



# Clean modern energy for all:

Benefiting health, society, environment, and climate in sub-Saharan Africa to achieve the 2030 Sustainable Development Goals



Global Health  
Research Unit

**NIHR** | National Institute for  
Health and Care Research



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# CLEAN-Air(Africa) Partnership

- CLEAN-Air(Africa) is a partnership of experts from academic, research, and clinical institutions from the UK, Cameroon, Kenya, Tanzania, Rwanda, and Uganda.
- By partnering with governmental stakeholders in our focus countries, including ministries of energy and health, we provide an evidence-base for policies to scale the adoption of clean cooking fuels to help achieve SDG7



# SDG7: “Clean, Modern, Reliable Energy for All” 2030 not on track

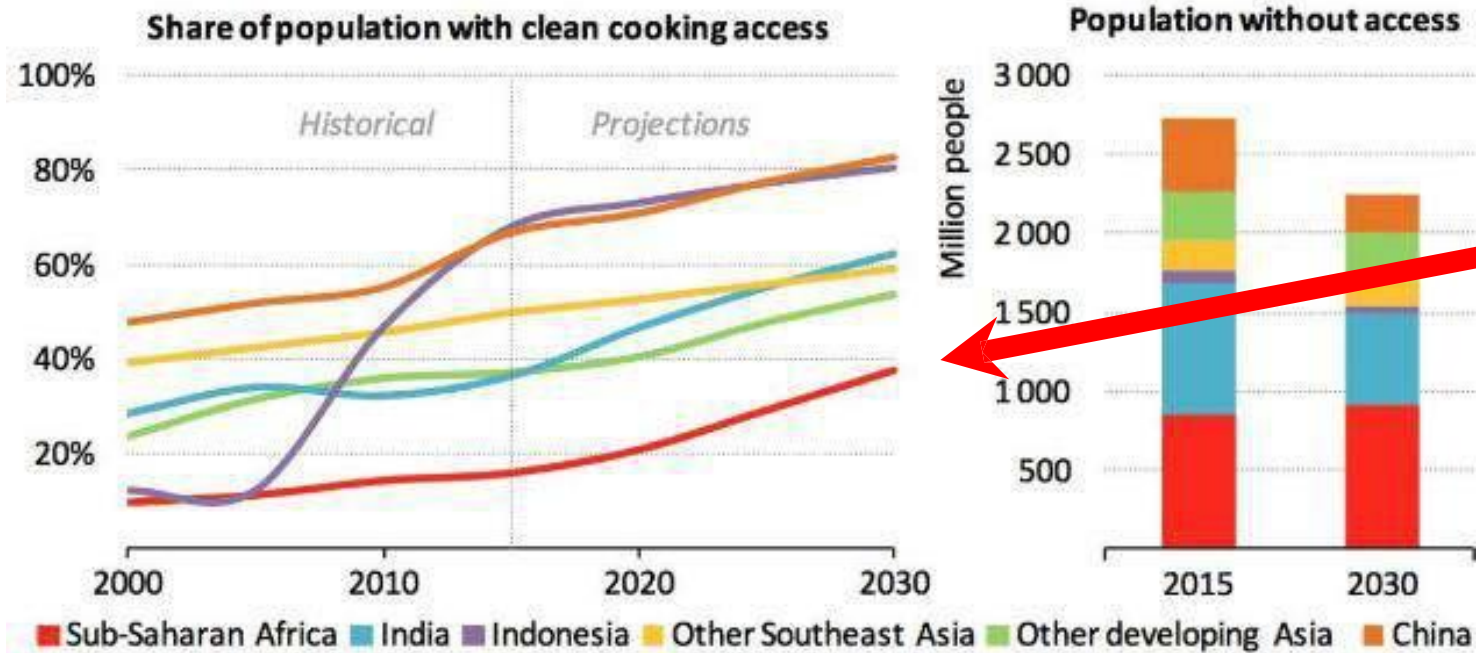
## Goal 7:

Ensure access to affordable, reliable, sustainable and modern energy for all.



### *International Energy Agency:*

“Unless rapid action is taken, the world will fall short of the universal access target for clean cooking by almost 30%, achieving 72% of the population in 2030.”



More than 60% of sub-Saharan Africa will be without access to clean cooking fuel in 2030



# NIHR134530 CLEAN-Air(Africa) Unit

Funder: NIHR



Independent Scientific Advisory Board (ISAB)

## Directorship

University of Liverpool  
NIHR contract holder  
UK

KEMRI  
KENYA



In Search of Better Health

## Collaborators

World Health Organization

World Food Programme

UK-Aid Modern Energy Cooking Services

Global LPG Partnership

Berkeley Air Monitoring Group

CircleGas Ltd

The 625 Ltd  
(TeachBox)

Douala  
General  
Hospital  
CAMEROON

Makerere  
Lung  
Institute  
UGANDA

Moi  
University  
(KENYA)

Rwanda  
Biomedical  
Center  
RWANDA

University of  
Dar es  
Salaam  
TANZANIA





## CAA Directorship



**Prof. Dan Pope**



**Dr Elisa Puzzolo**



**Dr James Mwitari**

# CLEAN-Air(Africa)'s Overview



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- ✧ CLEAN-Air(Africa) is a partnership between public health and other experts from the UK, 5 sub-Saharan Africa countries, aiming to provide policy-relevant evidence to address
  - i. Lack of access to clean household energy and
  - ii. Associated air pollution affects 3 billion of the world's population.
  
- ✧ CLEAN-Air(Africa) is clean fuel/technology agnostic but has been primarily focusing on population transition from cooking with polluting fuels to clean fuels such as LPG given national clean domestic energy targets in the partner country and the LPG scalability potential.
  
- ✧ CLEAN-Air(Africa) is supporting national clean energy programs by identifying community and institutional barriers to attaining large-scale, equitable, and sustained transition to clean energy and innovations/interventions to overcome these barriers, whilst demonstrating achievable health, gender, and environmental impacts.

# CLEAN-Air(Africa)'s Aims and 2030 Sustainable Development Goals



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**Aim 1:** To facilitate the transition for vulnerable communities and public institutions to clean cooking for positive health, climate, and gender

**Aim 2:** To evaluate and quantify chronic and hidden health burdens from polluting fuel use that can be addressed through clean cooking

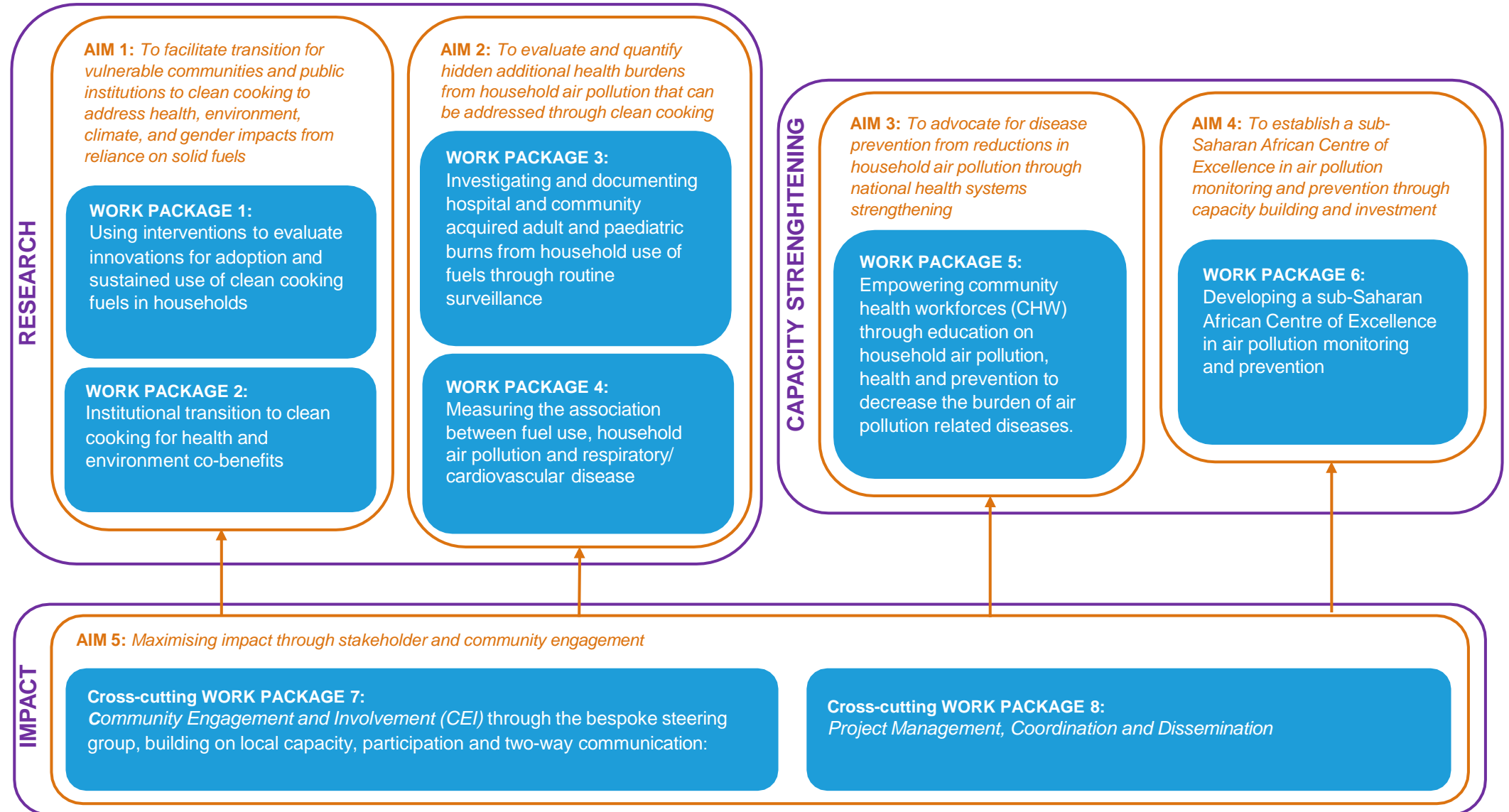
**Aim 3:** To advocate for disease prevention from reductions in air pollution through health systems strengthening

**Aim 4:** To develop a sub-Saharan African Air Pollution Centre of Excellence (training and air quality monitoring)





# NIHR CLEAN-AIR(Africa) Unit – Aims & Work Packages (Figure 1)





# Research



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*AIM 1: To facilitate the transition for vulnerable communities and public institutions to clean cooking to address health, environment, climate, and gender impacts from reliance on solid fuels*

## Work Package 1:

Using interventions to evaluate innovations for the adoption and sustained use of clean cooking fuels in households

- *Health, gender, and cost impacts*
- *SUMs and HAP measurement*

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**RCT1:** Evaluation of LPG adoption through PAYG smart meters (*Kenya*)

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**RCT2 and RCT 4:** *Evaluation of LPG exclusive use in PAYG users through PCs + behavior change + Evaluation of the impact of a mobile phone texting campaign (Kenya & Tanzania)*



# Research

*AIM 1: To facilitate the transition for vulnerable communities and public institutions to clean cooking to address health, environment, climate, and gender impacts from reliance on solid fuels*

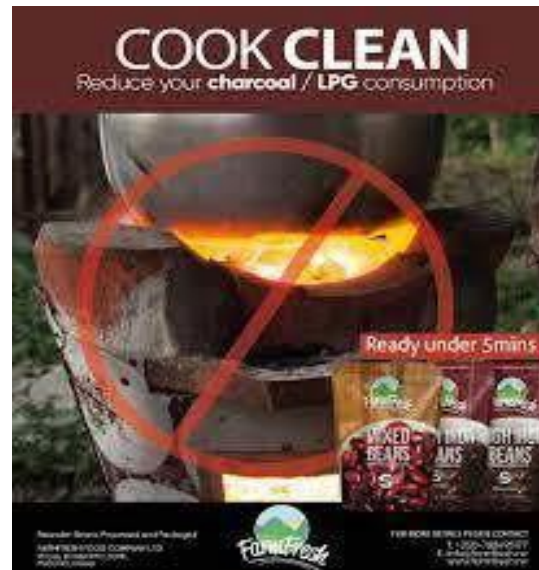
## Work Package 1:

Using interventions to evaluate innovations for the adoption and sustained use of clean cooking fuels in households

- *Health, gender, and cost impacts*
- *SUMs and HAP measurement*

*RCT3: Evaluation of LPG exclusive use through PCs (Rwanda)*

LPG adoption in rural communities through peer-to-peer microfinance- *West Kenya*



# Research



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*AIM 1: To facilitate the transition for vulnerable communities and public institutions to clean cooking to address health, environment, climate, and gender impacts from reliance on solid fuels*

## **Work Package 2:**

Using interventions to evaluate innovations for the adoption and sustained use of clean cooking fuels in households *(Kenya, Rwanda)*

- *Health, and cost impacts*
- *SUMs and HAP measurement*

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Energy Mapping for Public Institutions (Schools)  
*(Kenya & Rwanda)*

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Evaluation of transition to LPG for cooking Kenya  
*(Nairobi)*





# Research



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*AIM 2: To evaluate and quantify hidden additional health burdens from household air pollution that can be addressed through clean cooking*

## **Work Package 3:**

Investigating and documenting hospital and community-acquired adult and pediatric burns from household use of fuels through routine surveillance

*(Uganda, Cameroon, Kenya)*

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**Clinical Evaluation of Burns:** (i) Retrospective record review and (ii) Prospective evaluation of fuel-related burns

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**Primary Care Evaluation of Burns:** (i) Prospective evaluation of fuel/stove-related burns and (ii) Interviews with patients to understand the contexts of burns





# Research



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*AIM 2: To evaluate and quantify hidden additional health burdens from household air pollution that can be addressed through clean cooking*

## Work Package 4:

Measuring the association between fuel use, household air pollution, and respiratory/cardiovascular disease.

*(Cameroon, Rwanda)*

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**Modelled Health Impacts from LPG:** (i)HAP measurement and (ii) HAPIT Modelling **(Rwanda)**

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**Lung Function and Cooking Fuel:** (i)cooks through (ii) Spirometry and surveys **(Cameroon)**

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**HAP exposure and Heart Rate Variability:** (i)Cooks through HAP measurement, SUMs (Bluetooth beacons), wearable HRV monitors **(Cameroon)**

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# CAPACITY STRENGTHENING



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*AIM 3: To advocate for disease prevention from reductions in household air pollution through national health systems strengthening*

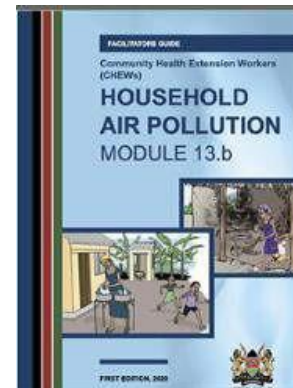
## **Work Package 5:**

Empowering community health workforces (CHW) through education on household air pollution, health, and prevention to decrease the burden of air pollution-related diseases  
(Kenya, Uganda, Cameroon, Rwanda)



## ***Monitoring and Evaluation of CHW National Training Initiative in HAP, Health, and Prevention***

- Training Evaluation (CHVs/ materials/ delivery),
- Messaging Evaluation (CHVs/ Job Aids and
- Preparation for UHC (led through CCEH TWG)



## ***Adaption of CHW Training Initiative for sub-Saharan Africa***

- Module 14 and Job Aids and
- Preparation and piloting (***Uganda, Rwanda, Cameroon***)

## ***Digital Delivery of Training and Health Surveillance (TeachBox)***

Kenya, Uganda, Rwanda

- Module delivery Health Surveillance (Kenya Informatics)



# CAPACITY STRENGTHENING



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*AIM 4: To establish a sub-Saharan African Centre of Excellence in air pollution monitoring and prevention through capacity building and investment*

## **Work Package 6:**

Developing a sub-Saharan African Centre of Excellence in air pollution

**A:Technical:** Establishment of Air pollution Hub



(i) State-of-the-art gravimetric filter weighing and analysis lab

(ii) Air quality monitors

- Gravimetric-UPAS
- Light Scattering: Purple Air
- (PM<sub>2.5</sub>, Cox, Nox, Sox)

(iii) Highly trained technicians,



# CAPACITY STRENGTHENING



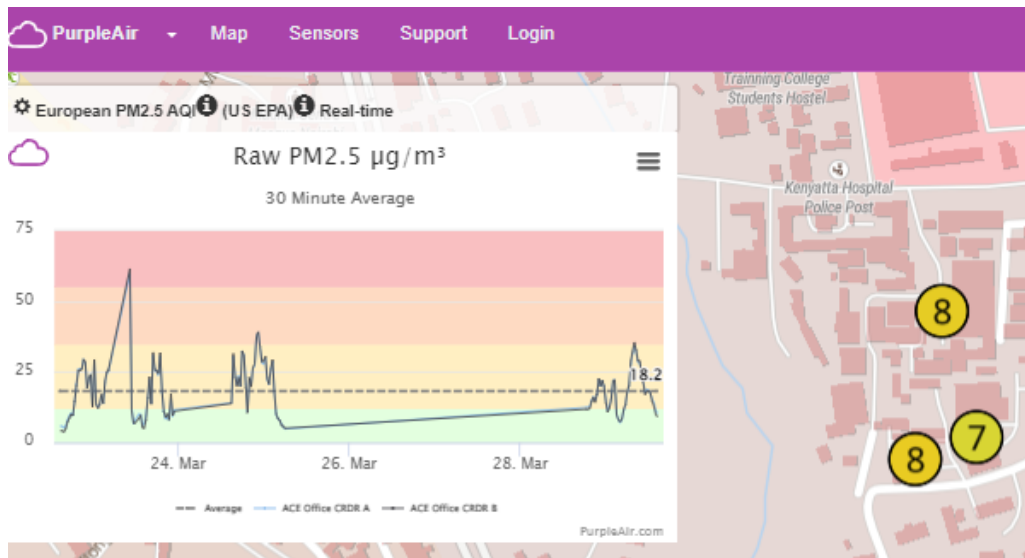
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**AIM 4:** *To establish a sub-Saharan African Centre of Excellence in air pollution monitoring and prevention through capacity building and investment*

## **Work Package 6:**

Developing a sub-Saharan African Centre of Excellence in air pollution

**A:Technical:** Operationalization of Air pollution Hub



- (i) The HUB has the potential to support results-based financing (RBF) initiatives for clean energy transition programs
- (ii) Through the partnership with the Berkeley Air Monitoring Group, staff will receive classroom and field-based training (*on the use of equipment, air monitors, and data handling*).
- (iii) Support research studies and monitoring components of public and private institutions seeking to have analyses conducted at the Hub.
- (iv) Support HAP Monitoring in 47 counties and other African Countries *i.e Ghana*



# CAPACITY STRENGTHENING



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*AIM 4: To establish a sub-Saharan African Centre of Excellence in air pollution monitoring and prevention through capacity building and investment*

## **Work Package 6:**

Developing a sub-Saharan African Centre of Excellence in air pollution

### **B. APCE Education Training Centre**



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### **Develop professional pieces of training on HAP i.e:**

- (i) Health Practitioner Training in Air Pollution, Energy, and Health
- (ii) Health communication and Journalism (*journalist cohort for Unit*)
- (iii) Health Impact Assessment

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### **Mentorship/ support for Academic Trainee Posts**

- (i) Ph. D. Programs
- (ii) PDRA fellowship to support research on HAP

# IMPACT and MANAGEMENT



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*AIM 5: Community Engagement and Involvement (CEI) through the bespoke steering group, building on local capacity, participation, and two-way communication*

## **Work Package 7:**

Maximizing Community Engagement and Involvement through CEI steering committee



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## **CEI Steering Committee**

(i) Chaired by Prof Were: World leading expert in the community-based empowerment and public health

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(ii) Community representatives from each focus country

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(iii) Input into all aspects of the Unit's activities (*through governance structure*) and documenting success stories.

# Open Discussion