

APHEKOM SYMPOSIUM AT ISEE CONFERENCE IN DUBLIN, IRELAND VIDEOS TRANSCRIPTION

Sylvia:

Hello everybody. We have a really big room for our symposium and I really would suggest that those of you who are in the back come closer, as close as possible because we would like to share in a small committee our symposium, so please come closer to us if you wish, if you dare, yes. We have 90 minutes for our symposium, we will address one of the key objectives of our project, which is what's the best way to express our findings to policy makers, environmental health professionals and the general public.

For this purpose, we begin with two keynote speeches on this subject. A general discussion will follow with experts in the fields of epidemiology, public health, policy making and communication.

Because we unfortunately have only 90 minutes (and no more!), I must ask our speakers to limit themselves strictly to the time allotted to them. And I ask the panellists to make their contributions very brief and concise please.

Lastly, your input is vital to our project. To gather your comments and questions on what we are discussing here today we have prepared a short questionnaire that has been distributed in the chairs. (If you don't have one please raise your hand and Aymeric will give it to you).

And now Hanns would like to say a few words about the questionnaire. Thank you.

Hanns:

Thank you also for being here. As Sylvia pointed the time is very short so if you don't find time to give your input during the discussion, please use the questionnaire. It's about health impact assessment. I want to know your experiences and your expectations concerning health impact assessment. And in order to enable us to extract the information it is a structured questionnaire, it was closed questions mostly, I mean it's a 3 pages and you have empty pages on the back side so if you want to give us more information just use it.

And we have boxes outside at the reception desk and Greg and Aymeric will stay at the doors and collect the questionnaires as well. And if you just want to think about it you can also go to our website and answer the questionnaire afterwards. Thank you.

Sylvia:

Thank you very much so now I would like to invite Nino to give the first keynote speech please. Thank you Nino.

Nino:

Well thank you very much Sylvia for the invitation and the opportunity to talk to this audience here in Aphekom.

Well, this is about communication of risks, strengths, needs, opportunities. I will focus particularly on needs in my discussion. The derivation and the communication of risks based on epidemiological research has a long tradition and if we take the example of smoking it has not even been much debated how we do that and how we communicate that. Such billboards are shown all over the world to communicate to people how many deaths to be attributable to

smoking. These numbers are simply estimates of attributable risks taking the association between smoking and death and the prevalence of smoking into account.

In air pollution risk assessment and communication, many of us did the same. In modern days I would say this started more or less with Bart Ostro's World Bank report on some methodological issues published around 1993. Some 10 years ago we applied the methods to answer a hot question asked by then by the ministers of health and environment of France, Austria and Switzerland mainly: what is the health impact and what are the costs that can be attributed to ambient air pollution?

While I do not consider this my most important paper it became indeed the most cited one of all I wrote so far. And why that? The numbers of attributable deaths, we were saying 40 000 attributable deaths per year to air pollution. These numbers more than any other result in this same paper kept the world media quite busy and interested for years.

For us, for ourselves more important was the fact that we were able to apply the concept used since decades into backer research and the backer risk assessment to the field of air pollution risk assessment. In particular, we were showing that the risk assessment for mortality or for death must be based on results from cohort studies and not just on studies that focus on the very immediate acute effects of air pollution, as shown in many time series studies. So at that time this was actually a highly relevant discussion and also a controversial issue. I would say today all would agree that yesterday's pollution can not explain the total adverse effects of air pollution on morbidity and mortality as there are pathologies supported by air pollution which take more time to happen and which actually would lead to these extreme of events like dying after quite some time and after the development of chronic pathologies.

So the risk assesses most used information that comes from cohort studies at least such as for example of course the famous American Cancer Society study that many of us in one way or the other have used in this risk assessment, saying that the risk goes up about 4% for each 10 micron cubic meter PM_{10} . Which is about 10 times bigger than the estimate based on yesterday's pollution and its impact on today's mortality.

If policy makers ask about the total effect of air pollution we must include both the acute and the long term effects and the question though is how to do this and at that point actually the smoking risk assessment paradigm does not really help because smoking has always rightfully been considered a long term habit with accumulative long term exposure being the cause for morbidity and mortality rather than focusing the interest on any single cigarette or the number of cigarettes smoked yesterday or today.

So how should we express this issue of death in risk assessment framework?

Brian Miller and Fintan Hurley have contributed in a very important way to the extension to the discussion on how to express these total effects in the domain of mortality. They have shown that the good old and will attributable deaths that we have calculated in many studies, that they are at least in the longer term a rather flat result and a rather flat concept. And Bert Brunekreef, Brian Miller and Fintan Hurley have published a very nice paper which actually Bert has given a great talk like two years ago in Mexico on this issue to tell us the reasons why we are actually running into some trap if we talk about these attributable deaths.

Yes, we only live once and we only die once, the only question at the only parameter that policies may influence is when, how early, at what average age and in what conditions would we die. So Hurley has perfectly correctly said that if the following twelve months had like 10 micrograms lower PM₁₀ concentrations that we would also see a lower death rate and less people dying during these twelve months. It is also true that in the long run this number of attributable deaths will not remain stable because the population changes if we remove or if we add risks. The population is aging. If we remove air pollution they will survive longer and therefore in the very end in the longer term actually more people would die than in a population which has higher levels of pollution. And therefore the expression of the impact in terms of years of life lost or gained due to policy is a far more appropriate way of communicating and many do so as a default these days in the risk assessments.

For example in our Barcelona risk assessments study we provided the risk for Barcelona not being in compliance with the lax European guidelines or regulations and being far from the WHO guidelines values in terms of PM₁₀. So we showed the attributable deaths both now the acute fraction and in the big bars the total long-term fraction attributable deaths due to these high levels of pollution and we did show the years of life lost so why do we still provide both measures, why do we provide unsatisfactory measures like those here?

Well I would say we have not yet resolved the question of how to communicate the impact in these terms. Lay people, the media do not like the years of life lost. They do not really understand the concept well or it is too complicated for them to communicate this. We even lack comparisons with these measures whereas the attributable deaths are so simple and easy to communicate. We did do both but I can tell you that those results had far less media attention.

So let me go to another central discussion issue of my talk, which can be summarized with a provocative statement. I would say no matter what we do either attributable deaths or years of life lost we mislead and we distract from the relevant issues. Why that?

To explain it let me go to this lifetime model of the development of chronic states, of chronic diseases which of course increase with age. So what we should not forget: mortality at the very end of people who develop these chronic pathologies, this comes at the very end the mortality or the years of life lost. The state of health however is what matters. It is the time at this lifetime period that matters. It is health that matters and it is health or the reduced health that ultimately determines our life time and our life expectancy.

We are exposed over life time and this exposure entertains the development of chronic pathologies leading to lots of morbidities during life time and ultimately to premature death. We should invest far more in communicating that part of the air pollution related adverse effects.

However, to focus the risk assessment on morbidity requires an expansion of our methodologies and an in-depth discussion with economists as well who continue to attach far higher monetary numbers to death. Also we all know that part of this money is virtual and also we know that the morbidity is far less monetized and less completely monetized and sometimes even based on different methodologies. So we should emphasize what happens during life prior to death but how should we do this in the risk assessment framework?

So if I raise that question let me discuss a search challenge we face. Very typical for many if not all chronic diseases and certainly of those of interesting air pollution is that those chronic pathologies are superimposed by acute exacerbations, acute problems. There are peaks, immediate peaks, acute peaks that are superimposed as acute problems, superimposed on the underlined chronic pathologies and I have shown the example of atherosclerosis as a long-term pathology and a superimposed triggered myocardium function. And the implication of this fundamental concept on the risk assessment is relevant although it has not been much discussed. So this is the underlined pathology and there are good animal studies now supporting strong evidence that air pollution contributes at least in animals to the development of atherosclerosis and of course air pollution epidemiology has shown strong evidence that air pollution can trigger these events among those we see underlined pathology. So to show you to discuss the implication of this model if we accept it the implication on the risk assessment, let me go to another disease that actually follows a similar model and this is asthma.

Very similarly to cardiovascular disease, asthma consists in an underlying chronic pathology with superimposed events. Evidence of a causal role for air pollution for these events is very strong and depending on how you read or term actually the evidence you would even come to the conclusion that air pollution is likely also a contributing cause to the development of asthma. I don't want to go to into the discussions, you can go into these nice reviews, suggestive but not sufficient evidence or others have concluded that there is consistent evidence for this statement but if this is true we have this model of acute and chronic effects and if this has implications on how we do the risk assessment and I want to go into two major issues on that: I show you one example out of that literature this is just one out of many studies it is the smooth relationship between the prevalence of asthma and how close you live to very busy roads and this is the example from the Southern California Children Health Study, I use this one because we apply the risk assessment framework to these data.

And this is the simply fight that caught to misestimate of these relative risks, so those who live within 75 meters of very busy roads or highways had a 1.5 odd-ratio relative risk or 50% higher risk of presenting a prevalent case of asthma. So what we did with these data we estimated the number of children living within 75 meters in long beach and we applied this risk function to this population assuming now this new model, assuming that air pollution also causes the underlying prevalence of the disease. This has never been done in risk assessment so far but if you apply these numbers we did conclude that some 7% of the prevalence of asthma was attributable to air pollution in terms of living close to these busy roads.

So this model raises now provocative question and let me expand this model. Traditionally asthma exacerbations attributable to pollution were quantified in one simple step applied to the number of asthmatics in the population. However if air pollution is for some cases the cause of the asthma development we argue now that among those cases one should attribute the entire box T, the entire future career as an asthmatic to air pollution, to living close to traffic and this box, this fraction here has never been considered at all in those risk assessments who assess the attributable cases of exacerbation of asthma. And if we don't do that we would say this is a flaw, this is a consistent underestimation of the impact. So you may wonder whether this is an important difference or not. We did apply it to one outcome, bronchial episodes as the major of these events. If you look into these numbers this is the box D that we have had so these are the additional 5% attributable cases that we would have ignored in past traditional approaches. So this is not a lot different, so this is in fact similar to the 33 total % and 38.

However I have to tell you that in case of other outcomes this can look very differently and we went through this exercise and we applied the same concept also to emergency room visits. If we ignore this other underlying model of long term causality, emergency room visits are about 9 times larger than this impact and this has to do with the frequency of these emergency room visits and with the risk function derived from the epidemiological literature.

So I would argue it is very important how we apply the concept of chronic and acute effects in these diseases if air pollution contributes to both factors and it has a major impact on the total impact attributable to air pollution.

So let me summarize in terms of future needs in this business of risk, derivation and communication. First we need better strategies to communicate the years of life lost and the limitations of using attributable deaths. Second, we need to advance the risk assessment in the domain of morbidity. Third, air pollution consists in complex mixtures and not all parts may be relevant for the same health effects as discussed for the traffic proximity. So we need models that integrate all kinds of pollutants and the adverse effects. And last but not least, in case of air pollution causes both chronic pathologies and its superimposed acute exacerbations, this must be integrated in the risk assessment framework as we may grossly underestimate the overall impact if this is not done properly. Thank you very much.

Hanns:

I was so impressed from this speech. Now I want to welcome Anthony Hedley. I'm very grateful that you came here that you had a break from your sabbatical and that you're with us. Please.

Pr Hedley:

Thank you very much Hanns. Thank you for inviting us to contribute to this discussion on risk communication and air quality management.

“Understanding connections among visibility, pollutants and health costs in pursuit of accountability and environmental justice.”

This title is targeted at our government. Hong Kong is an enormously successful region in many ways but its current air quality epitomizes the environmental health threat of the burgeoning economies of many parts of East Asia. In Hong Kong we have a very high level of social, economic and technological development and a GDP per capita probably higher than most nations represented in this conference. It is also a major tourist destination. But neither the detriment to the health of its children, nor to its work force, nor the degradation of its land and seascapes has driven political will to act on pollution abatement with what we might consider to be the urgency and effectiveness needed and commensurate with the size and seriousness of the problem.

These dense plots of PM₁₀ and NO₂ between 2003 and 2008 are mapped on to the WHO guidelines; you can see annual and 24-hour guidelines. These horizontal lines, show just how far we are at the present time from sustainable pollution control. And even the warm season nadir of our annual pollution pattern does not provide safe clean air.

Of course we must acknowledge the whole of the South China region and the Pearl River Delta in particular is blanketed with smog as shown by these deteriorating satellite images of

surface extension coefficients. 2004 was a particularly bad year but the general trend is stable or upward.

The government refuses to acknowledge that mainly local pollutant species are dominant in Hong Kong for 194 days of the year arising from traffic, power generation and marine emissions. For the general public of course, the most salient indicator of the mainly silent injury to health is the loss of visibility which is represented in this exponential curve of very low visibility days spanning more than 35 years. It is in effect, for Hong Kong, an epidemic curve for cardio-pulmonary disease which we've carefully documented over decades but failed to intervene except on rare occasions.

Of course the media plays an important role in risk communication but headlines like these (*"Putrid Air Killing Us Slowly"*) which are triggered by only the very highest pollution days have a short half-life. We also experience a lack of accountability by official government proclamations such as, *"Despite high pollution readings, air is getting cleaner, the government claims"*.

Despite the illogicality of some of their statements they simply serve to confuse the public and generally inhibit legislative action. And all these pronouncements ignore the fact that it is the average ambient levels which do the most harm on a daily basis. It gets worst because Hong Kong's chief executive, the honourable Donald Tsang appears to be very badly advised. He has emphatically stated that: *"Our loss of visibility in Hong Kong is not due to pollution."* On another occasion he infamously declared that: *"Our high life expectancy shows that our environment is healthy"*.

These naïve and misleading statements underline our need for better risk communication. In response we have demonstrated, as shown in these concentration-response curves of visibility, indicated here on the horizontal axes by visibility in kilometres and on the vertical axes by the risk of daily mortality, a robust relationship between daily visibility and daily mortality, principally from cardio-pulmonary disease. You can in fact look out of the window in Hong Kong and estimate on any one day how many people are being pushed into clinics, hospital beds and coffins.

To provide the general public with a better programme to raise the profile of visibility and the loss of Hong Kong's vibrant colours as an iconic symbol of damage to health and the economy, we engaged a professional photographer to take a series of photographs independently on clearer and hazy days and plotted the hourly pollutant levels of the 4 criteria pollutants on those days. As you would expect their monitored levels demonstrated pretty clear separation between the so-called hazy days (visibility <8 km) and the clearer days.

Now in an average year, only about 10% of Hong Kong days correspond to the air quality of better visibility days in our photographic sample. We use the risk ratios from our time series analyses, so these are short-term not cohort excess risks, to estimate the avoidable morbidity and mortality attributable to possible air quality improvement from Hong Kong's average level down to the pollutant levels of the "better visibility" days or even "good visibility". We called "good visibility" the best of those better days, on which the pollutant levels were actually consistent more or less with WHO guidelines.

And so in our population of 7 million we estimated that such an improvement in air quality would amount to an annual reduction of almost 7 million doctor visits for respiratory disease

alone at the primary care level, between 60 and 80,000 hospital bed days and up to 1,600 deaths annually. The community burden of direct and indirect costs, including lost productivity would amount to about 2 billion Hong Kong dollars, that's about 250 million US.¹ And population willingness to pay to avoid a day's illness, a hospital admission for a serious disease or a premature death adds another 18 billion to this figure, totalling over 2 billion US dollars a year in intangible costs.

We've now extended this approach in assessing the preventable fraction to the whole of Guangdong province and we've recently published a new report entitled "A Price Too High"² which among other things emphasizes the need for a wide spectrum of good data for health impact assessment and accountability that we need for this purpose.

In our next move, we have tried to operationalize this approach as a real time reporting system and by logging on to our environmental index³ which you see here, you are effectively transported 6,000 miles away to Hong Kong where it's about 25 minutes to midnight and we can see first the outputs from 13 general monitoring stations. Now, this is August and it's the best time of the year for air quality and they had a very good day in Hong Kong terms and although conditions look as they might be beginning to deteriorate at the general stations the air quality has been unusually good.

However at the road side, a different picture emerges driven by emissions from traffic, and in some districts from marine and port activities and many other sources. Today has been dominated by particulate (PM₁₀) levels, around of 75 micrograms per cubic meter and up to 150 micrograms for nitrogen dioxide.

On this site, any member of the public can identify pollution on any particular day of the year, for example 1 year ago today in 2008 we see a pretty similar picture except that on that day there was a very high pulse of sulphur dioxide. The site will also tell you what was the worst day so far this year and that turns out to be the 22nd of January when you can see particulates and nitrogen dioxide were each around 200 to 250 and sulphur dioxide between 80 and 100 micrograms per cubic meter; a normative picture for Hong Kong in the cool season.

These hourly pollutant levels translate into attributable costs which since midnight today are estimated conservatively at about 4 million Hong Kong dollars. You can press this button and get the same value in US dollars (\$500,000) and it will also tell you the intangible cost based on public surveys of willingness to pay to avoid these bad health outcomes, and on this day alone that amounts to 27 million Hong Kong dollars (US\$3.5 million).

This site shows you here that on this particular day so far these costs are the result of 13,000 doctor visits, 134 hospital admissions and 2 deaths, all attributable to pollution.

The site will also provide you with any cumulative index in a historical series which you can define by putting in the start and end dates for that period. There is an FAQ section which will help people navigate the site, talk about the methodology of how the costs were calculated and also discuss for example the concept of the intangible cost and its possible relevance to an individual. It discusses of course the mechanisms of air pollution's harm to health and provides links to scientific papers and general reports, links to news articles, to other sites such as CNN and feature programs about Hong Kong's air pollution problems and so on.

I have to say that the government's not very pleased with this development,⁴ they're certainly not well disposed to this site and the way that it externalizes the harm from pollution and its running commentary on health impact assessment. This may possibly have something to do with the fact that my colleagues insisted on naming it after me but hopefully this will not detract too much from its central purpose and value as an instrument for accountability.

In the meantime, the government has continued to procrastinate and has stated publically that the World Health Organization guidelines are "too strict". Government has employed a consultancy to invent a new series of air quality objectives which are mostly based on WHO interim targets but critically modified with many additional permitted exceedances of these single limit values. We can show by using Hong Kong monitoring data over many years, and log normal probability distributions, that the predictable outcome of these bowdlerized targets which are not health-based will not only slow progress towards better air quality beyond what is necessary but may cause a deterioration in some pollutants principally sulphur dioxide.

These new modified objectives are already being used to distort risk communication by the government, all of this is occurring in a very high pollution environment. On the right you can see that the pollutant trend curves, in this case for RSP, [*Respirable Suspended Particulates*] are statistically flat and if they're going anywhere it would be 2050 before they would even begin to approach WHO guidelines and on the left you can see that in the cool season the trends are clearly increasing.

Overall, the annual decrement, of minus 2.3% (-2.3%) based on these years, would have to increase to -14% or more if we were to even approach the WHO guidelines by 2015.

We are now moving to institutionalize our index as the standard risk communication instrument for the environmentally related state of public health in Hong Kong and project it for many users, such as schools where it might form the basis for exercises and a spiral curriculum, and certainly for the media, legislators and possibly even one day government policy makers. But, in the meantime we can only ponder the health risks, and the value of risk communication tools in different environments.

While we acknowledge that risk communication needs to be scientifically valid and robust and that it needs channels of dissemination which provide wide sustainable coverage, it may not succeed and may not influence policy against the agendas which are purpose-designed to protect vested interests. That's our present situation; Hong Kong children's lung function continues to be traded off in favour of vested interests as indicated in the hourly readings of those clocks in the Environmental Index. Thank you.

Sylvia:

Thank you very much Nino and Tony for your very stimulating and thought-provoking presentations. Now, I'd like to welcome our panel of distinguished experts in the fields of epidemiology, public health, communications, policy making and I would like to ask them to join me here, please. We have for epidemiology Joel Schwartz, Bert Brunekreef and Christophe Declercq, for public health Aaron Cohen and Fintan Hurley, for policy making Andrej Kobe and Micheal Young and as a representative of NGOs Genon Jensen, and for communication perspectives, Marco Martuzzi and Yorghos Remvikos. Thank you.

I would like to introduce this discussion saying that we have splited it in 3 parts: one from the methodological point of view of communicating health impact assessment findings, then from

the public health point of view, from the audiences perspectives and we will end if we can with a few questions from you and we should end by 5:30 or 5:40 at the latest. Thank you very much.

So I will start, first as I told you I would like to address the methodological issues and I would like to ask Bert Brunekreef, from what you've heard, Bert, can you tell us in a few words what you feel are the best way of expressing HIA findings on both mortality and morbidity today?

Bert:

Yes, thank you. Nino has talked already nicely to summarize some of the thinking and Fintan Hurley as well in the last couple of years so that doesn't need to be repeated. I think it was best shown that it's methodologically more correct to express things in the terms of disability adjusted life years and life expectancy rather than numbers of deaths or numbers of cases.

The question remains how to communicate that concept best and I don't have an easy answer to that question. I have been thinking that, we tend to think that the media want to hear the numerous, and that the public wants to hear the numerous rather than the years of life lost.

But I've been getting into the habit when I present about these issues, when I teach about these issues to start my presentation with a very simple question to the audience and that is what matters more to you, what you're going to die from eventually or how many years you're going to live in reasonably good health?. I could ask it to the people behind the table or in the audience. I've been asking this to at least 15 different audiences of very different compositions and there is almost no exception you know, nobody chooses that they want to know what they are going to die from, they are much more interested in how long they're going to live in a reasonably good health.

Now that's an important message I think because that's what people feel is important to them and yet we keep discussing how can we calculate and how many people are going to die from this or that.

Sylvia:

Thank you Bert, Christophe, tell us, what do you think?

Christophe:

Yes, I agree with what Bert said. At the population level, the number of attributable cases by year is really an approximation. If the level of particulate matter decreases, age-specific mortality rates of the exposed population will decrease. In the long term, the age structure will change and people will longer. As mortality rates are higher in older ages, this will cause the mortality rates and so the number of deaths by year to increase again. So, it is clear than, from a theoretical point of view then the gain in life expectancy is a better metrics than the number of attributable cases. As I said, it is true in the long term, fifty years or so, but for the next years to come, attributable cases can still be a useful approximation if it is simpler to communicate.

I see more the problem in the translation from the population level to the individual level. When you talk to the press or to the general public, and mention a number of attributable deaths, they can ask who are the victims. We can not answer to this question, because the whole exposed population is the victim. I think this question: "who are the victims?" is not a

bad question though. We know that there are inequalities in exposure to air pollution, which is higher for example in people living in proximity to the traffic, Results of some epidemiologic studies suggest that there is also inequalities in the health effects of air pollution, and that this differential vulnerability is linked to the social status of the exposed population. This strongly suggests that air pollution exposure and effects contribute to social inequalities in health. We need more research in this area, but what we already know should urge use to go beyond a summary indicator of health impact of air pollution, being number of attributable cases or life expectancy. If we want to assess benefits of air pollution public policies, we should also check that the more exposed and the more vulnerable part of the population get bigger benefits in terms of air quality and health.

Sylvia:

Thank you and I know Joel that you had to jump from one session to our symposium, thank you very much! From your experience and what you could hear since you joined this meeting, can you tell us what do you recommend on how to best express both in terms of communication, mortality and morbidity, HIA findings?

Joel:

OK. We'll get this discussion started because I need to disagree with the previous 2 speakers.

First of all, individual people would like to know how long they're going to live but we can't tell them that at all. We can tell them that in intervention that lowers air pollution changes average life expectancy but might not change theirs but might change it a lot more than average, so that's not anything that we can tell them. What can we tell them, what is the product that we're offering to sell them if society diverts some resources into pollution prevention? We can tell them that their risk goes down and there is a large and extensive literature on how people value reductions to risk. And that literature is uniformly reporting that years of life lost is not the metric that people value, OK? The evidence of that is as strong as the evidence that cigarettes smoking causes lung cancer.

So let me give you an example of one of the many studies that was done that demonstrates this. So Marin Craper did a study which she recruited a representative sample of the United States population and these people agreed in exchange from money to answer various questions and they were posed the following problem: suppose I could sell you a filter that you would put on the drinking water in your house and for some reason and we don't know why and we don't care why, let's imagine that that filter lowers your risk of death, because that's what we're selling with air pollution reduction, lowers your risk of death by 1 in 10,000. What would you be willing to pay for it? And so, people gave different numbers, OK?

Now; if years of life lost is the metric which people value reductions in risk then one would expect a roughly linear decline in the bid with the age of the participants because 80 year-olds are not going to increase their life expectancy by nearly as much as 40 year-olds by this constant 1 in 10,000 reduction in risk each year. And so that's an empirically testable hypothesis and there was absolutely no association between what people were willing to pay and their age, zero. Study was repeated in Canada, same thing.

A study in the UK asked people if you could pay a little extra, you're going on a business trip, your firm will pay for you to take the cheapest bus that goes from this town to that town but you could pay a little extra money to travel on one there is a lower accident rate, how much are you willing to pay? God bids, not associated with age. So it seems to me it is very hard to

convince people that they ought to care about years of life lost for the very simple reason that that's not what they care about.

The way they value reductions in risk is independent of age and from a theoretical viewpoint that's a perfectly plausible outcome because it's true that if I save the life of an 80 year-old today they are not going to gain as many years of life as if I save the life of a 40 year-old. But you know the 80 year-old knows that their life expectancy isn't all that long. Every year is precious to them. An incremental year of life is worth more quite plausibly than an incremental year of life to a 40 year-old and they may counteract the change in the number of years saved to result in a flat rate for what people are going to pay to this risk. So I think that they've clearly told us what they care about is attributable number of deaths so that's what we ought to tell them.

Sylvia:

Thank you Joel. I suppose there are some reactions there, or we follow up.

Bert:

Well I think this is very much dependent on how you frame these kind of questions. I frankly don't quite see the contradiction between the two. Because the jump that you made at the very end that the reduction of risk is the same as attributable numbers of death I don't think to feel it as a comparison. What you're showing, what you're saying is that people at any age value a reduction risk leading to an increase in their life spent. So that's not contradictory at all to what I've been trying to say in the beginning based on my unpublished observations asking similar questions to the audiences that I'm speaking to. They tell me the same thing I think.

Joel:

They're older, if they value something that reduces their risk of dying tomorrow and they're 80, they are clearly and they value with the same as someone who's 40 values the risk reduction of a risk of dying tomorrow. There is clearly a very different number of years of life lost associated with that death and so they are clearly not saying that years of life lost is the right metric and there is another entire literature which also varies on that which is that if you look at occupations, some occupations have higher risks of accidental death and study after study shows that controlling for education and things like that, there is a wage premium that is associated with that increased risk of dying in that occupation. And that wage premium doesn't change with age either.

Sylvia:

Thank you. As we imagine this subject is raising a lot of questions, Nino.

Nino:

I think Joel you're bringing the question of how to monetize so that's an economist approach.

Joel:

It doesn't have to be money.

Nino:

Well but I still think we have not resolved the methodological issue. Because of course life expectancy and the number of deaths are totally interrelated and they use exactly the same type of epidemiological data to derive them.

But the question is kind of the methodological issue: what do we communicate if it comes with this business of attributable death knowing that based on all the very nice work of Brian Miller, that this is conceptually flat, so somehow we need to bridge this problem in the concept with the problem of communication and the problem of how the economists assess the value of life which of course is ultimately the goal of many of disease assessments but it is an additional step and I think you do not resolve this first step of clarification in the long term and I mean we don't talk about one year of change in air pollution and I think Brian has nicely shown what we talk about, it is about what's going on in a population of 10 years, 15 years of sustained clean air.

Sylvia:

Thank you. I have to go on and I would like to ask Fintan from the Public Health perspective: what do you feel is the most effective way of expressing the HIA findings?

Fintan:

I'd like to start by congratulating Tony Hedley and his colleagues for what they're doing in Hong Kong. I think taking on a battle like they're doing is just really really important and the history of progress on air pollution and health in the USA and even in Europe shows that sometimes this is a battle. I think very often we talk and think of risk communication as if we were putting it into a neutral environment where everybody is eager to base what they do on evidence and it's salutary to be reminded so clearly that that's not the case.

On the issue of risk communication, we've had several very good science-based contributions here already, so I'll give myself the permission not to do that. I spoke briefly about this topic with Peter Van den Hazel before the meeting and Peter said - and I like what he said - that we've tried to be sensible over the years with the same message that air pollution's bad for you; and that we need to shake it up a little for a new generation and a new time.

So I thought well, what if we turn this around and say that clean air is good for you and of course many people have been saying that for a while. And that leads me in the context of the discussion around death and life years to focusing, like Bert said, on healthy life years.

In that spirit, I wonder if you could show images of people in their 60s and 70s in good health playing with their grand-children and so on and say look would you like that? Because my sense of focusing on life lost is that people think, well at 79 I'm really going to be struggling anyway, so who cares.

So that's one piece. And the second piece I take from what Joel said, and I was going to say it anyway, is that people are much more concerned with things that are going to happen or likely to happen immediately than in 40 or 50 years of time. So maybe we can strengthen the message on what are the immediate benefits of clean.

What we can say? Maybe we can copy the advertisers and take a phrase like "You are what you breathe". Or "Air pollution gives you bad breath". Or, I could take from what Nino put up about the causes of myocardial infarction and say "Clean air means safer sex". Now who would buy into that?

I really don't want to be committed long term to any of these phrases - I'm just brainstorming things to see if there's a different way of getting the message across. I'd like us to play with

the idea of trying to put something into the positive spin on this. That's it really. I think we've made a lot of progress the way that we've done things and now, maybe in a less public place than this, we should just play with some alternative ways of making the message, to see if we can get the basic ideas around some more.

Sylvia:

Thank you Fintan. Aaron, what do you think?

Aaron:

Well, I'm not sure what the question is here. Because if the question is, I mean it seems like the question, is how do you mobilize the population or populations to be militant in support of stricter air quality regulations or other interventions to reduce air pollution and improve health. Well, that's really a political question and it's really not a question of what is the most scientifically justifiable way to express the health effect of air pollution, I have my views on that but I think what we're discussing is really the former. So I think it's important to think about and contrast the situation in the United States, with say the situation in Hong Kong. I mean frankly the United States has been very successful in lowering levels of air pollution to levels that are quite low and there has been...

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...for a very long time, broad public support for improving environmental quality including air pollution, and certainly there has been a struggle that's involved competing interests where some said that the economy was going to suffer if you imposed regulations to improve air quality and that's been a struggle over many years. But what's never been in question is whether people in the United States wanted to improve air quality and the environment, they did and that's been the basis for the air quality improvements that we've seen, for the Clean Air Act and so forth. So the question is "what's going on in Hong Kong?" I mean Hong Kong has got 2 major universities with incredible intellectual resources as you've seen demonstrated here today and much research on health effects of air pollution. It's got Civic Exchange which is a NGO that is very skilled in public communication and working with the press. It's actually got financial support in the form of organizations like the Jockey Club which supports clean air advocacy...

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...The problem in Hong Kong is not figuring out the right things to say to the public about what air pollution does. I think they've done that very well. It's a political struggle in Hong Kong and so the discussion perhaps is about how that political struggle gets conducted and what the roles of science and advocacy are in that struggle but those are my views about this discussion.

Sylvia:

Just as a reminder, what we are trying to discuss here is how to best translate the scientific findings to different stakeholders.

Aaron:

I don't think the reason that the situation in Hong Kong is as Tony has described it is that we haven't figured out the right metric to talk about. I don't think the reason that we've been successful in the United States in achieving better air quality, and in the UK as well, (not that

it can't be improved or that the air pollution doesn't have health impacts), is that somehow we figured out the right metric to say describe the health effects of air pollution. I think that helps, that contributes, but I don't think that's really the problem. I'm very interested in discussing the different metrics, I work on these problems but I don't think choosing the right metrics what's going to remove the obstacles they face in Hong Kong. I just don't think that's true.

Sylvia:

It's not the cause but we are trying to improve the way we communicate. Joel you wanted to add something?

Joel:

I just wanted to extend what Aaron said. I mean if you take the US example, back in the 40s and 50s, there was no public interest in controlling air pollution, there was clear industrial interest in not controlling air pollution, we did not control air pollution, levels were terrible.

That changed in the 60s: in the 60s people became energized and there was a large environmental movement publically which put pressure on legislators to pass laws. And they had pressure from the industrial interest but once the public interest got elevated high enough people began to realize they weren't going to get elected if they voted against the Clean Air Act and the Clean Air Act was passed in 1970.

So what happened is something happened that turned around public opinion: A and B: public opinion had a big impact on the elected legislature because people ran in individual districts and they could lose, it did matter you know you have a party list and if you were higher up you were automatically in. If the people in your town were pissed off, you were out.

And so it seems to me that what's happening in Hong Kong is presumably a combination of the fact that A: the public isn't energized enough and B: they don't exactly have that same kind of elected legislature and so people aren't going to get voted out.

Sylvia:

Right! Hanns.

Hanns:

Well thank you. So it's my job to handle the rest of the panel through the next 20 minutes. We have learned that the medical centres don't really know what to say but hopefully it doesn't matter. Now I turn to those who had a target of our information, what information do you need and what format would you prefer to get it?

So I want to start with Andrej Kobe from the DG Environment. Could you comment on this please?

Andrej:

Good afternoon. OK, let me start with what Aaron was trying to present and in a sense I think it is showing pretty well in Europe as well: the public is being aware, has pushed also the politicians and there are measures being taken.

But starting with this, I will give an opinion or let's say an experience through the Clean Air for Europe programme in which I participated and as mentioned earlier, we communicated

both (metrics), in both ways. From my personal experience being in a process it didn't really matter which one was used, it was partially irrelevant in a sense of the impact to the policy makers.

I wouldn't say the solutions are with the policy process but we're kind of extreme pragmatists; both (metrics) are very well able to communicate that air pollution is bad, that something is to be done about it, and then it becomes just one element in a much bigger play of the conflicting interests. I'll just give you an example with probably one of the best integrate assessments and cost benefit analysis; everything we were able to throw in, we have thrown in the Clean Air for Europe programme.

The final policy ambition level taken in the thematic strategy on air pollution you can follow from the end result: it was 6 to 1 in terms of benefits over costs where the ambition level was set. So you can see there are a lot of competing interests; information was there, yet the level was set where it was.

What is important however is to mention that what was deteriorating the discussion was the fact that there were these disagreements in terms of which metric to use and it was just adding sometimes to the confusion, sometimes helping those that were trying to deliberately put some confusion into the process, to basically "throw some sand in the wheel" so to speak and that really didn't help. So whatever we have to communicate, I would say let's get it well accepted and let's not introduce this discussion which started in this panel, into the domain when we are actually discussing the policy options; it really doesn't help.

And then I would also say I'm very much with Nino and his recommendations when he was saying let's try to put whatever we know into those summaries, indices or however you want to call them: also information about morbidity, the fact that we have, through different special resolutions or through the fact that you are taking other, additional traffic contributions and so on, all these things should be included to the extent possible.

So all information from the exposure should be included into the whole discussion otherwise it gets forgotten and it's just kind of lost. If it's included, it's also easier to communicate.

I get to the final and probably most important point: it's not just in the policy development process where we need this kind of information to set a certain target. I think it's very important also in the continuous struggle that we have to have (implementation). Once legal tools are in place what we need is actually smart implementation, taking the right measures. Comply with the legislation in the smartest way as possible in order to maximize the health benefits.

So always think about what will the measures bring; that's why it's important to have the proper metrics and we are able to monitor how (the policy) is being implemented. If we're able then to assess there are health benefits, then we should get them out in the open. The success stories are bread and butter for the policy makers, we need them otherwise we can not push forward.

Hanns:

Thank you. I think this was a very valuable input. It really leads me on to our host country because Ireland was successful for example for the coal ban.

And Micheal what was the information which mostly helped you to achieve this success?

Micheal:

Ok, good afternoon everybody. My name is Micheal Young from the Department of the Environment, the Ministry for Environment in Ireland.

From a national perspective, the first thing to say is that Ireland has relatively good air quality at least in comparison to Hong Kong (which we heard about earlier), though myself and my colleagues in the ministry cannot claim responsibility for this as it results largely from historic and economic development: Ireland has very little heavy industry, very little smokes-stack industry, we've got prevailing south-westerly winds which bring clean air from the Atlantic ocean and generally the industry profile and the current transport fleet are comparatively modern and comparatively efficient so we don't have major drivers for pollution.

We did have one very significant challenge to air quality in the past, back in the 1980s in the major cities. We had major smogs which resulted from the use of solid fuel in domestic dwellings and that challenge was largely dealt with by a very effective policy prescription which was banning the sale of bituminous coal in the largest cities. It was introduced in Dublin in 1990 and in the other cities in 1995 and 1998. And that largely solved the problem, the ban was on the sale of coal rather than the use of coal so within the bigger cities where it's not practicable for people to move outside the cities to get their fuel it has worked very effectively. But as the ministry rolled out the ban to smaller and smaller towns it seemed to become less effective possibly because people as part of their daily routines can go in and out of smaller towns and so acquire smoky coal; so the ban was really effective particularly in larger cities and town, now ironically when we do get complaints or anecdotal reports of bad air quality, it's generally from the smaller towns rather than the bigger cities. But the monitoring conducted by the national environmental protection agency shows that there is good air quality across the country and we're complying with the EU and national air quality standards.

From a policy perspective just briefly I'd say there are three areas which are important for the policy makers. One of those is a good evidence base. Obviously as a policy maker you're making a decision in a context of competing arguments. With any policy, there is usually winners and losers, there are the winners in terms of the benefits of reduced pollution who are more broadly dispersed across the population; the health benefits per person are individually small and very difficult to realise and appreciate but the costs fall on a discrete number of operators or industries so this group can respond in a very focused way and v they can present the case in very tangible way usually citing quantitative evidence so the case is very clear and very tangible.

So from our perspective when you look at the evidences based on the benefits it's very valuable and it's not the only metric to use but having monetized benefits is very valuable because at least checking out the bottom line argument that the benefits do exceed the costs and then you can look at the more nuanced arguments of the various different factors so that's very important.

I think it's also important that the data should be comprehensive to ensure that (even in the environment field) when you introduce one policy it is not counter productive to another for example between air and climate change has got huge political profile and the measures being introduced to address climate change by large synergies with air policy and the two areas are

addressed through cleaner fuel. But in the area of biofuel and biomass there could be significant implications for health impacts in terms of PAHs, NO_x and particulate matter and that isn't always picked up in the evidence that's presented because of the rush to promote climate policies.

And finally the last point I'd make is in terms of public awareness: obviously when the policy maker provides the evidence for politicians before regulations are signed into law, they've got very focused evidence of the cost usually but not the benefits. One of the main incentives for a politician in democratic societies is re-election so public awareness and support is very important; it's important that the public acts as a policy driver.

Now air quality in Ireland is not perceived as a very significant issue in national terms because air quality is relatively good. I think that Ireland is the only country in the EU27 for example complying with the EU PM₁₀ standard.

I was in the United States recently and I was struck by the public profile given to air pollution and its impacts, I was in one of the national parks, and I noticed alongside the notice board for information on the flora and fauna, there was information on air quality, on long range transport of pollutants and quite a lot of detail on the significant sources in the region and facts on the impact of acidification on flora and also on the visibility. I thought in a context where people are appreciating the amenity of the environment, it provided a good opportunity to draw the connection between the damage caused by air pollution and the damage to amenities that we're enjoying.

Hanns:

Well we must go on. Genon, I know you do lobbying work for many years now in Brussels for the health environment and you also collaborate with scientists but I'm also sure you sometimes get frustrated from the input you get from scientists so what would you suggest we should do?

Genon:

I don't know if we actually get frustrated. I think we get a lot of excellent input from scientists. Just for those of you who don't know us the Health and Environment Alliance is a European platform bringing together not for profit organizations including health professionals, some scientific institutes, patient groups, women groups to do policy analysis and public awareness raising and advocacy on EU policy level issues.

So to start with in terms of communication and what I think works, I think Pr. Hedley's presentation provided us an excellent website on the health effects of air pollution in Hong Kong, which I thought, "oh this is what we need for Europe". When we're looking at the EU air quality directive and how that's implemented by country, the website provides an interesting example. If we want to motivate our organizations, which comprise national and local groups, to get involved in air quality issues and see the link with their health, we need information that is personally relevant to them and their country, and local condition.

The same goes for members of the European parliament who are also responsible for legislating on air quality. As a policy advocate we meet with MEPs and they're interested in knowing for instance what is the air quality in their country, in their region and how it is affecting their constituencies. But I don't think information and communication in itself is enough. I think we can have an excellent website about the costs both human and economic of

air pollution as seen in the previous presentation, and yet this doesn't translate into more protective laws in Hong Kong because the public engagement and the political will to use the science is not yet there..

This is exactly what has happened in the recent revision of the EU air quality directive. We had an incredibly comprehensive health impact assessment, we had all the right numbers but yet politicians decided not to go for what we and many other health groups thought should have been the highest level of ambition and bring the greatest health benefits for society.

So one of our strategies has been to look at how do we communicate better and increase more public engagement in policy making. I think what we need from the Aphekom project is clear and simple information that can be easily understood and used in political debates by stakeholders. I think we also need more information on the monetary benefits of air quality control because this is an argument that always comes up. This law is going to cost too much, we can't do it. But if we can come back and say well actually it might cost this much but at the same time we're going to have less hospital admissions and a healthier work force and society, then we can monetarize the issue which is often a deciding factor and very useful from a public interest and public health perspective.

I also think taking a message and making it more positive is also a very interesting idea. I was thinking about your brainstorming session Fintan and one of the things that we're doing is working with those groups such as the [European Federation of Allergy and Airways Diseases Patients' Associations](#) whose national asthma are more vulnerable to pollution,. We have created a website called Know Your Air for Health (www.knowyourairforhealth.eu) in several languages to provide information and tools for protecting themselves against air pollution and monitoring how air quality laws are working at national level. They can make the science-policy interface and bring the positive message about how cleaner air will benefit society such as reducing the rate of asthma in children. These groups who are often very good effective and very interested in raising awareness so I think that is a very important component of communicating as well in order to bring it down and involve a wider section of civil society.

Hanns:

Thank you very much. Yorghos, so far as I know, you're working on public participation for air quality plans and so on and so I want to ask you what's your perspective, how is scientific information and more importantly uncertainty, how does it enter into these processes?

Yorghos:

Yes, I would like to insist on the fact that I work with stakeholders, my research is on a stakeholder participation and the way they can actually come in to the question of air quality management. And so I would like to say that there are maybe two different questions that we have to separate and I'm definitely situated on the second one.

The first is whether public health scientists are actually saying that we should produce more strict regulatory standards that is the current standards are not protective enough which is probably true but there is a second question about what the stakeholders, how do they assess or how do they criticize public action to comply to current standards and I'm interested in this second part and I encourage you if you want to have more details because I can only speak for a couple of minutes: I have a poster presentation on Friday where I will give more indications about the results we have in our own survey, about what stakeholders actually say how they assess public action at the elaboration of action plans.

So the question now is if the stakeholders are involved in elaboration of action plans to manage air quality which are normally elaborated to comply with current standards, how do they think, how do they project the implementation of these action plans in terms of efficacy.

And there are two very important I think take on messages here: the first is that they generally tend to accept the current information on health impacts, they do not question these information on health impacts, they believe that air pollution does affect health and they do not actually ask for more precise figures to give us more information, more science and more knowledge about this aspect and the second thing is when they are asked to criticise these action plans they always come up with the same kind of commentary: it is a problem of political will.

Now if it is a problem of political will it means that somehow they believe that there are solutions but the decision makers do not adopt them. So this is a question which we might turn to the decision makers and see if they could indeed do something more efficient. Another conclusion that we drew from this survey is that if health professionals are looking for allies in terms of communication and action there is definitely a scope of getting together with urban planners who have to deal with climate change and greenhouse gas emission reductions because they do not have health endpoints, they only have climate change endpoints and this is a terrible lack of focusing because health impacts and air pollutants have local effects whereas the climate change policy is more global. So I think that we should get together also with these urban planners and get a common strategy both for climate change and for improving air quality and therefore improving health.

Hanns:

Thank you. Last but not least, WHO is very active and efficient in communicating scientific findings to the policy field and the general public. So please Marco give your input.

Marco:

Yes thank you very much and also for the invitation. I've been enjoying this workshop quite a lot. It also gives me opportunity to make a little bit of advertising for tomorrow's symposium on science informs policy where we've been looking at especially the situation in European research. They use a generation of new evidence and how this interacts with the policy making which is really at the heart of the work that we do in WHO in the European regional office where I come from.

Since I'm down under the communication headline which is a bit new for me and quite exiting I must say, I'd like to share with you a little episode that we went through some years ago, actually Nino's been quite dismissive of his own work, I think that the work on quantifying health impact from air quality, but indeed it has been cited and the number of citations is justified and as you know we were among those who followed your example and we were asked shortly after you came out with your estimates for Switzerland, France and Austria to do something similar for Italy and we made our estimation for the main cities not the whole country and it came up with unusually large numbers which activated some debate and it was quite good and influential at the national level and it mobilized a number of people and a debate was raised in profile.

However some time later we were also invited by one of the cities in the list which had kind of hot local situation depending on the fact that they had on the table proposed new

developments, new meeting sources of PM and there was a tense situation with cities and NGOs on one side and the local authorities on the other and we were asked to go there and present and discuss the data we had, the impacts that we came up with and we arrived there and the situation was indeed quite tense and on the day of the event there had been headlines on the local papers saying: 50 deaths per year attributable to air pollution, intolerable or a good and acceptable impact, the level of discussion and we did have angry committee saying 50 deaths is just impossible, 50 human lives lost and on the other side, we had other parties saying you know comparing to smoking it is very small etc. and after a short time we were able to speak and to say look wait a second you got it wrong it was 500, it's not 50 and there was a moment of void but in the end nothing changed. The debate went on exactly the same so that is to say.

I mean it was an example, it was very evident that accuracy is not really the top priority there, you can kind of get it more or less wrong but the essence of the debate doesn't change at that level of discussion, of course this is totally different matter and I agree with the concerns about the need of using the right metric if we embark in cost effectiveness and answers for example but in terms of communication, really the accuracy there the 50 versus 500 didn't really influence the debate and I'd be curious if in Hong Kong you could run experiment one day randomly move your decimal coma whichever side and see what happens. I don't know maybe it would be interesting to see what happens there. Thank you very much.

Hanns:

Yes. That was so very interesting episode thank you. We're running out of time. There was one question?

Mr. Birkett:

Simon Birkett. I founded the Campaign for Clean Air in London and I'm really thrilled to see you all here and I think the Aphekom project is really tremendous. I would encourage you to separate the problem into two things: winning the battle and what happens once it's won.

The excellent work done by Dr Miller really is about what happens once the battle's won. We are in a battle at the moment where the UK government for example refers to air pollution being good across 99% of the country says that the worst that happens is the maximum of 7 right months of loss of life expectancy which is across 61 million people. The two things that get real impact when I'm talking to the media and to the general public which I do every week: attributable deaths and your number of 9.8 years from your 2001 paper which is the years lost per statistical victim. Those two things which have a great deal of impact, they have to be used very carefully with caveats and so on but those are the things which really helped me on the ground attributable deaths and the life years lost per statistical victim.

I think with the most sophisticated policy makers and others yes it's absolutely essential to have years of life lost and monetarized things and so on but with the general public we need some really plant instruments frankly to deal with the sort of messages that Pr. Hedley and I have just described with the government's saying you know that's not a problem.

Hanns:

Well thank you very much. I think it's evident that this discussion can not be finished now. We already run out of time and I got lots of input which I've still to think about and to help you also. We'll think about it and maybe you give your input by e-mail, you have our website address www.aphekom.org. I hope we can continue this discussion. Thank you.

End