

Benefits of Nonpolluting Cookstoves on Maternal Child Health in Haiti

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Nonpolluting stoves are of great interest in Haiti due to health and environmental degradation created by charcoal production and wood-burning cookstoves. Incomplete combustion of wood produces soot, a microscopic black particle that causes several health problems. Women and children have the highest soot exposure. Soot pollution causes low birth weight, perinatal mortality, acute and chronic respiratory and eye diseases. Use of nonpolluting stoves such as ethanol, biogas and solar ovens prevents domestic indoor and outdoor air pollution. Such use can help stop exposure to toxic fumes, provide business opportunities, allow more family time and reduce the cutting down of trees.

In a study of five women in the southeast Haiti commune of Côtes de Fer, the women used two bio-digesters and five solar ovens in place of wood and charcoal cookstoves. They reported that they coughed less at night and their eyes were not burning or red. They also spent less money on cooking fuels and did not have to spend time searching for wood. One woman used her solar oven to bake cakes to sell and increase profit. Nonpolluting cooking technologies have been proved to be effective in other developing countries. Larger studies will be needed to examine use and acceptability in Haiti of various cookstove technologies on a broader scale, including their affordability. This would involve introducing technologies, teaching their use, documenting use in cooking and recording results in relation to changes in health. We hypothesize that adoption of new cooking-fuel technologies by Haitians will protect their health and prevent Haiti from harmful environmental disasters.

Introduction

More than 90 percent of households in Haiti use wood or charcoal to cook their meals, and these types of cooking fuels emit high amounts of greenhouse gas emissions; they also create climate change and pollutants such as soot that affect health. The high rate of wood consumption leaves a landscape devoid of trees and their environmental benefits. Haiti's depletion of tree cover exacerbates the consequences of storms and hurricanes. A majority of hurricanes and storms in the Caribbean strike Haiti. We hypothesize that adoption of new cooking-fuel technologies by Haitians will protect their health and help prevent avert environmental disasters.

Cooking Fuels



Families are caught in a poverty-disease-deforestation trap from traditional cooking with charcoal and wood



Charcoal production ruins health and the environment



SUNLIGHT Absorbed by **SOOT**

Traditional cooking methods contribute to global warming



Traditional cooking methods are a major contributor to environmental degradation.

Soot is a microscopic black carbon particle (black smoke) produced by incomplete combustion of biomass such as wood, charcoal and garbage. Soot pollution causes low birth weight, perinatal mortality, cancer, acute and chronic cardiopulmonary and eyes diseases. As per the global alliance for clean cookstoves, “it is estimated that each year in Haiti, over 8,000 people die prematurely due to illness associated from cooking with solid fuels.” Women and children are most affected because women do the daily cooking.

Nationwide deforestation, especially of a mountainous country such as Haiti, has led to flooding, dramatic rates of soil erosion, and consequently declines in agricultural productivity.

The way to attack these problems is to empower the Haitians with knowledge that traditional cooking fuels are destroying their health and the environment. They also need to be aware of new alternatives to cooking fuels such as ethanol, solar and biogas.

Small Pilot in Commune Côtes de Fer Haiti

In January 2017, we conducted a small pilot study in the commune of Côtes de Fer, in the southeast of Haiti, using two nonpolluting cookstoves. The research focused on the experience of using five solar ovens for solar cooking and two bio-digesters for biogas cooking. Both a solar oven and a bio-digester were used in part for commercial purposes in a small restaurant in the city of Côtes de Fer. The pilot was conducted in collaboration with Konbit pou developman Commune Côtes de Fer, www.kdck-cdf.org (KDCK), Public Private Alliance Foundation, www.ppafoundation.org (PPAF) and Solavore, www.solavore.com

Sport solar oven



Solar cooking session

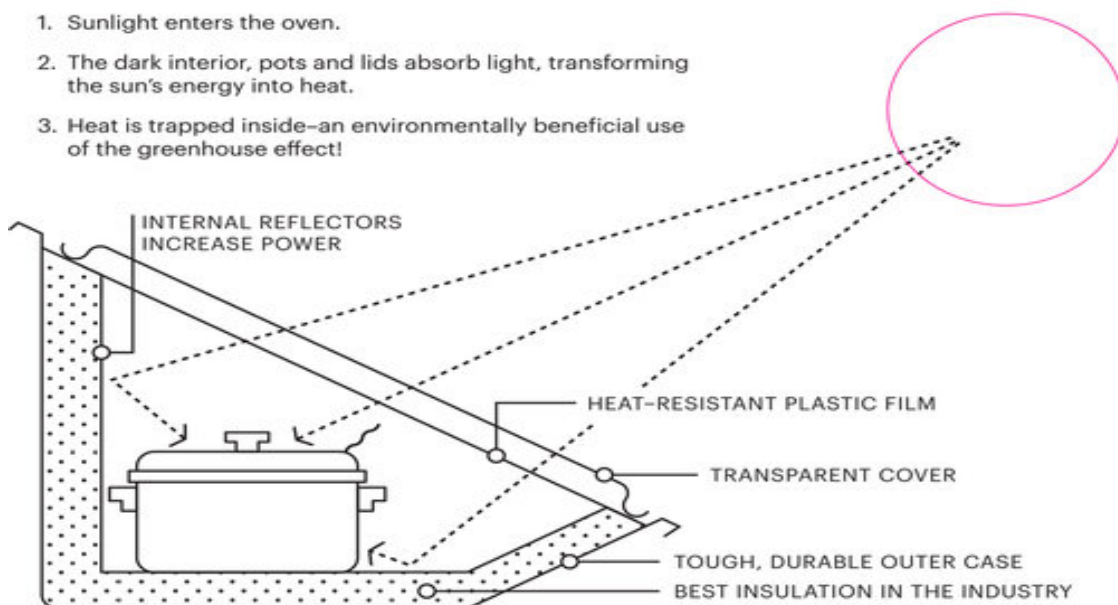
We provided solar cooking seminars, and during conversations we could hear the urgency in the voices of people attending. They are asking why we can have technologies like this all over the country to protect us from health and environmental disasters. Charcoal is expensive and wood is disappearing. The essential goal is to empower them with knowledge of new technologies and skills to solve their environmental issues and protect their health. The solar oven is easy to use and means savings on the price of fuel for cooking daily meals. It can pasteurize drinking water and its use prevents smoke inhalation from cooking fires. As charcoal will not be needed, deforestation will come to a halt. The progress to cleaner and more efficient cooking stoves and fuels will move Haiti toward sustainable cooking solutions.

Solavore Sport Oven with reflector, two pots and thermometer



HOW THE SPORT WORKS:

1. Sunlight enters the oven.
2. The dark interior, pots and lids absorb light, transforming the sun's energy into heat.
3. Heat is trapped inside—an environmentally beneficial use of the greenhouse effect!



Bio-digester for methane gas



Bibine and Charles standing by the bio-digester close to the kitchen

How does it work?

Anaerobic digestion is a process whereby organic biological waste, such as that produced by pigs and cows, can be converted into a gas rich in methane (CH_4) in a container that does not allow air intake. It is a combustible gas that burns with a pale-blue flame, provides good heating power and is the perfect replacement for oil, propane gas and wood.

The organic fertilizer, or effluent, is a viscous material containing small amounts of nitrogen, potassium and phosphorus as essential trace elements for the development of plants. Bio-digesters can contribute to the restoration of land degradation by providing fertilizer and irrigation to grow trees. The farmers were educated in the construction, use and management of bio-digesters.

Benefits of Nonpolluting Stoves on Maternal Child Health in Haiti

The focus of our research is on women, adolescent girls and children, as they are the most affected. In developing regions reliant on biomass, women and children are responsible for cooking and fuel collection, a time-consuming and exhausting task. They are taught to take their skills and knowledge to their families and communities to change the cooking fuels in Haiti. Our goal is to stop women and children from exposure to toxic

fumes, provide business opportunities, and allow more family time, reduce cutting down of trees, prevent global warming, and protect maternal and child health. We distributed questionnaires on documenting and reporting for two cooking methods: Biogas and solar oven.

Questionnaire, Solar Oven (SO)

1. How often do you use your solar oven?
2. Do you feel it's easy or hard to use?
3. What do you cook in the SO? What do you bake?
4. How long does it take to cook or bake in the SO?
5. Does solar cooking change the taste of the food? If so, do you like it or not like it?
6. Does it take longer or the same amount of time as the conventional ovens or stoves? If longer, how much and how do you feel about it?
7. How much time and money do you save daily using the SO?
8. How much money do you save daily on charcoal usage?
9. Do you or a family member suffer from eye and breathing problems?
10. If so, have you noticed any health improvement since you have been using this new technology?
11. What do you like or dislike about the SO?
12. Do you think the SO will prevent you or other Haitians from cutting down trees for charcoal? What is soot?
13. Are you aware that soot causes global warming, low birth weight, perinatal mortality, cardiopulmonary and eyes diseases, and even cancer?
14. Would you like to stop producing soot?
15. Would you like to protect Haiti against natural disasters?
16. Are you ready to change cooking fuels in Haiti?
17. Would you most likely continue to use the SO for cooking?
18. Would you most likely stop using the SO for cooking?

Questionnaire, Bio-Gas (BG)

1. How often do you use your bio-gas cooker?
2. Do you feel it's easy or hard to use?
3. What do you cook in your bio-gas cooker?
4. How long does it take to cook using the bio-gas cooker?
5. Does bio-gas cooking change the taste of the food? If so, do you like it or not like it?
6. Does it take longer or the same amount of time as the conventional ovens or stoves? If longer, how much and how do you feel about it?
7. How much time and money do you save daily using the bio-gas cooker?
8. How much money do you save daily on charcoal usage?
9. Do you or a family member suffer from eye and breathing problems? If so, have you noticed any health improvement since you have been using this new technology?
10. What do you like or dislike about the bio-gas cooker?
11. Do you think the bio-gas cooker will prevent you or other Haitians from cutting trees down for charcoal? What is soot?
12. Are you aware that soot causes global warming, low birth weight, perinatal mortality, cardiopulmonary and eyes diseases, and even cancer?
13. Would you like to stop producing soot?

14. Would you like to protect Haiti against natural disasters?
15. Are you ready to change cooking fuels in Haiti?
16. Would you most likely continue to use bio-gas for cooking?
17. Would you most likely stop using bio-gas for cooking?
18. Do you use the digester's effluent for your plants? If you do, what changes in growth and color of the plants do you notice?
19. Which by-product from the bio-digester is most important to you, the effluent or the methane gas?
20. Why?

Reports

1. One woman reported her son coughed less at night and her eyes were not burning or red.
2. All five women stated that they spent less money on cooking fuels.
3. The children did not have to search for wood.
4. The woman restaurant owner used her solar oven to bake cakes for sale and increase profit. She also said that the oven keeps her food warm and fresh, decreases waste and increases profits
5. All five women stated that they would purchase these new technologies, and so would their friends and families.
6. One farmer said that the effluent from the bio-digester makes his plantain trees stronger and greener.

Nonpolluting Cooking Technologies

Nonpolluting cooking technologies have been proven to be effective in other developing countries. Modern cooking-fuel solutions are the most appropriate way to reduce environmental degradation, health risks and time loss suffered by women and children in Haiti. However, larger studies will be needed to examine usage and acceptability, including their affordability in Haiti.

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