**Supplementary material**

**Table I: Research challenges, findings and conclusions (synthetized from abstracts at** [**https://ehp.niehs.nih.gov/do/10.5555/cf321013-5720-41d4-8883-2a43ac2853de/full**](https://ehp.niehs.nih.gov/do/10.5555/cf321013-5720-41d4-8883-2a43ac2853de/full)**)**

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| **Presentation title** | **Lead author Name, Institution and (country)** | **Research challenges / Gaps** | **Main findings** | **Conclusions** |
| No more disciplinary silos in tackling climate change impact on health: lessons from an Ecohealth research project in West Africa | * Brama Koné; Centre Suisse de Recherches Scientifiques en Côte d’Ivoire & University Peleforo Gon Coulibaly (Côte d’Ivoire) | * Climate and associated social changes are adding new pressures on vector-borne diseases in Africa * The complex impacts in terms of related hazards, vulnerabilities and exposure still not adequately understood * Schistosomiasis and malaria are two vector-borne diseases contributing significantly to the burden of disease in Africa | * Malaria and schistosomiasis and their respective vector and intermediate host are prevalent in Korhogo (Northern Côte d’Ivoire) and Kaedi (Southern Mauritania) and affected by climate seasonal variation (dry Vs rainy seasons) * Implementing transdisciplinary research through Ecohealth method allowed adequate characterization of climate and environmental related hazard, vulnerabilities and exposure. * Participation helped implement communities lead capacity building actions for resilience to Malaria and schistosomiasis | Transdisciplinary and community participation through Ecohealth research method proved usefulness in understanding hazards, vulnerability and exposure complexity related to malaria and schistosomiasis in a changing climate and environment. However, it is time consuming and needs lot of communication within the research team |
| Closing research gaps in climate change and health in Africa | * Adetoun Mustapha; Imperial College London (Nigeria) | * The effects of climate change are felt in many parts of Africa with resulting health risks affecting vulnerable and poorly resourced populations * Research to identify appropriate local scale adaptive options is sparse | * Number of papers for the whole of Africa continent is about the same for countries like UK and USA * Research are mainly driven by international institutions, national governments, NGOs and mostly from those nations receiving adaptation funds * There is minimal involvement of lower levels of government and local academic institutions or south-south collaboration * Most studies are on vulnerability assessments of natural environment than awareness of climate change by socioeconomically disadvantaged populations and effectiveness of adaptive actions on public health * Gaps in knowledge of effective local adaptation actions and policies are particularly notable | * More studies are required on effectiveness of adaption strategies on public health at local levels * Need for increased inter-ministerial and regional inter-country collaboration and data sharing for research * Development of regional datasets and increasing awareness of adaption strategies at local levels |
| Evaluating the effectiveness of a community-based adaptation strategy for dengue vector control in Burkina Faso. | Samiratou Ouédraogo & Tarik Benmarhnia; University of California, San Diego (USA) | * Dengue is the most common arbovirus infection globally with approximately 9,221 death/year worldwide and geographical inequalities * Many Dengue outbreaks recently reported in Burkina Faso * Coexistence with Malaria led to some confusion about these outbreaks and the ineffectiveness of public health actions for malaria * Importance of developing and evaluating public health interventions to prevent dengue fever | * Community base interventions decreased immunological markers of dengue, increase the knowledge of dengue by communities and improve their attitudes and practices against this disease. | * This is the first study to report on the effectiveness of a community-based intervention (CBI) for dengue vector (DV) control in Africa. * It showed some impacts on knowledge of dengue, immunological markers and communities attitudes and practices against the disease |
| Short Term Seasonal Effect of Particulate Matter and Airborne Fungal Spores on the Lung Function of School Children in Western Cape, South Africa: A Panel Study | * Toyib Olaniyan; University of Cape Town (South Africa) | * Very few previous epidemiological studies investigated the combined effect of short-term ambient air pollutants and fungal spores on children's lung function. * These studies did not investigate respiratory effects beyond 1-day lag nor investigated possible effect modification by one on the other | * *Alternaria* and *Cladosporium* decreases Forced Expiratory Flow in one second (FEV1) especially in winter. * There is evidence of delayed effects beyond the day of exposure to these fungal spores * No significant negative acute effect of PM10 | * Daily exposure to ambient fungal spores of Alternaria and Cladosporium results in lung function deficits especially in winter. The adverse effect on lung function by these fungal spores can occur beyond the day of exposure. |
| The Canaries in the Coal Mine of Climate Change Impacts: Understanding the Threats that Climate Change Poses to Respiratory Health of Workers | * Isabella Annesi-Maesano; INSERM (France) | * Workers are often the first to be exposed to the effects of climate change as they may be exposed to climate related hazards for longer durations and at greater intensities than the rest of the populations. * Climate change may result not only in the increasing prevalence and severity of known occupational hazards and exposures but also in the emergence of new ones including allergic and respiratory diseases | In workers, in terms of respiratory health:   * Extreme heat triggers asthma and extreme cold worsens Chronic Obstructive Pulmonary Disease (COPD). * Air pollution is an established trigger and cause of both asthma and COPD. * Exposure to loud noise as source of stress exacerbates the effect of air pollution. * Increasing molds and pollen count and allergens may increase allergies. * Thunderstorms tightening will enhance asthma occurrence due to pollen and mold sub-particles penetration in the airways * Poisonous plants can cause allergic skin reactions and respiratory problems if their toxins are inhaled. * More vector-borne respiratory diseases and allergies are expected.   The risk of other climate-related diseases than respiratory diseases is documented. | * Employers should train outdoor workers about their workplace hazards, including hazard identification and recommendations for preventing and controlling their exposures * Physicians should provide workers with recommendations on the management of climate-related diseases * Need of more data on climate related occupational diseases * Need for more research |
| Indoor air pollution from solid fuel use and children’s developmental status in  LMICs: Insights from the Multiple Indicator Cluster Survey | * Youssef Oulhote; Harvard T. H. Chan School of Public Health (USA) | * Pollution was linked to 9 million deaths worldwide in 2015, equivalent to one in six deaths * 92% of deaths occur in low and middle-income countries with children being the most affected * Air pollution is the most contributing cause of death among all pollutions * 2.8 billion people worldwide rely on Solid Fuel Use (SFU) for cooking and heating purposes with over 60% of households in Africa and Southeast Asia * Most of the studies investigating health effects of SFU focus on respiratory diseases, and very few studies target neurodevelopmental effects of exposure to indoor air pollution | * 31% of Children in LMICs are not developmentally on track in terms of cognitive and behavioral development * SFU decreases the Early Childhood Development Index (ECDI) by 0.11 SD (Standard Deviation) | * The way exposure to indoor air pollutants affect children’s cognitive and behavioral development may be through (1) passage of airborne pollutants into blood-brain barrier (BBB) that cause extensive neuroinflammation and cell loss within the central nervous system, (2) oxidative stress and inflammatory processes that disrupt differentiation and organization of the fetal brain and central nervous system and (3) Epigenetic mechanisms affecting brain maturation * Need of more studies focusing on mechanistic pathways. |
| Outdoor air pollution in the city of Abidjan (Côte d’Ivoire): from pollutant  concentrations to diseases in hospitals | * Kouadio Kouame; Institut Pasteur of Côte d’Ivoire (Côte d’Ivoire) | * To date, no epidemiological studies have been coupled with air pollution measurements in Côte d’Ivoire * State of cardiorespiratory and dermatological diseases including asthma, heart and skin pathologies and levels of air pollutants that are listed by WHO as causes of cardiac, respiratory and skin diseases are unknown in Abidjan and whole Côte d’Ivoire | * PM2.5, NO2 and O3 concentration values for waste burning, traffic and domestic fires are common in Abidjan. * For domestic fire, the concentrations are higher in wet season while for waste burning and traffic, the values are higher in dry period. * Cardiac, respiratory and skin diseases are prevalent with higher number of cases for respiratory diseases followed respectively by dermatological and cardiac diseases in polluted zones | * There is a need for more adapted epidemiological study to couple particles measured to the prevalent cardiac, respiratory and skin diseases. |
| A Time Series Analysis of Morbidity and Mortality of Lung and Cardiovascular  Diseases in Kampala, Uganda | * Samuel Etajak; Makerere University School of Public Health (Uganda) | * World Health Organization 2017 report estimated that 40 million deaths occur per year worldwide, due to non-communicable diseases (NCD) and 31 millions of all these deaths occur in low and middle income countries. | * Among 870 patients from 3 hospitals in 2 sub cities of Kampala in Uganda, 78% had respiratory related conditions. * Cardiovascular related conditions were notably higher in adults more than 40 years. The most reported cardiovascular conditions in adults were stroke and cardio pulmonary failure. * In children, we had stroke, cardio pulmonary failure and pneumonia | * The findings will help to generate road maps and action by governments and implementing partners in controling the NCD in Kampala |
| Exposure to DDT and pyrethroids and humoral response to vaccines among South African children | * Jonathan Chevrier; McGill University (Canada) | * Indoor Residual Spraying (IRS) is used by at least 60 countries to control malaria. While IRS is associated with substantial reduction in malaria infection and mortality, the side effects of this practice are poorly understood. DDT and pyrethroid insecticides are commonly used for IRS and adversely affect the immune system in laboratory animals. | * Preliminary analyses suggest that maternal peripartum urinary concentrations of pyrethroid metabolites are associated with an increased risk of low serum antibodies to measles in 3.5-year-old children. * No association were found with maternal serum DDT or DDE concentrations. | * Prenatal exposure to pyrethroids may be associated with inhibited humoral response to the measles vaccine. |
| Neurodevelopmental Outcomes of Children Exposed to Lead in Selected Locations of Kabwe District in Zambia | * Nosiku Munyinda; University of Zambia (Zambia) | * - Kabwe a town in Central Zambia has been the principal producer of lead (Pb) and Zinc (Zn) since the early 1900’s. * - Pollution arising from unregulated mining and smelting is massive. Kabwe named among the top ten most polluted places in the world. * - Resulted in Blood Lead Levels (BLLs) in children that could induce sub-acute toxicological effects. * - No known study that explored exposure levels and pathways during the most crucial periods of neurological development in pregnancy and the first two years after birth in Africa. | * - Median BLLs of 35.1µg/dl (IQR 0 - 381.6) for all the areas. * - Mean scores for communication, gross motor, fine motor, problem solving and personal social domains were 44, 44, 40, 37 and 38 across all the areas. * - There were significant differences across the areas with lower scores below the cutoff points recorded in areas which recorded higher Blood Lead Levels in the children. * - Significant inverse correlations between BLLs and ND scores. * - The mothers reported a variety of conditions such as hearing difficulties, behavior problems, speech delays among the children. * - Habits such as washing of hands just before a meal significantly reduced the BLL of the children. | * The children in locations within a 20 km radius of the mine have BLL more than 150 times the World Health Organization reference limit. * There is need for more education to reduce exposure which is mainly through ingestion. * There is need to conduct a longitudinal study to measure co-exposures to other metals ZN, Cd and Hg and how these influence other health outcomes. * There is need to control the scavenging at the mines and offer alternative livelihoods to the people. |
| Mercury Exposure Biomarkers and Neurologic Measure Differences between Registered and Unregistered ASGM Miners in Ghana | * Nil Basu; McGill University, Montreal (Canada) | * Mercury is a global pollutant of concern now being acted upon through the UN Minamata Convention * The world’s largest source of mercury use is now in the artisanal and small-scale gold mining (ASGM) sector * ASGM is largely informal and often illegal, and it is mainly situated in low- and middle-income countries where there may be ~15 million ASGM miners and ~100 million ASGM community members | * Formally registered miners in the Western Region of Ghana tend to have fewer injuries and accidents than informal workers * Formally registered miners in the Western Region of Ghana tend to have lower mercury exposures than informal workers | * Formal registration of ASGM miners is associated with reduced mercury exposures and overall improved working conditions |
| Agbogbloshie Electronic Waste Recycling Site: A Case of Focal Environmental Contamination | Julius N. Fobil; University of Ghana  (Ghana) | * Over the past decade there has been a surge in the production and demand for electronics, and as such there has been a concomitant rise in electronic waste (E-waste) materials which often ends up in low- and middle-income countries * E-waste is principally processed in an informal sector that consists of manual dismantling with rudimentary tools and open-air burning, as well as the use of toxic chemicals | * Informal level electronic waste recycling activities lead to focal contamination for some environmental media such as soil and for some other media such air and water; the contamination is more widespread and somewhat more global. * Local ambient environment including soil and air have elevated concentration of inorganic and organic compounds similar in origin to those originating from electronic combustion * For some of the trace metals, blood and urine level concentrations were in subjects taken from comparison sites compared to the levels in subjects taken from the recycling site; perhaps suggesting that at city-level, there were other more important sources of environmental pollution than electronic waste recycling activities. | * At the local/community levels, electronic waste recycling activities are major sources of environmental contamination but at the global-scale (city-level), other pollution sources may be more important. |

PM10: Respirable particles of <10 µm of diameter; PM2.5: Fine particulate matter of <2.5 µm of diameter; NO2: nitrogen dioxide; O3:ozone