Building health workforce capacity on air pollution and health

a train-the-trainer pilot workshop in Ghana

World Health Organization

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Glossary

Capacity-building

According to the United Nations, a process of developing and strengthening the skills, instincts, abilities, processes and resources that organizations and communities need to survive, adapt and thrive in a fast-changing world. An essential ingredient in capacity-building is transformation that is generated and sustained over time from within[1].

Capacity-building material

A framework including different educational opportunities for individuals (e.g. in-person training, online training, books, videos, etc.) but also other important items related to the role of institutions and governing bodies, such as guidance for setting standards in the implementation of health sector curricula (undergraduate and continuing medical education).

Clinicians

In this report broadly intended as physicians including general practitioners, as well as nurses, midwives and other health professionals who can be considered as caregivers of patients. The term also includes medical students and future health care professionals as well as community health workers.

Community health workers

Health care providers who live in the community they serve, and receive lower levels of formal education and training than professional health care workers such as nurses and doctors[2]. This human resource group has enormous potential to extend health care services to vulnerable populations, such as communities living in remote areas and historically marginalized people, to meet unmet health needs in a culturally appropriate manner, improve access to services, address inequities in health status, and improve health system performance and efficiency.

1 Capacity-building. New York: United Nation Academic Impact; 2022 (https://www.un.org/en/academic-impact/capacity-building, accessed 4 November 2022).

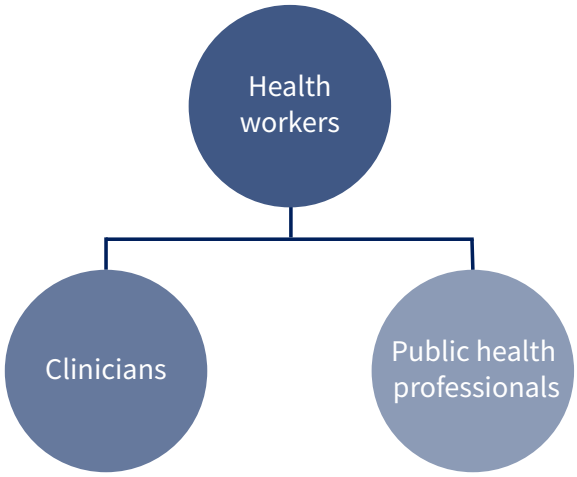
2 What do we know about community health workers? A systematic review of existing reviews. Geneva: World Health Organization; Human Resources for Health Observer Series 19; 2021 (https://www.who.int/publications/i/item/what-do-we-know-about-community-health-workersa-systematic-review-of-existing-reviews, accessed 31 October 2022).

Educational opportunities

A series of educational materials and/or moments dedicated to strengthening the audience knowledge on a specific topic. An in-person training session is an educational opportunity as well as online training, but also books, videos/documentaries, lessons, conferences, etc.

Health workers

For convenience, in this report the term health workers is used to refer to both clinicians and public health professionals, although the term also encompasses other professionals. According to the World Health Report 2006[3], health workers are all paid workers employed in organizations or institutions whose primary intent is to improve health, as well as those whose personal actions are primarily intended to improve health but who work for other types of organizations.



Public health professionals

All workers, with or without a medical background, whose job is related to serving the population in attaining the best health possible. They are not working at an individual level (as clinicians do) but at a population level, being involved in fields such as epidemiology, clinical research, environmental health, health policy and health management, both at the national and local level.

Toolkit

A container of specific products (e.g. training modules, training manual, tools and communication materials).

Training

A well defined moment in time and space in which the products of a toolkit are tested or used. An online course or massive open online course is also considered as training.

3 The world health report: 2006: working together for health. Geneva: World Health Organization; 2006 (https://www.who.int/publications/i/item/9241563176, accessed 4 November 2022).

Introduction

Air pollution is a major environmental risk causing almost 7 million premature deaths per year, mostly from noncommunicable diseases (NCDs) such as ischaemic heart disease, stroke, chronic obstructive pulmonary disease and lung cancer, but also from acute lower respiratory tract infections such as pneumonia, which mainly affect children in low- and middle-income countries *(1)*.

A growing and consistent body of evidence has shown that additional air pollution health effects include preterm birth, low birth weight, the exacerbation and onset of asthma, and cognitive and neurological impairment *(2)*.

In a world where more than 9 out of 10 people breathe unsafe levels of polluted air *(3)*, this environmental threat affects everybody. However, the most vulnerable groups pay the highest price of air pollutant exposure: older people, children, pregnant women, and people with chronic health conditions or of a low socioeconomic status. This health risk also disproportionately affects individuals of all ages who are active or work outdoors, or who live near industrial zones or busy, polluted roads.

Regions and countries differ widely in their burden of air pollution. Globally, low- and middle-income countries still experience greater exposure to unhealthy levels of particulate matter (PM) compared with the global average, where the air quality in less than 1% of cities complies with recommended thresholds for $PM_{2.5}$ or PM_{10} (particulate matter of diameter ≤2.5 μm or 10 μm, respectively) set by the World Health Organization (WHO) *(4)*. This perpetuates the unequal global distribution of risk factors, health and wealth.

In Ghana (Box 1), the levels of air pollution are a concern for public health. The majority of households (78% of the population) rely heavily on polluting fuels for cooking, increasing exposure to air pollutants, while Ghana's annual ambient mean concentration of $PM_{2.5}$ (43 mg/m^3) exceeds WHO air quality guidelines *(1)* by a factor of eight. Urban areas including Accra and Kumasi make up 56% of the total population. In these urban centres, transport, industry, waste burning and unclean household fuels significantly contribute to air pollution exposure and important health outcomes in the population *(5)*.

The WHO Urban Health Initiative (UHI) in Accra, Ghana, is a project to reduce deaths and diseases associated with air and climate pollutants, improve health with policies to tackle urban air pollution and short-lived climate pollutants, and save lives by linking health, environment and sustainable development. UHI mobilizes and empowers the health sector to: use its influential position to promote the implementation of air and climate pollutant reduction strategies; provide tools and guidance for decision-makers to assess potential health benefits and health risks; and demonstrate to the public the full range of health, economic and climate benefits that can be achieved from implementing local emission reduction policies and strategies *(6–10)*.

Reducing air pollution emissions can protect human health and the environment. In addition, because the combustion of fossil fuels contributes to increased levels of some air pollutants, the reduction of air pollution levels can also help to address the complex challenge of climate change. As well as a number of interventions to reduce air pollution that could be implemented in sectors such as energy access, transport and waste management, building the capacity of the health sector on air pollution and health is essential to reduce the burden of disease.

Box 1. Air pollution in Africa: Ghana case study and the need for health workforce training

The African region is facing significant environmental health challenges. As stated in the Libreville Declaration *(11)*, almost one quarter of all deaths in Africa are due to environmental risks factors, disproportionately impacting poor and vulnerable individuals. Engaging in preparedness and prevention by addressing environmental health risk factors, such as air pollution, can improve human health and well-being and prevent premature deaths.

According to the latest WHO estimates, in Africa only 21% of the population has primary reliance on clean fuels and technologies for cooking. Tragically, an estimated 1 550 children aged <5 years died in Ghana in 2019 as a result of exposure to household air pollution. *(1)*

Results from recent WHO analysis *(6)* have shown that if air pollution levels were reduced to interim target 4 (i.e. 10 µg/m^3) of the WHO air quality guidelines, about 1 800 annual premature deaths would be avoided in Accra alone, and years of life lost would be reduced by nearly 70 000 over 10 years. By adopting ambitious policies on clean and sustainable household energy access, a reduction in exposure to air pollutants by 35%, resulting in about 2 000 averted deaths, could be achieved.

Economic analysis found that the direct costs to individuals, particularly people working in the informal sector, are catastrophic; however, the benefits to the public sector of controlling air pollution are highly cost-effective.

Addressing environmental determinants of health, such as air pollution and climate change, can relieve pressure on health systems, allowing health professionals to better serve patients and communities. The health community also has a role to play in reducing the effects of air pollution, and the WHO training workshop held in Ghana for clinicians and public health officers aims to equip health workers with the knowledge of air pollution and health to train other health workers.

Workshop development

Background

The engagement of the health sector and the health community is pivotal to boost advocacy and political action for clean air. This requires a strong effort by countries willing to increase awareness and equip current and future health workers with knowledge and tools to tackle air pollution *(12).*

The international community recently recognized that the health workforce should play a more prominent role in the battle for clean air. The World Health Assembly (WHA) resolutions WHA68.8 *Health and the environment: addressing the health impact of air pollution (13)* and A69/18 *Road map for an enhanced global response to the adverse health effects of air pollution (14)* request that WHO strengthen the capacity of the health sector to address the adverse health effects of air pollution *(13)*.

To date, air pollution is not sufficiently addressed in the curricula of health professionals, with only 12% of medical schools having a formal education on air pollution and health *(15).* According to a World Heart Federation survey, clinicians wish to see air pollution as a risk factor for cardiovascular diseases being featured more prominently in cardiovascular training materials and/or medical school curricula. WHO has extensively reviewed existing training opportunities on air pollution and health, although most of these only applied to high-income countries *(16).*

WHO is therefore developing the Air Pollution and Health Training toolkit for health workers (APHT) (https://www.who.int/tools/air-pollution-and-health-training-toolkit-for-health-workers) that aims to build the capacity and strengthen the knowledge of health professionals to address the health effects of air pollution, but also mitigate risks by effectively communicating with patients, communities and the general public. A train-the-trainer approach was proposed for the Ghana workshop, allowing participants to engage in comprehensive, distributive learning of knowledge and skills, enabling them to effectively train others.

Key health professionals in Ghana were invited to join a series of events to pilot the available training material, providing them with the opportunity to become actively involved in shaping the future WHO APHT toolkit.

General and specific objectives

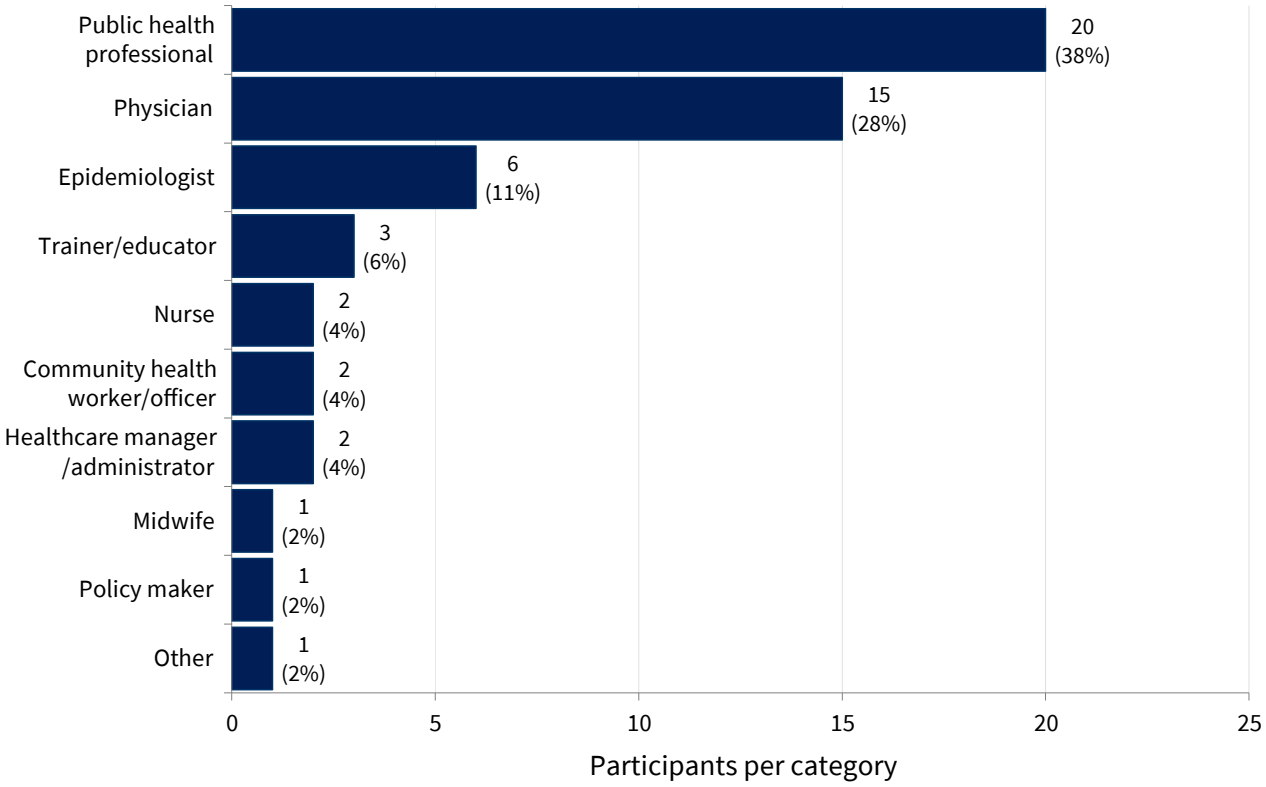
The general objective of the pilot workshop in Ghana was to build the capacity of health workers and patients, to improve their understanding, and to enable them to train others on the link between air pollution and health as well as effective interventions.

Specifically, the aim was to enable participants/trainees to (1) identify air pollution exposure as a risk factor for the onset and exacerbation of a broad spectrum of negative health outcomes and diseases; (2) include air pollution knowledge in the assessment of a patient, while identifying most vulnerable or susceptible individuals; (3) identify key air pollution exposure primary and secondary prevention interventions, which could be delivered through individual, community and public health action; (4) train clinicians and empower patients with the knowledge to recognize exacerbations of disease related to air pollution, and provide tools to reduce exposure to air pollution; (5) train other health workers on the link between air pollution and health, and improve their ability to advocate for action; and (6) develop context-specific training materials and tools for local, regional and national air pollution and health.

Target audience

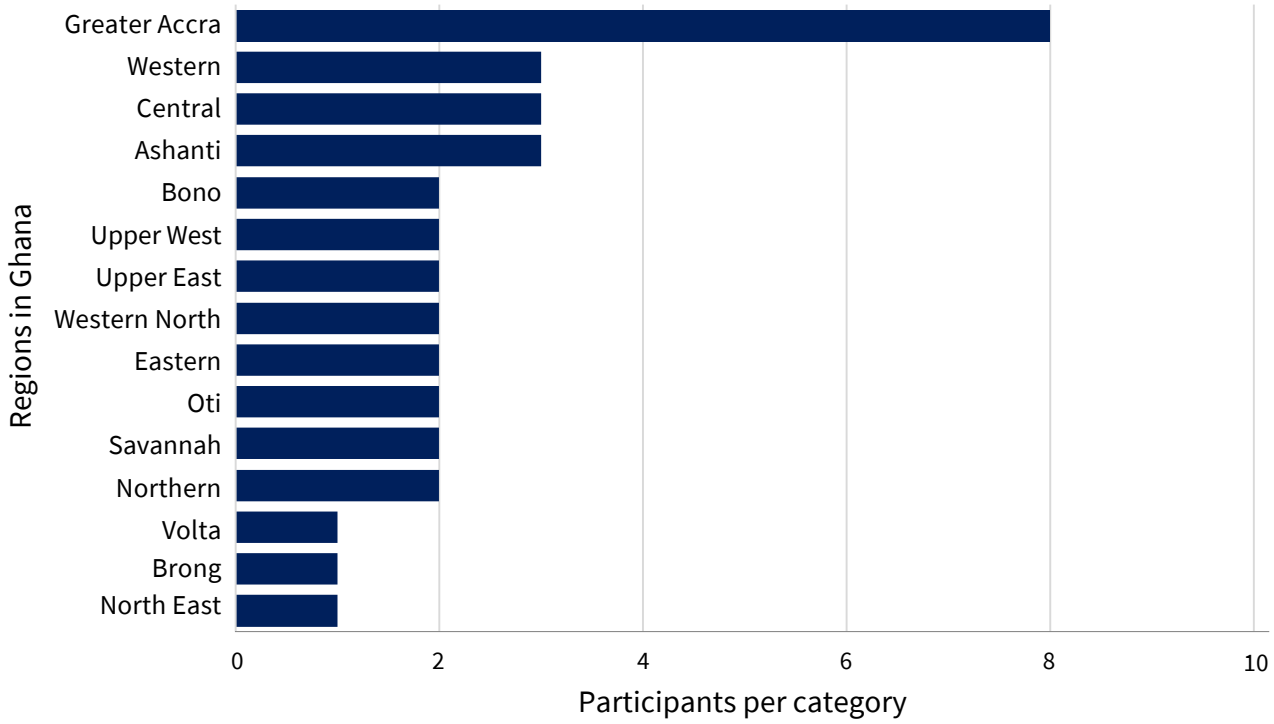
The workshop was attended by 42 participants (9 women, 33 men) representing all regions in Ghana. Participants identified by Ghana Health Service included physicians, public health nurses and community health officers, as well as public health officers such as disease control officers and epidemiologists. According to the pre-workshop survey completed by 36 participants (response rate 85.7%), health workers who are also trainers and educators as part of their daily practice accounted for 6% of the total (Fig. 1). The most represented region was Greater Accra (see Fig. 2).

Fig. 1 Number (%) of participants in each particular role within the health workforce



Note: The numbers within each category do not add up to 36 because participants were allowed to select more than one response.

Fig. 2. Regional distribution of participants of Ghana workshop



Expertise and expectations

A pre-workshop survey was sent to all participants to allow the organizers to: identify experience in the field of air pollution and health that attendees may have encountered in their daily practice; learn more about what participants expected to gain from attending the air pollution and health workshop; and assess willingness to become an advocate for air quality and health, and to disseminate knowledge among peers and the community.

The main results of the knowledge assessment are shown in Fig. 3. Participants generally indicated that they had some knowledge of air pollution and health effects, and some experience of being confronted with air pollution health issues in their daily practice, although 36% not currently advising patients or engaging in community outreach activities. Most of the participants agreed or strongly agreed that health workers can play a role in counselling individuals and communities. The current level of training in health education programmes to address air pollution in Ghana was assessed as mostly weak or very weak (Fig. 4).

Fig. 3. Pre-workshop survey results

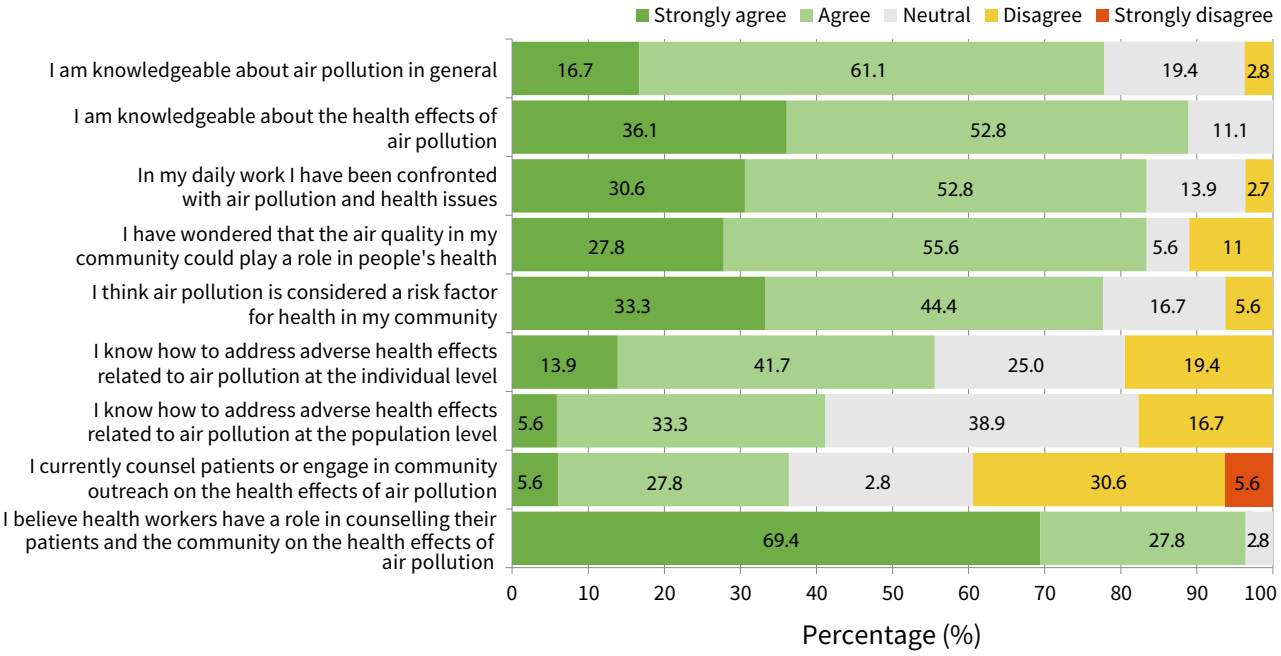
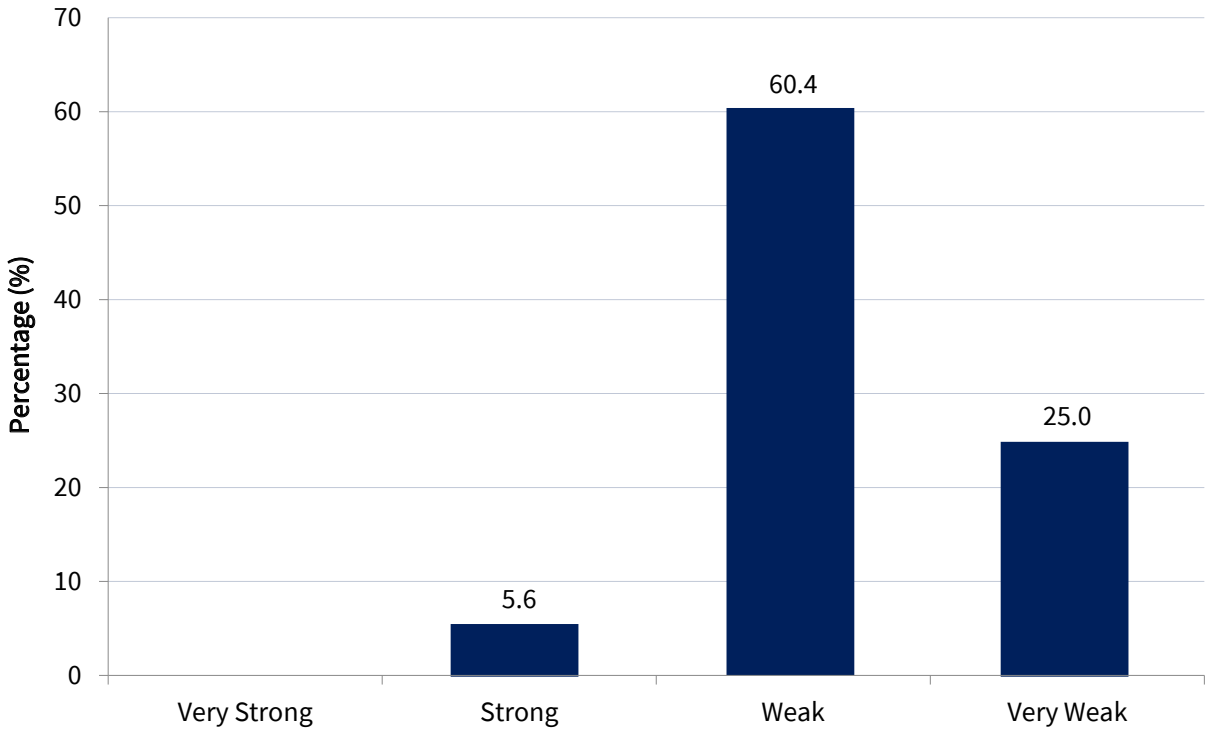


Fig. 4. Opinion on the ability of the current level of training in health education programmes to address health issues related to air pollution in Ghana (n = 36)



The main expectations of the workshop were: understanding air pollution as a risk factor for health and the prevention measures to reduce exposure; learning how to organize and facilitate a training workshop for health professionals on air pollution and health; and becoming empowered as advocates to bring the health argument to all policies (Table 1).

Table 1. Expectations of participants before attending the Ghana workshop (multiple choice allowed)

Parameter	Count	Rank
Understand prevention measures to reduce exposure to air pollutants, both at the community and individual level	32	1
Learn how to organize and facilitate a training workshop for health professionals on air pollution and health	26	2
Learn how air pollution is a risk factor for health	24	3
Be empowered as an advocate to bring the health argument to all policies related to air pollution in the local/regional context	20	4
Learn how to build a campaign on air quality and health	9	5
Learn more about the role of WHO in air pollution and health issues	9	5
Have the opportunity to network with other colleagues	7	7
Other (specify: gain knowledge of scientific data collection methods on air quality)	1	8

Participants were able to make preliminary commitments in terms of the follow-up activities they anticipated taking part in, including the organization of campaigns for clean air, meetings, conferences and training workshops, as well as conducting research on air pollution and health-related topics (Table 2).

Table 2. Follow-up activities on air pollution and health, targeting health workers (multiple choice allowed)

Parameter	Count	Rank
I would like to carry out campaigns for clean air in my community	27	1
I am considering personally organizing meetings, conferences and training opportunities	24	2
I plan to meet other colleagues to share my experience	22	3
I would like to conduct research on air pollution and health-related topics	20	4
I am considering asking other people to organize meetings, conferences and training opportunities	12	5
I would like to produce a position paper or other scientific publication	10	6
I am interested in producing media and social media products	8	7

Workshop delivery

The WHO *Building health workforce capacity on air pollution and health: a train-the-trainer pilot workshop* took place from 6 to 10 June 2022 in Kumasi, Ashanti Region, Ghana. It represented the first WHO training workshop on air pollution and health, targeting the health workforce. It was attended by 42 participants (Annex 1) from all over the country, as well as the national and international experts and the WHO staff who facilitated the workshop (Fig. 5). Organized by WHO in collaboration with Ghana Health Service, the workshop was a unique opportunity to test the training material using a train-the-trainer approach, allowing participants to gain knowledge of air pollution and its health impact, and become equipped with skills to act as advocates in the community and trainers of other health professionals in the country.

Fig. 5. Participants and facilitators of the WHO pilot workshop for health workers on air pollution and health

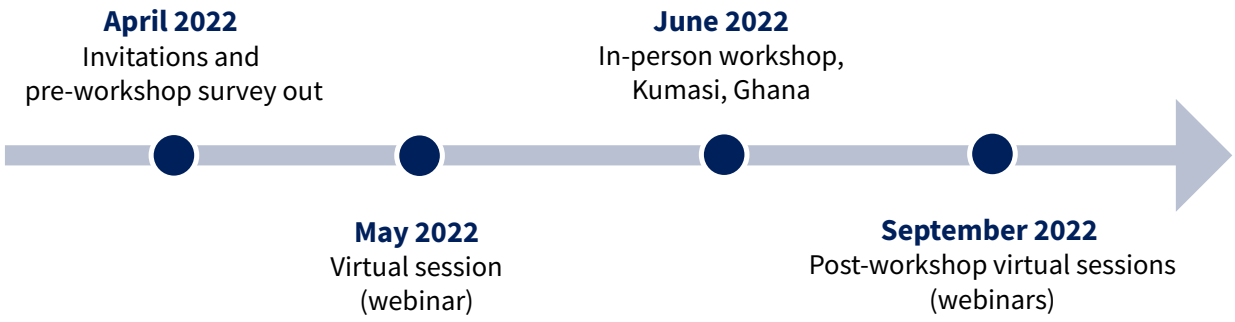
Four training modules (introduction to ambient air pollution, introduction to household air pollution, a general overview of the health effects of air pollution and the role of the health workforce) were piloted during the workshop, in addition to a set of clinical case scenarios focused on cardiovascular and respiratory diseases and children's health. The workshop included a series of interactive sessions and activities, group discussions and a field visit to some of the

Kumasi areas at which exposure to air pollution is high (referred to as hotspots). The last day of the workshop was focused on community health officers in Ghana, and the identification of resources for equipping this category of health professionals to successfully engage with vulnerable and susceptible individuals and communities. An overview of the agenda and a detailed programme are included in Annexes 2 and 3, respectively.

Timeline of key events

The timeline of the workshop-related activities is presented in Fig. 6. A pre-workshop survey was sent to all nominated participants in April 2022 to allow the organizers to create a workshop agenda tailored to the characteristics and expectations of the audience. In preparation for the in-person pilot training event, a virtual session (webinar) with all participants was organized in May 2022. This aimed to ensure that all nominated participants fully appreciated the subject matter while contributing to the content of the training toolkit and to present some highlights of the forthcoming workshop including break-out group discussions. See Annex 4 for the virtual session agenda. Post-workshop virtual sessions were organized to evaluate the training in Ghana and test some additional training modules (see Outcomes and follow-up section).

Fig. 6. Timeline of workshop-related activities



Day 0: getting to know each other

On 6 June, an informal session was held by WHO and Ghana Health Service as an introduction for the participants. Icebreaker activities are an important part of training; they allow the trainer to set the tone for the rest of the session, and allow the participants to get to know each other, facilitating the sharing of ideas and opinions within the group while creating a safe, relaxed and productive learning environment. The interactive activity was participation in the human map (Fig. 7), where participants position themselves around the space based on where they live relative to where the facilitator is standing (north, east, south, west). They are then asked to introduce themselves to one another while they picture the relative locations of each other across the country. After the icebreaker activity, a pre-workshop test was conducted to immediately engage trainees with air pollution and health content by testing their knowledge, and to open discussion.

Fig. 7. Taking part in the human map interactive activity

Day 1: introduction to air pollution and health

The first day of the pilot workshop was chaired by Dr Emmanuel Kyeremanteng (Occupational and Environmental Health Unit, Ghana Health Service), who provided welcome remarks and invited the speakers to officially start the meeting. High-level speakers who provided welcome remarks included: Dr Emmanuel Tinkorang, Ashanti Regional Director of Health Services, Ghana Health Service; Dr Maria Neira, Director of the Department of Environment Climate Change and Health, WHO headquarters (video recording); Dr Elizabeth Juma, on behalf of the WHO Representative to Ghana; Dr Brama Koné, WHO Regional Office for Africa; Dr Reginald Quansah, University of Ghana; Dr Alan Abelsohn, World Organization of Family Doctors; and Ms Rosamund Kissi-Debrah, Co-Founder and Executive Director, Ella Roberta Family Foundation, BreatheLife Champion (video recording).

The first day of the workshop included the testing of three training modules of around one hour each, as well as interactive activities such as mapping of air pollution sources, air pollution and health stories.

Training module 1: Introduction to ambient air pollution

Learning objectives: what is air pollution, and what are the classic air pollutants and their characteristics; reasons for the increased concerns related to air pollution in recent decades; the impact of air pollution on the global burden of diseases and on the development of NCDs; an introduction to the main determinants of air pollution health effects; and the milestones of WHO work on air quality and health, including the WHO global air quality guidelines *(4)*.

Training module 2: Introduction to household air pollution

Learning objectives: define household air pollution and learn how it relates to indoor air pollution; identify some of the main household air pollutants and their sources; understand the role of household air pollution effects on gender, climate, poverty and awareness implications; and describe household air pollution health effects, including safety and social risks.

Training module 3: Health effects of air pollution: a general overview

Learning objectives: adverse health effects of air pollution; how air pollutants enter the body, which organs are mostly affected and the main short- and long-term health effects; how the health effects of air pollution have been investigated; the main pathological mechanisms leading to disease as well as the pollutants-specific main health effects; and recognize who is more susceptible or vulnerable to air pollution (categories at higher risk).

Key messages from training modules 1–3 are summarized in Boxes 2–4.

Box 2. Training module 1: introduction to ambient air pollution

- Appreciation of adverse effects of air pollution on health emerged after high-pollution episodes in 1950s.
- Classical air pollutants are solid–liquid contaminants such as $PM_{2.5}$ and PM_{10}, and gases such as ozone (O_3), nitrogen dioxide (NO_2) and sulfur dioxide (SO_2).
- Air pollution is the first environmental risk factor for health and $PM_{2.5}$ is fourth highest cause of death among all health risks.
- The WHO global air quality guidelines *(4)* set the levels of air quality to be achieved in order to significantly reduce the adverse health effects of pollution.
- A key determinant of air quality is the emission of pollutants to the atmosphere influenced by urbanization and population growth, unsustainable consumption and production of goods, use of unclean energy systems and climate change.
- Meteorological conditions and topography influence atmospheric dispersion and, consequently, ambient concentration of the pollutants.

$PM_{2.5}$: particulate matter of diameter ≤ 2.5 μm; PM_{10}: particulate matter of diameter ≤ 10 μm.

Box 3. Training module 2: introduction to household air pollution

- Almost one half of the world's population (2.4 billion people) still relies on polluting fuels and technologies for household-related activities such as cooking.
- Household air pollution refers to the incomplete combustion of carbon-based fuels used for cooking, heating and lighting.
- PM is the best single indicator for household air pollution exposure.
- Household air pollution is estimated to be responsible for 3.2 million deaths per year, mainly from NCDs and acute lower respiratory tract infections, and poses serious safety risks such as burns and poisoning.
- Household air pollution is a gender issue as it disproportionately affects women and girls, especially in low- and middle-income countries, who are the primary procurers of fuels and main responsible for cooking, heating and lighting.
- Short-lived climate pollutants from dirty household energy use contributes to climate change, and polluting fuels are often harvested unsustainably. Clean household energy is therefore beneficial for people's health and for the climate.

NCDs: noncommunicable diseases.

Box 4. Training module 3: health effects of air pollution: a general overview

- Air pollution is responsible for about 7 million premature deaths per year worldwide.
- Air pollution is one of the main risk factors for NCDs.
- Research on air pollution and health is extensive, based on epidemiological as well as toxicological studies.
- PM causes damage beyond the lungs, as small particles can enter the bloodstream, therefore reaching other organs.
- Almost every organ in the body is affected by air pollution; especially important are cardiovascular diseases, respiratory diseases, lung cancer and pneumonia, which mainly affects children.
- Evidence shows that air pollution health effects also include preterm and low birth weight, asthma as well as cognitive and neurological impairment.

NCDs: noncommunicable diseases; PM: particulate matter.

Interactive activity: mapping of air pollution sources

The main purpose of this activity was to engage participants in identifying and visualizing air pollution sources in their community, used to trigger discussions on the consequent health effects, specific populations at higher risk and types of actions that could be taken in the community.

Break-out groups representing different regions drew a map in a flipchart, and a plenary discussion was then facilitated for groups to present their maps (Fig. 8). Many individuals do not consciously think about the household and ambient air pollution sources in their environment. By mapping these sources, trainees could obtain a better understanding of their own region, tying sources to potential health effects and their daily variations.

Fig. 8. Plenary presentation of air pollution sources as mapped by break-out groups

Day 2: from monitoring air pollution to health impacts – clinical perspectives

The first part of day 2 was dedicated to the piloting of some interactive tools, such as the air pollution and health clinical case scenarios. This exercise aims at improving reasoning and decision-making skills among health workers related to air pollution in their patient's health and their ability to induce action at the individual and the community level. Clinical case scenarios facilitated by the trainers included: (1) air pollution and cardiovascular diseases: heart failure, Rwanda; (2) air pollution and respiratory health: acute lower respiratory tract infection, Sri Lanka; and (3) air pollution from the womb to childhood: intrauterine growth restriction, Mexico. These clinical case scenarios were designed using the script concordance test *(17)*, a methodology that is used to assess clinical reasoning in ambiguous or uncertain situations. While the strength of evidence of air pollution health impacts is well assessed and acknowledged by the scientific community, it is important to take uncertainty into account at the clinical level as assessing the causality between individual level exposure to air pollution and the occurrence of symptoms or diseases may be challenging.

Each clinical case scenario was based in a different geographical setting and focused on ambient and/or household air pollution. It consisted of a series of vignettes including an initial narrative (description of the patient), a predefined hypothesis and a new piece of information. Participants had to assess how the initial hypothesis may change with the new information provided, using a Likert scale. After stating their decision, the participants learned the opinion of a number of experts; a trainer-facilitated discussion then followed.

Field visit to air pollution hotspots

In the afternoon of day 2, participants were divided into groups and taken on a field visit to four different air pollution hotspots within the Kumasi Metropolis (a smelting location; a charcoal production area; a Kenkey factory, which is a commercial cooking spot; and a location at which cowhide singeing took place), organized by Ghana Health Service and Environmental Protection Agency Ghana (Fig. 9 and Fig. 10). The field visit was included to enable trainees to experience the practicalities of knowledge gained from the training sessions. With the assistance of local guides, trainees conducted a rapid appraisal of air pollution sources, populations at risk, behavioural risk factors, and local knowledge and perceptions of the health impacts of air pollution exposure. During the visit, selected participants could use an air pollution personal monitor for assessing and measuring individual levels of exposure to air pollutants.

Participants were also encouraged to use an observation and questionnaire guide, providing inspiration for useful activities during the field visit as well as facilitating discussion with locals in order to obtain an understanding of sources of air pollution and their potential health effects. Participants were able to conduct interviews with some key respondents previously identified by the organizers, exploring topics such as: the perception of air pollution in the community and at the individual level; the health effects perceived to be linked to air pollution exposure; and whether any action has been taken forward to reduce the exposure.

Fig. 9. Field visit sites (charcoal production factory on the left, Kenkey factory on the right)

Fig. 10. Field visit sites (hide singeing spot on the left, smelting site on the right)

Day 3: the role of health workers and train-the-trainers approach

Day 3 of the workshop began with a plenary discussion on the field visits and the main outcomes of the observation and questionnaire guide. Trainees were able to identify sources of air pollution at the hotspots, focusing on occupational as well as community-level sources (although the boundaries between occupational and community exposure are often difficult to disentangle). Interviews with key respondents facilitated by the community leaders at each site enabled the attendees to collect qualitative information on the perception of air pollution as a risk factor for health. Generally, all groups reported that the community had some awareness that air pollution was a potential threat to their health, although not always able to recognize the major health effects. Common symptoms identified were sore and running eyes, headache, and fever.

The day continued with a focused train-the-trainers session, including a presentation of the train-the-trainers manual and communication resources (e.g. the WHO-led BreatheLife campaign; see Box 5). The manual includes sections on the basic concepts of adult learning and peer education principles as applied to air pollution, how to organize an air pollution and health training session, and a final section on the different components of the training toolkit, including a set of specific interactive activities.

Box 5. The BreatheLife campaign

The BreatheLife campaign was launched by WHO, the Climate and Clean Air Coalition (CCAC), United Nations Environment Programme (UN Environment) and the World Bank. It combines public health and climate change expertise with guidance on implementing solutions to air pollution in support of the sustainable development goals. The campaign provides a platform for cities, regions and countries to share best practices and demonstrate progress to meet the WHO global air quality guidelines *(4)*. The campaign brings together 79 member governments to expand monitoring efforts, inform citizens, and increase demand for solutions to air pollution with multiple benefits for health, climate mitigation and sustainable economic development.

More information at https://breathelife2030.org

A copy of the draft manual was provided to each participant during the interactive session that followed the presentation (Fig. 11), and feedback was collected for its implementation and finalization. During this session, trainees were divided into groups and asked to work on the development of an air pollution and health workshop/event for health workers. Each group was assigned a specific target audience for their event, namely: (1) an in-person workshop for health workers; (2) an online event lasting 2 hours; (3) a health education programme for future health professionals; (4) a health education programme or campaign for the community; and (5) a 1-day event for community health workers/officers. Time frames for the activities debated by groups (1), (3) and (4) were decided by the groups themselves.

Fig. 11. Interactive session: developing an air pollution and health workshop

In the afternoon, the fourth module on the role of the health workforce in tackling air pollution, and what action the health workforce can take in both the clinic and the community, was presented to the participants.

Training module 4: role of the health workforce

Learning objectives: the role of health professionals in identifying patients with illnesses related to air pollution and advising vulnerable groups of patients and communities on how to minimize their exposure; the key role of health workers as clean air advocates in the (health) community; and the importance of leading by example as well as what individual participants can do to mitigate air pollution.

Key messages from this training module are summarized in Box 6.

Box 6. Training module 4: the role of the health workforce

- Health professionals have a role to play in reducing exposure to air pollution, both at the population and individual level, for the protection and promotion of health.
- Identifying the individuals who are most vulnerable and susceptible to the health effects of air pollution can lead to reduced mortality and morbidity, and improve well-being.
- Health professionals can use the health argument to advocate for clean air interventions, and promote the collaboration between all civil society relevant actors, political parties and institutions for policy implementation.
- Only a few clinical screening tools for air pollution risk assessment are available; developing a clinical approach to air pollution as a major risk factor for NCDs is key.
- An air quality index is a tool commonly used for reporting short-term changes in air pollution in cities and sometimes regions, including related health messaging for exposure reduction; where available, it can be used for educational purposes with patients and communities.
- There is a need for disease guidelines, medical schools and other health professionals' curricula to address air pollution and health issues.
- Health professionals can educate themselves, as well as train other colleagues and communities on air pollution and health.

NCD: noncommunicable disease.

The participants identified key actions by health professionals and other relevant stakeholders at the macro-, meso- and micro-level. The below paragraph summarizes participants' perspective.

Macro-level actions include: the formulation and enforcement of clean air policies; the development of guidance for capacity-building to tackle the health effects of air pollution; and advocacy programmes on air pollution.

Meso-level actions include: the enforcement of air quality by laws (e.g. ban on importation of old cars, composting farming waste instead of bush burning); the strengthening of air pollution monitoring; safe waste management (e.g. transport of waste to final disposal site instead of open burning, incorporation of waste management companies to handle the disposal process, paving of essential roads to mitigate dust pollution); strengthening the collaboration with community health workers when environmental issues are identified (reporting health events); using air pollution local data at hospital level to promote research and protocols to be adopted; and community awareness and education, including identification of media champions.

Micro-level actions include: community education activities on air pollution and health (e.g. billboards, radio stations, social media, campaigns, television, videos in waiting rooms of hospital and other public facilities); organizing training sessions using the air pollution modules for health care workers; modifying and tailoring training modules for opinion and community leaders; prescribing clean energy solutions such as improved awareness of the use and adoption of clean fuels at the household level; advising on the use of personal protection equipment, where applicable; asking patients about their environment and life settings as part of a medical-history-taking; and providing advice on air pollution exposure prevention strategies for vulnerable and susceptible individuals.

Day 4: next steps and adaptation for community health officers

An additional and optional half-day session was offered to participants to discuss specific needs for the development of tools for community health officers. The objectives of this closing session were to discuss the need to adapt the training material according to the target audience, and to explore interest in setting up a working group for the development of an air pollution and health package of tools for community health officers in Ghana.

To introduce the topic, an extensive overview of the role of community health workers and nurses in Ghana was presented. Existing tools on air pollution and health targeting this audience group were also introduced, including Ghana Health Service resources and apps; CLEAN-Air(Africa) tools for community health workers, with examples from Kenya; and WHO Urban Health Initiative flipchart for community health workers in Ghana. Specific feedback was collected on the WHO Urban Health Initiative air pollution (Box 7) and health flipchart for future implementation and publication.

Box 7. The WHO Urban Health Initiative

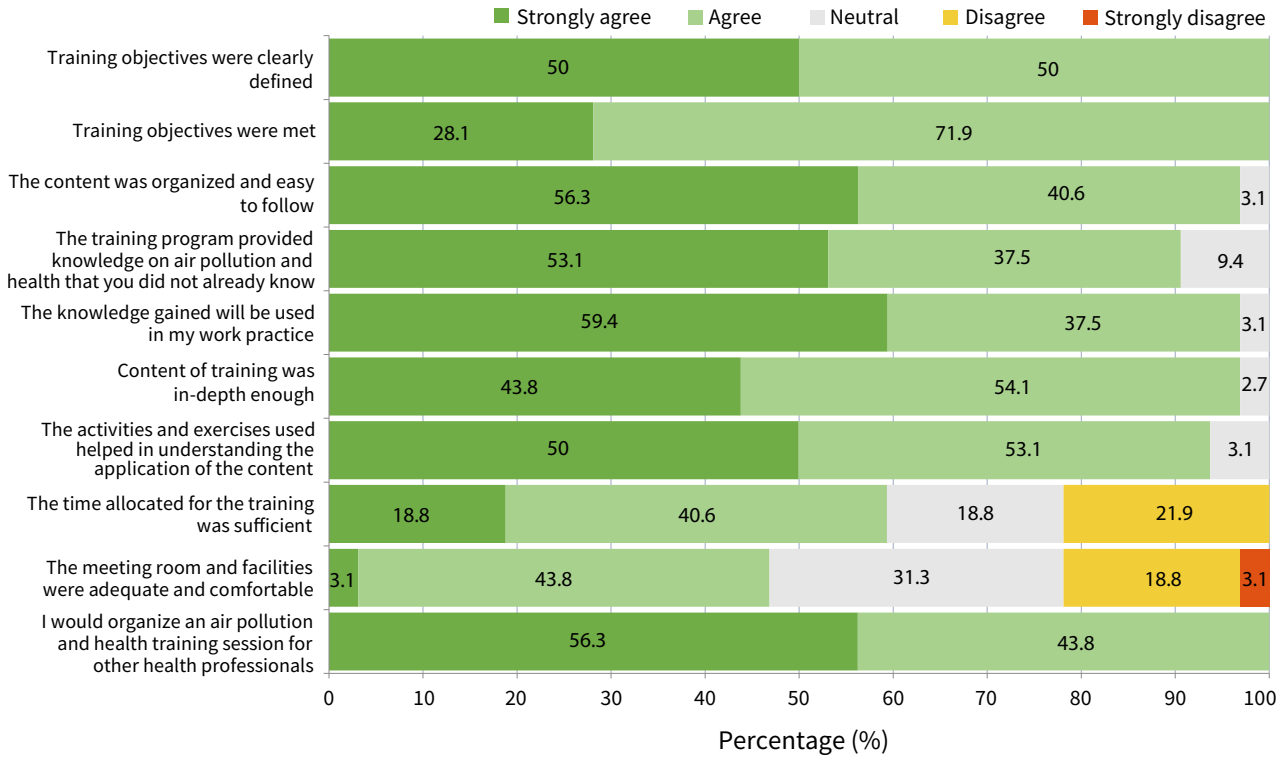
The WHO Urban Health Initiative (UHI) is an implementation framework to reduce deaths and diseases associated with air and climate pollutants. The initiative aims to enhance health co-benefits from policies to tackle urban air pollution and short-lived climate pollutants, saving lives by linking health, environment and sustainable development. UHI mobilizes and empowers the health sector to use its influential position to promote the implementation of air and climate pollutant reduction strategies. It also provides tools and guidance for decision-makers to assess potential health benefits and risks, and demonstrates to the public the full range of health, economic and climate benefits from implementing local emission reduction policies and strategies.

More information at https://www.who.int/initiatives/urban-health-initiative

Evaluation and feedback

A post-workshop survey was conducted among 32 of the 42 participants. The post-training evaluation indicated that the objectives for the training were clearly defined and adequately met. The participants further indicated that they plan to organize air pollution and health training sessions for their peers within their catchment area. Potential improvements were identified, relating to the meeting room and facilities as well as the time allocated for the training. (Fig. 12).

Fig. 12. Post-workshop evaluation and feedback



According to the participants, the features of the workshop that were most appreciated included the facilitating of an improved understanding of the health effects of inhaling air pollutants and how to minimize/avoid these, which was adequately provided from the content and training methods, in-depth and practical explanations, discussions and participatory nature of the workshop. Participants also greatly appreciated the field trip, allowing them to observe the sources of air pollution within communities and the associated effects on human health, as well as the group and interactive sessions that helped to apply knowledge gained. Finally, participants also valued the clarity of the power point presentation slides, and the friendly manner in which the facilitators presented the module materials.

Outcomes and follow-up

The outcomes of the train-the-trainer workshop in Ghana on the health effects of exposure to air pollution can be summarized as in Box 8 below.

Box 8. Workshop outcomes

- Trained 42 health professionals over a 4-day workshop for both dissemination and implementation of knowledge, and capacity-building of the health sector, on air pollution and health across all regions of Ghana.
- Reached the goal of training health professionals and creating a pool of trainers.
- Fulfilled participants' expectations (as identified in the pre-workshop survey) according to the evaluation conducted post-workshop, including the ability to understand prevention measures to reduce exposure to air pollutants, both at the community and individual level, as well as how to organize and facilitate a training workshop for health professionals on air pollution and health.
- Dedicated a half-day of training to the specific target audience of community health officers, identifying air pollution education gaps and needs.
- Developed action plans on how regional participants could transfer knowledge gained to other health workers in the country, using a train-the-trainer approach.
- Planned a timeline for follow-up activities on future implementation of the project at the country level, including organizing training of and the development of specific tools for community health officers in Ghana.
- Confirmed interest for future training on air pollution and health at the regional level in the WHO African Region.
- Evaluated input and feedback on the piloted material (four training modules, three clinical case scenarios, the training-of-trainers manual and the Urban Health Initiative flipchart for community health officers).
- Obtained media coverage of the pilot workshop in local and national newspapers (Annex 5), as well as support at the international level from WHO Director-General, Dr Tedros Adhanom Ghebreyesus, and WHO Director of the Department of Environment, Climate Change and Health, Dr Maria Neira, as well as Climate and Clean Air Coalition and BreatheLife Ambassador Ms Rosamund Adoo-Kissi-Debrah (Ella's Foundation).

Follow-up activities

Follow-up activities were discussed with the participants before closing the workshop and in a series of post-workshop calls between the three levels of WHO and Ghana Health Service, and were proposed as: piloting additional and specific training modules on cardiovascular, respiratory and children's health via webinar series; finalizing the community health workers flipchart; developing clinical case scenarios specifically for the Ghana settings; mapping regional and country stakeholders in the WHO African Region; training new trainers to support WHO in piloting experiences in other WHO African Region countries; translating training material into French for French-speaking African countries; engaging new trainers; tracking policies at a country level that include air pollution as part of the curricula of health workers; publishing papers and case studies on this project; and disseminating the project at a regional and/or international level.

By engaging in this training, attendees committed to contacting and training other health workers in Ghana, increasing their awareness of the health effects of air pollution while empowering them as actors for change. The individual commitments and assessment of the needs of participants are presented in Table 3, and a tentative timeline of planned activities is presented in Table 4.

Table 3. Summary of participants' commitments and requirements for implementation

Questions for participants	Selection of responses
What will I do with the knowledge I gained?	• Sharing with other colleagues. I am now well equipped. We will not be able to work without the regional director. We want to be in training programmes of this nature. We will brief the management level. • We realized some of the laws that should be enforced during this meeting. Health workers cannot do it alone. We would like to brief colleagues and organized workshops. • I am better equipped to teach. But we will need [the] engagement of the Regional Director and go to the Regional Minister, and Regional Coordination Council. On our weekly morning meeting, we can teach the whole directorate. • Sharing the knowledge with families.
Who are my audience that I want to share the information and knowledge with to induce action?	• Our audience will include, but [are] not limited to policy-makers. The first thing to do is target the policy-makers [and find out] who we would to partner to. • Other health workers. • Secondary schools. • Importance of churches. Women in the churches are a very important audience.
How do I translate the material for my audience?	• In our region, we would translate in our own language. • Pictographic representations would help, especially in the hotspots zone. • Community leaders are influential and could benefit [from] translations [into] their languages. • Health promotion unit could be a good resource to translate – they are able to translate and tailor it to the various target audiences.

As a clinician, how can I incorporate air pollution as a risk factor in my practice?	• As a clinician, one of the key things, is in history taking, especially the questions raised during the clinical case scenario. We should ask questions about household air pollution. [The] clinical assessment tool is great. • We can use in the clinic and teach our colleagues. • From [public health] perspective, we usually give health talks during the time we do our daily work. We can add it in our talks. How it affects our health, underlying causes etc. • Intensify our home visit in the communities. Seize the opportunity and talk to the community members. • Community health workers will be more aware. If we get funds, we will go to the media and do showcase about it. • Development of screening tool. • We can collaborate with other[s] … in our district. [Once we have] trained district level staff, [we can] demand creation activities. We leverage on their platform. Cascading close to the field and local. • Reach local radio stations.
What support would you need so that you can function as a trainer over the next two years?	• We need financial support to do training, orientation of health staff, awareness creation and how to engage media. • Integration with local manufacturers and support of our local engineers: they could help solve some of the issues that the people experience in the field (occupational health situations). Example of burning [tyres] to get the coil out. They are other opportunities, but those [tyres] are the ones they don't purchase. Involvement of local producers. We need to give them alternatives.

Table 4. Proposed timeline for Ghanaian country-wide train-the-trainer programme on the health effects of air pollution

Activity	2022				2023	2024
	Q1 (Jan–Mar)	Q2 (Apr–Jun)	Q3 (Jul–Sept)	Q4 (Oct–Dec)		
Virtual sessions in preparation for pilot event						
Train-the-trainer (pilot event, Kumasi, Ghana)						
Material studying, preparation/ planning of training activities						
Training of other trainers						
Follow-up session with trainers						
Evaluation of training impact within country						
Training in other African countries						

Light, medium and dark shading represent activities to be conducted by WHO, local trainees, and both WHO and local trainees, respectively.

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Annex 1. List of participants

Region	Facility	Name	Profession/staff cadre
Ahafo	Regional Hospital	Dr James Ankoma	Physician
Ahafo	Regional Health Directorate	Mr Kingsley Authur	Disease control officer
Ashanti	Kumasi South Hospital	Dr Fredrick Gyamfi Apraku	Physician
Ashanti	Komfo-Anokye Teaching Hospital	Dr Joshua Arthur	Physician
Ashanti	Regional Health Directorate	Mr Solomon Boakye	Disease control officer
Ashanti	Komfo-Anokye Teaching Hospital	Dr Ashley WF Owusu	Physician
Ashanti	Regional Health Directorate	Ms Lydia Owusu-Ansah	Regional public health nurse
Bono	Regional Health Directorate	Mr Daniel Konka	Disease control officer
Bono	Regional Hospital	Dr Kofi Acheampong Saarrah-Akyerekoh	Physician
Bono East	Regional Hospital	Dr Victor Atanga	Physician
Bono East	Regional Health Directorate	Mr Obeng Poku David	Disease control officer
Central	Trauma and specialist hospital	Dr Richmond Dennis Ofosu	Physician
Central	Regional Health Directorate	Ms Caroline Okine	Regional public health nurse
Central	Regional Health Directorate	Mr Edward Owusu	Disease control officer
Eastern	Regional Hospital	Dr Ama Dela	Physician
Eastern	Regional Health Directorate	Ms Angela Quaye	Disease control officer
Greater Accra	Greater Accra Regional Hospital	Dr Lilian Addai	Physician
Greater Accra	Regional Health Directorate	Mr Ato Ashon	Disease control officer
Greater Accra	Korle-bu Teaching Hospital	Dr Samuel Kwame Dadzie	Physician
Greater Accra	Regional Health Directorate	Ms Charity Sikanku	Regional public health nurse
North East	Municipal	Mr Agyemang Christian	Physician
North East	Regional Health Directorate	Mr Iddrisu Mbanya	Disease control officer
Northern	Regional Health Directorate	Ms Theodora Asutane	Regional public health nurse
Northern	Regional Health Directorate	Mr Sulemana Ahmed Nassam	Disease control officer
Oti	Regional Health Directorate	Mr John D. S. Baffoe	Disease control officer
Oti	Regional Health Directorate	Dr Simon K. Bawah	Physician
Savanna	Regional Health Directorate	Mr Cyril Azornu	Disease control officer
Savanna	Regional Hospital	Dr Cletus Ballu	Physician
Upper East	Regional Health Directorate	Mr Augustine Agamba	Disease control officer
Upper East	Regional Hospital	Dr Bruce Paul Tanzubil	Physician
Upper West	Regional Health Directorate	Dr Dominic Akaateba	Physician
Upper West	Regional Health Directorate	Mr Musah B. Ali	Disease control officer
Volta	Regional Health Directorate	Mr Daniel Desire Afun	Disease control officer
Volta	Regional Hospital	Dr Ndukwa Chinedu Felim	Physician

Western	Regional Hospital	Dr Pius Seth Mensah	Physician
Western	Regional Hospital	Ms Dorcas Sackey	Regional public health nurse
Western	Regional Health Directorate	Mr Clement Tettey	Disease control officer
Western North	Regional Health Directorate	Mr Kwaku Gyan	Disease control officer
Western North	Sefwi Wiawso Municipal Hospital	Dr Jonathan Mensah	Physician
National	Deputy Director, Quality Care, Ghana Health Service	Dr Mary Ashinyo	Public health specialist
National	Head, Poison Center, Ghana Health Service	Mr Caesar Nyadedzor	Toxicologist
National	Deputy Director, Disease Surveillance Department	Dr Azumah Abdul Tawab	Public physician

Annex 2. In-person workshop: agenda overview

<table>
<tr><th></th><th>Day 0:
6 Jun</th><th>Day 1:
7 Jun</th><th colspan="3">Day 2:
8 Jun</th><th>Day 3:
9 Jun</th><th>Day 4:
10 Jun</th></tr>
<tr><td rowspan="2">Morning</td><td rowspan="2"></td><td rowspan="2">Opening</td><td colspan="3">Debrief day 1</td><td rowspan="2">Evaluation and debrief day 2</td><td rowspan="2">Next steps and adaptation of the material for community health workers

(optional half-day)</td></tr>
<tr><td colspan="3">Parallel sessions – clinical case scenarios</td></tr>
<tr><td></td><td>Introduction to ambient air pollution</td><td>Air pollution and cardiovascular diseases</td><td>Air pollution and respiratory health</td><td>Air pollution: from the womb to childhood</td><td>Train-the-trainer session: how to organize a training workshop on air pollution</td><td></td></tr>
<tr><td colspan="8">Lunch break</td></tr>
<tr><td rowspan="3">Afternoon</td><td rowspan="3">Travel and registration</td><td>Introduction to household air pollution</td><td colspan="3" rowspan="3">Field visits organized by Ghana Health Service and Environmental Protection Agency Ghana</td><td>The role of the health workforce for clean air</td><td rowspan="3"></td></tr>
<tr><td>Air pollution and general health effects</td><td>Post-test and evaluation</td></tr>
<tr><td>Evaluation</td><td>Closing</td></tr>
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Annex 3. In-person workshop: detailed agenda

Day 0 (6 June 2022): getting to know each other

Time	Agenda item	Facilitators
12:00–15:30	Registration and welcome	Ms Aubrey Musngi-Anouar, Mr Ben Sackey, Mr George Atiim
15:30–17:00	Informal introduction to the workshop: human map and introduction of the participants; pre-test quiz	Dr Sophie Gumy, Dr Nita Chaudhuri, Mr Abraham Mwaura

Day 1 (7 June 2022): introduction to air pollution and health

Time	Agenda item	Facilitator
9:00–10:00	Welcoming remarks and opening Chair: Dr Emmanuel Kyeremanteng, Occupational and Environmental Health Unit, Ghana Health Service • Dr Emmanuel Tinkorang, Ashanti Regional Director of Health Services, Ghana Health Service • Dr Maria Neira, Director of the Department of Environment Climate Change and Health, WHO headquarters (video recording) • Dr Elizabeth Juma, on behalf of WHO Representative to Ghana • Dr Brama Koné, WHO Regional Office for Africa • Dr Reginald Quansah, University of Ghana • Dr Alan Abelsohn, World Organization of Family Doctors • Ms Rosamund Kissi-Debrah, Co-Founder and Executive Director, Ella Roberta Family Foundation and BreatheLife Champion (video recording)	See list of speakers on the Agenda item column
10:00–10:30	Presentation of the objectives and expected outcomes of the WHO capacity-building workshop on air pollution and health	Dr Samantha Pegoraro
10:30–11:00	Q&A, logistic information point and group photo	Dr Samantha Pegoraro
11:00-11:15	Break	
11:15–13:00	Training module 1: Introduction to ambient air pollution Presentation and Q&A in plenary	Dr Pierpaolo Mudu
13:00–14:00	Lunch	

14:00–15:00	Training module 2: Introduction to household air pollution Presentation and Q&A in plenary	Dr Sophie Gumy Dr Nita Chaudhuri
15:00–16:30	Interactive session: Mapping air pollution sources in your region (break-out groups discussion)	Of five break-out groups: Dr Reginald Quansah/Dr Alan Abelshon; Dr Carl Osei/ Mr Joss Mothe; Dr Brama Koné/Ms Yvonne Mensah; Dr Pierpaolo Mudu/Mr Ben Sackey; Mr George Atiim/Dr Nita Chaudhuri
16:30–17:30	Training module 3: Health effects of air pollution Presentation and Q&A in plenary	Dr Samantha Pegoraro
17:30–18:00	Evaluation day 1	Mr Josselyn Mothe

Day 2 (8 June 2022): from monitoring air pollution to health impacts; clinical perspectives

Time	Agenda item	Facilitator
9:00–9:05	Debrief day 1 and kick-off day 2	Dr Samantha Pegoraro
9:05–10:30	Interactive session: mapping air pollution sources in your region (plenary presentations)	Dr Nita Chaudhuri
10:30–11:45	Parallel sessions (three clinical case scenarios): interactive presentation and discussion	
Group 1	Air pollution and cardiovascular diseases: heart failure, Rwanda	Dr Alan Abelshon Co-facilitators: Dr Pierpaolo Mudu, Ms Cynthia Davis, Ms Aubrey Musngi-Anouar
Group 2	Air pollution and respiratory health: lower respiratory tract infection, Sri Lanka	Dr Samantha Pegoraro Co-facilitators: Dr Brama Koné, Ms Akosua Kwakye, Mr Josselyn Mothe
Group 3	Air pollution: from womb to childhood: intrauterine growth restriction, Mexico	Dr Reginald Quansah Co-facilitators: Dr Sophie Gumy, Dr Carl Osei, Mr Abraham Mwaura
11:45–12:00	Break	
12:00–13:00	Interactive session: developing key messages • Break-out group discussion on developing key messages for community and patients from the related parallel sessions • Plenary presentation per group	Dr Nita Chaudhuri, Dr Samantha Pegoraro

13:00–13:30	Presentation of the field visit and logistics	Dr Carl Osei, Ms Yvonne Mensah
13:30–14:30	Lunch	
14:30–17:30	Field visit to air pollution hotspots: charcoal production site; smelting site; hide singeing site; and commercial cooking site	Ghana Health Service and Environmental Protection Agency Ghana

Day 3 (9 June 2022): the role of health workers and train-the-trainers approach

Time	Agenda item	Facilitator
9:00–10:00	Plenary presentation of air pollution field visit (per group)	Dr Carl Osei, Dr Nita Chaudhuri
10:00–10:30	Train-the-trainers session • Presentation of the WHO air pollution and health train-the-trainers manual, Ms Nita Chaudhuri • Presentation of WHO BreatheLife Campaign and other WHO air pollution and health communication resources, Mr Abraham Mwaura	See Agenda item column for presenters
10:30–11:15	Interactive session: how to organize a training workshop on air pollution and health • Break-out groups to work on the development of an air pollution and health workshop/event for health workers	Facilitators for group discussion: Dr Brama Koné/Dr Alan Abelshon; Mr Abraham Mwaura/Dr Pierpaolo Mudu/Ms Akosua Kwakye; Mr Josselyn Mothe/Dr Nita Chaudhuri; Dr Sophie Gumy/Dr Samantha Pegoraro/Ms Cynthia Davis
11:15–11:30	Break	
11:30–13:00	Interactive session: how to organize a training workshop on air pollution and health (continued) • Presentation in plenary by group of the outline of the education event as per the group discussion	Dr Nita Chaudhuri, Dr Samantha Pegoraro
13:00–14:00	Lunch	
14:00–15:30	Training module 4: Role of the health workforce for clean air Presentation and Q&A in plenary	Dr Alan Abelsohn
15:30–15:45	Break	
15:45–16:30	Plenary discussion and presentation of a proposed timeline for follow-up activities	Dr Pierpaolo Mudu, Dr Samantha Pegoraro
16:30–16:45	Evaluation of the day	Mr Josselyn Mothe
16:45–17:00	Closing remarks	Dr Carl Osei, Dr Brama Kone, Dr Pierpaolo Mudu

From 17:00	Social event with all the participants

Day 4 (optional, 10 June 2022): next steps and adaptation for community health officers

Time	Agenda item	Facilitators
9:00–9:15	Objectives of the day • Discussion of the need to adapt the training material depending on the target audience • Constitution of a working group for development of a full air pollution and health package of tools for community health officers in Ghana	Dr Samantha Pegoraro, Ms Cynthia Davis
9:15–9:30	Presentation of the role of community health workers and community health nurses in Ghana	Ms Lydia Owusu-Ansah
9:30– 10:30	Group discussion: Role of community health officer on air pollution and health	Dr Samantha Pegoraro, Ms Cynthia Davis
10:30–11:00	Existing tools for community health officers on air pollution and health: • CLEAN-Air(Africa) tools for community health workers in Kenya, Dr Daniel Pope, University of Liverpool (video recording) • WHO Urban Health Initiative flipchart, Mr Abraham Mwaura • Ghana Health Service resources for community health officers, Ms Lydia Owusu-Ansah	See Agenda item column
11:00–11:15	Break	
11:15–11:45	Group discussion on the UHI tool: • Do you think this tool is effective? • How can it be improved?	Dr Samantha Pegoraro, Mr Abraham Mwaura
11:45–12:15	Next step and timeline proposal for air-pollution-related training opportunities for community health officers	Dr Samantha Pegoraro
12:15–12:30	Recap and closure of the day	Dr Pierpaolo Mudu

Annex 4. Virtual session agenda

This online Zoom meeting took place on 18 May 2022, 14:00–16:00 GMT (16:00–18:00 CEST), chaired by Dr Carl Osei of the Occupational and Environmental Health Unit, Ghana Health Service.

Why air pollution is a big public health threat: the role of the health workforce

Time (CET)	Topic	Presenter/facilitator
14:00–14:05	Welcome and opening by chair; housekeeping notes	Dr Carl Osei, Occupational and Environmental Health Unit, Ghana Health Service; WHO Secretariat
14:05–14:10	Brief remarks by WHO	Mr Guy Mbayo, Team Leader for the Climate, Health and Environment Unit, WHO Regional Office for Africa
14:10–14:40	Keynote presentations	Interventions by • Dr Pierpaolo Mudu, WHO European Centre for Environment and Health, Bonn, Germany • Dr Reginald Quansah, University of Ghana • Dr Alan Abelsohn, World Organization of Family Doctors
14:40–15:00	Overview of the WHO capacity-building material on air pollution and health for the health workforce; presentation of Ghana in-person workshop	Dr Samantha Pegoraro and Mr Ben Benasco Sackey, Air Quality and Health Unit, WHO
15:00–15:45	Break-out group discussion: getting to know each other's experiences and expectations a. What is your name, affiliation and role in the health sector? b. Can you give an example of when you believe air pollution has affected you, your family or patients? c. What are the main sources of air pollution in your community? d. What would you like to learn from this training workshop? e. Do you have any reactions or questions on the previous presentations?	Not applicable
15:45–15:50	Information point and logistics	WHO Secretariat

15:50–16:00	Closing remarks	• Dr Carl Osei, Occupational and Environmental Health Unit, Ghana Health Service • Dr Pierpaolo Mudu, WHO European Centre for Environment and Health, Bonn, Germany

Annex 5. Selected press and media review

Air pollution: The invisible health threat. WHO trains health workers to battle air pollution and protect global health. In: NewSpecial July-August edition 2023 https://newspecial.org/newspecial-juillet-aout-2023/

Ghana News Agency: WHO builds capacity of health workforce in Ghana on air pollution and health https://www.ghanabusinessnews.com/2022/06/10/who-builds-capacity-of-health-workforce-in-ghana-on-air-pollution-and-health/

WHO News: WHO trains health workers in Ghana on air pollution and health https://www.who.int/news/item/14-09-2022-who-trains-health-workers-in-ghana-on-air-pollution-and-health

BreatheLife: WHO trains health workers in Ghana on air pollution and health: a pilot workshop https://breathelife2030.org/news/training-the-trainers/

Social media:

- Dr Maria Neira (WHO) https://twitter.com/DrMariaNeira/status/1535257880877797377
- Dr Tedros, WHO Director General https://twitter.com/DrTedros/status/1536398294527746049
- Ms Rosamund Adoo-Kissi-Debrah, The Ella Roberta Foundation https://twitter.com/ellarobertafdn/status/1536794098778112000?s=21&t=IC6WDHG6nKLco-NEVLzBxg

For further information: aqh_training@who.int

Air Pollution and Health Training toolkit
for health workers (APHT)

Air Quality and Health Unit

World Health Organization
20 Avenue Appia
1211 Geneva 27
Switzerland

https://www.who.int/teams/environment-climate-change-and-health/air-quality-and-health/

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