipes when promoting cooking demonstrations.

The pellets, sourced from agricultural waste, not only contribute to reducing deforestation from the collection of firewood but also play a role in improving public health. The ash generated in the cooking can be used as fertiliser. This holistic approach forms the foundation of a social enterprise, turning agricultural residue into a valuable energy source—a true embodiment of the “waste to energy” mantra.

The initiative recognises the disproportionate impact of traditional cooking methods on women, both in terms of the physical drudgery involved in firewood collection and the adverse health effects, as well as the missed opportuni-

ties due to time constraints. This article highlights the imperative need to include women and the community at large in the design and execution of solutions for clean cooking energy access. In relation to the nutrition benefits of the use of clean cooking technologies, the following three research gaps have been identified when looking ahead. First, finding best practices on how to integrate nutrition into upscaling approaches. Second, the evaluation of impact on diet diversity, young child feeding practices, and broader nutrition outcomes. Third, the need for feasibility studies on using such technologies in institutional settings (e.g. schools). These gaps are being addressed via a collection of case studies.

For more information and to submit your best practices, visit <https://www.fao.org/in-action/global-bioenergy-partnership/programme-of-work/working-areas/bioenergy-and-nutrition/en>

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