The World Organization of Family Doctors Air Health Train the Trainer Program: lessons learned and implications for planetary health education

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The World Organization of Family Doctors (WONCA) Air Health Train the Trainer Program was a pilot educational programme that focused on a key aspect of planetary health: the intersection of air pollution, human health, and climate change. In this Viewpoint, we—the coordinators of the training programme and some of the most active trainers—briefly describe the programme and discuss implementation successes, challenges, and lessons learned, which relate to the creation and use of training materials appropriate for health professionals in low-income and middle-income countries, strategies to improve the retention of trainers to deliver activities in their communities, and the development of stronger networks and further tools to support trainers. These findings could be applied to future education and training programmes.

Introduction

Planetary health is a complex concept, which sits at the intersection of climate change, biodiversity loss, pollution, and profound social, economic, and environmental injustices.[1] Education for planetary health is equally complex, as presented in descriptions of crosscutting principles and a guiding framework.[2,3]

Although education for planetary health is aspirational in its broad scope, there remains the question of how to engage health-care practitioners from clinical and public health disciplines. Primary health-care professionals are important because they are scientists embedded in communities, widely dispersed within countries of all income groups, and are often more trusted than public health experts or government agencies.[4–6] Moreover, they deal with the clinical manifestations of climate change and detriments to planetary health in their daily practice.

Although air pollution, both outdoor and household, causes an estimated 7 million deaths annually, it is yet to be established in the curriculum of health-care students, with an estimated 11% of the 2817 medical schools surveyed around the world having formal education on air pollution and health.[7] The topic is also not well understood, and seldom incorporated into practice, by health-care practitioners.[8–10] Therefore, patients, particularly those with cardiovascular and respiratory disease who are more susceptible to the health effects of air pollution, are generally not aware of the risks from exposure to air pollution, and have not been counselled by their health-care team.[11]

Air pollution and health as a topic is different from planetary health, and even climate change and health, because it is more tangible. Air pollution affects almost everyone, and its health effects include conditions frequently seen by primary health-care clinicians, including childhood pneumonia and asthma, COPD, ischaemic heart disease, stroke, and lung cancer.[12–17] In 2021, a coroner in the UK ruled that air pollution from road traffic made a significant contribution to the death of a young girl with asthma.[18] Air pollution is also clearly visible as haze or smog in many communities, both urban and rural. As such, the topic presents an opportunity to engage the interest of primary health-care providers, their teams, and their communities, and establish a foundation for expanding the focus to include all of the concepts comprising planetary health.

The World Organization of Family Doctors (WONCA) piloted the Air Health Train the Trainer Program for health-care professionals in low-income and middle-income countries (LMICs). Here, we describe the programme and the lessons we learned while coordinating and delivering this model of education.

The training programme

The programme ran from March 5, 2019, to Oct 31, 2020 (although there was some fexibility for late submissions of activities, up until Nov 16), and was a standalone, grant-funded initiative through WONCA. It adopted a train-the-trainer model,[19–23] and was divided into two key phases: the training of the trainers (March–April, 2019), and trainers delivering activities in their communities (May, 2019–October, 2020).

The objectives of the programme were to provide trainers the knowledge and tools to achieve three goals (appendix p 1): understand effects of air pollution on health, its links to climate change, and the role of the health-care professional; assess and counsel patients; and build capacity among health-care professionals and the wider public in their communities, countries, and regions, through teaching and advocacy activities.

Recruitment

Recruitment of trainers took place between January and February, 2019, and was promoted through WONCA committees and national member organisations, as well as allied organisations, such as the Global Climate and Health Alliance. 178 health-care practitioners, from 52 different countries, applied to join the programme

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See **Online** for appendix

(appendix p 16). Funded applicants (ie, people who would receive remuneration for activities they completed following their training) were selected on the basis of both regional and individual factors (appendix p 1). 62 trainers were initially selected as funded trainers. The remaining 116 were also invited to participate in the initial training; however, they were not required to report their activities and were not offered remuneration for any activities they conducted. An additional 11 trainers from the initial 178 applicants were recruited as funded trainers in January, 2020. The 73 trainers came from 32 different countries and a wide range of professions, including primary care, respiratory medicine, paediatrics, nursing, community health, and physiotherapy (appendix p 17).

Phase one: training of the trainers

A scientific advisory group was established to review and guide the course content. The training programme was delivered remotely. The training content included two online courses (from the University of British Columbia [Vancouver, BC, Canada] and the US Environmental Protection Agency [Washington, DC, USA]),[24,25] recorded presentations by world-leading experts on planetary health and household air pollution, prescribed readings, and a live webinar, with a total learning time of 8 h (appendix pp 2–3). Trainers were invited to complete the online courses, video recordings, and readings in their own time, from the middle of March until the end of April, 2019. Completion of training was verified by submission of the Environmental Protection Agency course certificate and by University of British Columbia administration. The live webinar was presented in three separate sittings in April, 2019, to accommodate different time zones and work schedules. The webinar included a presentation of the evidence of the health impacts of exposure to ambient and household air pollution, and a discussion on what health-care practitioners can do to tackle the health effects of air pollution, including presentations from three trainers from the initial pilot programme and a WHO air pollution specialist. All materials were saved on Google Drive and made available to all trainers. Trainers were asked to complete pre-training and post-training surveys (appendix pp 4–10) to evaluate the educational component of the programme.

Phase two: trainers delivering activities in their communities

Following completion of the training, the trainers were encouraged to become active as trainers and advocates by undertaking educational and advocacy activities in their own communities from May, 2019, to October, 2020. Some training activities, such as hospital rounds, staff training, lectures, and journal articles, were suggested (appendix p 11); however, trainers were given agency to conduct whatever activity they felt most effective and appropriate in their specific context. Trainers were asked to record each activity using an activity reporting form (appendix p 12), and were encouraged to ask their participants to complete a short, mobile-phone-compatible evaluation survey, which was created through Qualtrics version XM and translated by the trainers into ten languages (appendix p 13).

We created a network with regular email updates, including new research on air pollution and spotlighting activities run by trainers, a WhatsApp group to share activities and challenges, and a series of virtual follow-up meetings to support the trainers individually and the network. An additional online meeting was held as a result of the COVID-19 pandemic, to discuss experiences and challenges of working in the pandemic with other trainers from around the world.

Training programme outcomes and evaluation

The results from the pre-training survey suggest a high level of existing knowledge of air pollution, with 88 (79%) selecting "Agree" or "Strongly Agree" for the statement, "I am knowledgeable about the impact(s) of air pollution on health more generally", and 76 (67%) selecting these responses for the statement, "I am knowledgeable about the impact(s) of air pollution on health in my specific community" (appendix p 18). These percentages rose to 92% and 96%, respectively, in the post-training survey, although it is important to note that the response rate in the post-training survey was much lower (25 compared with 112). Following completion of phase one of the training, a larger proportion of trainers agreed that they had the knowledge or tools, or both, and the confidence to counsel patients or engage in community outreach (pre-training after phase one 24 [96%] *vs* before phase one 53 [47%]), and to educate their colleagues (pre-training after phase one 24 [96%] *vs* before phase one 53 [47%]; appendix p 18). Reported pre-training and post-training knowledge of the general health impacts of climate change was also high, as were agreements with the statements around knowledge or tools, or both, and confidence to counsel patients and educate colleagues (appendix p 19). Although we do not know the exact reasons why so few trainers completed the post-training survey, it could be due to challenges the trainers had processing the extensive amount of information and instructions that were provided following the completion of phase one (eg, information and advice regarding the next steps for delivering their own activities, and instructions on how to report the activities and distribute the surveys). Furthermore, only 62 trainers were selected as funded trainers at this point, so other applicants who completed the pre-training survey might have assumed the post-training follow-up did not apply to them.

38 (52%) of 73 trainers completed at least one activity, and 370 activities were reported in total. Of these activities, 325 were direct contact training (eg, workshops and presentations to staff, students, and community members), with an estimated reach of 20 940 people. However, although trainers were encouraged to ask their participants to complete the Qualtrics evaluation survey, only 431 (2·1%)

of the estimated 20 940 people trained completed the survey. The reasons for this low number included the inability to access the internet or devices for participants to complete the survey at training locations, or both; low levels of literacy among some communities; challenges in following up participants to remind them to complete the survey; and the administrative burden of manually uploading the results of printed versions of the survey (one of our trainers reported he was able to do this for trainings of 10–15 people, but not for his training of >600 secondary school students). 406 (94%) of respondents reported the training helped them to be a better advocate for clean air (appendix p 22).

40 (55%) of 73 trainers completed the post-training programme evaluation. 33 (82%) reported being engaged or very engaged with the programme. 33 (80%) thought the programme had made them a better health professional, 30 (75%) a better educator or teacher, 32 (80%) a better advocate for clean air, and 28 (70%) a better advocate for climate change. Furthermore,

Panel 1: **Examples of activities and lessons learned from seven trainers from the WONCA Air Health Train the Trainer Program in six countries**

Dhaka, Bangladesh

Activities

- Small group sessions, workshops, and quiz competitions with medical students, nurses, and residents of respiratory medicine.
- Awareness programmes on air pollution in high-risk groups in tannery and wood industries.
- Air pollution and anti-smoking awareness programmes in junior school and primary school.
- Multiple interactive live television programmes.

Lessons learned by the trainer

- Air pollution and climate change activities may also include smoking cessation advocacy, because they are all linked.
- Changing the mindset of the general population is crucial for effective air pollution interventions.
- Targeting school children might play a big role in disseminating information on air health and convincing communities of the importance of air quality, and would be cost-effective.
- Plastic wastage burning, widespread in Bangladesh, might contribute to air pollution and climate change.
- Strict anti-pollution legislation should be implemented in industrial areas, especially in low-resource countries like Bangladesh.

Porto Alegre and Santa Maria do Herval, Brazil

Activities

- Citizen science development and installation of five low-cost $PM_{2.5}$ sensors in four community health clinics and a university.
- Development of an app and analysis for communicating air pollution.[26]
- Community raffle acquisition of two low-cost sensors for the two community health clinics in this town of 6000.
- Training of family doctors and communities through the primary care clinics and community health workers.
- Creation of the Brazilian MOOC on planetary health, later translated into English for a wider audience.
- Creation of a non-governmental organisation to stop coal mining in Porto Alegre.
- Preparation of an article about air pollution and clinical recommendations for family doctors for the *Brazilian Journal of Family Medicine* (review phase).

Lessons learned by the trainers

- Family doctors are eager for evidence-based information on air pollution.
- Evidence-informed practice can influence policy making.
- Education is one of the best ways for health professionals and communities to change planetary health paradigms.
- Communication, both focused on health professionals (like specialised podcasts or articles) and on the wider community through mass media is important for spreading the message and sensitising communities.

Yaoundé, Cameroon

Activities

- Worked with school principals to include air health in school programmes, and presented to students, teachers, and parents on air pollution and asthma care.
- Collaborated with the Ministry of Health (MOH) to train health workers at clinics in health districts within Yaoundé.

Lessons learned by the trainer

- Training through schools is cost-effective with impact felt within many families. A multisectoral approach should be encouraged.
- Tobacco control and air pollution align during training.
- It is difficult as an air health trainer to advise on air pollution sources without including environmental tobacco smoke.
- Collaboration with the MOH is essential towards mobilising health-care professionals. This is a novel area of work and needs government authorities' active involvement.

Kisumu, Kenya

Activities

- Conducted an educational programme in collaboration with the Ministries of Medical Services and of Public Health, reaching 440 community health workers and 120 health professionals in Kisumu County.
- Workshops included role plays, pictures, stories, group discussions, and plenary presentations.

Lessons learned by the trainer

- Health professionals have changed their approach—from focusing on treatment of symptoms to understanding and educating patients on triggers for permanent solutions.

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(Panel 1 continued from previous page)

Kigali, Rwanda

Activities

- Face-to-face trainings on air pollution and health to clinical staff (eg, specialists, general practitioners, residents, nurses, midwives, medical and nursing students, and environmental officers) in 26 of the 42 district and referral hospitals of Rwanda.
- Patient counselling sessions, including one-on-one and group education during hospital ward rounds, were provided to most of the hospitals.
- In-person and virtual community outreach activities, through TV and radio as well as youth trainings on air pollution, climate change, and health.
- Presentations on air and climate health at both local and international conferences, seminars, and round table discussions as well as African youth consultations through Zoom.
- Interviews with local newsletters and other media outlets on global megatrends and components of planetary health, notably urbanisation, sedentary lifestyles, food systems, and climate change

Lessons learned by the trainer

- Air pollution can be branded as the new tobacco; it is an independent killer and almost everyone is exposed.
- Knowledge on air pollution among health-care professionals is very low in low-income countries. Patient education on environmental pollution is poor. There is, however, a willingness to learn and join other air and climate health actors, although their engagement is also still low.
- Raising community awareness on air pollution and its individual health effects is a challenge, especially in rural areas of Rwanda, where 80% of the population reside. The low level of literacy is a key factor.
- Communities themselves are contributors to both household and outdoor air pollution. Poverty and unawareness are important factors.

Lattakia, Syria

Activities

- Published a chapter on air pollution and health for the 2021–22 national practical guidebook for chronic respiratory diseases and comorbidities, edited by the MOH. This book aims to train primary care physicians, nurses, and residents in hospitals.
- Presentations to general practitioners, postgraduate doctors, and primary care leader nurses.
- Contribution to a policy for the Syrian health programme of chronic respiratory disease that every primary care doctor should add to the clinical history of each patient standard questions about exposure to air pollution.
- Surveys assessing exposure to air pollution among patients with chronic respiratory diseases, with focus on war pollutants in conflict zones.

Lessons learned by the trainer

- We should be ready to discuss and raise awareness on air pollution on any occasion, and to any person or group of individuals exposed to air pollutant—eg, waste burning near homes and cooking with open fire—in the same way we discuss passive smoking exposure in children. When possible, we should ask people around us in the community to also talk about air pollution.
- Introducing air pollution on curriculum at all levels beginning from schools to universities and for primary care health workers and clinicians is essential. This requires the trainer to get in touch officially with authorities, respecting administration steps.
- Training can be effectively spread through networking and preparing standard PowerPoint slides on air pollution and health to be used by all.
- WHO country offices could help with training and engagement.
- Introducing standard questions on air pollution of cars, industry, waste burning, and indoor pollution in the medical history of all patients and at all levels of care and including air pollution on all surveys and programmes for communicable or non-communicable diseases will help with data gathering, awareness raising, and interventions.
- In war zones there is the additional consideration of pollution of weapons, waste and trash burning near homes, and psychological stress.[27]
- Partnerships between high-income countries and low-and-middle-income countries remain important for the understanding and management of air pollution.

31 (76%) of the responding trainers reported having conducted further training activities since the conclusion of the training programme and all 40 respondents indicated their willingness to train other health-care professionals in their region in the future (appendix p 22).

Implementation successes, challenges, and lessons learned

Here, we will describe what we consider successes and challenges in the design, implementation, and evaluation of this pilot programme, and lessons learned that we hope will inform a scaled-up second round of the programme. These lessons are from both the programme coordinators' and the trainers' perspectives, with specific lessons learned from trainers also highlighted in panel 1.

The train-the-trainer model

We used the train-the-trainer model,[19–23] which was based on the Health Canada AQHI train-the-trainer programme conducted by The College of Family Physicians of Canada,

from 2012 to 2018,[22,23] and a smaller WONCA pilot, which trained 15 family doctors in six LMICs. This approach was favoured because of our successful experience with it in Canada, and because of its potential to efficiently reach a broad and diverse audience of health-care practitioners by the cascade effect—ie, we, the original trainers, used our training programme to train a group of health-care professionals, who would then train others.[19,20] The model is popular in global health education because of "its potential for up-skilling the workforce rapidly, cheaply and exponentially".[21]

The train-the-trainer model has been used to address environmental health issues in LMICs. For example, van Gemert successfully used this model in Uganda, Viet Nam, and Kyrgyzstan, with training cascading from health-care workers to community health workers, who trained their communities, raising awareness about lung health.[28–30] Using the same model, they followed up with intervention studies to reduce tobacco and biomass smoke. They concluded that the train-the-trainer model was effective, that community health workers were effective trainers within their community context, and that flexibility in the programme was important. Nevertheless, several challenges have been identified in the delivery of train-the-trainer interventions.[21,31]

Recruitment of trainers

Although air pollution affects all communities, whether in LMICs or high-income countries (HICs), and health effects are significant even at low levels of air pollution,[32] we chose to recruit trainers in LMICs. We were limited in scope by funding, but also persuaded by the fact that both the concentrations of ambient air pollution, and the burden of illness from air pollution, are higher in LMICs, especially when including both outdoor and household air pollution. Additionally, fewer opportunities exist for training in public and environmental health in LMICs.[33] We were able to recruit family doctors, community and public health professionals, medical students, and some specialty consultants, including paediatricians and respirologists, but only one nurse and one community health worker. This deficit is not unique to this programme, and frontline community workers have been under-represented in other train-the-trainer interventions.[21,34] Getting closer to the community with nurses and community health workers would support interventions in households, such as encouraging families to use a more efficient liquid propane gas stove (rather than a traditional wood fire), and allow greater influence in communities. Nevertheless, our trainers achieved substantial outreach into communities, both by training community health-care practitioners and by leading activities in schools and other community groups. In the next round of the programme, our recruitment process would be enhanced by the networks our trainers have developed locally, and by collaboration with WHO, UN Environment Programme, and others.

In terms of distribution, there are advantages to conducting a programme with a geographical concentration in a community or smaller region. In these scenarios, the training can be live and hands on, and the evaluation can be conducted intensively.[28] In our model, trainers were widely distributed—in several instances with only one trainer per country and only a small number of trainers for an entire region. The strength of this wider distribution is that there is potential for wider reach, seeding new ideas, and enabling people to take action. However, this distribution means the trainers receive less support and must be more independent, creative, and self-motivated.

Trainers were remunerated at an hourly rate for activities that they conducted, plus preparation time, up to a maximum of 35 h in the first year of the programme. As there is no standard global health-care professional salary, we remunerated each participant based on what they reported as their average hourly rate in their regular health-care work, to a maximum of US$50/h.

The training

All the training was conducted online, as in-person training would have required extensive time, travel, and costs. In general, the training was effective and efficient, as suggested by the evaluations; however, some areas need improvement. For example, a number of the trainers had slow or unstable internet access. Although connectivity has improved substantially in recent years, it continues to act as a barrier to accessing training and health services in some settings.[35–38] Another barrier was the variation in time zones; because the trainers had to keep to their regular work routine, the regional time difference affected the training attendance to the webinar. We attempted to overcome these barriers by holding three identical sessions on different days at different times, recording each session, and making all the material available for viewing and reading at the trainers' convenience. Another challenge was that the structure of the training did not allow for much interaction among participants.

Further limitations related to content and accessibility of the training material. Both online courses used in the training were developed in HICs. At the start of 2019, training programmes in air pollution and health were scarce, and none had been developed in LMICs.[39] To include more content relevant to LMIC contexts, we added the topic of household air pollution through additional expert videos (from the late Prof Kirk Smith)[40,41] and in the webinar. The online registration for the University of British Columbia course was also complex (it was a multi-step process designed for students residing in Canada, and errors made required intervention by staff), and this affected the completion of the course for some of the trainers. Furthermore, the training was without specific content on educating health-care professionals to train others, and there was little specific training on advocacy.

Panel 2: **Implementation of training activities**

Training other health-care professionals
This process involved giving lectures, leading tutorials, writing articles, and engaging in training programmes. The focus was on clinical history taking and clinical and community interventions.

Training within existing programmes
Some of our trainers worked within existing organisational structures (eg, community health worker organisations, primary care nurse groups, medical school, and public health courses) to teach about clinical presentations, community interventions, and air pollution.

Community interventions
Some trainers engaged in community projects. An example of this was a trainer who worked with engineers to build low-cost air pollution sensors, and then placed these at health centres. The air pollution data generated was used to train the health centre staff, educate patients in the community using a citizen science approach, and to advocate for transdisciplinary action to reduce community sources of air pollution.[52] Other trainers conducted programmes to teach both teachers and their students in the schools in their communities.

Network development
Some trainers established networks within existing medical and health-care societies to promote air health issues.

Tool development
One trainer used her time to develop a massive open online course (MOOC) on planetary health in Brazil, which includes a module on air pollution. This Brazilian Portuguese version was evaluated, relaunched, and translated into English to be accessible to a wider audience.[53] This MOOC also served as the template for the WONCA Planetary Health in Primary Care MOOC, which MF and several others helped to develop.[43]

Outreach via media
This included giving television and radio interviews, creating podcasts, and running social media campaigns on platforms such as Facebook.

Conducting research
Several trainers worked on air pollution research projects, including a survey of barriers to implementing technologies to reduce household air pollution among mothers and pregnant women (building on previous research),[54,55] a project to assess children's exposure to air pollution in the different places where they spend their time, and an intervention project to address indoor air pollution exposure in a state penitentiary. Several trainers also wrote reviews.[56–58]

Since the delivery of our training, more fit-for-purpose training materials have been developed. In the next round of the training, we will base the content on the WHO training toolkit on air pollution and health for the health workforce,[42] which is in development, and the WONCA Planetary Health for Primary Care massive open online course,[43] which is hosted in the Brazilian Platform, TelessaúdeRS-UFRGS. Both courses were developed by teams from both HICs and LMICs, including several of the Air Health trainers. They are directed to training a clinician dealing with a patient and community, as well as empowering the learner with skills as a trainer of other health-care professionals, and as an advocate in the community context. In this way, the next round of the programme will include the teaching of skills in both education and advocacy.

Context matters and cultures differ, and the air pollution levels, makeup, sources, and monitoring differ across regions, as will the opportunities for, and nature of, community interventions for advocacy and interactions with health systems. Consequently, training would be improved by regional adaptation. To address this issue, we plan to engage regional leads, who will be responsible for adapting the programme for local communities, for establishing stronger regional networks of trainers, and for engaging a group of regional experts to act as a resource to trainers, ensuring regionally appropriate content and assisting with opportunities for community and regional collaboration and interventions.

Addressing air pollution and health, and even more so planetary health, requires practitioners to work in a transdisciplinary and trans-sectoral environment, collaborating with climate and meteorological scientists, transport and waste engineers, urban planners, non-governmental organisations and government agencies, universities, and schools. In future trainings we aim to equip trainers with the tools to effectively present the health evidence, including cost–benefit analyses, to a transdisciplinary team.[44,45]

Trainers have suggested that they, and their trainees, would have benefited from a greater knowledge and understanding of the links between air pollution and climate change. The linkages are evident in the reduction of air pollution health co-benefits of climate change mitigation, the reduction in greenhouse gas emissions with reductions in air pollution, the reduction in short-lived climate pollutants with reduction in household pollution emissions, the increase in forest fires with climate warming, and the synergistic health impacts of air pollution and heat.[46–50] Some of the trainers themselves have addressed these knowledge gaps, by contributing as authors to the WONCA Planetary Health for Primary Care modules.[43]

Retention of trainers through phase two and creating a network

38 (52%) of the 73 trainers we selected and trained reported conducting activities in their own communities from May, 2019, to October, 2020. This number is similar to that of the Health Canada AQHI Train-the-Trainer Program. How this retention compares with other LMIC train-the-trainer programmes is more difficult to assess, because retention is generally not captured in programme evaluations.[25,51] However, the retention rate for this group could be expected to be low—the work of most health professionals is typically demanding, and the COVID-19 pandemic added extra demands and affected the trainers' ability to stay engaged and to organise educational or advocacy activities. To encourage engagement and to improve

retention in the next round, we propose to offer the trainers a modest reimbursement for time spent in training (in addition to the remuneration for time spent conducting activities), to be paid only after they have demonstrated educational or advocacy activities.

The trainers who did engage in the programme expressed that they wanted to engage in ongoing online webinars and discussions, as discussed earlier. Regional leads will engage trainers through regional networking and support activities.

Although the WhatsApp group, email updates, and trainer participation in further activities, such as a workshop at the WONCA World Conference, are ongoing, the training programme did not have a clear strategy for maintaining engagement and support for trainers beyond October, 2020, and engagement has since continued in an ad hoc fashion. Strategies to maintain engagement among these trainers would include recruiting them as regional leads in the next round of the training programme and planning continuing professional development opportunities during and beyond the official programme period, as suggested in the TRAIN framework.[23]

The 38 trainers who were engaged in the programme were innovative, productive, and effective. We observed seven models of implementation from their activities; namely, training with other health-care professionals, training within existing programmes, community interventions, network development, tool development, outreach via media, and conducting research (panel 2).

Lessons learned by the trainers

Several recurring themes can be identified within the lessons the trainers expressed that they had learned (panel 1). These lessons include: the opportunity to link the topics of air pollution and tobacco smoking and to learn from smoking cessation advocacy; school-based trainings, which are a cost-effective way to educate and engage communities; and collaboration with governments and other stakeholders, which is important for community education and for designing interventions.

Although knowledge on air pollution and health is low in general among health professionals, they are willing to engage and be trained in this topic. We suggest the use of these experiences as case studies in further training activities, to teach and inspire the next group of trainers.

Tools for trainers

Some of the trainers worked in cities or regions without real-time air pollution data. They suggested that they would benefit from having some way to quantify the exposure of their communities, to alert and inform their communities. It is possible to do this by using inexpensive sensors, and we plan to purchase sensors to be shared by trainers within regions. These sensors are not accurate and reliable enough to be used to gather data for research purposes, but can be effective as tools for education, awareness raising, and advocacy, providing more evidence to inspire action.[59–62]

Conclusion

Although we considered this pilot programme to be a success, with at least 370 activities conducted, we identified several challenges in delivering this training programme. These challenges related to the professional diversity and geographical distribution of trainers, the appropriateness of the training materials for health-care professionals working in LMICs, the retention of trainers to deliver activities in their communities, and the tools available to support trainers in their education and advocacy activities. This pilot training programme enabled the development of stronger networks and training materials more appropriate to LMIC settings. We plan to apply the lessons learned to a future train-the-trainer programme, and suggest that these lessons could also be useful to others in planning and implementing train-the-trainer interventions to address air pollution and other planetary health issues.

Contributors

AA contributed to the conceptualisation, funding acquisition, method, and supervision of the WONCA Air Health Train the Trainer Program. AM contributed to the method, project administration, supervision, data curation, and formal analysis of the WONCA Air Health Train the Trainer Program. AA and AM led the writing of the original draft, and the review and editing. EFdB, MF, YM, AEN, CN, PAO, and SS were trainers in the WONCA Air Health Train the Trainer Program and contributed to its method, activities, reporting, and evaluation. RW contributed to the method, data curation, and formal analysis of the WONCA Air Health Train the Trainer Program, and reviewing and editing of the draft. All authors contributed to the original draft, and the review and editing.

Declaration of interests

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