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Assessment of Household Air Pollution in Paraguay.

Summary Report

For the past few decades the air pollution has been deteriorating in many cities across the world, and countries in Latin America are not an exception. The historically polluted metropolis of São Paulo, Santiago and Mexico City, are being surpassed today by the capitals of Guatemala, Honduras and Peru, where urban development and dirty air have gone hand in hand.

In Latin America and the Caribbean at least 100 million people are exposed to air pollution above the World Health Organization's (WHO) acceptable levels. Air pollution is continuing to rise at an alarming rate, and at the same time, the awareness is rising more and more in several countries, which are now surveilling their air quality. This is the case of Paraguay that recently adopted legislation in order to control the poor air quality and to protect the public from the health effects of polluted environments.

The first time I visited this country was the winter of 2014, with the mission of supporting environmental authorities in the process of developing the air quality standards and the institutional framework for air quality management. That time, I met a distinctive country, special in many ways, however very needy for policies to promote cleaner transportation and more sustainable forms of energy.

Situated over the Guarani aquifer, Paraguay is practically a nation of water, even though it is one of the only two inland countries of the continent. This nation is crossed by powerful rivers and also hosts with Brazil the most potent hydroelectric dam in the world, the *Itaipu*, or the noisy water rock, in the Guarani language.

This year I returned to Paraguay, but this time to investigate the air pollution produced by cooking with firewood in the outskirts of Asunción. The purpose of my trip was to collect data for my thesis research focused on the exposure to wood smoke. One thing I learned is that in Paraguay the day starts next to the *tata*, the fire, especially for a lot of women who use wood to prepare the first meal of the day.

It is surprising to find out that such popular cooking habit for many people in low and middle-income countries, can double the risk for childhood pneumonia or is responsible for one quarter of all premature deaths due to stroke, half of which are women (WHO, 2014).

In fact, more people die from air pollution every year than from other common causes such as alcohol or drug abuse. It is currently, the fourth greatest risk of death, just after high blood pressure, bad nutrition and smoking. Air pollution is not only concerning because of its health implications, but also due to its major alteration to the global climate.

Moved by the purpose of raising awareness about indoor air pollution and the use of more ecological methods of cooking, I joined a work team with the DIGESA, the national institution of environmental health. The team developed a monitoring campaign in rural households that

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cooked with firewood, charcoal, LP gas or electricity. After more than a month, we visited 110 households, and for 24 hours we recorded information about how they cooked, the type of fuel they used, and the quantity of air pollutants that they were exposed, such as the fine particulate matter (PM2.5) and carbon monoxide.

Reliance on pollutive materials due to inefficient fuels as firewood and charcoal, as well as the use of rustic appliances, was a visible reality in the rural households that we visited. In those places, women spent many hours a day tending the stove, and therefore, were greatly affected by the smoke full of health-damaging pollutants.

We noted that exposure was particularly high among women and young children who spent most of the time close to the *tataypy*, or kitchen. Homes were precariously constructed and often families did not have the economic resources to obtain cleaner fuels and modern appliances, resulting in a strong dependency on the use of solid fuels and open fires for their household cooking needs.

Electricity is little-consumed by people, according to national statistics and our same observations. Even when almost all rural households possessed this type of energy, two thirds used firewood, crop residues or charcoal as primary fuel to cook.

The findings of my work are expected to provide valuable insight of home indoor air pollution, which can exceed hundreds of times the accepted levels for fine particles. Lamentably, the health risks linked with indoor air pollution have not received much attention in Paraguay, even though it is scientifically known that there are health, economical and climate benefits from substituting the use of solid fuels for cleaner energies.

During my stay I had the opportunity to learn more about the culture of Paraguayans. They are most polite and hospitable, and also very conscious of their origins. I was able to appreciate the history of these people, marked by the devastation of the deadliest war that has ever occurred in South America.

Having participated in this study, I learned about hope and resilience. It came from both the warmth of the Guarani, and the overwhelming feeling of love that I received from all the families who let me enter their homes. I am still amazed by that irrepressible spirit represented through their language that resisted the colonialist utopia of Jesuits and subsequent bans of speaking and teaching Guarani. Due to this, Paraguay is the only country in the Americas that has maintained alive an indigenous language that is still widely spoken by the majority of its population.

I believe that enhancing the quality of life for many people through the introduction of electric power in their kitchens, is likely to occur soon in Paraguay. The next step needed is to engage authorities with an intervention program that replaces fireplaces with electric stoves, and enable them to realize a future with the clean energy of the hydroelectricity, and from the *y* (water), as it is called in the Guarani language.

I want to finish this report acknowledging all the institutions that made this project possible. I greatly appreciate the monetary support from the Tinker Foundation and the Center of Latin American Studies at UC Berkeley, as well the grant given by the Suzanne Llewellyn's student project award through the Center for Occupational and Environmental Health. Also I need to thank

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I am hoping to return to Paraguay soon, to make known the results of this study and create more awareness of air pollution. With luck, I will be able to write again about my experiences in this country and that Guaraní fire, which in its words, a hymn is reflected, without beginning or end, as well as the history of a people burning without being consumed.