

The 4th Biennial Partnership for Clean Indoor Air Forum



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Berkeley Air Monitoring Group

At Berkeley Air Monitoring Group, our mission is to protect global health and climate by providing high quality, scientific monitoring and evaluation of appropriate household energy technologies and approaches in less developed countries. We are a social venture based in California, USA, currently working on projects to measure indoor air pollution, fuel use and/or stove emissions for household energy programs in Asia, Africa and Latin America. We have field-tested biomass rocket and gasifier stoves, insulated charcoal stoves, and cleaner fuels. Our results have helped partners obtain grant funding and carbon financing.

Monitoring & Evaluation of the Shell Foundation's Breathing Space Programme (BSP) in South India



Objectives

- Enable BSP to assess progress in meeting its mandate to achieve a material, verifiable, long-term reduction in the incidence of indoor air pollution in order to produce health and socioeconomic benefits among biomass stove users by:
 - Measuring the potential of Shell Foundation-sponsored stoves to reduce health-damaging air pollution in rural homes in the short (1 month) and medium (6 months) term; and
 - Estimating fuel savings and assessing household members' attitudes towards and acceptance of the new stoves

Background Information

- Monitoring of three types of rocket stoves with clay liners (single pot, double pot, double pot with chimney) in two Indian states (Tamil Nadu, Karnataka)
- Measuring changes in indoor air pollution levels in kitchens when traditional mud stoves were replaced with Shell Foundation-sponsored stoves
- Households used primarily wood or agricultural waste for fuel

Methods

- Stove type was matched to traditional stove used in each household (60 households in total)
- 24-hour monitoring period; households asked to cook a typical day's worth of food
- PM_{2.5} kitchen concentrations measured with UCB Particle Monitor, TSI DustTrak, pump/filter system
- CO measured with HOB0 CO Logger
- One-day kitchen performance test to measure fuel use
- Questionnaire on cooking activities and perceptions after each monitoring period

Results

Adoption

- After 6 months, 96% of users reported that the improved stoves saved fuel, while 78% said cooking times were shorter
- 85% of households said they would adopt the improved stove as their primary stove

PM

- For all households, the average reduction in 24-hour concentrations was 66% in first 'after' monitoring, and 50% in 6-month follow-up
- Significant or nearly significant reductions in all subcategories except single pot stoves in Tamil Nadu

CO

- For all households, the average 24-hour concentrations were 42% and 41% lower in the first and second 'after' phases, respectively; although no significant change for single pot stove subgroup
- Maximum 15-minute, 1-hour and 8-hour averages all decreased about 40% for all households (34-37% single pot, 26-46% double pot, 65-72% chimney)

Comparison to World Health Organization (WHO) Guidelines

- 93% of households (52 of 56) met the 15-minute WHO CO Guideline of 90 ppm, 57% met the 1-hr Guideline of 25 ppm, and 77% met the 8-hr Guideline of 9 ppm
- While PM_{2.5} concentrations decreased significantly, levels remained 3 to 8 times higher than the WHO interim guideline of 75 µg/m³ (24 hr mean) as would be expected for rocket-style stoves

Next Steps

- IAP efficacy field testing of new stove products as BSP develops improved models (2009-10)
- Testing in additional geographical areas as BSP expands distribution to North India and beyond (2010-11)
- Comprehensive fuel-use evaluation with 3-day Kitchen Performance Tests (2009)
- Field assessment of socioeconomic status and health symptoms (2010)



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