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Report on AQ information towards the public based on the outputs from the questionnaires based survey

Hai-Ying Liu (ed.)

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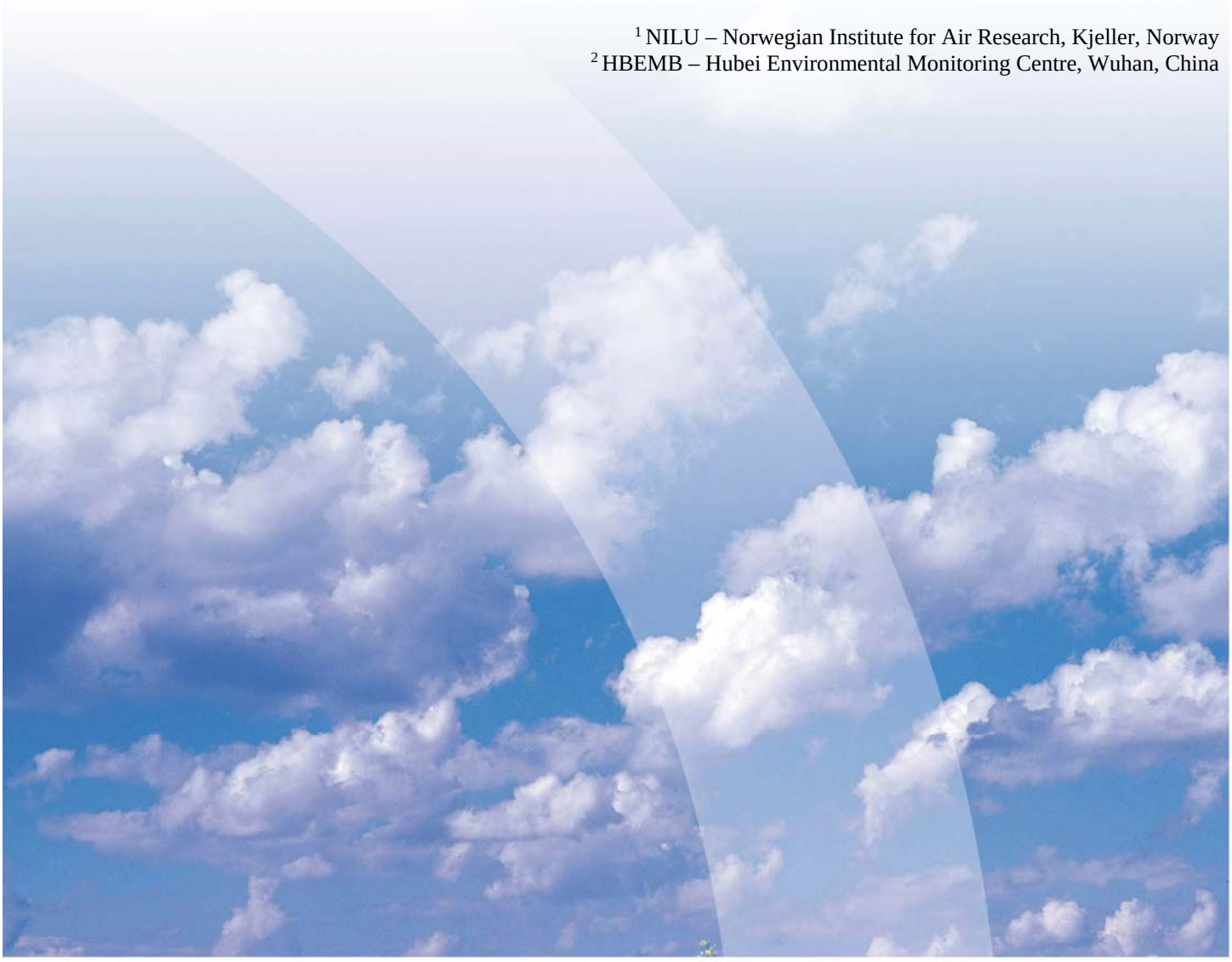

Scientific report

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Contents

Summary

This report is a deliverable of a project Hubei-AQ.info (Hubei air quality information and early warning system complementing Hubei "1+8" city cluster haze monitoring project). Hubei-AQ.info is a collaborative project supported by the EU – China Environmental Governance Programme (EGP) and the Ministry of Environmental Protection, P.R. China (MEP). The project Hubei-AQ.info is led by NILU and the main partner is from Hubei Environmental Monitoring Central Station (HBEMC). It started in December 2012 and will be finalized in November 2014.

The objective of Hubei-AQ.info is to (i) establish an up-to-date air quality (AQ) information system for nine cities in Hubei; (ii) provide more accurate and adequate AQ information to the public, objectively and efficiently; and (iii) enhance the awareness of AQ status among the public for protecting human health.

This report on AQ information towards the public based on the outputs from the questionnaires survey is one of tasks to be performed within Work Package (WP) 2, activity 2.1 "Develop public AQ information questionnaires and analysis of the results" of the Hubei-AQ.info-project. This activity is to develop, distribute the questionnaires to the public, collect and analysis the received data based on the results of the survey. The outputs can contribute to development of AQ information system to the public, which is one of the main aims of WP 2.

The key contents within this report are:

- Questionnaires
- Questionnaire reference information
- Target groups and implementation approach
- Questionnaires survey results

This report has been supported by the following people within the project, who are acknowledged for their respective contributions: Sonja Grossberndt at NILU for suggestions and comments, and for helping us with the English language. Fan Shen, Yiping Tian, and Jihong Quan from Hubei Environmental Monitoring Center for discussing, helping with the distribution of the questionnaires. Dr. Li Liu at NILU for following up and support the working process and the report.

For more information, please visit Hubei-AQ.info website at http://www.hubei-aq.info, contact Dr. Hai-Ying Liu, E-mail: hyl@nilu.no

Hubei-AQ.info

Report on AQ information towards the public based on the outputs from the questionnaires based survey

1 Aims

The overall objective of this air quality (AQ) questionnaires survey is to increase public awareness and enhance the understanding of AQ-related information among the public in Wuhan, Hubei. The specific objectives are as follows:

- Empower the public to participate in and contribute to AQ-related environmental monitoring and decision making.
- Improve the communication between the AQ information holders (e.g., HBEMC) and the public.
- Explore what environmental information is useful for the public.
- Provide recommendations on AQ-related information to the public.
- Provide recommendations on AQ-related policies to the decision- and policy-makers.

2 Questionnaires

We have designed two types of questionnaires: one towards the general public (e.g., citizens are interested in air quality) and another one for experts and professionals in the AQ-related fields. The questions included in the survey are either one or multiple-choice questions or require the input of free text from the participants. Questions marked with an asterisk (*) require an answer to be given (H.-Y., Liu and H., Liu et al., 2013a). It takes approximately 15-20 minutes to answer the questions.

Both questionnaires consist of nine sections. The first section relates to the personal information of the participant. The second section addresses the basic understanding of AQ-related information. The next six sections consist of questions regarding air pollution driving force, pressure, state, exposure, effect and action. In the last section, there is room for final remarks and the participants' wishes regarding the AQ-related issues (H.-Y., Liu and H., Liu et al., 2013a).

3 Questionnaire reference information

For those who are interested in learning more about AQ-related issues, in addition to the questionnaires, we have provided online web links to obtain reference information regarding local and regional air quality (in near real time) and the Chinese national environmental protection standards:

- Wuhan online ambient air quality information system (Hubei Environmental Protection Bureau (HBEPB), 2013a)
- Hubei province online air quality information system (HBEPB, 2013b)
- Chinese national environmental protection standards - air quality standards (Ministry of Environmental Protection (MEP), 2011)
- Chinese national environmental protection standards - environmental air quality index (AQI) technical requirements (Trial) (MEP, 2012)

4 Target groups and implementation approach

Our questionnaires' target groups are: (i) Citizens in general interested in air quality issues; (ii) Citizen groups who are highly exposed to air pollution (e.g., bus/taxi drivers, street police, etc.); (iii) Air pollution vulnerable groups (e.g., children and elderly, etc.); (iv) Health interest groups (e.g., those who suffer from asthma and allergy problems, and other respiratory disease patients, etc.); and (v) experts and practitioners involved or interested in AQ-related activities (e.g., researchers in environmental health fields, those peoples who work at environmental health related agencies and non-governmental organizations (NGOs)).

The questionnaires implementation approaches are: (i) Both published online (H.-Y., Liu and H., Liu et al., 2013b) and by hard copy directly handed out to the target groups; and (ii) Both an active (volunteered participation) and passive (motivated participation) empowerment and participation approach.

5 Questionnaires survey results

5.1 Number of valid questionnaires collected

In total, we collected 1086 questionnaires from the general public, of which 1038 were collected by motivated online approach (i.e., participants were first reached by a professional online survey company – Sojump (Sojump, 2006-2012), and project paid for participants to answer questions (20RMB for each participant)) and 48 through volunteered online participation (i.e., project partner HBEMC advertised our online questionnaires through their social media network: QQ and microblog). Further 12 questionnaires from experts and professionals have been collected through volunteered online participation. Paper copy questionnaires that have been handed out to experts/professionals (i.e., those who work at HBEMC, Hubei Environmental Protection Bureau, relevant Universities and research institutes in Hubei), highly exposed groups (i.e., street polity man, bus/taxi drivers) and vulnerable/sensitive people (i.e., kindergartens, preliminary schools, elderly people's homes) still need to be collected.

5.2 Analysis of questionnaire from general public

The basic analysis was completed through a Chinese professional online survey platform (Sojump, 2006-2012) and Excel. Tables 1-9 present the results of analysing the survey from 1086 valid questionnaires (i.e., those questionnaires that participants has answered all the required questions).

5.2.1 Results of survey: introduction questions

Table 1 presents the results of section one on the introductory questions for the survey participants. We can see that out of 1086 participants: (i) 44% are male and 56% are female; (ii) 51% of the participants are in the age between 18-25, 25% between 25-45, 17% under 18, 7% between 45-60, and only 3 participants above 60 years of age (Figure 1); (iii) 64% of the participants have bachelor degree, 12% a master, 1% a PhD, 15% high school education (Figure 1); (iv) Most participants are students (56%), 25% are employed at enterprises, 9% from administrative organization and/or public institutions (Figure 1); (v) 89% of the participants are general public and have not been/are not involved in air pollution related activities or work, and 11% have been/are engaged in work related to air pollution issues; (vi) Most of the participants live in the urban area or suburbs in Wuhan, e.g., Hong Shan or Wu Chang districts.

Table 1: Results of section one with introductory questions

Question No.	Questions and answers	Volunteered No.	Motivated No.	Total No.	Percentage
1	**What is your gender?**				
	Male	22	456	478	44 %
	Female	26	582	608	56 %
2	**What is your age?**				
	under 18	0	185	185	17 %
	18-25	11	538	549	51 %
	25-45	37	234	271	25 %
	45-60	0	78	78	7 %
	Above 60	0	3	3	0 %
3	**What is your highest education?**				
	PhD	1	12	13	1 %
	Master	21	114	135	12 %
	Bachelor	22	678	700	64 %
	Junior college	4	164	168	15 %
	High school or technical secondary school	0	65	65	6 %
	Middle school	0	5	5	0 %
	Preliminary school	0	0	0	0 %
4	**What is your job/occupation?**				
	Administrative organizations, public institutions	9	92	101	9 %
	Enterprises	23	249	272	25 %
	Freelancers	3	59	62	6 %
	Farmers	0	7	7	1 %
	Students	10	602	612	56 %
	NGOs	1	0	1	0 %
	Other	2	29	31	3 %
5	**Are you engaging or engaged in the work related with air pollution?**				
	Yes, I am currently engaged in the work related with air pollution.	13	52	65	6 %
	Yes, air pollution used to be one of my working fields.	4	46	50	5 %
	No.	31	940	971	89 %
6	**Which district do you live in Wuhan?**				
	Jiang An District	3	57	60	6 %
	Jiang Han District	2	65	67	6 %
	Qiao Kou District	0	37	37	3 %
	Han Yang District	0	57	57	5 %
	Wu Chang District	15	239	254	23 %
	Hong Shan District	8	327	335	31 %
	Qing Shan District	7	34	41	4 %
	Dong Xi Hu District	0	23	23	2 %
	Cai Dian District	0	14	14	1 %
	Jiang Xia District	6	150	156	14 %
	Huang Po District	0	10	10	1 %
	Xin Zhou District	7	18	25	2 %
	Han Nan District	0	7	7	1 %
7	**Which type of area do you live in?**				
	Village	2	73	75	7 %
	Suburban area	15	264	279	26 %
	Urban area	31	701	732	67 %

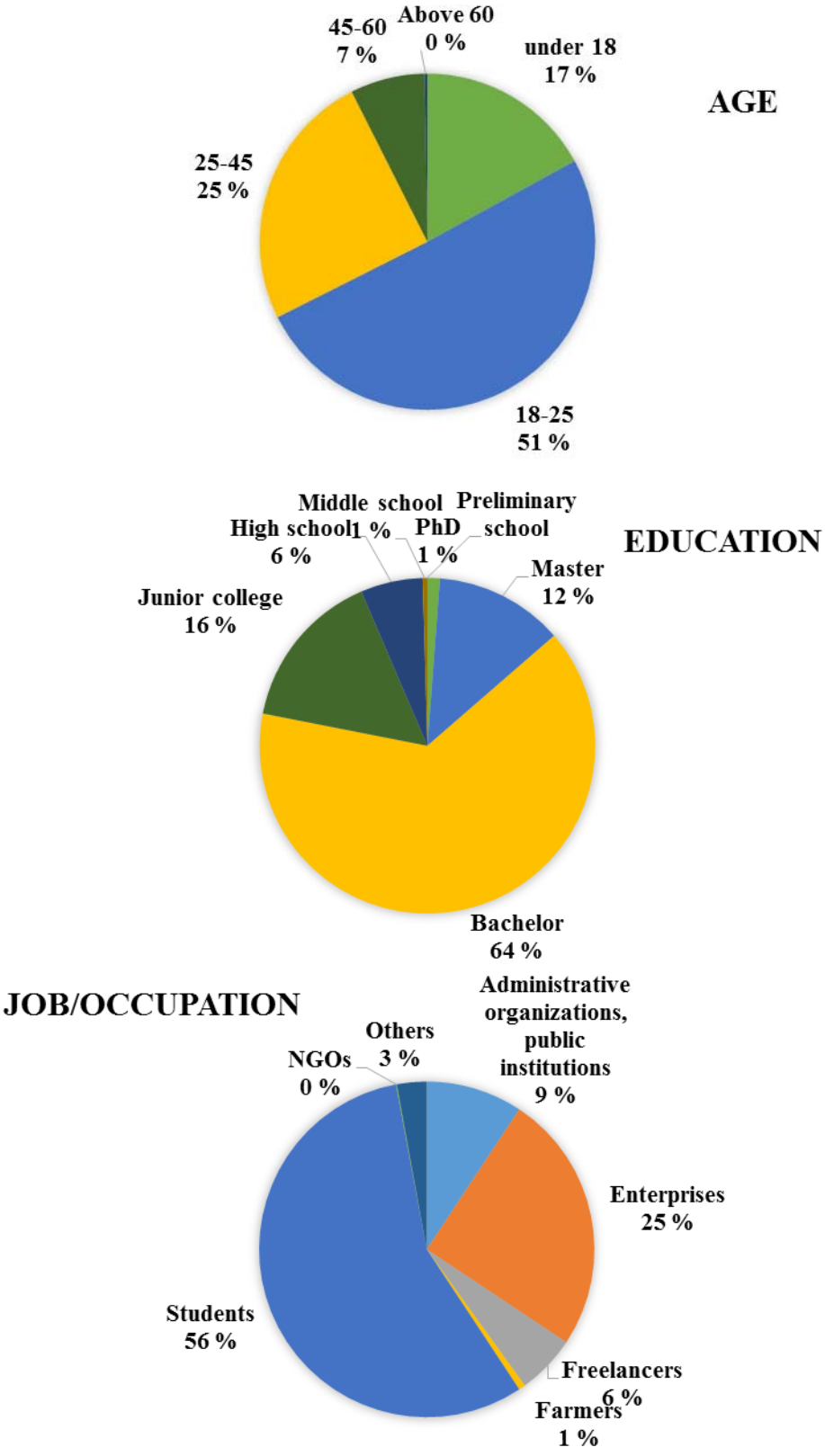

Figure 1: Participants' age (Top), education (Middle) and their job/occupation (Bottom)

5.2.2 Results of survey: basic knowledge on AQ

Table 2 presents the results of section two of the questionnaire, linking to basic understanding of air quality-related information. We can see that out of 1086 participants: (i) 96% know what air pollution is; (ii) 94% care about the air quality issues in the area they live; (iii) 65% think air quality is bad in Wuhan and 34% believe the air quality in Wuhan is quite normal; (iv) Most participants are concerned about PM2.5, SO2 and HCHO as the major air pollutants (Figure 2); (v) 75% show their interest in air quality information and are willing to learn more about it.

Table 2: Results of section two: questions about basic understanding of AQ-related information

Question No.	Questions and answers	Volunteered No.	Motivated No.	Total No.	Percentage
8	**Do you know what air pollution is?**				
	Yes	47	998	1045	96 %
	No	1	40	41	4 %
9	**Do you care about the air quality issues in the area you live?**				
	Yes	47	973	1020	94 %
	No	1	65	66	6 %
10	**Do you think the air quality in Wuhan is good or not good?**				
	Good	2	17	19	2 %
	Normal	21	344	365	34 %
	Bad	25	677	702	65 %
11	**What air pollutants you are most concerned about? (multiple choice)**				
	PM_{10}	33	265	298	27 %
	$PM_{2.5}$	42	862	904	83 %
	SO_2	28	579	607	56 %
	NO_2	18	359	377	35 %
	CO	17	368	385	35 %
	O_3	17	245	262	24 %
	HCHO	23	483	506	47 %
	Pb	22	312	334	31 %
	Other (e.g., dust)	1	27	28	3 %
12	**Are you interested in air quality information and do you want to learn more?**				
	Yes	42	768	810	75 %
	No	0	94	94	9 %
	I hope to learn more about air quality-related information	6	176	182	17 %

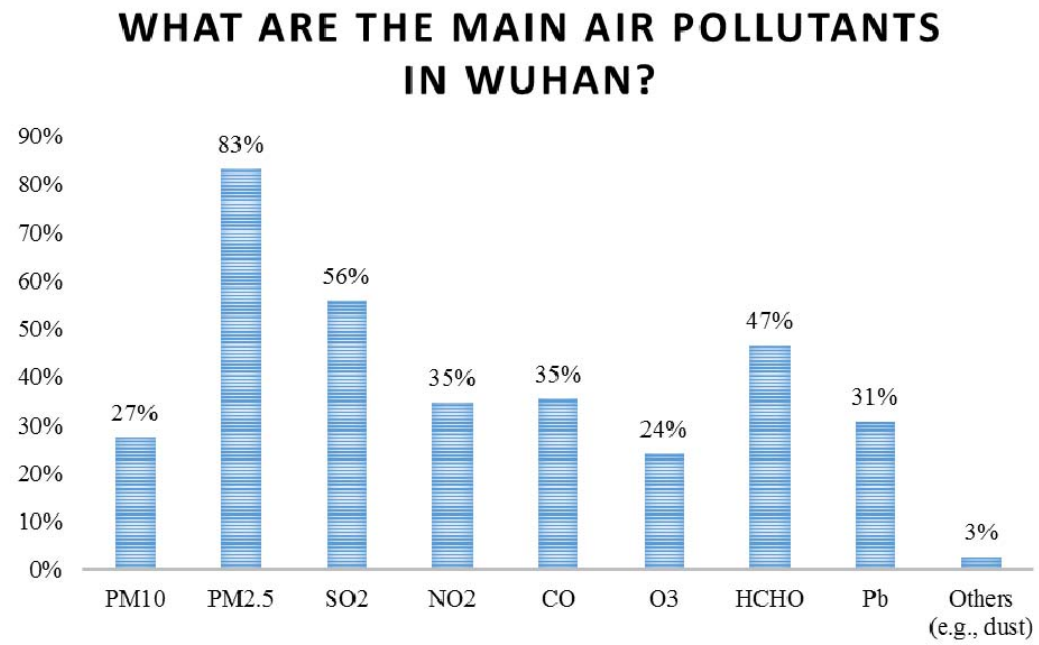

Figure 2: Participants' knowledge on main air pollutants in Wuhan

5.2.3 Results of survey: AQ-related information – drivers and pressure

With regard to the main drivers and pressures that cause the air pollution problems in Wuhan, most participants believe that: (i) Transportation needs, economic development, energy demand and population increase are the main driving forces (See Table 3, Figure 3); and (ii) Emissions, construction and production are the main human activities that give the pressures on the environment (see Table 4, Figure 3).

Table 3: Results of section three: good understanding of AQ-related information: drivers

Question No.	Questions and answers	Volunteered No.	Motivated No.	Total No.	Percentage
13	**What is/are the main driver(s) that caused the air pollution in Wuhan? (multiple choice)**				
	Economic development	35	835	870	80 %
	Population increasing	19	608	627	58 %
	Transportation demand	36	841	877	81 %
	Energy demand	19	620	639	59 %
	Agriculture requirement	1	73	74	7 %
	Domestic consumption requirement	6	173	179	16 %
	Others	2	18	20	2 %

Table 4: Results of section four: good understanding of AQ-related information: pressure

Question No.	Questions and answers	Volunteered No.	Motivated No.	Total No.	Percentage
14	**What is/are the main human activities that caused the air pollution in Wuhan? (multiple choice)**				
	Production	29	735	764	70 %
	Consumption	7	338	345	32 %
	Construction	33	803	836	77 %
	Waste release/emission	41	949	990	91 %
	Others	1	12	13	1 %

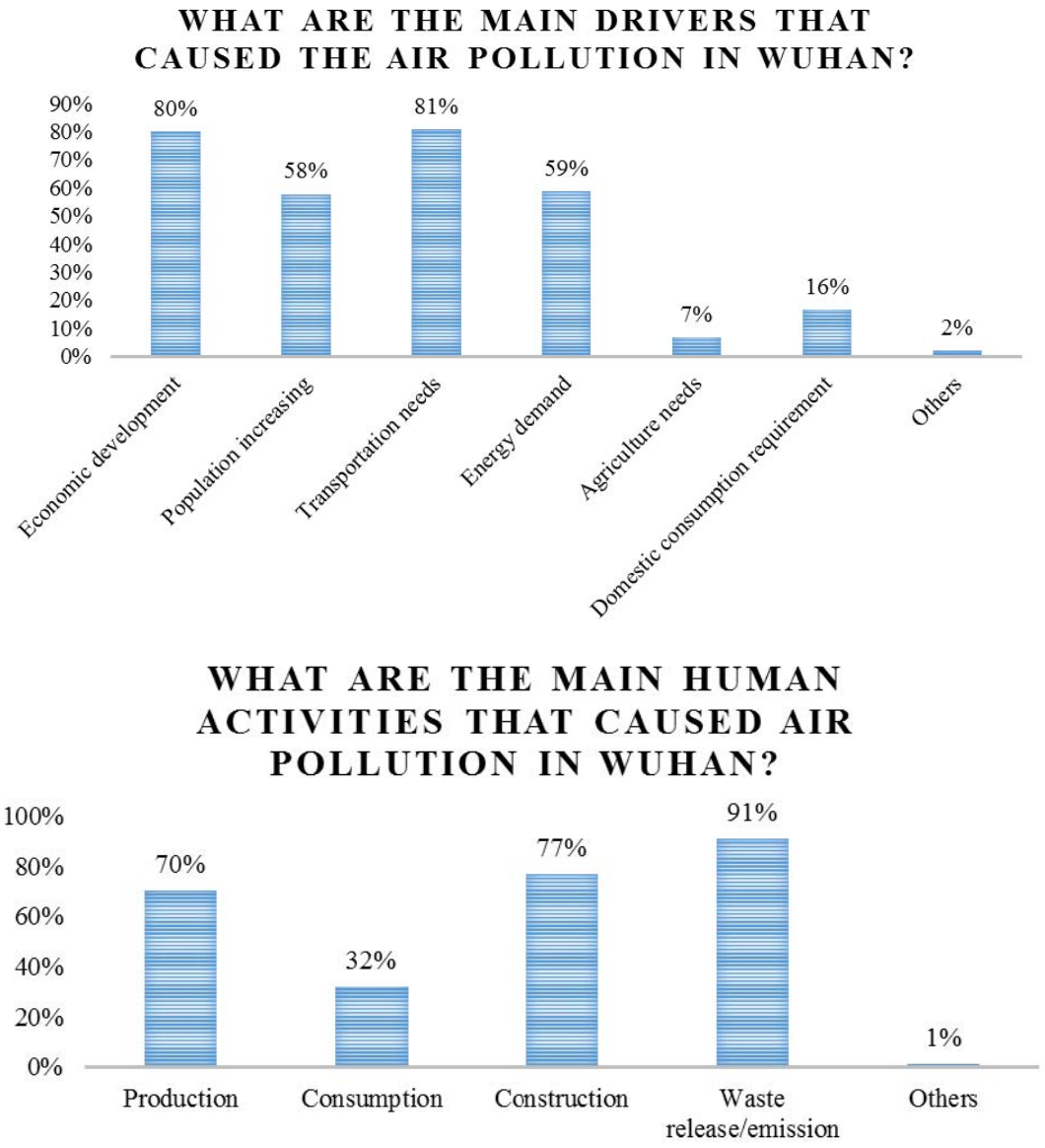

Figure 3: Participants' knowledge on main drivers (Top) and human activities (Bottom) that caused air pollution in Wuhan

5.2.4 Results of survey: AQ-related information – status

In Table 5, we can see that out of 1086 participants: (i) 40% know about the air quality index (AQI) in China and most of them usually access the air quality information through websites, mobile phone software, TV news, newspaper, etc.; (ii) Most of the participants do not know that there is a real-time release system on the air quality information in Wuhan which is held by HBEMC, and 44% participants know Wuhan's real-time air quality release system, but have never visited it or rarely visited it; (iii) Around 60% of the participants are interested in the following air quality information: air pollutants concentrations, air quality grade, and air quality forecast for the next 24 or 48 hours (Figure 4); (iv) More than 70% of the participants chose forecasts on environmental quality, meteorological conditions connected to air pollution, and forecast of haze and visibility as their most demanded air quality services (Figure 5); (v) Around 45% of the participants think the current AQI and real-time air quality release system provide useful information for their daily life, but most of the participants are not very satisfied with the quality of such information; and (vi) 25% of the participants trust air quality information released by the Chinese government, followed by NGOs and foreign embassies in China most, and around 15% of the participants trust the air quality information released by the Foreign Embassies (e.g., USA Embassy in China) in China, followed by NGOs and Chinese government most. 1% of the participants chose other information release sources, but did not indicate which source.

Table 5: Results of section five: good understanding of AQ-related information: status

Question No.	Questions and answers	Volunteered No.	Motivated No.	Total No.	Percentage
15	**Do you know the Air Quality Index (AQI) in China?**				
	Yes	23	411	434	40 %
	No	25	627	652	60 %
16	**Where do you usually access the air quality information in Wuhan? (multiple choice)**				
	I do not know	4	71	75	7 %
	Website	38	831	869	80 %
	Newspaper	20	545	565	52 %
	TV news	21	568	589	54 %
	Radio	8	321	329	30 %
	Mobile phone software	21	600	621	57 %
	Outdoor screen	3	159	162	15 %
	I do not care such information	1	6	7	1 %
	Others	1	1	2	0 %

Table 5: Results of section five: good understanding of AQ-related information: status (Cont).

Question No.	Questions and answers	Volunteered No.	Motivated No.	Total No.	Percentage
17	**Do you know about or have you ever visited the real-time release system on the air quality which is published by the government in Wuhan?**				
	I don't know it at all.	21	536	557	51 %
	I know it but I have never visited it.	20	224	244	22 %
	I know it but I have rarely visited it.	5	233	238	22 %
	I know it and I often visit it.	2	45	47	4 %
18	**What type of air quality information are you really interested in? (multiple choice)**				
	Air pollutant concentration	29	578	607	56 %
	Change in tendency of the air pollutant concentration	23	445	468	43 %
	Air quality grade	29	665	694	64 %
	Air quality forecast for the next 24 hours	29	634	663	61 %
	Other	0	6	6	1 %
19	**Could you please choose the air quality services you are most interested in? (multiple choice)**				
	Environment quality forecast	33	723	756	70 %
	Forecast on the meteorological condition of air pollution	29	731	760	70 %
	Forecast on the haze and visibility	38	779	817	75 %
	Forecast on sand storm	14	213	227	21 %
	Other	0	4	4	0 %
20	**Are the current AQI and real-time release system on air quality in Wuhan useful for you?**				
	Useful	21	466	487	45 %
	Useless	14	137	151	14 %
	I don't know	10	367	377	35 %
	It doesn't matter for me	3	68	71	7 %
21	**Do you trust the results of the real-time release of the air quality in Wuhan?**				
	Yes	12	451	463	43 %
	No	23	309	332	31 %
	I don't know	13	278	291	27 %

Table 5: Results of section five: good understanding of AQ-related information: status (Cont.).

Question No.	Questions and answers	Volunteered No.	Motivated No.	Total No.	Percentage
22	**Are you satisfied with the current release/disclosure information of the air quality?**				
	Yes	17	411	428	39 %
	No	24	457	481	44 %
	I don't know	7	170	177	16 %
23	**In China, air quality information to the public is available from Chinese government, NGOs and Foreign Embassies. Could you please tell which one you trust most? (the one ranking the first means the highest reliability for you)**				
	Chinese government, NGOs, Foreign Embassies in China	17	257	274	25 %
	Chinese government, Foreign Embassies in China, NGOs	2	237	239	22 %
	NGOs, Chinese government, Foreign Embassies in China	5	148	153	14 %
	NGOs, Foreign Embassies in China, Chinese government	5	140	145	13 %
	Foreign Embassies in China, Chinese government, NGOs	0	104	104	10 %
	Foreign Embassies in China, NGOs, Chinese government	15	145	160	15 %
	Others	4	7	11	1 %

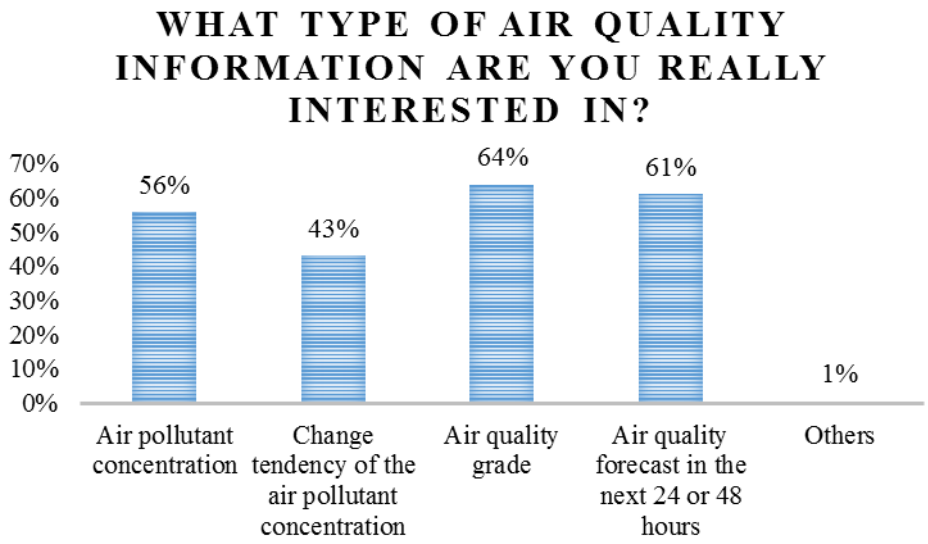

Figure 4: Participants' interest in AQ information

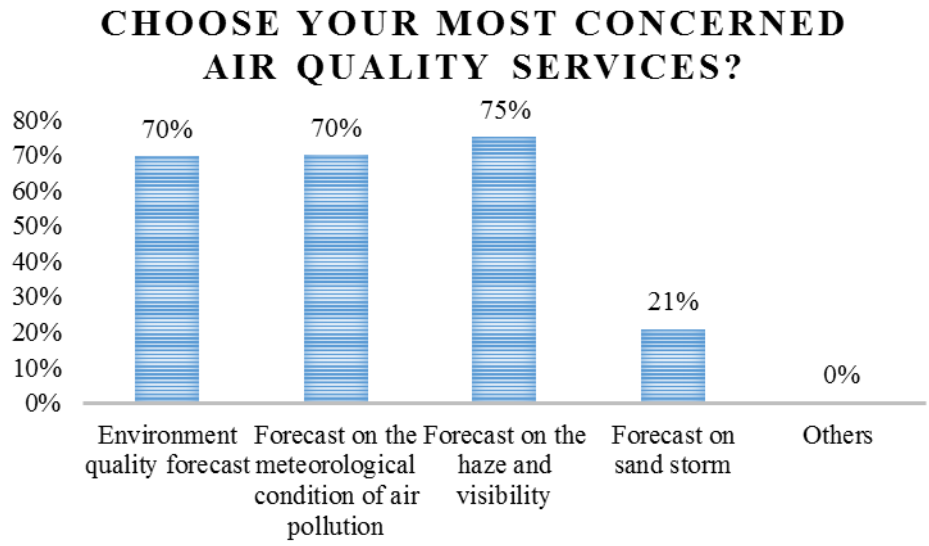

Figure 5: Participants' interest in AQ services

5.2.5 Results of survey: AQ-related information – exposure and effect

For the question linking to the exposure routes (i.e., questions linking to how people are exposed to toxic air pollutants that can pose health risks, U.S. EPA, 2012), 77% of the participants know that breathing polluted air is the most direct way to be exposed to the air pollution (Figure 5). For other routes of exposure, 12% chose skin contact with contaminated soil, dust, or water, 8% chose drinking water contaminated by toxic air pollutants, and 5% chose eating contaminated food products (Table 6, Figure 6).

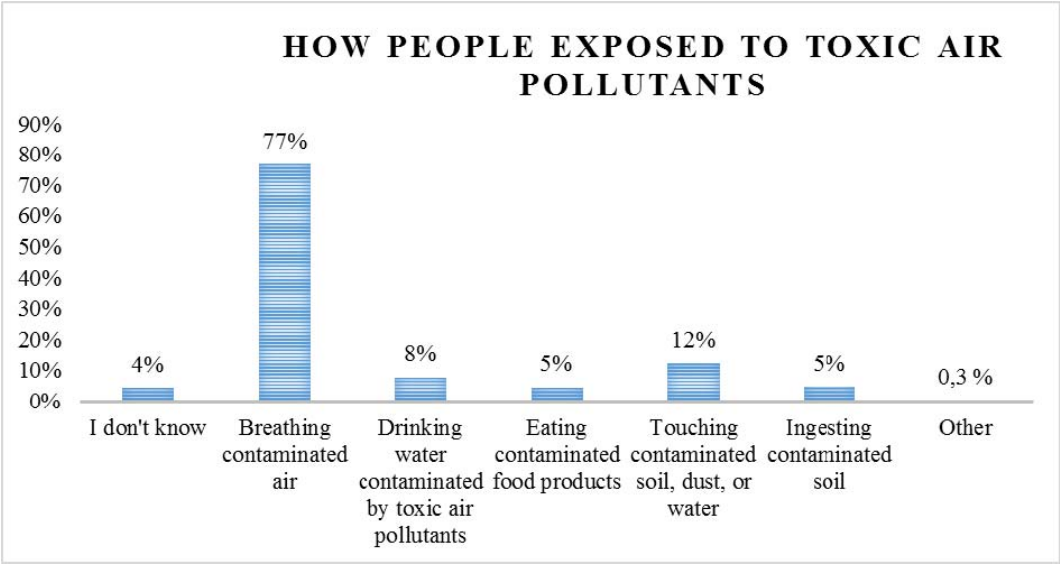

Figure 6: Participants' knowledge on exposure routes to air pollution in Wuhan

Table 6: Results of section six: good understanding of AQ-related information: exposure

Question No.	Questions and answers	Volunteered No.	Motivated No.	Total No.	Percentage
24	**Do you know how humans are exposed to toxic air pollutants that can pose health risks? (multiple choice)**				
	I don't know	0	46	46	4 %
	Breathing contaminated air.	48	786	834	77 %
	Drinking water contaminated by toxic air pollutants.	32	52	84	8 %
	Eating contaminated food products, such as fish from contaminated waters; meat, milk, or eggs from animals that fed on contaminated plants; and fruits and vegetables grown in contaminated soil on which air toxics have been deposited.	23	26	49	5 %
	Touching (making skin contact with) contaminated soil, dust, or water (for example, during recreational use of contaminated water bodies).	39	94	133	12 %
	Ingesting contaminated soil (e.g., Young children are especially vulnerable because they often ingest soil from their hands or from objects they place in their mouths.).	19	31	50	5 %
	Other	0	3	3	0 %

For the questions linked to the effects, 96% of participants know that air pollution can cause negative effects on the environment, economy, society and health, and 85% feel uncomfortable or sick when they are breathing the polluted air (Table 7). Almost all the participants know that exposure to the toxic air pollutants can cause pulmonary disease, and around 45% tell that exposure to the polluted air can cause cardiac and vascular disease as well (Table 7, Figure 7).

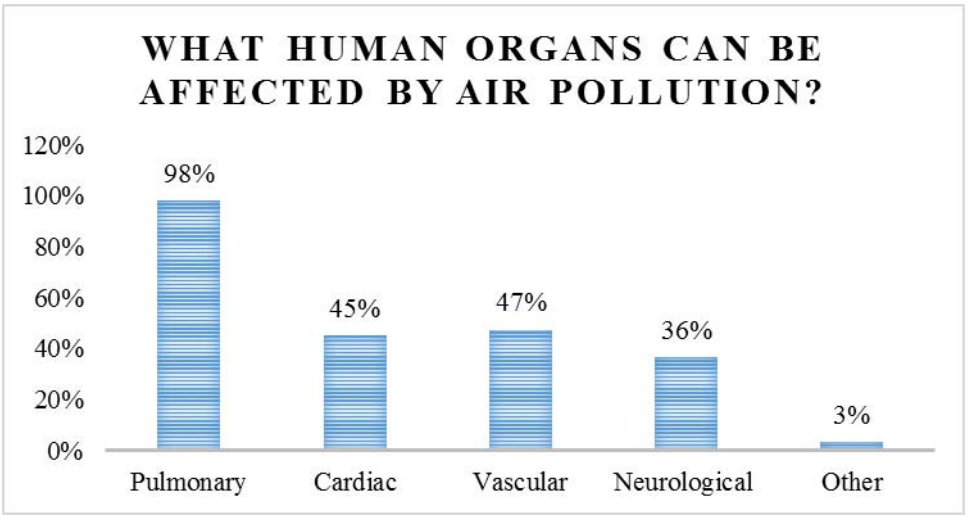

Figure 7: Participants' knowledge on air pollution's effects on human health in Wuhan

Table 7: Results of section seven: good understanding of AQ-related information: effect

Question No.	Questions and answers	Volunteered No.	Motivated No.	Total No.	Percentage
25	**Do you know that air pollution can cause negative effects on environment, economy, social and health?**				
	Yes	47	992	1039	96 %
	No	0	31	31	3 %
	I don't know	1	15	16	1 %
26	**Do you feel sick or uncomfortable when air quality is bad?**				
	Yes	47	875	922	85 %
	No	0	24	24	2 %
	Feeling is not obvious	1	139	140	13 %
27	**Could you please tell us which human organs can be affected by air pollution? (multiple choice)**				
	Pulmonary	48	1017	1065	98 %
	Cardiac	20	469	489	45 %
	Vascular	27	488	515	47 %
	Neurological	29	367	396	36 %
	Other	2	34	36	3 %

5.2.6 Results of survey: AQ-related information – action

With regard to the questions linking to the actions that can help to control the air pollution, the results are (Table 8):

i) Around 49% of the participants tell that public bus is their major transportation mode for their daily life, only 7% using private cars and 2% use motorcycles as their main transportation mode (This can be biased by the fact that most of the participants were students. They probably don't have a car);
ii) 65% of the participants use the outdoor air conditions as reference for their outdoor activities;
iii) 81% of the participants oppose Chinese traditional social development mode - developing economy first and protecting environment second;
iv) Most of the participants express their willingness to reduce air pollution through their individual behaviours' changes, e.g., thinking seriously before using their private car for an outdoor journey, and try best to use public transportation, reducing their energy consumption and switching to clean renewable energy sources at home, stop burning solid fuels, etc.;
v) 65% of the participants are not aware of any actions that have been implemented in Wuhan to help reducing the air pollution, or actually do not believe that any actual action has been implemented at all;

vi) Only 15% of the participants have air purifiers at home, around 40% of the participants do not have air purifiers at home yet, but plan to buy, 45% do not plan to buy it even though they do not have it at home;

vii) Most of the participants suggest the government to take or implement the following actions to improve the air quality in Wuhan:

- Resettle or close enterprises with high pollution, high energy consumption and outdated production method.
- Restrict the use of motor vehicles and increase the use of environmentally-friendly vehicles.
- Flush the road with a lot of water to remove the dust from construction activities.
- Limit private cars' driving time.
- Restrict the number of private cars purchased.
- Strengthen the implementation of pollution - discharge fee regulations.
- Strengthen air pollution control and improve the oil quality.
- Close all BBQ coal stands on the street throughout the city.
- Launch and implement new pollution regulations for newly started high pollution projects.

Table 8: Results of section eight: good understanding of AQ-related information: action

Question No.	Questions and answers	Volunteered No.	Motivated No.	Total No.	Percentage
28	**What is/are your major transportation mode(s) for your daily life?**				
	On foot	5	257	262	24 %
	Bicycle	1	67	68	6 %
	Bus	31	497	528	49 %
	Subway	2	120	122	11 %
	Private car	6	70	76	7 %
	Motorcycle	3	20	23	2 %
	Others	0	7	7	1 %
29	**Will the ambient air conditions serve as reference for your outdoor activities or not?**				
	Yes	29	677	706	65 %
	No	19	361	380	35 %
30	**Do you support Chinese traditional social development mode - developing economy first and protecting environment second?**				
	Yes	8	174	182	17 %
	No	39	841	880	81 %
	I don't care	1	23	24	2 %
31	**Have you ever considered to reduce air pollution through any of the following individual behavioural changes? (multiple choice)**				
	Think seriously before using your car for an outdoor journey, and try best to use public transportation, e.g. bus, subway, etc.	27	817	844	78 %
	When doing the shopping or going to work, think about car sharing	11	372	383	35 %
	Turn off your car engine while stationary	12	283	295	27 %
	Maintain your car properly	8	173	181	17 %
	Always try to reduce or slow down your speed when you drive	5	126	131	12 %
	Buy green and efficient car	21	509	530	49 %
	Reducing your energy consumption at home or switching to clean renewable energy sources, stop burning solid fuels	23	658	681	63 %
	I have never considered to reduce air pollution through changing my own behaviour	4	31	35	3 %
	Other	3	10	13	1 %
32	**There are many actions that have been implemented in Wuhan to help reducing the air pollution. Are you aware of any of these actions?**				
	Yes	14	333	347	32 %
	No	33	668	701	65 %
	I don't care	1	37	38	3 %

Table 8: Results of section eight: good understanding of AQ-related information: action (Cont.).

Question No.	Questions and answers	Volunteered No.	Motivated No.	Total No.	Percentage
33	**Could you please suggest what actions shall be implemented in Wuhan to control air pollution? (Optional choice)**	Action suggested by the participants are: • Increase in environmentally-friendly vehicles, Emigrate or remove high-polluting enterprises • Limit private cars' driving time • Restrict the number of private cars purchased • Implement pollution - discharge fee system • Strengthen air pollution control and improve the oil quality • Coal ban for stalls throughout the city. • Launch and implement new pollution regulations for newly started high pollution projects • Close enterprises with high energy consumption and outdated production method			
34	**Do you have air purifier at home?**				
	Yes	11	147	158	15 %
	No, but plan to buy	13	426	439	40 %
	No, do not plan to buy	24	465	489	45 %
35	**If the area you live requires the environmental contingency plans, what kind of policies or intervention measures do you suggest the government to take or implement? (multiple choice)**				
	Close the highly polluting enterprises	40	870	910	84 %
	Restrict the use of motor vehicles	25	658	683	63 %
	Spray water to remove the dust	20	702	722	66 %
	I do not have any suggestion at all	0	18	18	2 %
	Others	5	19	24	2 %

5.2.7 Results of survey: final remarks/comments from the participants

From the participants' final remarks (Table 9), we can see that 95% of the participants express their willingness to follow the environmental contingency plans if the government requires them to do it, for example, to reduce their private car driving time according to the capital city's environmental and traffic authorities (e.g., only vehicles with the license plate number ending with the odd numeral will be allowed on the roads on Friday and Saturday, and vehicles with the license plate number ending with an even number will be allowed on the road on Sunday and Monday).

Table 9: Results of section nine: participants' final remarks/comments

Question No.	Questions and answers	Volunteered No.	Motivated No.	Total No.	Percentage
36	**If the area you live requires the environmental contingency plans, and the government requires you to reduce the private car driving time, do you accept or refer to follow?**				
	Yes, I accept it	45	992	1037	95 %
	No, I will not accept it	3	46	49	5 %
37	**Have you learned anything from this survey?**				
	Yes	39	906	945	87 %
	No	9	132	141	13 %

87% of the participants believe that they have learned the following new knowledge from our survey (Table 9):

- Gathered new knowledge related to air pollution in general.
- Learned to start paying attention to AQ-related information released from the government, and other sources as well.
- Started to realize that local government begins to pay more attention to environmental pollution and realize its serious consequences.
- Learned personal/individual behaviour can have impact on air quality.
- Learned that the local government has various measures to reduce air pollution and a real-time air quality release system.
- Learned that air pollution can cause negative health effects, and recognized that they can change their personal behaviours that can help to reduce air pollution caused by themselves.
- Learned about AQI in China, and public participation in awareness raising in Wuhan.
- Learned that this Hubei-AQ project and local '1+8' city cluster haze monitoring project are taking measures on air quality in Wuhan.
- Gathered AQ-related knowledge and suggest that such environmental awareness raising activities shall be further disseminated to the wider public in Wuhan.

Table 9: Results of section nine: participants' final remarks/comments (Cont.)

Question No.	Questions and answers	Participants final remarks/comments
38	**Please describe what have you learned from this questionnaire survey? (optional choice)**	• Air quality related information sources. • Government begins to pay more attention to environmental pollution and its serious consequences. • Personal behaviour can have impact on air quality. • Air pollution can cause negative health effects, and we can change our personal behaviours that can help to reduce air pollution caused by ourselves. • Air quality index, and the public participation in awareness raising. • Someone is taking measures on air quality issues in Wuhan. • Air pollution related knowledge and suggestion that such environmental awareness raising activities shall be further disseminated in Wuhan.
39	**Please write any other comments with regarding to this questionnaire survey. (optional choice) (Cont.)**	• Hope future similar questionnaire can use more easy understandable language for better understanding of laymen. • Hope through this questionnaire we can get more information on the web with regard to the air pollution control actions and real-time air quality report. • Hope government cares about citizens' voices for a better life quality, don't wait until the environment has deteriorated until government figures out the urgency and importance of environmental protection, strives to build a green sustainable economy, and gives future generations a clean sky. • Raising environmental awareness, increasing dissemination activities and disseminating air quality information releasing system. • Opening more convenient free service for environmental consulting. • Increasing air quality information towards public, providing more information to the general public about their living environment, aware of the air quality and its impact on the environment and the human health. • Hope released air quality information and data are trustworthy. • Hope such questionnaire survey can reach a wider and more representative fraction of the general public. • More research or study needed for the negative impacts on the environment from current large number of municipal infrastructure construction activities in Wuhan.

Some of the participants comment on this survey as follows:

- This questionnaire is very good, easy to understand, but hopefully it uses a language that it is better understandable for laypersons.
- This questionnaire is very good, but they hope that through this questionnaire more information will be available on the web regarding the local actions and real-time air quality report.
- Hope government cares about citizens' voices for a better life quality, don't wait until the environment has deteriorated until government figure out the urgency and importance of environmental protection, strives to build a green sustainable economy, and gives future generations a clean sky.
- Hope that the environmental awareness will be raised broadly, and an air quality information releasing system will be disseminated to the public.
- Proving more convenient free services for environmental consulting.
- Increasing AQ information towards public, which lets the public know their living environmental conditions, being aware of the air quality and its impact on the environment and the human health.
- They hope that existing released real-time air quality information and data are trustworthy.
- They hope such questionnaire surveys can reach a wider and more representative fraction of the general public in Wuhan.
- They hope that more research or studies can be carried out to explore the negative impacts on the environment from current large number of municipal infrastructure construction activities in Wuhan.

5.3 Analysis of questionnaire from experts/professionals

Until now, only 12 valid online questionnaires from experts/professionals were collected. We are still trying to motivate more experts/professional to join our questionnaires survey. In this report, we do not include any outputs from the questionnaires-based survey on experts/professionals.

6 Conclusions and suggestions

We collected in total 1338 online-questionnaires from the general public, of which 1086 are valid. It indicates that the online questionnaire survey approach in Wuhan is working well, especially for those young people who use the PC on an everyday basis.

Out of the valid 1086 questionnaires, 1038 are collected by choosing a motivated approach and 48 by volunteers. This indicates that a motivated approach will definitely help us to reach a wider and more representative group of the general public. The volunteered approach does not seem to be very promising for our questionnaires survey in Wuhan and the motivated approach to empower the general public needs to be developed further.

So far, only 12 questionnaires from experts and professionals were collected through volunteered online participation. In order to engage or involve more experts and professionals to participate in our questionnaires survey, the motivated approach towards experts/professionals should be applied as well.

From the results of the questionnaires analysis, we can conclude the following:

1) Most participants are students with bachelor degree, aged between 18-25 years, and not having studied AQ-related subjects or worked with AQ-related activities (Table 1, Figure 1).
2) Most participants care about air pollution issues in Wuhan; know what air pollution is; know what the main air pollutants are (Table 2, Figure 2); know about AQI in China (Table 5); have basic knowledge about air pollution driving sources (Tables 3-4, Figure 3), how humans are exposed to air pollution (Figure 6) and its impacts on the environment, society and human health (Tables 6-7, Figure 7).
3) Most participants do not know that there is an existing real-time release system on air quality information in Wuhan (Table 5);
4) Most participants are interested in the information on air pollutants concentrations, air quality grade, and air quality forecast for the next 24 or 48 hours (Table 5, Figures 4 and 5).
5) Most participants are not aware of any actions that have been implemented to control air quality in Wuhan or actually do not believe there are any actions that have been implemented at all (Table 8).

Corresponding to the above conclusions, combining the participants' final remarks/comments (Table 9), we suggest that:

1) Wider representatives of the general public shall be reached by this questionnaires survey. This is also one of the recommendations from some of the participants.
2) Although public environmental awareness is rising in general, more environmental awareness rising activities need to be developed, especially towards those groups of the general public with low education.
3) Dissemination efforts on existing environmental information should be strengthened (e.g., Hubei real-time AQ information release system).
4) New and innovative environmental information systems should be developed (e.g., air quality early warning system), and user-friendly tools provided so that the general public can access the information which is useful for them.
5) The general public should be empowered to participate in AQ monitoring using innovative and novel Earth Observation applications (e.g., smart phones, micro-sensors, etc.), and to contribute to local environmental decision-making and action implementation.
6) Practical and effective actions have to be developed and implemented to improve the air quality.

7 References

Liu, H.-Y., Liu, H. (2013a) Deliverable no 2.1 – Public AQ information questionnaires. URL: http://www.hubei-aq.info/en-gb/membersarea/deliverables.aspx (Access for members of Hubei-AQ.info only).

Liu, H.-Y., Liu, H. (2013b) Hubei AQ questionnaires. URL: http://www.hubei-aq.info/大气质量问卷.aspx [Downloaded 12 February 2014] (Chinese language).

HBEPB (2013a) Wuhan online ambient air quality information system. URL: http://ft.whepb.gov.cn:8090 [Downloaded 12 February 2014] (Chinese language).

HBEPB (2013b) Hubei province online air quality information system. URL: http://59.172.208.45:8080 [Downloaded 10 February 2014] (Chinese language).

MEP (2011) Chinese national environmental protection standards - air quality standards. URL: http://www.zhb.gov.cn/gkml/hbb/bgth/201111/W020111121388004546031.pdf [Downloaded 10 February 2014] (Chinese language).

MEP (2012) Chinese national environmental protection standards - environmental air quality index (AQI) technical requirements (Trial). URL: http://www.mep.gov.cn/gkml/hbb/bgg/201203/t20120302_224146.htm [Downloaded 10 February 2014] (Chinese language).

Sojump (2012) Chinese professional online survey platform. URL: http://www.sojump.com [Downloaded 10 February 2014] (Chinese language).

U.S. EPA (2012) About air toxics. URL: http://www.epa.gov/air/toxicair/newtoxics.html [Downloaded 10 February 2014].

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ABSTRACT
This report presents the results from the questionnaires based survey in Wuhan. Within 1086 valid questionnaires collected from the public, the results showed that most participants: 1) are young students with bachelor degree; 2) have basic knowledge about air pollution issues in Wuhan; 3) expressed their willingness to learn more AQ-related knowledge; 4) suggested to strength environmental awareness raising activities in Wuhan; and 5) strongly appeal to the local government to implement actions to improve the air quality.

NORWEGIAN TITLE

Rapport om informasjon på luftkvalitet rettet mot offentligheten basert på svar fra spørreskjemabasert undersøkelse

KEYWORDS		
Air Quality	Public participation	Environmental awareness raising

ABSTRACT (in Norwegian)
Denne rapporten presenterer resultatene fra en spørreskjemabasert undersøkelse i Wuhan. Ut fra 1086 gyldige spørreskjemaer samlet inn fra offentligheten, viste resultatene at de fleste deltakerne: 1) er unge studenter med bachelorgrad, 2) har grunnleggende kunnskaper om luftforurensningsproblemer i Wuhan, 3) uttrykte vilje til å lære mer om luftkvalitetsrelatert kunnskap; 4) foreslo å styrke miljøholdningsskapende aktiviteter i Wuhan, og 5) på det sterkeste appellere til de lokale myndighetene til å gjennomføre tiltak for å bedre luftkvaliteten.

** Classification*
A Unclassified (can be ordered from NILU)
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