Social Factors Influencing Uptake of Solar Fuel Technology in Refugee Camps; A Case of Kakuma Refugee Camp in Kenya.

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INTRODUCTION
Most refugees in camps use firewood for domestic fuel needs, but it’s usually scarce. In Kakuma, refugees resort to cutting down vegetation to meet fuel needs, or barter their meagre food rations for charcoal. Others burn plastic jerry cans, with serious harmful effect not only to environment but also their nutritional and health status. Many solar fuel projects have been initiated in the camp since 2000 but solar fuel adoption has remained paltry and not as remarkable as anticipated. Why?

This research, done in Nov. 2016, investigates social factors influencing uptake of solar fuel projects in Refugee Camps - a case of Kakuma Refugee Camp.

FUEL TYPES MOSTLY USED BY REFUGEES
Charcoal, is the most preferred option due to its:
- Speed of cooking;
- Ability to cook all types of foods;
- Flexibility;
- Non-effect on taste;
- No need for training; Availability.

Other alternatives are firewood, solar, gas & kerosene.

Solar fuel: this is the 2nd most preferred option at 33.8%.

Why solar fuel is preferred:
- It's Clean, doesn’t smoke, emit soot or blacken cooking pots.
- Time saving and safety aspects; trips avoidance, no need for women to venture into bushes.
- Unlimited, cheap, renewable: environmentally friendly.

Issues mentioned as solar fuel's drawbacks:
- Lack of O&M follow-up - 99% of kits not working, 84% burnt down; 11% were stolen, 5% swept away by floods/blown away by Kakuma strong winds;
- Inability to use; indoors, for large households;
- Inability to cook all food types;
- Slow cooking;
- Method not suitable to use indoors;
- Safety and security challenges while using the kits;
- Low beneficiaries participation and awareness.

SOCIAL DETERMINANTS & SOLAR FUELS
1. THE GENDER THAT COOKS
Most of cooking is done by women and girls (85%). Men take up only 10% of domestic cooking, majority (55.6%) preferring solar fuels to other substitutes, compared to women 29.8%.

Pearson’s Chi-square p = 0.029, thus there is a significant association between gender and the most preferred fuel type.

2. MARITAL STATUS:
Most refugees with using solar fuel were married (72.1%). However no significant association between marital status and solar fuels adoption as Chi-square p-value = 0.58.

3. HOUSEHOLD SIZE:
The largest household has 15 pax. From Chi-square there was no significant association between household sizes and solar fuels adoption.

4. AGE:
Over 98% of Kenya’s refugee population fall below 60 years (UNHCR, 2016). However data showed no significant association of age and solar fuel preference.

5. PREFERRED PLACE OF COOKING:
Cooking is mostly done indoors. Only 38% of cooking was taking place outdoors, while 62% of beneficiaries said they find problems cooking outdoors because of insecurity, harsh weather conditions, fear of poisoning and stinging insects and animals - spiders, scorpions and snakes. Some prefer cooking in an enclosed place; room for privacy. This would therefore be a disincentive to solar fuels since cooking with sun must take place outdoors under sunshine.

6. TIME FOR COOKING:
the data showed no significant association between preferred cooking time and the solar fuel adoption as p-value = 0.05.

7. SECURITY AND SAFETY:
Almost half of respondents suffered some form of insecurity or injuries related to solar fuel use. A third reported thefts of their cooking kits while 10% talked of loss of taste on food. These are a huge disadvantage to users on solar fuels. Over 2/3 highlighted health problems like eye irritation and respiratory problems, from use firewood.

However Chi-square p = 0.554 thus no association on security issues and solar fuels acceptance.

9. BENEFICIARY PARTICIPATION
About 3 of every 4 beneficiaries said they were never involved in development of solar fuel projects. About 25% reported having some form of participation, and were observed to have a higher rating of solar fuels compared to those who hadn’t. Chi-square gave p-value = 0.114, meaning that there is a strong association between beneficiaries’ participation and solar fuels adoption.

9. EDUCATION LEVEL
Solar fuel preference was higher among respondents with secondary/post-secondary schooling. The Chi-square p = 0.016 indicated a significant association between beneficiaries' education level and solar fuels preference in Kakuma camp.

CONCLUSION & RECOMMENDATIONS
It’s interesting to note that Solar Fuel is the 2nd most preferred fuel by refugees after charcoal. Socio-cultural issues influence solar fuels adoption.

1. FIRE PLACE: Reluctance by beneficiaries to cook outdoors in daytime retards the solar fuels adoption. Fireplaces is an important social venue in Kakuma. A more efficient and a wider use could be achieved by user sensitization to vary cooking times and place.

2. GENDER: A higher percentage of men than women prefer solar fuels compared to other alternatives. However, few men participate in domestic cooking, thus making the adoption gets suppressed. Advocacy at community level would be useful to promote the adoption of the fuel.

3. BENEFICIARY PARTICIPATION & O&M
One way to generate solar fuel renaissance and counter community resistance, in a culturally-embedded practice like cooking, is by direct user involvement. Inadequate user contribution, limited O&M, lack of follow-up and user training were found to have significant an adverse affect on solar fuel adoption. A new technology can't be introduced overnight, thus a sustained financial, time and human resources are needed to raise awareness amongst users on use. A dedicated Kakuma-based agency to train and follow-up on O&M would helpfully to churn refugees for solar fuels. Community leaders and refugees who have displayed dedication to behavioral in embracing solar energy would be ideal to start with to show that solar fuels work as well as other fuel types.

4. LEVEL OF EDUCATION: Additional years of schooling above secondary level showed a higher refugee acceptance of solar fuels compared to others. Education creates awareness, eliminates stereotypes and can serve as a catalyst in promoting gender parity in household roles. It also reduces negative perceptions and distortions on solar fuel use. More education and enlightening refugees on the cost, greener fuel is needed to spur its adoption.