



Reducing Emissions by Increasing the Adoption of Clean Stoves with Behavioural Change Techniques

The Cooking Problem

In Vietnam, almost half of the households use wood and agricultural residues for cooking, which has adverse consequences for especially women and children that usually collect wood and take care of the cooking. Smoke exposure from the burning of biomass severely affects health; 45,000 people die each year in Vietnam from illnesses associated with smoke exposure from traditional cooking. Wood burning contributes to global warming as well by emitting climate pollutants.

Our Response

To address this situation, EnDev (SNV) started a regional project to develop the market for Advanced Biomass Cookstoves (ABC), by improving the quality of local producers, and by introducing an innovative Results Based Finance (RBF) mechanism promoting sales through cash incentives to the seller. The level of cash incentives is established at an auction platform where the producer bid for the lowest level. Over less than three years, 33,000 stoves were sold by four producers.

Adoption Study and Behavioural Change

EnDev's challenge is not just market development but of equal importance is the functionality of stoves over time. EnDev's Cooking Energy System gives context to the stoves stack, fuels and cooks. Behavioural Change Communications have been regarded as a key component in triggering transformational change in the adoption of new technologies. The clean cookstove analysed in this study was a portable biomass-fueled top-lit updraft gasifier stove that utilises natural draft airflow.

Accordingly, a unique two-year stove's adoption study was executed by a mix-methods approach with longitudinal and cross-sectional analysis, objective data collection tools (SUMS), interviews and group discussions. Cooking time was furthermore correlated to laboratory tests that assessed total emissions.

Emissions were further factored into easy relatable Cigarette Equivalent Units (CEUs) to increase intelligence on the impacts of particulate matter and the meaningfulness of these findings.

Conceptualising and Developing BCTs

Within the realm of BCCs, and based on user feedback on functionality limitations of ABCs, Behavioural Change Techniques (BCTs) were implemented to tackle these issues, namely:

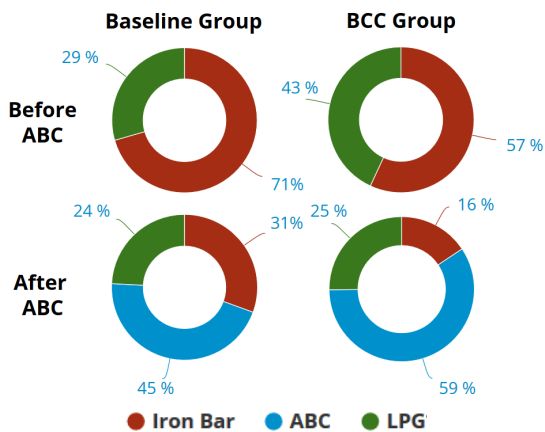
- **Shaping Knowledge:** Developing a cooking guide that illustrates the procedure to operate and maintain their ABC, as well as the benefits achieved by using it
- **Change in Physical Environment:** Introducing a stove frame allowing for cooking with larger pots and pans
- **Peer and Social Impact:** Focus Group Discussions across cooks and households members

The cooking guide aimed to simplify the know-how involved in operating and maintaining their ABC; allowing users to troubleshoot typical setbacks seen throughout the cooking process. The stove frame served the purpose of transforming the ABC into a larger-pot-friendly stove, providing support and stability. Finally, focus group discussions gave the opportunity for users to share and learn about each other's experiences.



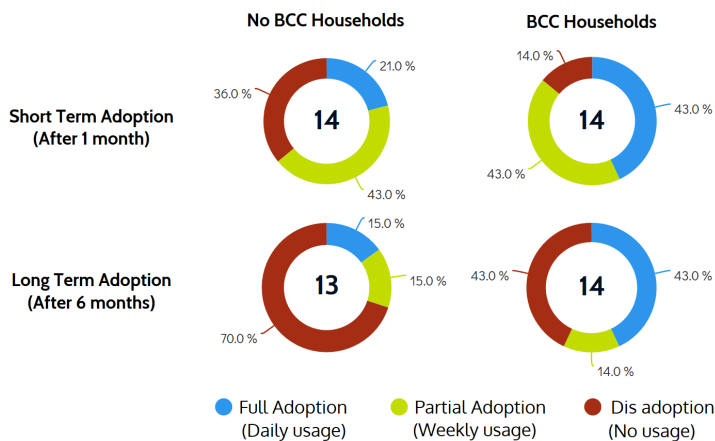
ABC Usage and Behavioural Change

Usage levels were presented for 35 households; 18 of which received the ABC alone without behavioural change (Baseline Group), while the other 17 households received an ABC and BCTs from Day 1 (BCC Group). The BCT intervention incurred a significant increase in ABC short term usage levels from 45% to 59%.



Short and Long Term Impacts

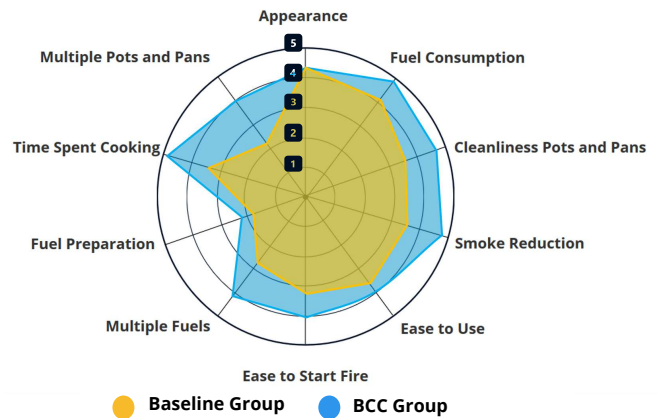
The study defined full adoption as the usage of the ABC on a daily basis, partial adoption as the acquisition and usage of the ABC at least once per week and dis adoption as the scenario in which the frequency of cooking events are below once per week or cease to occur any longer.



Short term results indicated a widespread use of clean stoves among those exposed to behavioural change (86%). Additionally, the proportion of households using their clean cookstove at least once per week in the long term was nearly twice as much in the group that received behavioural change techniques (57% vs 30%). Only 2 out of 13 households from the baseline group were still using their stove regularly on a daily basis. The stark contrast between both groups arguably suggests that behavioural change provided the conditions to sustain the adoption levels both in the short and the long term.

User Satisfaction and Willingness to Pay

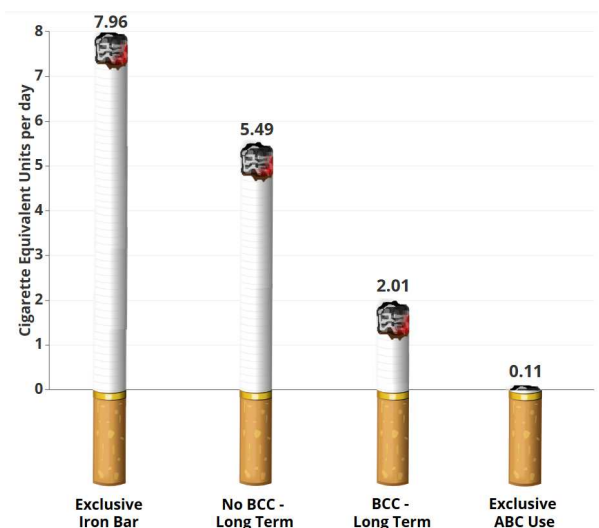
User satisfaction is a key driver for adoption in the short and long term. From high satisfaction (5) to low satisfaction (1), the study showed significantly higher scores among those who were given BCTs compared to the baseline group; explaining the observed higher adoption rates.



Furthermore, users exposed to behavioural change, not only had a better experience with their clean cookstove (increased satisfaction) but also had a higher willingness to pay for their stove (\$8.3 USD) compared to the baseline group (\$4.8 USD).

Emissions and Cigarette Equivalent Units

Field work data on cooking patterns and behaviour, and emission readings from laboratory testing, showed that cooking events in households with behavioural change led to 61% lower PM emissions inhaled by cooks (2.01 CEUs per day) when compared to baseline households (5.49 CEUs per day) and 75% lower PM emissions inhaled than households exclusively using the traditional stove (7.96 CEUs per day). Fully replacing the traditional stove with a clean cookstove, based on the observed cooking patterns, would yield reductions of 98% in PM emissions inhaled (0.11 CEUs) on a daily basis.



The **results of BCT-based strategies are promising**. Clean cookstove users, who received behavioural change, showed higher satisfaction and usage levels compared to those who did not receive them; leading to lower smoke levels and cigarette equivalent units.

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