



Clean Cooking and Child Survival Technical Workshop Meeting Report

Kathmandu Valley, Nepal
March 28 – 29, 2015

Presentations from the workshop are available at
www.cleancooking.org/NepalWorkshop

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Overview and Objectives

On May 28th and 29th, 2015, the Global Alliance for Clean Cookstoves (Alliance) brought together 30 colleagues, including leading public health researchers from various academic institutions and countries, in Kathmandu Valley, Nepal for a two-day technical workshop, on clean cooking and child survival. Co-hosted by the Alliance and Johns Hopkins University, the purpose of this meeting was to convene researchers currently conducting randomized control trials (RCTs) and other studies focused on the link between exposure to household air pollution and child survival. The meeting provided experts with an opportunity to exchange lessons from the field, and to present preliminary results of ongoing research evaluating the child health benefits of clean cookstoves and fuels (see Appendix 1 for a list of participants). Additional topics addressed were intended to better harmonize research efforts and results moving forward, including: evaluation of the intensity of adoption, challenges with outcome assessments in field settings, methods and approaches to exposure assessment, and strategies for updating integrated exposure response curves for air pollution and children's health outcomes.

Participants included researchers from ongoing Alliance-funded studies on clean cooking and child survival in Ghana, Nepal, and Nigeria; large RCTs currently being conducted in Malawi and Rwanda; and the RESPIRE Guatemala trial. Also participating were colleagues working in Bangladesh, Kenya, and India. A few representatives of the public sector with an interest in child survival also participated in the workshop, most notably regional representatives from local public health organization Mrigendra Samjhana Medical Trust (MSMT) and UNICEF.

Workshop Agenda

Nepal Clean Cooking and Child Survival

March 28 - 29, 2015

Saturday, March 28th (Day 1)

- 7:30 Optional: Morning Walk
- 9:00 **Introductions and Overview of Meeting** *Mehta*
Exposure Assessment
- 9:25 Nepal Study: Including Mix of Seasonality in Outcomes and Exposure *Breyse*
- 9:50 Ghana Study: Exposure Assessment Outcomes *Jack*
- 10:15 Nigeria Study: HAP Exposure Assessment *Northcross*
- 10:40 *Tea Break*
- 11:00 **Open Discussion**
- 11:30 *Lunch*
- 12:30 **Notes from the Field**
- 13:30 Nepal PEER Study *Pokhrel*
- 13:50 A large-scale program to provide water filters and cookstoves in Rwanda *Clasen/Miles*
- 14:10 Cooling and Pneumonia Study (CAPS) in Malawi *Gordon*
- 14:35 **Open Discussion**
- 15:15 *Tea Break*
- 15:45 Context Matters: Influence of Covariates on Assessment of Impact of HAP Reductions on Health *Tielsch*
- 16:15 **Clinical Assessments in the Field**
Lessons Learnt from Ongoing HAP Study in Nigeria *Olopade*
- 16:35 Issues in Measurement of Health Outcomes in Field Settings: ALRI and Reproductive Outcomes *Tielsch*
- 16:55 Health Outcome Assessments in Household Air Pollution Trials: Challenges and Experience of GRAPHS *Jack*
- 17:15 **Open Discussion**
- 18:00 **Adjourn**

Sunday, March 29th (Day 2)

- 8:00 Day 1 Recap *Mehta*
- 8:15 Insights from a Pioneer in the Field *Pandey*
- 8:30 Lessons Learned From RESPIRE *Smith*
- 9:00 Methodological Challenges in Child Neurodevelopmental Assessment *Thompson*
- Preliminary Results from Alliance-Funded Child Survival Studies**
- 9:25 Nepal Cookstove Intervention Trials: Preliminary Results from Phase 1 *Tielsch*
- 9:55 Preliminary Observations in Randomized Controlled Intervention HAP study in Nigeria *Olopade*
- 10:25 Fetal HAP Exposure and Lung Development: Evidence from GRAPHS *Jack*
- 10:55 *Tea Break*
- Notes from the Field**
- 11:15 PM_{2.5} Exposure-Response Relationship with Child Pneumonia in Bhaktapur, Nepal: The Importance of Fuel Type *Bates*
- 11:40 NICHD Study: Household Air Pollution and Maternal and Child Health *Patel*
- 12:05 **Open Discussion**
- 13:00 *Lunch*
- 13:45 Communicating Results: Headlines from a Comms Observer *Patrick*
- 14:00 Contributing to the IER Curves *Mehta*
- 14:30 Discussion: Influencing Advocacy *Rafique/Mpoke*
- 15:00 Summary and Next Steps *Mehta*
- 15:30 **Group Hike**

Presentation Summaries

Exposure Assessment

This session presented preliminary exposure assessment results from the three Alliance-funded child survival and clean cooking studies being conducted in Nepal, Ghana, and Nigeria, respectively.

Nepal Study: Including Mix of Seasonality in Outcomes and Exposure

Dr. Breyse, Johns Hopkins University/Center for Disease Control

The Nepal study is a 2-phase enhanced step wedge design randomized trial in Sarlahi District, Nepal:

- 1) 6 months of run-in, 12 months of step-in installation of Envirofit stove, n ~ 4,200
- 2) Individual homes randomized to continue with Envirofit or receive LPG, n ~1,900

An overview of household air pollution concentrations in the Nepal study was presented, including baseline concentrations and concentrations post-intervention for both the improved biomass Envirofit stove and the liquid petroleum gas (LPG) stove.

Key Findings

- Phase I: Almost 1400 $\mu\text{g}/\text{m}^3$ $\text{PM}_{2.5}$ daily averages seen in control homes, with great variations seen over time
- On average, a 26% drop in $\text{PM}_{2.5}$ (400 $\mu\text{g}/\text{m}^3$) seen with Envirofit stove intervention
 - % drop in CO is greater than that of PM
 - Some correlation between CO and PM seen, but not great
- Phase II: Additional 50% drop in household PM concentrations above Envirofit stoves
 - Additional 69% drop in CO

Highlights and Discussion

- High background concentrations were seen in these homes.
- The Asian Brown Cloud present in this region has a clear effect on ambient concentrations.
- Although no personal exposure measurements have been collected thus far, the team plans to develop a study in which personal exposure measurements will be taken in a subset of homes to make correlations to household concentrations.

Ghana Study: Exposure Assessment Outcomes

Dr. Jack, Columbia University

This village-level RCT was designed to evaluate the effects of household air pollution (HAP) on birth weight and child pneumonia (n = 1415). Interventions include Biolite (fan stove; n = 488), and LPG (n = 361). An update was presented on exposure assessment of the GRAPHS study, conducted in central Ghana.

Key objectives

- How clean is clean enough?
- What interventions will get us there?
- What distribution strategies will deliver equitable, enduring public health results?

Key Findings

- Mixture of open air cooking, semi-enclosed and indoor cooking, with most people cooking outdoors
 - Baseline average personal exposure = 130 $\mu\text{g}/\text{m}^3$
 - 9000 CO measurements and 1665 PM measurements
 - Sampling approach includes 7 x 72 hour exposure monitoring sessions
 - Use predictive model to impute personal $\text{PM}_{2.5}$ for deployments only having personal CO ->CO measured 7 times, and PM only measured twice
 - Currently rejecting about a quarter of all data
- Significant reductions in both PM and CO
- Shiny App available for MicroPEM data for other studies
 - Shiny App is a web application framework for R that turns your analysis into interactive web applications
 - App helps field team check quality of data without the need to write programs

Highlights and Discussion

- Field staff found it difficult to evaluate data quality at download. Shiny App helped the field team look at initial data
- Concentration distribution for both PM and CO are significantly lower post intervention

Nigeria Study: HAP Exposure Assessment

Dr. Northcross, George Washington University

Preliminary exposure assessment results were presented from a randomized controlled intervention trial conducted in Ibadan, Nigeria. Three hundred pregnant women were randomized to 1) receive the clean bioethanol stove or 2) continue cooking with kerosene and/or biomass. Data was only provided for women who were kerosene users pre-intervention. Data has not yet been analyzed for firewood users.

Key Findings

- Ambient sources include trash burning, generator use, traffic, outdoor food vendors, and industry
- Almost all women in the intervention arm completely replaced their kerosene stove with bioethanol stove by month two
- Data from the kerosene arm of the study indicate that personal $\text{PM}_{2.5}$ concentrations are significantly lower in the intervention group compared to the kerosene group

Highlights and Discussion

- Many households in the study have combined families with multiple women using a communal cooking area. Participants are also exposed to HAP from cooking events that are not their own

Notes from the Field

This session presented an overview of three HAP and child survival studies currently being conducted in Nepal, Rwanda, and Malawi, respectively.

Nepal PEER Study

Dr. Pokhrel, University of California, Berkeley

An overview of the Nepal PEER biogas study was presented. It is a prospective cohort study in which 550 children (age < 36 months) are followed for 2 years to evaluate the effectiveness of biogas cookstoves in reducing the incidence of ALRI in children.

Key objectives

- Can biogas complement Nepal Government's effort of lowering the incidence of ALRI and under-five mortality in the country?
- Which levels of air pollution (PM_{2.5}) reduction is necessary to protect or meaningfully improve children's health?
- Are currently dissemination biogas stoves sufficient to reduce HAP level and improve children's health?

Expected study outcomes

- Consistent comparison of impacts of clean and polluting stove technologies on occurrences of ALRI in children
- Evaluation of benefits of the national cookstove program
- Identify behavior change interventions among cookstove users that could be applied at a national scale
- Develop a plan to scale-up the best cookstove interventions in Nepal

Highlights and Discussion

- Possible confounders in the study was discussed.

A Large-Scale Program to Provide Water Filters and Cookstoves in Rwanda

Dr. Clasen and Mr. Kirby, Emory University/London School of Hygiene and Tropical Medicine

The overall aim of this cluster RCT in Rwanda is to evaluate the impact of a national-level water filter and cookstove program and to assess coverage and use, and impact on health (pneumonia, diarrhea, hypertension, adverse birth outcomes, and mortality). It is a 6-yr study combining nano-filtration with safe storage & Eco-Zoom stove intervention. The study includes 2 phases. Phase 1 randomized 566 HHs from 3 villages. Phase 2 will have an intervention arm of 100,000 HH and a control arm of 40,000 HH, across 174 village clusters.

Key findings for Phase 1 evaluation: uptake and exposure

- 67% of intervention households identified the intervention stove as their main cooking stove
- Intervention was associated with a 48% reduction in 24-hr PM_{2.5} concentrations in cooking area
- Reduction was 37% for those cooking indoors and 73% for those cooking outdoors

Phase 2: Highlights

- Exposure measurements on primary cook (16 years and older) and child 1.5 – 4 years
- Will use light sensor to evaluate compliance
- Bi-laterals, including the World Bank are buying carbon credits, which pays for this project

Discussion

- Diarrhea may have an impact on acute respiratory infections and vice versa

Cooking and Pneumonia Study (CAPS) in Malawi

Dr. Gordon, Liverpool School of Tropical Medicine

An overview of the cluster RCT Cookstoves and Pneumonia Study (CAPS) currently underway in Malawi was presented. The intervention is provision of two Phillips cookstoves per household (n=10,000 children from 8000 households).

Highlights and Discussion

- Primary outcome: pneumonia in children under 5 years of age with use of a health passport assessment card - every child has a health passport or is provided on upon clinic visit
- Exposure measurement: personal 48-hour CO measurement in all children every 6 months, 24-hour black carbon and PM_{2.5} in 400 households and adults
- CO is assumed to be correlated with PM for exposure analysis
- SUMs are placed on 1 intervention stove in 400 households
- SUMs are not placed on all stoves in a home so developing exposure-response curves may be difficult

Context Matters: Influence of Covariates on Assessment and HAP Reduction on Health

Dr. Tielsch, George Washington University/Johns Hopkins University

The study presented some of the covariates that influence outcomes in HAP studies highlighting drastically changing conditions within these countries and how they affect the health of the study populations. Key points of the presentation include:

Highlights

- Dynamic settings: risk factors for pneumonia and other things changing dramatically over time
- New vaccines from respiratory illness now widely available (Hib-2009, PCV-2015, Flu, RSV, etc.)
- Birth weight has increased over time: from 2705g ('02-'05) vs 2763g ('10-'14)
- Nutritional status has also improved
- Electricity, TV ownership, and household cell phone ownership has increased dramatically
- Reduction of rates of ALRI
- Reduces potentially preventable burden due to biomass PM exposure

Discussion

- Instead of RCTs, intervening at a community level may be important in order to reduce outdoor air pollution due to HAP and the associated burden of disease

Clinical Assessments in the Field

This session focused on some of the lessons learned from the studies on how to best conduct clinical assessments in the field, given the constraints including lack of electricity, trained personnel, etc.

Lessons Learnt from Ongoing HAP Study in Nigeria

Dr. Olopade, University of Chicago

Lessons learned in the Nigeria cookstove RCT was presented.

Primary study outcomes

- Birth Weight (BW)
- Secondary study outcomes include: intra-uterine growth restriction (IUGR), pregnancy outcomes (miscarriages, still births), effect of nutrition, biomarkers of nutrition, epigenetic changes,

pulmonary function in mothers, and blood pressure (BP) changes during pregnancy and post-pregnancy

Study Challenges

- Many women prefer not to give birth at health care center, so community health workers were trained to collect birth outcome data for home deliveries
- Deploying MicroPEMs in tropical conditions is difficult because pumps get clogged frequently
- No access to CO and other gases for calibration of CO monitors

Highlights and Discussion

- To overcome some of these challenges, phone cards were given to participants to use when they are about to deliver ensuring that a community health worker and field team member can be present during or shortly after delivery to collect data

Issues in Measurement of Health Outcomes in Field Settings: ALRI and Reproductive Outcomes

Dr. Tielsch, George Washington University/Johns Hopkins University

This session highlighted some practical issues of consideration in measurement of health outcomes in field settings focusing on ALRI and reproductive outcomes in low-resource settings.

Highlights

- Logistical considerations
 - Optimal if single encounter leads to definition
 - Use of appropriate field tools
 - Portable BP, spirometry devices
 - Power requirements
 - Plug-in or battery
 - Is there power in the household/clinic?
- Bio-specimen collection considerations
 - Cultural acceptability
 - Timeliness of collection
 - Stability of specimen in the field
 - Transport to processing and analytic tabs
 - Permissions for export if required
- ALRI
 - Differentiating upper and lower respiratory illness
 - Can concurrent signs “hide” LRI signs?
 - Training and retraining of field staff
 - Prior treatment with antibiotics before identification by field staff
- BW
 - Timing of measurement (BW drops precipitously 24 hours after birth)
 - Use algorithms to calculate to true birthweights
 - Scales need to be digital

Discussion

- Conduction x-rays in the field is difficult as inter-rater variability is high
- Lung ultrasound has better inter-rater variability than x-ray

- While this method proves promising, there is still a need to have diagnostic tool that can be standardized in for field research settings

Health Outcome Assessments in Household Air Pollution Trials: Challenges and Experience of GRAPHs

Dr. Jack, Columbia University

The presentation discussed challenges in obtaining quality health outcome assessments in the GRAPHs study involving 35 villages.

Primary study outcomes

- Physician-assessed severe pneumonia and BW

Highlights

- Study vehicle comes and takes all potential pneumonia cases to Kintampo District Hospital where a study physician sees all the participants and is blinded to intervention status of the patient
- Biomarkers collected include
 - Urinary PAHs
 - Placenta storage for later analysis
- MassTag PCR to try to pin down which pathogens are responsible for pneumonia
- Challenges in assessing low birth weight (LBW)
 - Missed deliveries (some deliveries occur outside of study area)
 - Some participants move out of study site
 - Anthropometric measurements (breakdown of the scales, etc.)
 - Missed preterm and stillbirths
- Challenges in assessing pneumonia cases
 - Respondent fatigue
 - Some reluctance to send kids to hospital
 - Distance to hospital is too far for some participants
 - Out of pocket costs is higher than expected
 - logistical supply

Discussion

- Positioning of exposure monitor is important– breathing zone vs. waste.
- It is unknown whether we should be looking at black carbon. It may not be important to look at BC for some health endpoints, but it may be for others.

Insights from a Pioneer in the Field

Dr. Pandey, Mrigendra Samjhana Medical Trust

This presentation gave a brief overview of the history of Dr. Pandey's extensive research in the field of HAP.

- As a cardiologist in the late 70's, he saw patients in his clinic who had none of the 'conventional' risk factors for COPD and other cardiopulmonary diseases, yet suffered from the diseases. The one thing his patients had in common, however - they all cooked with solid fuels
- He began conducting studies on HAP, and in 1984, he published the first study to find correlations between HAP and pneumonia in Thorax

Lesson Learned from RESPIRE

Dr. Smith, University of California, Berkeley

This presentation discussed the history of HAP studies and lessons learned from RESPIRE, an RCT conducted in 530 households in Guatemala from 2001-2011, to study the impact of HAP reduction on pneumonia incidence in children aged ≤ 18 months.

Primary study outcome

- Intention-to-treat analysis of pneumonia

Secondary study outcome

- Exposure-response curve

Key Findings

- Severe pneumonia was statistically significant but primary outcome was not quite
- No effect of smoke was seen on RSV
- Even though operating well, chimney was not capable of sufficient exposure reduction by itself
 - 50% reduction in exposure of babies ($120\mu\text{g}/\text{m}^3$ $\text{PM}_{2.5}$ vs. 240 w/open fire)
- Indoor air pollution (IAP) wasn't the right measure
- Exposure-response curve highly non-linear
- Large reductions needed for substantial health benefits
- Exposure response models absolutely necessary

Key lessons learnt

- Conducting a study in an accessible site is important with few other smoke sources
- Focus pilots on exposure not indoor levels, and make sure that pollution decreases
- Intervene with a well-used and well-liked intervention
- Do microbiology if possible
- Make deal to eliminate old stove
- Deploy SUMs on all stoves within the home in order to monitor stove use
- Repeated exposure measurements are important, and for ALRI personal monitoring should be done on the children as well
- Add extra budget and resources for data management, exposure assessment and analysis

Highlights and Discussion

- Household monitoring is not sufficient and that exposure assessment is needed in any large-scale study

Methodological Challenges in Child Neurodevelopmental Assessment

Dr. Thompson, University of California-San Francisco

The presentation highlighted methodological challenges in child neurodevelopmental assessment and various assessment tools available.

Highlights

- Neurodevelopmental impairment (NDI) is defined as disturbances in cognition, behavior, language development, motor skills and emotional regulation

- Higher rates of NDI in preterm infants and IUGR infants
- There are higher rates of NDIs in LMICs
- Mild impairment, if recognized early enough, can be reversible with intervention
- Poverty is an underlying problem in NDIs
- Approaches to assessing NDIs
 - Home-based screening questionnaires
 - Observer-rated child assessment
 - Professional vs. non-professional
- Age of assessment is important
 - Hard to detect at young ages
 - Important to detect and intervene at very young ages
- Considerations for screening questionnaires
 - Mother's education
 - Maternal depression/mental health
 - Social acceptability
 - Gender: over-reporting in boys and under-reporting in girls
- If child doesn't pass screening, there are longer child assessment/ability Instruments, of which the Bayley III is the gold standard

Discussion

- While Bayley III must be performed by a professional and is quite lengthy, the Rapid Neurodevelopmental Assessment is a much quicker assessment tool and can be performed by a community health worker after short training period with intermittent recalibration of assessments

Preliminary Results from Alliance-Funded Child Survival Studies

This session highlighted some of the preliminary findings from the Alliance-funded child survival studies. Note: most of the preliminary findings were presented in strict confidence, and are not included here nor in the publically available copies of presentations.

Nepal Cookstove Intervention Trials: Preliminary Results from Phase 1

Dr. Tielsch, George Washington University/Johns Hopkins University

Preliminary results from Phase 1 of the Nepal cookstove intervention trial, in which a biomass stove with chimney was installed in intervention homes in Sarlahi District, Nepal.

Primary study outcome

- Incidence of ALRI among children aged < 36 months, rate of birthweight and rate of pre-term birth

Secondary study outcome

- PM and CO concentrations, respiratory function in adults, blood pressure in adults and growth of children < 36 months of age

Key Findings

- Post-intervention daily average concentrations were reduced by 32% and 50% for PM_{2.5} and CO, respectively
- Household concentrations started out very high, with mean household concentrations pre-intervention of 1380 µg/m³ for PM_{2.5} and 8.1 ppm for CO

Key challenges

- Traditional step-wedge designs assume no secular trend
- There is a clear trend for almost all morbidities, therefore accounting for secular trend, season, and child age are all important to isolate the effect of the new stove on health outcomes.

Discussion

- Child morbidity and survival rates have improved at a rapid rate, and this should be taken into account when doing power calculations
- Need for personal exposure monitoring in this study
- It was agreed that the team would develop a plan to conduct personal exposure monitoring on a subset of homes, post study and correlate with household concentration data

Preliminary Observations in Randomized Controlled Intervention HAP Study in Nigeria

Dr. Olopade, University of Chicago

The presentation discusses preliminary observations of a randomized bioethanol cookstove RCT in urban Nigeria on pregnancy outcomes in 300 women.

Key objectives

- Investigate ability of ethanol stove and bioethanol to reduce personal exposure to PM_{2.5}, CO, and PAH and improve pregnancy outcome in women who cook primarily with firewood and/or kerosene
- Establish exposure-response relationship between pollutants and health outcomes
- Evaluate stove use/likability of the ethanol stoves by temperature based monitoring and compare health outcomes

Preliminary Findings

- The CleanCook stove and bioethanol combination appears to reduce PM_{2.5} and CO exposures relative to kerosene
- CleanCook stove is liked and is being used by Nigerian women

Highlights and Discussion

- Recruitment is complete and last delivery is expected August 2015
- Approximately 100 firewood users and 200 kerosene users have been randomized into the study
- SUMs data show high ethanol stove use and displacement of kerosene stove
- Preliminary birth outcome data does not show statistical differences between preterm delivery, still births or miscarriages; however, the study was only powered for BW
- 70% of deliveries occur in the Primary Health Center, the rest occur at home or other location
- Given a small sample size, it may be difficult to see statistically significant difference in primary outcomes

Fetal HAP Exposure and Lung Development: Evidence from GRAPHS

Dr. Jack, Columbia University

Preliminary results were presented on lung development using a single occlusion technique.

Highlights

- 3rd trimester of pregnancy is when lungs develop and so does reducing this exposure affect lung function in children
- Parameters of interest: Tidal volume, respiration rate, minute ventilation, compliance, and resistance (all hypothesized to change with exposure)
- Single occlusion technique used in this study where the airway is occluded for a brief period (400 – 1500 milliseconds after maximal inhalation)
 - Lung function measurements taken at 1 month at Kintampo Hospital

Preliminary Findings

- Correlations in measurements with mean CO exposure of mother

Discussion

- Parameters are highly predictive of lung function at age six
- This study is only conducting the measurements on infants at one month of age because they need to be sleeping

Notes from the Field

This session presented an overview of HAP and child survival studies currently being conducted in Nepal and India.

PM_{2.5} Exposure-Response Relationship with Child Pneumonia in Bhaktapur, Nepal: The Importance of Fuel Type

Dr. Bates, University of California, Berkeley

Presentation discussed preliminary results from a case-control study (children with/without pneumonia) conducted in Bhaktapur, Nepal in which four different cooking fuels were used by the community – electricity, gas, kerosene, and biomass. The focus of this presentation was on kerosene and whether kerosene use is greater risk factor for ALRI than biomass. N= 917 children (case = 452, control = 456), 2–35 months of age.

Key Findings

- Indoor fuel use: electric – 21%, gas – 29%, kerosene – 24%, biomass – 26%
- Relative risks based on categories of stove use have been published earlier (Ref: Bates et al. EHP, 2013:121(5):637-42), where the relative risk for child ALRI and stove type was 1.71 (1.08,2.72), 2.33 (1.40, 3.86), and 2.13 (1.34, 3.41) for gas stove, kerosene stove, and biomass stove, respectively, compared to baseline (electricity). Dr. Bates presented results based on measured concentrations of fine particulate matter in the study homes.

Highlights and Discussion

- Potential toxicity of kerosene: Household concentration were much less than concentrations in homes using biomass; however, effect was just as high.

NICHD Study: Household Air Pollution and Maternal and Child Health

Dr. Patel, Lata Medical Research Foundation

Results from two maternal and child health studies were presented.

Study 1 Key Objective

- Using a multicenter prospective cohort study (n = 69,705), assess the impact of exposure to HAP on stillbirths, perinatal, and neonatal mortality in India, Pakistan, Kenya, Zambia, and Guatemala

Study 1 Key Finding

- Results indicated perinatal mortality was associated with exposure to HAP from week 20 of pregnancy through day 2 of life

Study 2 Key Objective

- Using a cross-sectional study, assess impact of exposure to biomass fuel use on anemia in pregnant women in Nagpur, India.

Study 2 Key Finding

- Results indicated increased risk of mild and moderate-to-severe anemia with biomass use, independent of covariates

Highlights and Discussion

- There were questions regarding the validity of these results, as the results were not adjusted for socio-economic status (SES)
- As SES is not included in these questionnaires, education level was used as a proxy

Communicating Results and Influencing Advocacy

This session focused on how to best communicate the results of the clean cooking and child survival studies and how to use these results to influence advocacy.

Headlines from a Communications Observer

Mr. Patrick, Alliance

- Discussion emphasized on the importance of communicating the benefits of clean cooking solutions.
- Stories such as how the women in Nigeria gave away their traditional kerosene stoves after using their clean-burning ethanol stoves or talking about “smoke-free” villages in India are powerful tools to communicate women’s willingness to adopt clean cooking technologies

Contributing to the IER Curves

Dr. Mehta, Alliance

- Discussion highlighted importance of integrated exposure-response curves after the child survival studies are complete
- There was also a discussion on how exposure data from these studies will be used to update the HAPIT tool, as well
- Although the best process for collaboration to update the Integrated Exposure Response (IER) curve for ALRI was not determined, the study investigators suggested that the Alliance should be prescriptive about its requirements for a minimum level of exposure assessment necessary to be funded

Influencing Advocacy: Kenya Medical Research Institute (KEMRI)

Dr. Mpoke,

This presentation highlighted potential avenues for advocacy in Kenya.

Highlights

- There is a demand of 3.5 million tons per year of fuelwood in Kenya and only a supply of 1.5 million tons
- This causes a huge threat to forests and highlights the need to design innovative alternatives to biomass fuel
- Fortunately, there is an energy sector development plan which call for regulations for biogas technology and standards and regulations for improved biomass cookstove for domestic and institutional sector by 2016
- The budget set aside for these is approximately 29 million USD

KEMRI can play a role in promoting clean cookstoves and fuels in Kenya by the following ways:

- Monitor, report and verify the health benefits associated with upscaling of cookstoves
- Develop research proposals that will assess the impact of clean cookstoves on prevalence and incidence of respiratory tract infections among children, maternal health, and impact on incidence of domestic-related burns
- Infrastructure already in place for large-scale studies

Discussion

- Evidence-based policy formulation and implementation is needed
- There is a need to accelerate studies and demonstrate clear beneficial outcomes – including economic and environmental – of using clean cookstoves and fuels.

Influencing Advocacy: UNICEF

Drs. Nuzhat Rafique and Pravin Khobragade, UNICEF

This presentation highlighted UNICEFs advocacy programs.

- Presentation highlighted the Integrated Global Action Plan for the Prevention and Control of Pneumonia and Diarrhea (GAPPD)
- As part of GAPPD, UNICEF is working to change social norms in order to achieve the Millennium Development Goal to save lives of children under the age of five. Promoting community behaviors and demands for clean cooking solutions that improve the survival rates of newborns is a critical part of the equation
- UNICEF can collaborate at a national and sub-national level and can partner in advocating for clean cooking solutions

Next Steps and Action Items

The child survival workshop concluded with a short discussion on the action items moving forward. A clear message was the need to prime advocates for the upcoming results from the Alliance-funded child survival studies. Additionally, several action items were discussed and are as follows:

1. The Alliance will convene a meeting on strategies to update the integrated exposure response curves for air pollution and children's health (IER curves) during Q3 or Q4 2015. This meeting will determine the protocols necessary for adding to the IER curves.
2. In September 2015, Alliance-funded child survival studies will be highlighted at a panel session at the 9th European Congress on Tropical Medicine and International Health.
3. In 2015, the Alliance will convene a meeting to highlight the methodological aspects of designing studies to look at neurodevelopmental impairment in children.
4. In November, 2015, the Alliance will bring together researchers from the child survival studies to present at the Clean Cooking Forum in Ghana.

Appendix 1: Clean Cooking and Child Survival Meeting Participants

Name: Donee Alexander, PhD
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Appendix 2: Acronyms and Abbreviations

| | |
|-------------------|---|
| Alliance | Global Alliance for Clean Cookstoves |
| ALRI | Acute Lower Respiratory Infection |
| ARI | Acute Respiratory Infection |
| BC | Black Carbon |
| BP | Blood Pressure |
| BW | Birth Weight |
| CDC | Centers for Disease Control and Prevention |
| CO | Carbon Monoxide |
| COPD | Chronic Obstructive Pulmonary Disease |
| GAPPD | Global Action Plan for the Prevention and Control of Pneumonia and Diarrhea |
| HAP | Household Air Pollution |
| IAP | Indoor Air Pollution |
| IUGR | Intra-Uterine Growth Restriction |
| IER | Integrated Exposure Response |
| KEMRI | Kenya Medical Research Institute |
| LBW | Low Birth Weight |
| LMICs | Low- and Middle-Income Countries |
| LPG | Liquid Propane Gas |
| NDI | Neurodevelopmental Impairment |
| NIH | National Institutes of Health |
| PAH | Polycyclic Aromatic Hydrocarbon |
| PM | Particulate Matter |
| PM _{2.5} | Particulate Matter less than 2.5 micrometers in diameter |
| ppm | Parts Per Million |
| RCT | Randomized Controlled Trial |
| RSV | Respiratory Syncytial Virus |
| SES | Socio-Economic Status |
| SUMs | Stove Use Monitors |
| UNICEF | The United Nations Children’s Fund |
| USD | US Dollar |