



*Malé Declaration on Control and Prevention
of Air Pollution and its Likely Trans-boundary
Effects for South Asia*

**Report of the Third Regional Training
on Health Impact Assessment
Kathmandu, Nepal
23-25 March 2011**

Table of Contents

Table of Contents	ii
Background	Error! Bookmark not defined.
Report of the Training Programme	1
Documents	8
Attachment 1. Agenda	8
Attachment 2. List of Participants	10
Attachment 3. Presentations.....	13

Background

The health impacts of air pollution are the major policy driver for decision makers of developing countries. Health Impact Assessment is one of the priority areas identified for capacity building during the Phase III implementation of Malé Declaration. The activities in the Phase III have concentrated on enhancing the capacity of key regional stakeholders, including government agencies and health professionals, in health impact assessment methods and helping them to access relevant information. The first training workshop on Health Impacts was held in Pathumthani, Thailand on 19-22 February 2007 and a follow up training was held in the same place on 15-18 October.

A simple epidemiological study was conducted in Dhaka, Bangladesh, to demonstrate the relationship between the bronchial health of asthmatic schoolchildren and the very high levels of particulate matter found in air in the large cities of South Asia.

REPORT OF THE TRAINING PROGRAMME

Introduction

1. As a continuation to the earlier study conducted in Dhaka, Bangladesh, this health impact assessment study will be conducted again in selected cities in South Asia. Objectives of the study is to a) determine whether there is an association between daily mean PM10 and PM2.5 concentrations and respiratory health and lung function in children in a city, b) quantify the relationship, and c) assess the scale and severity of impacts. This assessment can address the need for information on the effects of air pollutants on health in South Asia at the high concentrations commonly found in large cities, and provide locally-gathered evidence to support actions by governments to control particulate emissions.
2. To further address the capacity building needs in this area, a training workshop was held on 23-25 March 2011 in Kathmandu, Nepal. The training was attended by 17 health and air quality experts from 7 participating countries who are involved in health impact studies and air pollution related activities. They are from Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. The training was conducted by resource person from Murdoch University, Australia together with AIT-UNEP RRC.AP and ICIMOD. Expert from National Institute of Preventive & Social Medicine (NIPSOM), Bangladesh who involved in the previous study conducted in Dhaka, during Phase III implementation was also involved as a resource person for this training. The programme for the training workshop is enclosed as Attachment 1.

Opening Session

1. The session started with short welcome remarks from ICIMOD, Ministry of Environment, Nepal and UNEP RRC.AP. Follow by self introduction of all participants and their expected outcome from this training workshop.
2. Ms. Naw Wah Wah Htoo, UNEP RRC.AP gave a brief presentation on the progress of Male' Declaration Phase IV activities, follow by objectives and expected outcome from the study and training workshop. She also mentioned that after the training, the study team from Nepal and Pakistan were expected to develop a complete implementation plan for the study to be conducted in their cities within two weeks time. The detail of the presentation is enclosed as Attachment 3a and 3b.

First Day Training Workshop

3. Dr. Frank Murry, Murdoch University gave first presentation on "*Emissions of Air Pollutants of Health Significance*" with highlight major types and Sources of Air Pollution. Follow by discussion of the major sources of air pollution in South Asian countries. He explained the important of understanding source apportionment,

knowledge of major air pollution sources in the city for policy measure/option. Understanding emission inventory and emission factors are important for rapid assessment of air pollution in the cities which play an important role in policy development and right decision for policy makers. The detail of the presentation is enclosed as Attachment 3c and 3d.

4. Second presentation of Dr. Murry was on “Typical concentrations of air pollutants, air quality guidelines and standards” which focus to understand the magnitude of concentrations of the key air pollutants in outdoor and indoor environments and to understand the rationale and objectives for setting air quality standards and some international guidelines and standards. It was mentioned how WHO guidelines and standards help the national government to set their own standards based on countries situation. After the presentation, participants shared/discussed their experience, knowledge on the standards set in their countries. The detail of the presentation is enclosed as Attachment 3e.
5. Afternoon section started with Dr. Murry’s presentation on “Ambient air quality monitoring.” Dust Track demonstration was included during presentation. In his presentation he explained the various equipment used for ambient air quality monitoring and the important of wet chemistry analysis. He also presented the cost range of equipments, advantage and disadvantage of some of the equipment used in air quality monitoring at different places. The need for Quality assurance and quality control was also explained. The detail of the presentation is enclosed as Attachment 3f.
6. In the afternoon after the presentation and a short discussion on dust track, participants visited the air quality monitoring site prepared for ABC training school on top floor of the hotel where the workshop was held. The ABC expert explained the air quality monitoring equipments and the pollutant (black carbon and others) measured at this temporary monitoring site. After that participants visited two places in Kathmandu to measure the air quality with dust track equipment as an demonstration and exercise. The two places were one at Kalimati bus terminal and another at Kalanki at the road site on the hill of Kathmandu city. The result from dust track at these two sites were mentioned below:

The PM_{2.5} concentration measured at Kalimati, Kathmandu, was 150 ug/m³
The PM₁₀ concentration measured at Kalanki, Kathmandu, was 156 ug/m³

Second day Training Workshop

7. The morning section started with presentation by Dr. Murray on “impacts on health of the major air pollutants”. The main objective of this presentation is to understand some of the major impacts of air pollution on health and to understand some of the mechanisms of these impacts was explained. Different air pollutants have different effects on health was presented and explained. Bad experience of air pollution impact on health in London and Asia were presented as examples. He also presented the HIA studies result from Europe and America which were applicable to other parts of the world. A number of epitomical studies done in Asia were also presented. He

concluded his presentation with the effects of air pollution on health in Asian cities are 1) particulate matter is the most significant pollutant in most cities; 2) Impacts on human health are serious and have substantial economic effects; 3) major changes are occurring with rapid economic growth accompanied by emissions reductions in some cities but not others. The detail of the presentation is enclosed as Attachment 3g and 3h.

8. Dr. Sanjeev Agrawal, CPCB India participant presented air quality monitoring in different cities across the India. He also presented the facility and monitoring mode available in CPCB and the flow of air quality data which were available through National Air Quality Monitoring Programme (NAMP). Parameters monitored in all the monitoring stations in India are SO₂, NO₂, RSPM (PM₁₀), SPM. Trace Metals, PAHs, NH₃, H₂S in seven mega cities including Meteorological Monitoring data. Three monitoring stations which were sectioned for Male' Monitoring networks was also mentioned during his presentation. The detail of the presentation is enclosed as Attachment 3i, 3j and 3k.
9. After above presentation, he presented another presentation on "Health effects of Major pollutant studies done in India". A number of Epidemiological Studies Initiated by CPCB in India was presented. The objectives of the studies were to prepare a database on the impact of chronic exposure of ambient air pollution on the respiratory and systemic health of the adult and children residents of Delhi. These studies will serve as the reference data for all future monitoring studies of the city's air quality with respect to health and to help to adopt and monitor intervention policies for the betterment of the situation. Another objective was to investigate the underlying mechanism of air pollution-related health impairments at the cellular and subcellular levels for better understanding of the problem. He also presented the findings from the studies as below:
 - High level of air pollution in Delhi was associated with higher incidence of upper and lower respiratory symptoms
 - The symptom were more prevalent during winter when PM₁₀ level in air is highest suggesting positive association with particulate air pollution
 - In children girls suffered more than boys
 - Both adult and children residents of Delhi showed significant increased prevalence of restrictive, obstructive, as well as combined type of lung functions deficits as compared with controls. Restrictive type was predominant.
 - Significant reduction in lung function specially in winter and summer
 - Lung function reduction was more prevalent in women than in men both and girls than the boys among children in both rural and urban settings
 - Besides gender, smoking habit, Body mass index (BMI) and Socio economic status (SES), particulate air pollution was positively associated with lung function deficits

The detail of the presentation is enclosed as Attachment 3l.

10. Cities are having more symptoms than rural area was also mentioned. After his presentation, all participants actively discussion, ask question and give their comment on the issues. The detail of the presentation is enclosed as Attachment 3m, 3n and 3o.
11. Prof. Akhtar Ahmad, National Institute of Preventive & Social Medicine (NIPSOM), Bangladesh presented presentation on *The Effects of PM on respiratory Health of Schoolchildren in Dhaka*. He was involved as a team leader during this study done in Dhaka during Phase III Implementation of Male' Decoration. He explained the detail of the study conducted and also mentioned the difficulty they faced during conducting the study time. The result outcome of the study was also presented. The presentation was followed by discussion from the participants. According to the experience and outcome/result of Bangladesh study, Nepal and Pakistan will not include the asthmatic children as their response to air pollution was same as other children. The detail of the presentation is enclosed as Attachment 3p.
12. Afternoon section started with general presentation on Sin-Air model by Dr. Murry which was developed based on exl. format for air pollution assessment. He explained that SIM-Air is a framework used for integrated Air Quality Management (AQM); to calculate emissions and concentrations; to analyze impacts of various sources and estimate cost-effectiveness of policy options. This model is a good tool for a rapid assessment for the city. He also explained the list of data requirement for this model and how to modify the model with locally available data. Different management options like policy, technical, economic and institutional approaches were also presented. In association with this model other model and tool could be use (e.g GIS.) was also explained. Moreover, this is a simple option for decision maker was mentioned.
13. Above presentation was followed by Ms. Bidya, ICIMOD presentation on" the result from SIM-Air project which was done in Kathmandu". In her presentation it was mentioned how the data need to be collected. A short presentation resulted from SIA-Air, which is good to show policy maker was expressed.
14. The Status of Kathmandu air pollution was presented by Mr. Shashank Pandey from VSBK, Nepal. The high pollution growth in Kathmandu city is mainly due to all requirements for basic need like facility/education etc. which are available only in the city was explained. Therefore, it is ended with all environment problem in the city especially air pollution with major issue on public transport and ownership of car population. Vehicle loan scheme are also one of the pressure which increased the number of vehicle population was mentioned. The monitoring site and the result of monitoring data were also presented. In his presentation, 60% 70% of air pollution data result are mainly Pm1 and PM2.5 data. The result of health impact study done in Kathmandu by WHO was presented. Major increase in COPD patients records were also presented.

15. In the evening, all participants visited vertical shaft brick kiln which is in Imadol, Kathmandu. This is energy efficient kiln with less emission.

Third Day of the Training Workshop

16. Morning Section started with Dr. Murry's presentation on "Measuring health impacts of air pollutants". His main presentation objectives are to introduce a number of methods available to measure health impacts of air pollution and to discuss the suitable methods for studies to be done in Nepal and Pakistan. He presented a series of epidemiology studies with their main study focus, design, factors, effects etc. These studies were conducted since early times in UK and US. In his conclusion he mentioned that there is no "best" design but the study team needs to decide the best suite design/ questions which need to be answered and then assess the resources and data source available so that the team could chose the best fits these circumstances and addresses the key questions. The detail of the presentation is enclosed as Attachment 3q and 3r.

Presentation from Pakistan and Nepal on propose study/Implementation Plan

17. Mr. Asad Ullah Faiz, Pak-EPA presented the proposed implementation plan for the study to be done in Pakistan. He started his presentation by mentioning that there were no major studies conducted in Pakistan on Air pollution effect on health but only World Bank organization conducted a study on health and environment. This studies will be the first study to be conducted by Pak-EPA (as a coordinator NIA) under supervision of MOE, together with Education Ministry, Health Ministry and others suitable institutes. Methodology to be used in the study was presented based on outline provided by Dr. Murry through Male' Declaration Secretariat. Mobile monitoring station will be used during monitoring air pollution data was expressed. Questionnaires will be modified according to the discussion with participating school children and parents (to make it more comfortable) and plan to translate it into local language. Peak flow meter selection will be done by expert together with MD secretariat was mentioned. The length of the project is proposed for 6 weeks and whole study will be completed in 14 weeks time. Tentative implementation timetable was proposed. The hot spot of the city is also identified. Awareness activities will be included during studies time was also mentioned. He also mentioned the air quality monitoring will be continued even after the project study finish for further continuation of the study on the air quality. A risk analysis on the project was also presented. Current air quality monitoring index and facility of air quality monitoring stations were also mentioned.

Suggestion from participants:

18. It was suggested to Pakistan that the Questioners need a trial test so that it could know these questions are suitable/easy for the students/parents to understand or not. The time frame was also discussed which need to be suitable for teacher and student. Pak-

EPA will provide the revised implementation plan for health impact study after two weeks time.

19. After Pakistan presentation, Dr. Krishna Aryal, Senior Research Officer, Nepal Health Research Council (HRC) presented a presentation on Health Impact Studies in Nepal. He presented a number of health research conducted by HRC. Study approaches done in previous studies were explained with the outcome and recommendation for further study.
20. After above presentation, he continued to present the proposal for health impact study to be conducted in Nepal which was prepared together with ICIMOD. He mentioned the National standard on ambient air quality and National Indoor air quality standard. The propose studies is based on the outline provided and it was modified according to the condition of the country. The participating school will be selected near the monitoring station for easy sampling was explained. He mentioned that it may be only one school or two due to the constraint in monitoring station. 150 to 200 students may invite to participate in the study. For data collection: questionnaires will be used and will be translated to local language.

Closing Session

An informal short closing session was held. Mr. Iyngarasan from UNEP HQ, Ms Bidya from ICIMOD, MD Secretariat and MOE gave their short closing remark and thanking all participants for their actives participation.

On behalf of all the participant, participant from Sri Lanka expressed his special thanks to resources person and also other presenters which was a fruitful experience and he learn more new things/experience on health impact assessment during training time. He also expressed his willingness to conduct studies on health impact assessment in Sri Lanka. This will be discussed with NIAs and will contact MD secretariat for further development.

The session was followed by group photo.

Training Workshop Experience and Evaluation

The participants were actively involved in the workshop. Emphasis was given to discussion of implementation plans on health impact studies to be conducted in Nepal and Pakistan. Sri Lanka also expressed willingness to involve in the study. After the closing session, an evaluation form was completed by eight of the participants. The summary of the responses and suggestion made by all of those who completed the questionnaire is as follows:

Question	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
My personal goals were met by this training course				25%	75%
I enjoyed this training course				38%	62%
I learned a lot from this training course				25%	75%
the workshop provided an interactive environment				38%	62%
the administrative arrangement for this training course were good				62%	38%
I will be able to use what I have learned during this training course				50%	50%

The participants indicated that they would use the information they obtained from the workshop to conduct studies of impacts of air pollution on health in their countries (3 participants), in teaching (two participants), and one participant will use the information in policy development in a government agency.

Attachment 1

Agenda

Workshop on the Health Impacts of Air Pollution

International Centre for Integrated Mountain Development, Kathmandu, Nepal
23-25 March 2011

Wednesday 23 March		
09:00-10:30	Opening Session <ul style="list-style-type: none"> Objectives of the workshop Discussion of expectations of participants 	UNEP/ICIMOD/MOE
10.30-11.00	Tea/Coffee break	
11:00-12:30	<i>Emissions of Air Pollutants of Health Significance</i> <ul style="list-style-type: none"> Major Types and Sources of Air Pollution Overview of types of air pollution and discussion Discussion of the major sources of air pollution in South Asian countries 	Frank Murray
12:30-13:30	Lunch	
13:30 -14.30	<i>Ambient Concentrations of Air Pollutants of Health Significance</i> <ul style="list-style-type: none"> Typical concentrations of the major pollutants in different environments, air quality standards, and some international standards to protect health Discussion of the typical concentrations of air pollutants in South Asia 	Frank Murray
14.30 – 17.00	<i>Excursion to selected sites in Kathmandu and demonstration of the DustTrak PM monitoring instrument at selected locations</i>	Soaltee roof top; Kalimati; Kalanki

Thursday 24 March		
09.00-09.45	<i>Air Quality Monitoring Methodologies</i> <ul style="list-style-type: none"> Monitoring methodologies Discussion of the major monitoring types in the countries of South Asia 	Frank Murray
09.45 – 10.30	<i>Health Impacts of Air Pollution</i> <ul style="list-style-type: none"> The impacts on health of the major air pollutants 	Frank Murray
10.30 – 11.00	Tea/Coffee break	
11.00 -11.45	<i>The Effects of PM on respiratory Health of Schoolchildren in Dhaka</i>	Prof. Akhtar Ahmad
11.45-12.30	<i>Presentations on effects of air pollution on the health of</i>	Mr. Sanjeev

	<i>children and adults</i>	Agrawal; Mr. Sanjeev Paliwal
12:30-13:30	Lunch	
13.30-14.30	<i>Introduction to SIM Air</i>	Frank Murray
14.300-14.50	<i>Air Pollution in Kathmandu</i> VSBK	Ms. Bidya Pradhan Mr. Shashank Pandey Mr. Meghnath Dhital
14.50-17.00	<i>Excursion to major sources of air pollution in Kathmandu</i>	Ms. Bidya Pradhan

Friday 25 March		
08.30-10.30	<i>Measuring Health Impacts of Air Pollution</i> <ul style="list-style-type: none"> • Analysis and discussion of some study designs are their applicability in South Asian countries <i>Field visit</i> 	Frank Murray
10.30 – 11.00	Tea/Coffee break	
11.00 – 12.30	<i>Measuring Health Impacts of Air Pollution</i> <ul style="list-style-type: none"> • Presentations from Nepal and Pakistan on proposed design and implementation of the study of the impacts of PM on school children • Discussions of proposed design and implementation 	Representatives of Nepal and Pakistan NIAs
12:30-13:30	Lunch	
13.30 -15.30	<i>Measuring Health Impacts of Air Pollution</i> <ul style="list-style-type: none"> • Discussion of the proposed design of the study of the impacts of PM on school children • Discussion of plans and selected methods for measuring health impacts of air pollutants in South Asian countries 	Frank Murray
15.30 – 16.00	Tea/Coffee break	
16.00 – 16.30	<i>Closing ceremony and course review</i>	Frank Murray

List of Participants

<p>Bangladesh</p> <p>Mr. Sayed Nazmul Ahsan Deputy Director (Technical) Department of Environment Paribesh Bhaban, Room No. 101, E-16, Agargaon, Sher-E-Bangla Nagar, Dhaka-1207, Bangladesh Tel: 880-28121793 Email: nazmul@doe.bd.org</p>	<p>Bhutan</p> <p>Dr. Nima Wangchuk Faculty of Public Health Royal Institute of Health Sciences (RIHS) Thimphu, Bhutan Email: nimawang@yahoo.com</p>
<p>Iran</p> <p>Ms. Elham Azizi Senior Expert Protection of Atmosphere Department of Environment Pardisan Park, Hakim Highway, Tehran, Iran Tel: +982188244576 ,+982188267996 mobile: +989122179765 Email: elham_azizi@yahoo.com</p>	<p>India</p> <p>Dr. Sanjeev Kumar Paliwal Scientist-C Central Pollution Control Board (CPCB) Parivesh Bhawan, East Arjun Nagar, Delhi 110032, India Tel: Mobile:+91 9711113945 Email: paliwalsk@yahoo.com</p>
<p>India</p> <p>Dr. Sanjeev Agrawal Scientist-C, CPCB Parivesh Bhawan, East Arjun Nagar, Delhi 110032, India Telefax: 91-11-22302188 Mobile Phone No.: +919891903524 Email: sanjeev.cpcb@nic.in; sanjeevcpcb@yahoo.co.in</p>	<p>Maldives</p> <p>Ms. Aminath Shaufa Public Health Programme Coordinator Centre for Community Health and Disease Control Republic of Maldives Tel: +9603328887 Fax: +9603014489 Email: shaufa@health.gov.mv</p>
<p>Pakistan</p> <p>Mr. Zia Ul Islam Director Ministry of Environment 3rd Floor, Local Government Building G-5/2, Islamabad Pakistan Email: rmamazia@hotmail.com</p>	<p>Pakistan</p> <p>Mr. Asad Ullah Faiz Director (EIA/Monitoring) Pakistan Environmental Protection Agency (Pak-EPA) Ministry of Environment Government of Pakistan 311- Margalla Road, F-11/3, Islamabad, Pakistan Tel: +92-52-9267627, Mob: +92-333-5610789 Fax: +92-51-9267625</p>

	e-mail: pakepa@environment.gov.pk asadullahfaiz2000@hotmail.com
Pakistan Mr. Murad Khan Chemist/ Air Quality Expert Pak-EPA Ministry of Environment Government of Pakistan 311- Margalla Road, F-11/3, Islamabad, Pakistan. Tel: +92-51-9250716, Mobile Phone No: +92-300-9705949 Fax: +92-51-9250718 e-mail: muradkhan64@yahoo.com	Pakistan Miss. Saima Asghar Professional for Supervising Health Impact Assessment Study 196, Umer Block Allama Iqbal Town, Lahore, Pakistan Mobile Phone No.: +92-321-7002885 e-mail: saimee_21@hotmail.com
Sri Lanka Dr. S.N. Yatagama Lokuge Lecturer - Public Health Evaluation and Research Unit National Institute of Health Sciences Ministry of Health Kalutara, Sri Lanka Tel: 00 94 38 2285288 Email: sumalnandasena@gmail.com	Nepal Ms. Sushma Upadhyay Chief of Environmental Pollution Control and Monitoring Section Ministry of Environment Singha Durbar Kathmandu, Nepal Email: upadhyay_sushma@hotmail.com
Nepal Hari Datt Joshi Assistant Research Officer Email: sahara.hari@gmail.com Mobile: 9841721687	Nepal Meghnath Dhimal Chief Research Officer Email: meghdhimal@gmail.com Mobile: 9841467581
Nepal Dr. Krishna Aryal Senior Research Officer Email: krish.aryal@gmail.com Mobile: 9851123730	Nepal Bikram Dhimal Assistant Research Officer Email: bickram1@hotmail.com Mobile: 9841513383
Nepal Bimala Dhimal Email: bimaladhimal@gmail.com Mobile: 9841977025	Nepal Hari Dhimal Email: dearharidhimal@gmail.com Mobile: 9849511497

<p>Nepal</p> <p>Shashank Pandey Programme Environmentalist CESEF, Cost Effective, Social and Environmental Friendly (Clean Building Technologies for Nepal) Email: shashank.pandey@vsbk.org.np Mobile: 9841272925</p>	
---	--

Resource Person

<p>Dr. Frank Murray Associate Professor School of Environmental Science Murdoch University Murdoch WA 6150, Australia Tel + 61 8 9360 2501 Email: F.Murray@murdoch.edu.au</p>	<p>Dr. Sk. Akhtar Ahmad Professor (Ex.) Department of Occupational & Environmental Health National Institute of Preventive & Social Medicine (NIPSOM) Mohakhali, Dhaka-1212, Bangladesh Mobile No: 01552465730 Email: anon@bdcom.com</p>
---	--

UNEP RRC.AP

<p>Ms. Naw Wah Wah Htoo Programme Officer AIT-UNEP RRC.AP Asian Institute of Technology P.O. Box 4, Klong Luang Pathumthani 12120, Thailand Tel: +66-2-524-5234 Fax: +662-516-6233 Email: wahwah@rrcap.unep.org</p>	
--	--

List of Presentation

- 3a. Male Declaration, Overview and Objectives of the workshop
- 3b. Male Declaration, Health Impact Assessment, Phase IV
- 3c. Introduction to The Workshop by Frank Murray
- 3d. Source of Air Pollution by Frank Murray
- 3e. Typical Concentration of Air Pollutant, Air Quality, Guidelines and Standards by Frank Murray
- 3f. Ambient Air Quality Monitoring by Frank Murray
- 3g. Emissions of Air Pollution (Impact of Air Pollution) by Frank Murray
- 3h. Effect of Air Pollution (Impact of Air Pollution) by Frank Murray
- 3i. National Ambient Air Quality Network in India
- 3j. National Ambient Air Quality Monitoring Programme
- 3k. Air Quality Monitoring and Reporting under NAMP by Dt. Sanjeev Agrawal and Dr. Sanjeev K. Paliwal
- 3l. Health Effects of Air Pollution in Delhi by Dr. Sanjeev Agrawal and Dr. Sanjeev K. Paliwal
- 3m. Country Presentation Bangladesh by Farid Ahmad
- 3n. Assessment of Air Pollution (PM) among School Children in Dhaka City
- 3o. Assessment of Impact of Air Pollution among School Children in Selected School in Dhaka City
- 3p. What is SIM-Air? by Frank Murray
- 3q. Measuring Health Impacts of Air Pollution by Frank Murray
- 3r. The Effects of PM10 and PM2.5 on Health of Children in Dhaka by Frank Murray