

The Vanuatu Cooking Project:

Developing a Toolkit to Combat Smoke: The Killer in the Kitchen

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Smoke: the Killer in the Kitchen

At first glance, the Western eye may see activities of daily living in developing countries as healthy, pure, and natural. Few things could be further from the truth. The World Health Organization (WHO) estimates that 1.6 million people, mostly small children, die each year from diseases brought on by inhaling smoke from indoor cooking fires. This death toll translates to one death every twenty seconds. This is a greater number of deaths than those caused by malaria and nearly as many as those caused by unsafe water and poor sanitation.

Exposure to indoor smoke affects women and small children far more than other sectors of society. Women typically spend hours per day by the fire, often with their young children present. They are subjected to noxious fumes at concentrations that are up to 500 times the internationally accepted levels. The amount of smoke that is inhaled from these indoor cooking fires is equivalent to smoking two packs of cigarettes per day.

Particulate matter, chemicals, and other noxious compounds from smoke make lungs vulnerable to disorders such as **acute lower respiratory infections**, like pneumonia (one of the world's greatest killers of children under the age of five), **chronic obstructive pulmonary disease**, like chronic bronchitis, and even **lung cancer**. In addition, there is evidence to link exposure to indoor smoke and increased risks of **asthma, tuberculosis, low birth weight and infant mortality**, and **cataracts**.

In the rural areas of Vanuatu, nearly all families cook on indoor fires. There is also an unusually high incidence of **Chronic Obstructive Airways Disease** (bronchitis, emphysema) in Vanuatu, particularly in women. In the West, COAD is attributed to cigarette smoking. However, cigarette smoking among rural women in Vanuatu is virtually nonexistent. This suggests that exposure to indoor smoke is a contributing factor in the respiratory problems in Vanuatu.

Reducing Exposure to Indoor Smoke

However, as dangerous as indoor smoke is, there are ways to reduce one's exposure to it. There are interventions at the source of the smoke, modifications to the kitchen environment, and changes in the behavior of the end users which could all reduce the health risks of exposure to indoor air pollution. These solutions needn't be expensive or high tech. Some examples of these include: cooking on cleaner fuels, reducing smoke volume by using dry (seasoned) fuel, getting smoke out of the house through the use of smoke hoods and/or chimneys, improved ventilation in the kitchen (windows, etc.), using pot lids while cooking, and keeping children out of smoke. The following table came about as a result of a study on indoor smoke and ways to reduce it that was commissioned by the World Health

Organization (WHO) and the United States Agency for International Development (USAID.)

Source of smoke	Living environment	User
<p>Improved cooking devices Chimneyless improved biomass stoves Improved stoves with chimneys</p> <p>Alternative fuel-cooker combinations Briquettes and pellets Charcoal Kerosene LPG Biogas Producer gas Solar cookers (thermal) Other low smoke fuels Electricity</p> <p>Reduced need for fire Efficient housing Solar water heating</p>	<p>Improved ventilation Hoods/fireplaces Windows/ventilation holes</p> <p>Kitchen design and placement of stove Shelters/cooking huts Stove at waist height</p>	<p>Reduced exposure through operation of source Fuel drying Use of pot lids Good maintenance Sound operation</p> <p>Reductions by avoiding smoke Keeping children out of smoke</p>

Table 2: Potential interventions for the reduction of exposure to indoor air pollution.⁵³

Finding Appropriate Solutions

Simple, low-cost solutions are available. However, a technical fix alone is not the answer. Cooking is a deeply cultural and personal task and communities themselves, particularly the women, must be directly involved in developing solutions that suit their circumstances.

1) Getting Smoke Out of the House

Substantial reductions in smoke exposure can be achieved through the use of smoke hoods, eaves, and improvements to ventilation such as adding windows.

2) Cutting Smoke Volumes

Improved stove designs can greatly reduce the volume of smoke. Using dry fuel wood will drastically decrease the amount of smoke produced by the fire.

3) Changes in Behavior

Simple changes in the way the cook cooks can have a significant impact on exposure to smoke. Using a pot lid while food is cooking can reduce emissions by almost half. Keeping children away from the fire is an obvious way to reduce their exposure to smoke. However, this may not be as easy as one might think. Cooking outdoors, when conditions allow it, should reduce exposure to smoke.

Using solar cookers, hay boxes, and vacuum bottles where possible could make a major impact on smoke in the home.

4) Cooking on Cleaner Fuels

The most effective way to reduce exposure to indoor smoke is to switch to cleaner fuels. Kerosene is the most common clean cooking fuel in the developing world. Switching to a cleaner fuel may not be a viable solution for many people, however, the benefits are great for those who are able to switch.

Coconut oil: Vanuatu's Cleaner Fuel

All vegetable oils could potentially be used as fuels. However, due to the differences in structure, plant oils have very distinct chemical, physical, and combustion properties. A few are well suited to be used as fuels, others not so much. Coconut oil has properties that make it an excellent candidate for use as a cooking fuel. While kerosene is a hydrocarbon and coconut oil is a triglyceride, coconut oil can be made to behave similarly to kerosene through processes such as esterification, transesterification, saponification, and others. There are also fairly simple processes like filtration and blending with small amounts of kerosene that will improve the effectiveness of coconut oil as a cooking fuel.

Further, many of these processes can be performed in a suburban, or even rural, context. This means that in addition to providing a much healthier living environment, switching to coconut oil based fuel for cooking could have economic benefits as well. These benefits include fostering local coconut fuel industries which would generate employment and income opportunities and help to revitalize a sagging coconut industry. These health and economic benefits could greatly improve the quality of life for the rural population of Vanuatu.

Project Objective and Goals

The primary objective of this project is to develop healthier kitchen environments and cooking practices. In so doing, the project will look primarily at:

- Developing cleaner, coconut oil based cooking fuels.
- Raising awareness of solar cooking.
- Finding ways to reduce the volume of smoke and ways of removing smoke from the house.
- Raising awareness of the problems associated with the exposure to indoor smoke.
- Liaise with relevant stakeholders to facilitate the dissemination of this information.

Project Activities

Vanuatu Renewable Energy and Power Association (VANREPA) will develop and test several coconut oil based cooking fuels that will function well in existing kerosene pressure stoves. VANREPA will also experiment with different types of wicks and will try to improve the wicking properties of coconut oil through various means so that it can be used in wick-type lamps and stoves.

VANREPA will also develop a “toolkit” of other ways to minimize exposure to indoor air pollution. This “toolkit” will consist of a number of interventions, including:

- The production of educational and awareness raising materials so that people are aware of the problems associated with exposure to indoor smoke.
- The design and production of training materials on solar cooking.
- Techniques to reduce the volumes of smoke and to remove the smoke from the kitchen.
- Identify behavioral changes that could result in reduced exposure to indoor smoke.
- Develop strong, strategic alliances with stakeholders including Wan Smol Bag, U.S. Peace Corps, and the Ministry of Health to facilitate the dissemination of this information.

Beneficiaries

The entire rural population of Vanuatu stands to benefit from this project. In fact, this project could have an impact on rural families far beyond the borders of Vanuatu such as the entire Pacific region.

Benefits to Women

Women are the primary beneficiaries of this project. Exposure to indoor smoke affects women and small children far more than other sectors of society. This is due to the fact that in Vanuatu (and perhaps most of the developing world) cooking is done almost exclusively by women.

Young children are also at risk because they spend most of their time with their mothers. The impact smoke has on young respiratory systems is compounded by several factors such that children absorb pollutants more readily than adults and retain those pollutants in their systems for longer.

Exposure to smoke is not the only impact that the cook fire has on women. Women carry the bulk of the burden for gathering firewood for the family. The time cost for this task is huge, not to mention the physical toll it takes as families typically use more than two tons of firewood per year.

Project Budget

Materials:

Coconut oil extracting equipment	78,000 vatu
Processing equipment	540,000 vatu
Supplies (coconuts, methanol, lye, etc)	385,000 vatu
Overseas Shipping	67,000 vatu
Technical Support and Assistance	1,360,000 vatu
Administrative Support	245,000 vatu
Grand Total	2,675,000 vatu