washplus weekly

Supportive Environments for Healthy Communities

Issue 94 | March 29, 2013 | Focus on Health Impacts of Household Air Pollution

This issue features new data sources and studies/reports on the health impacts of household air pollution (HAP). Included are 2013 studies on HAP and the impact on blood pressure, tuberculosis, respiratory diseases, stillbirths and other health issues. Also featured is a new community of practice on the Health Impacts of Household Air Pollution that is facilitated by WASHplus and the Global Alliance for Clean Cookstoves. Please contact WASHplus if you have other HAP and health-related studies or resources to add to future issues on this topic.

COMMUNITY OF PRACTICE

- **Health Impacts of Household Air Pollution Community of Practice**. (Link)
  This new community of practice, hosted on the community space of the Global Alliance for Clean Cookstoves and facilitated by the USAID WASHplus project, was created to support information sharing and discussions on the health impacts of household air pollution. Participation is open to all, but registration on the Alliance website is required to sign up.

DATA SOURCES

- **Children: Household Air Pollution by Country**. Global Observatory Health Data Repository, World Health Organization. (Link)
  Data on child deaths, by country, due to indoor air pollution.

- **Household Air Pollution**. Global Observatory Health Data Repository, World Health Organization. (Link)
  Data on: Burden of Disease; Population using solid fuels; Solid cooking fuels; Non-solid cooking fuels

GENERAL/OVERVIEW STUDIES

- **Energy and Human Health**. Annu. Rev. Public Health, (34) 2013. K Smith. (Full text)
  Energy use is central to human society and provides many health benefits, but each source of energy entails some health risks. This article reviews the health impacts of

each major source of energy, focusing on those with major implications for the burden of disease globally. The biggest health impacts accrue to the harvesting and burning of solid fuels, coal and biomass, mainly in the form of occupational health risks and household and general ambient air pollution.

- **The Global Burden of Air Pollution on Mortality: The Need to Include Exposure to Household Biomass Fuel–Derived Particulates**. *Env Health Perspec, Mar 2013*. J Rylance, Liverpool School of Tropical Medicine. (Full text)
  Interventions that have significantly reduced exposure to HAP improve health outcomes and may reduce mortality. However, there is a lack robust, specific and field-ready biomarkers to identify populations at greatest risk, and to monitor the effectiveness of interventions. New scientific approaches are urgently needed to develop biomarkers of human exposure that accurately reflect exposure or effect.

- **Kirk Smith Presentation on the Health Impacts of Household Air Pollution at the Clean Cooking Forum, 2013**. (Video)
  Kirk Smith, of the University of California at Berkeley, speaks at the Clean Cooking Forum 2013 in Phnom Penh, Cambodia. The goal of the Forum is to further a market-based approach to the global adoption of clean cooking solutions, and drive innovations in research, market development, standards and testing, project finance, behavior change, awareness-raising, and policy change.

- **Tackling the Health Burden from Household Air Pollution: Development and Implementation of New WHO Guidelines**. *Air Quality and Climate Change, Feb 2013*. N Bruce. (Abstract)
  Building on previous air quality guidelines, WHO is developing new guidelines focused on household fuel combustion, covering cooking, heating and lighting, and although global, the key focus is low and middle income countries reflecting the distribution of disease burden. These guidelines will include reviews of a wide range of evidence including fuel use in homes, emissions from stoves and lighting, household air pollution and exposure levels experienced by populations, health risks, impacts of interventions on HAP and exposure, and also key factors influencing sustainable and equitable adoption of improved stoves and cleaner fuels.

BLOOD PRESSURE

- **Indoor Air Pollution and Blood Pressure in Adult Women Living in Rural China**. *Env Health Perspec, Mar 2013*. J Baumgartner, University of Minnesota. (Full text)
  Limited evidence suggests that exposure to air pollutants from indoor biomass combustion may be associated with elevated blood pressure (BP). The aim of this study was to assess the relationship between air pollution exposure from indoor biomass combustion and BP in women in rural China. Exposure to fine particles < 2.5 μm in aerodynamic diameter from biomass combustion may be a risk factor for elevated BP

and hence for cardiovascular events. The authors recommend that these findings should be corroborated in longitudinal studies.

CATARACT

- **Biomass Stoves and Lens Opacity and Cataract in Nepalese Women**. *Optom Vis Sci, Mar 2013*. A Pokhrel. (Full text)
  Cataract is the most prevalent cause of blindness in Nepal. Several epidemiologic studies have associated cataracts with use of biomass cookstoves. This study provides support for associations of biomass and kerosene cookstoves with nuclear opacity and change in nuclear color. The novel associations with kerosene cookstove use deserve further investigation.

DIARRHEAL DISEASES/HOUSEHOLD WATER TREATMENT

- **Safe Water and Solar Cookers**. *Solar Cooker Review, Mar 2013*. (Full text)
  Solar Cookers International, inspired by the work of Dr. Bob Metcalf, one of its founding members, has for many years spread the concept of safe water through pasteurization with its solar panel cooker known as the CooKit.

EMISSIONS

- **Characterization of Ultrafine Particulate Matter from Traditional and Improved Biomass Cookstoves.** *Environ Sci Technol, Mar 2013*. B Just, University of British Columbia. (Abstract)
  In this laboratory study, the authors compared the size, composition, and morphology of ultrafine particulate emissions from a "three-stone" traditional fire to those from two improved stove designs (one "rocket", one "gasifier"). In the improved stoves, particulate mass (PM) emissions factors were much lower although median particle size was also lower: 35 and 24 nm for the rocket and gasifier, respectively, vs. 61 nm for the three-stone fire. Particles from improved stoves formed clearly defined chain agglomerates and independent spheres with little evidence of volatile matter and had a higher proportion of black carbon (BC) to total PM, although overall BC emissions factors were fairly uniform. The three-fold increase in quantities of sub-30 nm particles from improved cookstoves warrants further consideration by health scientists, with due consideration to the higher combustion efficiencies of improved cookstoves.

- **Longitudinal Relationship Between Personal CO and Personal $PM_{2.5}$ Among Women Cooking with Woodfired Cookstoves in Guatemala**. *PLoS ONE, Feb 2013*. J McCracken. (Full text)
  Household air pollution (HAP) due to solid fuel use is a major public health threat in low-income countries. Most health effects are thought to be related to exposure to the fine particulate matter (PM) component of HAP, but it is currently impractical to measure personal exposure to PM in large studies. Carbon monoxide (CO) has been shown in cross-sectional analyses to be a reliable surrogate for particles<2.5 μm in

diameter ($PM_{2.5}$) in kitchens where wood-burning cookfires are a dominant source. This work provides evidence that in settings where there is a dominant source of biomass combustion, repeated measures of personal CO can be used as a reliable surrogate for an individual's $PM_{2.5}$ exposure. This finding has important implications for the feasibility of reliably estimating long-term (months to years) $PM_{2.5}$ exposure in large-scale epidemiological and intervention studies of HAP.

LUNG/RESPIRATORY STUDIES

- **Acute Lower Respiratory Infection in Childhood and Household Fuel Use in Bhaktapur, Nepal**. *Env Health Perspec, Mar 2013*. M Batres. (Full text)
  This case-control study was conducted among a population in the Bhaktapur municipality, Nepal, with the objectives of investigating the relationships of cookfuel type to Acute Lower Respiratory Infection (ALRI) in young children. The study supports previous reports indicating that use of biomass as a household fuel is a risk factor for ALRI, and provides new evidence that use of kerosene for cooking may also be a risk factor for ALRI in young children.

- **Biomonitoring of Polycyclic Aromatic Hydrocarbon Exposure in Pregnant Women in Trujillo, Peru: Comparison of Different Fuel Types Used for Cooking**. *Env Int, Mar 2013*. O Adetona, University of Georgia. (Abstract)
  Women and children in developing countries are often exposed to high levels of air pollution including polycyclic aromatic hydrocarbons (PAHs), which may negatively impact their health, due to household combustion of biomass fuel for cooking and heating. We compared creatinine adjusted hydroxy-PAH (OH-PAH) concentrations in pregnant women in Trujillo, Peru, who cook with wood to levels measured in those who cook with kerosene, liquefied petroleum gas or a combination of fuels. Women who cooked exclusively with wood or kerosene had higher creatinine adjusted OH-PAH levels in their urine samples compared to women who cooked with liquefied petroleum gas or coal briquette.

- **Indoor Air Pollution and Risk of Lung Cancer Among Chinese Female Non-smokers**. *Cancer Causes Control, Mar 2013*. L Mu, University at Buffalo, SUNY. (Abstract)
  This study investigated indoor particulate matter level and various indoor air pollution exposure, and to examine their relationships with risk of lung cancer in an urban Chinese population, with a focus on non-smoking women. Indoor air pollution plays an important role in the development of lung cancer among non-smoking Chinese women.

- **Intrauterine Exposure to Fine Particulate Matter as a Risk Factor for Increased Susceptibility to Acute Broncho-Pulmonary Infections in Early Childhood**. *Int J Hyg Environ Health, Jan 2013*. W Jedrychowski. (Abstract)
  The main purpose of this study is to assess the impact of prenatal exposure to fine

particulate matter $PM_{2.5}$ on the recurrent broncho-pulmonary infections in early childhood. The study suggests that prenatal exposure to $PM_{2.5}$ increases susceptibility to respiratory infections and may program respiratory morbidity in early childhood.

- **Proinflammatory Effects of Cookstove Emissions on Human Bronchial Epithelial Cells**. *Indoor Air. Feb 2013*. B Hawley, Colorado State University. (Full text)
  The objective of this research was to evaluate the effects of traditional and cleaner-burning stove emissions on an established model of the bronchial epithelium. Emissions from more efficient, cleaner-burning cookstoves produced less inflammation in well-differentiated bronchial lung cells. The results support evidence that more efficient cookstoves can reduce the health burden associated with exposure to indoor pollution from the combustion of biomass.

STILLBIRTHS

- **Household Air Pollution and Stillbirths in India: Analysis of the DLHS-II National Survey**. Environ. Res, 2013. P Lakshmi. (Full text)
  Background: Several studies have linked biomass cooking fuel with adverse pregnancy outcomes such as preterm births, low birth weight and post-neonatal infant mortality, but very few have studied the associations with cooking fuel independent of other factors associated with stillbirths. This study concluded that biomass and kerosene cooking fuels were associated with stillbirth occurrence in this population sample. Assuming these associations are causal, about 12% of stillbirths in India could be prevented by providing access to cleaner cooking fuel.

TUBERCULOSIS

- **Risk Factors for Tuberculosis**. *Pulm Med, Feb 2013*. P Narasimhan, University of New South Wales, Australia. (Abstract)
  The risk of progression from exposure to the tuberculosis bacilli to the development of active disease is a two-stage process governed by both exogenous and endogenous risk factors. Along with well-established risk factors (such as human immunodeficiency virus (HIV), malnutrition, and young age), emerging variables such as diabetes, indoor air pollution, alcohol, use of immunosuppressive drugs, and tobacco smoke play a significant role at both the individual and population level.

- **Systematic Review and Meta-analysis of the Associations Between Indoor Air Pollution and Tuberculosis**. *Trop Med Intl Health, Jan 2013*. C Sumpter. (Full text)
  Thirteen studies have reported investigating association between IAP and TB since 1996. There is increasingly strong evidence for an association between IAP and TB. Further studies are needed to understand the burden of TB attributable to IAP. Interventions such as clean cook stoves to reduce the adverse effects of IAP merit rigorous evaluation, particularly in Africa and India where the prevalence of IAP and TB is high.

Each WASHplus Weekly highlights topics such as Urban WASH, Indoor Air Pollution, Innovation, Household Water Treatment and Storage, Hand Washing, Integration, and more. If you would like to feature your organization's materials in upcoming issues, please send them to Dan Campbell, WASHplus knowledge resources specialist, at dacampbell@fhi360.org.

About WASHplus - WASHplus, a five-year project funded through USAID's Bureau for Global Health, creates supportive environments for healthy households and communities by delivering high-impact interventions in water, sanitation, hygiene (WASH) and indoor air pollution (IAP). WASHplus uses proven, at-scale interventions to reduce diarrheal diseases and acute respiratory infections, the two top killers of children under five years of age globally. For information, visit www.washplus.org or email: contact@washplus.org.

Please let WASHplus know at any time if you have resources to share for future issues of WASHplus Weekly or if you have suggestions for future topics. An archive of past Weekly issues is available on the WASHplus website.