Special Report
Indoor Smoke Pollution
The Silent Killer

Co2balance special report on the health effects of indoor smoke pollution from unregulated indoor cook stoves.

Pneumonia accounts for nearly one fifth of childhood deaths worldwide, with approximately 2 million children under five dying each year. The majority of deaths occur in Africa and South-East Asia. Source WHO/ UNICEF.

Acute lower respiratory infections (pneumonia) in young children are responsible for the most lost life years in the world. Every five minutes, seven children die from pneumonia in Africa.

When we think of major health threats to people in Africa we often recall HIV/ Aids, Malaria or other preventable diseases such as Polio or Measles, yet there is a threat present in almost every home which takes more life than these well know conditions, almost no one outside Africa is aware of it and it lives in the heart of every home.

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About co2balance UK Ltd

Established in 2003, co2balance UK Ltd is a leading, UK based, carbon management provider offering carbon calculation, management and reduction services to leading blue chip companies including, BSkyB, Toshiba Europe Gaz De France, Fiat and Flybe. As a project developer co2balance UK Ltd creates African Gold Standard and CDM projects that focus on social, health and community benefits to the families within the project area, in addition to carbon savings.

The Silent Killer

Pneumonia has been cited as a leading cause of death among children below the age of 5. It is caused by a bacterial infection which, in turn, causes a number of other infections known as pneumococcal diseases. Pneumonia is a lung infection that can severely affect breathing and is more common in children. Professor Shabir Madhi, of Wits University Johannesburg, says children in developing countries are at a higher risk of developing pneumonia due to a number of factors.

"Pneumococcal disease is much more common in developing countries like Africa. Forty-five percent of all children that die of pneumococcal disease die in Africa. The reason why children in Africa die and the reason why they are more susceptible to developing it, is living in overcrowded settings, having limited access to treatment or antibiotics at the correct time and **being exposed to pollution such as in-door pollution**. These are some of the predisposing factors that can cause a child to develop pneumonia"

The Special Report

At co2balance we have shared encouraging case studies of the individuals and households benefiting from our Improved CarbonZero stoves. During our interviews with these households, we discussed the different benefits associated with the new stove. The women we spoke to were all incredibly happy with their new stoves, and told us all about the way the stoves improved their lives. One benefit that came up in almost every household was the decrease in smoke emitted from the new stove as opposed to the smoke emitted by the traditional 3 stone stove. The feedback from the women we interviewed reinforced our belief that this particular benefit of the CarbonZero stove was far more complex and significant than we it first appeared. This reduction in smoke and indoor smoke pollution is a story on its own.

An understanding of the global impact of indoor smoke pollution helps to value the local impacts of the improved stove. A large part of the world's population uses wood as fuel for household cooking and space heating, mostly in developing countries. Energy from traditional biomass fuel is thought to account for nearly one-tenth of all human energy demand today (more than hydro and nuclear power together), and wood-based fuels make up some two-thirds of household use.

In the poorer developing-countries households' burn wood, charcoal and other solid fuels often in open fires or poorly functioning stoves. Incomplete combustion leads to the release of small particles and other constituents that have been shown to be damaging to human health in the household environment.

Figure 1 Traditional three stone stove

Many of these households use wood fuel stoves that lack working chimneys or hoods for venting the smoke outdoors. Hundreds of studies around the world in typical local situations have shown that such stoves produce substantial indoor concentrations of small particles – typically 10 to 100 times the long-term levels recommended by the World Health Organization in its recently revised global air quality guidelines for protecting health (WHO, 2005). Even stoves with working chimneys, however, do not completely eliminate indoor pollution, as there is often substantial leakage into the room and some smoke returns into the house from outside.
Millions of people inhale significant amounts of seriously health damaging pollutants from households stoves on a daily basis. In a risk assessment, WHO compared the burden of illness and premature death from solid fuel use with other major risk factors, the results indicating that solid fuels may be responsible for 800 000 to 2.4 million premature deaths each year. This places solid fuel use approximately tenth among major health risks in terms of potentially preventable lost life years. Biomass such as wood and charcoal is responsible for 95% of this total. The sad truth is that exposure to these harmful effects are felt hardest by women and children, the ones who are most often present during cooking and preparation of meals.

Figure 2 Soot clings to the roof of a typical house

Solid fuel use is most firmly associated with acute lower respiratory infections (including pneumonia) in young children, and chronic obstructive pulmonary disease and lung cancer in women (and to a lesser degree in men). Biomass fuel in particular has been found to be associated with tuberculosis, cataracts, low birth weight in babies of exposed expectant mothers and a number of other health conditions. Household solid fuel use is a major cause of disease burden in communities where it is prevalent. Globally, 2.6% of all ill-health is attributable to indoor smoke from solid fuels, nearly all in poor, developing regions.

Given that according to the World Bank, biomass fuels are the main source of fuel for 60 – 90 percent of all households in developing countries, and that household indoor smoke pollution levels are expected to remain high; we at co2balance believe that efforts to improve household air quality should be concentrated on improving local cook stove efficiency. This is exactly what we are doing with our improved CarbonZero Stove. It is clear that traditional cooking methods pose a risk factor associated with ill health in developing countries – by providing households with a healthier alternative; we are successfully reducing this risk factor and actually guaranteeing a health improvement for the communities within which we work

The following interviews focus on these issues and on the hardest hit population groups – the women and children. It is easy to read statistics about the health impacts of the stove, and to look at graphs about the reduction in indoor smoke pollution as a result of using the carbon zero stoves… But, if you want to hear the truth about indoor smoke pollution, what goes on inside these homes – the inside story - Then you have to hear what these people have to say. They have experienced it, are living it and are the only ones with the inside information on indoor smoke pollution. This is their story .

Figure 3 Eunita Owino

Eunita Owino

Nursing Officer, Matron, Maternity Ward – NRHS

"One of the top 10 diseases we see in our clinic and in this region is definitely related to respiratory disease. We deal only with pregnant women in this unit, and many of them present with chest pain, productive cough and slight fever. This is almost always as a result of exposure to smoke and indoor smoke pollution on a regular basis. The sad thing is that we treat the effects, but the women return to their homes and to continued exposure to the smoke, and so all that happened is that they are back at our clinic a week later with the same symptoms. You see, the people cooking in the home every single day, for every single meal are the women! And when they are pregnant or medicated and particularly vulnerable, you think they have a break? No! They are back in the kitchen for hours, daily, inhaling these smokes and fumes. And then, it just gets a little worse you see. What happens when they have given birth? What do you think? They still need to cook. So now, you have an already ill mother standing by the stove, but this time she has her baby on her back who is actually a new born and already inhaling this smoke. The cycle begins again. Before the child has his or her first birthday they have already suffered from acute lower respiratory infection at least once"

Nyanje and Nick Shen,

Nursing staff at Baolala Health Dispensary

Figure 4 Doctor Nick Shen

"It has been a tradition for many rural Kenyans to use open fire stoves for cooking. The Giriama community use open fire stoves for cooking and for lighting their homes. Although the community members are used to using open flames for cooking and lighting and perhaps are attached to this tradition, it does not necessarily make it healthy or effective. At our dispensary we see many people come in with various respiratory diseases. We believe this has a connection with the open fires stoves. Women and children feel the consequences the most as they are always exposed to the smoke. Think about it. These stoves are basically three stones, with some firewood, and the pot is placed on top of it. The smoke is not contained so it goes everywhere. The women are sitting next to the stove cooking. They more than often have a baby on their back. They are continuously breathing in the smoke. The introduction of new stove technologies will certainly be able to address this as it will reduce smoke, and as a result reduce the amount of exposure to indoor smoke pollution. Have a look at the table of illnesses treated at our little dispensary here. It is clear that the figures of patients presenting with Diseases of the Respiratory System are amongst the highest of any other illnesses we treat here. "

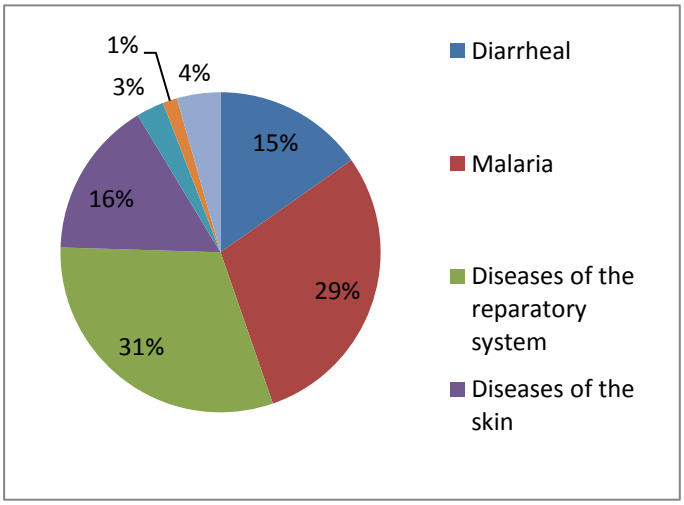

Figure 5 Under 5's attending the Baolala Health Dispensary between June 2009 and May 2010

Marilyn and Gladys

"My name Marilyn Ochieng. This here is my first born Gladys. I live in Kisumu. Gladys is with me because I have to bring her to the children's ward again. You see Gladys is always coughing and she has also tightness in her chest. It is very difficult for me to get her better because I know that she is taking her medication but I know she is still coughing. I think maybe it is sometimes because there is very much smoke in my house. But I need to cook because I also have a husband and mother and sister that also needs to eat. Everyone in Kajulu is talking about this new stove from CarbonZero. They are saying that this new stove is very much a good thing because it means that there is not very much smoke. This for me and for Gladys is very good news.

I tell you she is always getting sick. She was sick once about 6 months ago, but because she has not had the chance to get better the chest problem is still there. If we have a stove with no smoke, and no smoke in the house, I am sure that finally Gladys will have clean air to breathe in and her coughing will get less and less. The less and less the cough the better she will get and I will not have to leave work to sit in hospitals again and again and Gladys and me will be very very happy"

A Solution At Hand

At co2balance we run projects financed by carbon credits across Sub Saharan Africa, to replace the traditional three stone fires with clean burning purpose built stoves. These stoves reduce fuel usage by 50%, burn significantly hotter than an open fire and as a consequence reduce smoke emissions by up to 80%. The stove is designed to be used in a way that's very close to the traditional way of cooking which encourages participation from communities. Our projects are conducted under the strict standards of the UNFCCC (Clean Development Mechanism) CDM or the Gold Standard for carbon reduction.

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