

TRANSCRIPT

STANDING COMMITTEE ON THE ENVIRONMENT AND PLANNING

Inquiry into unconventional gas in Victoria

Torquay — 12 August 2015

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Dr Mike Forrester (affirmed), Geelong Paediatric Group.

The CHAIR — I would like to welcome to the table Dr Mike Forrester from the Geelong Paediatric Group. If you could make a short submission, then we will ask a couple of questions.

Dr FORRESTER — Thank you. My name is Dr Mike Forrester. I am a full-time medical specialist in paediatrics at the University Hospital Geelong, caring for children presenting to the hospital as well as clinic-based medicine — seeing children referred in by their GPs. I have an interest in health research and am a coinvestigator on the NHMRC-funded Barwon infants study looking into the incidence and causative pathways of non-communicable diseases, such as allergy, in a cohort of over 1000 babies in the region that we are following from pregnancy on.

My expertise is in acute medicine and appraising clinical research. I have not been involved with any public health research related to gas extraction and risk estimation. I have no formal affiliations with any political group. I am a resident of the area, with my wife and two young sons. In fact, after I described to the boys today why I was presenting here on this issue, my six-year-old was most concerned about the pandas. I am not sure where he got that from, but he may have been thinking about acting local and thinking global.

Ms SHING — I share his view in relation to the general importance of pandas, just for the record.

Dr FORRESTER — Yes, thank you, but the exchange did remind me of the need for communicating today with clarity and focus, and I will do my best.

Upon hearing a couple of years ago of the potential to allow unconventional coal seam gas, or unconventional gas extraction and exploration, in the Barwon and Surf Coast region, I started to read into the evolving risk and safety data, which raised some concerns for me. Some of the relevant papers were discussed at a clinical meeting in our paediatric unit, and this prompted all 13 of the paediatricians in the region to write a formal submission to the Geelong council in September last year to relate our concerns and call for caution.

The Barwon paediatricians have subsequently made a submission — no. 864 on the website — to the Victorian parliamentary inquiry on onshore unconventional mining, which states:

We, the paediatric doctors of the Barwon region, are unanimously opposed to any form of unconventional gas mining proceeding in the Geelong/Surf Coast/Bellarine areas given the concerning emerging data related to environmental and associated health impacts.

Having carefully appraised the emerging safety data, it is clear that the proposed gas extraction practice poses an unacceptable risk to our local environment and to the health of our community. With our duty of care to the children of the Barwon region in mind, we strongly urge the Victorian government not to approve any UCSG/fracking exploration or mining permit applications.

We support an extension to the current moratorium to UCSG/fracking while data from existing sites around Australia and internationally is being analysed and more robust risk estimation becomes available.

I am grateful to the environment and planning committee for the opportunity to speak today on behalf of our clinical group and expand upon our submission, and I will attempt to answer any questions within my field of expertise and wider reading around the topic as accurately as possible. I would like to respond to the terms of reference of the inquiry, in particular considering matters relating to the environmental, land productivity and public health risks, risk mitigations and residual risks of onshore unconventional gas activities, and further scientific work to inform the effective regulation of an onshore unconventional gas industry.

I have endeavoured to summarise and collate the most scientifically robust and conservative data, prompting the following recommendations, if it is of interest to the inquiry and we have sufficient time in the discussion.

In the discussion I would like to focus on, one, responding to claims of safety and understanding potential harms to humans from unconventional gas exploration and chemical exposures, including observations and studies to date, and two, the difficulties documented in medical and scientific literature pertaining to regulating against incidental or accidental contamination of air, waterways and land.

In summary, we echo the key recommendations made in the submission by the Doctors for the Environment Australia, which are:

1. that the Victorian government applies a precautionary principle towards risk management of the health effects of any further development of the unconventional gas industry.

2. that the exploration and extraction of unconventional gas in Victoria, including the use of hydraulic fracturing, is subject to an indefinite moratorium until research can clearly demonstrate that the key determinants of human health are not compromised.
3. a mandatory full public disclosure of all chemicals used in the gas industry, and assessment of all chemicals for safety by the national industrial chemical regulator.
4. if the moratorium is rejected, adequate environmental monitoring be undertaken for the lifetime of the project, including:
 - independently audited water and air monitoring programs with publicly available results;
 - effective independent monitoring and reporting of wastewater produced and methods of disposal;
 - sufficient capacity and resources to effectively oversee compliance;
 - full life cycle analysis of greenhouse gas from UGD —

unconventional gas developments —

5. if the moratorium is rejected, mandatory health impact assessments for all UGD appropriate to the industry, including:
 - comprehensive epidemiological studies of population health before and after gas extraction commences;
 - support for research on potential health effects of unconventional gas development independent of industry funding, including long-term prospective health studies;
 - health surveillance of persons living and working near major UGD.

The authors of that paper, I am sure, would be able to expand further on these recommendations, but I would be happy to summarise for the committee some of the underlying medical and scientific data.

The CHAIR — Dr Forrester, thank you for your submission. It makes a very significant point. What I am interested in is the strength of the evidence. There are many studies that touch on different areas, but to show to a reasonable extent some clear linkage, the correlation in the first instance, is a step. The second, which is to demonstrate some causal link, is obviously more challenging in a public health sense. I wonder if you might reflect on the strength of the evidence that is available.

Dr FORRESTER — If we think about the potential harms from water, land and air contamination, firstly, as you say, it is important to state how difficult it is to establish what is categorically safe. Observations of potential harm can be made in a shorter time frame, but it is often not until there is prolonged large population exposure to a chemical that its true risk is understood. It is the job of industry and government to proceed with caution and it is the job of scientists to monitor for exposure and to tease out exactly, as you say, the difference between association and causation, which is what I will try and touch on here.

On this issue though of what do we do while we are observing associations, while we are trying to demonstrate causation or refute causation, much has been said in the medical literature. In his annual report 2014 to the United Kingdom government entitled *Innovation — Managing Risk, Not Avoiding It* — it is a scientific paper — the UK government's chief scientific adviser likens fracking — strong words — to thalidomide, tobacco and asbestos. If I might quote, the chief scientific adviser said:

History presents plenty of examples of innovation trajectories that later proved to be problematic — for instance involving asbestos, benzene, thalidomide, dioxins, lead in petrol, tobacco, many pesticides ... mercury —

and a few more —

recognition of adverse effects incurred not only serious environmental or health impacts, but massive expense and reductions in competitiveness for firms and economies persisting in the wrong path.

The methylmercury poisoning in Minamata Bay is a good example where initially government officials and health experts recognised some associations between these families who were becoming very unwell, but it took some decades before the true causation was recognised and the dumping of methylmercury in Minamata Bay was stopped. By that point there had been 2265 victims officially recognised as having Minamata disease and 1784 who had died. That is obviously a strong example, but I use it as an example of where you start out by observing association and it is not until later that you can actually understand what is actually being causative or not. I would like to then go on to talk about an example of each, an example of an association that has been observed —

Ms SHING — Just before you do, can you provide a citation for that UK report for the record?

Dr FORRESTER — Yes. I am happy to provide citations for everything I present today. Would you like me to do that afterwards — send that in?

Ms SHING — Thank you.

Dr FORRESTER — There are two examples. One is of an association that is of local relevance, and then going on to look at some studies where they are trying to better nail down if there is a causative pathway. The local example is in Tara. I am sure the committee has already heard about this example so I will only touch on it briefly. A GP went to Tara in Queensland and wrote a report entitled *Symptomatology of a Gas Field — An Independent Health Survey in the Tara Rural Residential Estates and Environs*. In one key paragraph she reports:

... high percentage of the residents surveyed had skin irritation and symptoms of which could relate to neurotoxicity, including tingling, paraesthesia, numbness, headaches, difficulty concentrating and extreme fatigue. Of particular concern was the high percentage of symptomatic children, with paraesthesia being reported for almost a third of surveyed children to age 18, and headaches being reported for more than 70 per cent.

She also goes on to list the chemical exposures identified and the limited and sporadic testing that was done, and very reasonably notes the potential selection bias in the sample and the difficulty establishing causation in a study like this. Establishing that these chemicals cause these problems in these people is much harder.

We need to then go on to much larger studies, and some of this data is emerging. An attempt to more comprehensively measure the airborne pollutants and quantify a health impact assessment in the residential and agricultural area around a non-conventional gas development in Garfield County, Colorado, was undertaken in an EPA-guided 2012 study. I will just summarise that the results showed that the hazard index, which is a particular public health measure, from air emissions due to natural gas development is greater for residents living closer to wells. The health index is driven principally by exposure to trimethylbenzenes, aliphatic hydrocarbons and xylenes, all of which have neurological or respiratory effects and all of which were measured in EPA-guided analysis. These preliminary results indicate that the health effects resulting from air emissions during unconventional natural gas development warrant further study.

They are actually now starting to quantify the chemical exposure and linking that to what is known about the potential risks of those chemicals. I could — —

The CHAIR — No, I get the drift. We will get those citations. Thank you.

Ms SHING — Thank you for that presentation and for outlining the data that underpins a number of the positions now arising around risk. I would like to draw upon a number of the things that you said around the moratorium needing to remain in place until such time as risks are better understood. That is paraphrasing, and I hope correctly, what it is that you just said. At what point is it feasible or reasonable to bring risk down to a manageable level such that onshore unconventional gas exploration and/or extraction might occur? It sounds to me from everything you have just said that there is not any point at which this might safely be done, in which case why would you be calling for a moratorium to remain in place and not for an outright ban?

Dr FORRESTER — Calling for the moratorium to remain in place is the most conservative scientific position while observing incoming data from existing unconventional gas exploration sites. It is beyond my level of expertise either in public health or policy to quantify what level of safety justifies any potential benefits. I note that in Germany they have decided to say no to fracking, full stop, and in New York state and in one of the states in Canada. That is beyond my expertise, so I make — and we make as a group — the most conservative submission there is concerning data coming in, enough to justify observing what information is coming from existing sites, at a minimum.

Ms BATH — Just with respect to Garfield, Colorado, and you were talking about chemical exposure to hydrocarbons, did they look at BTEX chemicals over in that zone? Is that what they will be using?

Dr FORRESTER — I listed there the chemicals that they mentioned in their paper. I am not sure what their position on BTEX chemicals is. I know that BTEX chemicals have now been banned in New South Wales. Again, in response to the comment by David Davis earlier, it took a long time I think to establish that BTEX

chemicals cause problems, and enough to justify them being prohibited. But there are so many more chemicals we know very little about.

Ms BATH — You mentioned Tara in New South Wales, and symptoms around illness and that we cannot have a causal effect per se, but they are consistent across a number of people. Have you had conversations with other paediatricians in the northern states, in Queensland or New South Wales?

Dr FORRESTER — No, I have not, nor have I spoken to that doctor. I am here today really to try to convey what I have appraised of the emerging evidence. I gave that as an example of something that demonstrates nothing more than an association. I can briefly at some point if you like speak to four papers which give a couple of lines each, four papers which actually do seem to be more robust scientifically and raise more concerns.

Ms BATH — I would appreciate it if you picked one — —

Ms SHING — Or just provide the details.

Ms BATH — Yes, provide the details.

Dr FORRESTER — One of the ones that was concerning to us as paediatricians was a rural study in Colorado. When you are trying to establish scientific causation, one of the things that is important is the power of the study. The power of the study comes partly from the sample size. This study involved 124 832 infants and reported an association between density and proximity of natural gas wells within a 10-mile radius of maternal residents in the infant's birth year. What they were looking for was evidence of obvious structural congenital defects. They were not able to measure subtle things like neurological development that will come down the track, but obvious structural defects. They focused on two in particular: one was neural tube defects, commonly including spina bifida; and one includes congenital heart defects, or structural abnormalities that babies are born with in their heart.

They found that the spina bifida prevalence was associated with the highest exposure with an odds ratio of two, so there was double the rate of spina bifida in this large sample based on 59 cases — a reasonably high number — compared to those where there were no gas wells within a 10-mile radius. The obvious question is: could there be some other confounder in that? That is the appropriate scientific question to ask — could there be some other confounder? They did fairly complicated covariate analysis, which I will not try to convey and a public health expert might better be able to get across, and what they pull out are any confounders including tobacco use, ethnicity, alcohol use, parity at the time of pregnancy, infant sex, family history of these defects et cetera. So anything else they think that could be related to that, they pulled out in their statistical analysis, and they still found, with a significant confidence interval, that it could be double. But it could be anywhere up to 3.9 times or as low as 1, but did not seem to be less, and that is with a strong confidence interval.

They then looked at the prevalence of babies born with congenital heart defects, and that also was found to increase, but to a lesser extent, with proximity to the wells, with the closest exposure group being 1.3 times more likely to have a heart defect. This is one of the many concerning associations in the emerging data. It is statistically significant. It does not yet demonstrate causation, but it starts to become more scientifically robust. It does warrant further scientific inquiry and I think caution by policymakers. I am more than happy to talk about a couple more studies in brief.

Ms BATH — Thank you, Dr Forrester, that was informative.

Dr FORRESTER — You are welcome.

Ms SHING — Again, the citations for those additional reports though — it would be very helpful if you are able to provide them to the secretary.

Dr FORRESTER — I am very happy to.

Ms DUNN — Thank you, Dr Forrester, for your presentation. I just want to go back to the information you cited in relation to Tara, where you talked about the percentage increase in terms of a whole range of conditions, and made the point that the causation does not underpin that, but it is an observation up there.

What I am really wondering out of that is that you talked about skin irritations, paraesthesia, headaches, and a range of other things which I did not have a chance to note down, what are the direct impacts on the child of experiencing those and are there broader impacts on the child in relation to their general health and wellbeing or development? I am just trying to understand the flow-on effects, if you like, of those conditions.

Dr FORRESTER — Thank you. As are we. The great difficulty is that very little is known about many of the chemicals that are potentially going to be used. A 2011 paper identified that of the 23 at that point commonly used fracking chemicals, only 2 had been assessed by the national regulator, NICNAS, although I note from their website that there is a preliminary assessment report due for submission this year from that body. The toxins of greatest concern in coal seam gas water include volatile organic compounds, like benzene, polyaromatic hydrocarbons, methane, heavy metals and radioactive materials. And in response to the impacts question, they are thought to affect the respiratory, endocrine, nervous and cardiovascular systems, impact foetal development and cause cancer, which is one of the reasons for the Colorado study. A paper from the American Academy of Pediatrics in 2012 listed 12 chemicals used in fracking or found in the brine drawn out from the wells which are of particular concern to the authors, and they go on to talk about those chemicals and the particular effects they have.

Ms DUNN — Just spinning that around to the child, what is life like for the child who is living in an environment where they are exposed to those chemicals, perhaps experiencing some of those conditions you outlined in Tara?

Dr FORRESTER — I cannot say. I have not spoken to any of those families or children directly. I have only read the reports, which are enough to raise concerns.

Ms DUNN — That is a fair comment, thank you.

Mr DALLA-RIVA — Doctor, just a couple of questions. We have taken evidence in relation to coal seam gas, tight gas, shale gas and everything else, and by no means am I an expert on this, and that is why I am going to ask this question. You talk about fracking and the fracking liquids or the chemicals that are used as part of the fracking process, but I think from my memory the advice we got is that fracking only accounts for 3 per cent or 5 per cent of what is applied, so we could still do coal seam gas extraction without the fracking process, if there is no fracking. I understand about the heavy metals, and everything else. You touched on it briefly so we are aware of the implications of non-fracking processes that may expose other types of heavy metals and the like.

Dr FORRESTER — In the produced water, you mean?

Mr DALLA-RIVA — Yes, in the produced water et cetera. I am just trying to work out whether, in the evidence you have produced, most of that is related to fracking-type exploration or is it related to non-fracking type exploration, in other words other forms of coal seam gas exploration?

Dr FORRESTER — Firstly, I should say I do not have any engineering experience, so I would not be able to comment on what percentage of unconventional coal seam gas requires fracking chemicals to be added. I understand that some chemicals come up in produced water. The question you asked really raises this question of incidental and accidental exposures to chemicals arising from these processes and the potential to regulate against those.

For example, you mentioned limiting the use of techniques that involve introducing fracking chemicals. The British medical journal tried to address this question — and again I will provide the reference — in response to Public Health England's draft report on the matter. In response to the draft report, the conclusion was that shale gas operations present a low risk to public health is not substantiated by the literature. The correct conclusion that Public Health England should have drawn is that the public health impacts remain undetermined and more than environmental, and public health studies are needed.

Furthermore, the report incorrectly assumes that many of the reported problems experienced in the US are the result of a poor regulatory environment. This position ignores many of the inherent risks of the industry that no amount of regulation can sufficiently remedy, such as well casing cement failures and accidental spillage of wastewater or produced water. More attention should have been paid to drilling in areas that are densely populated, and recent evidence suggests a higher prevalence of some adverse birth outcomes for those living in proximity — and that is the Colorado report we discussed.

Mr DALLA-RIVA — Yes, I understand that, but was that related to fracking and using fracking vehicles? That is what I was trying to get at. You can take it on notice, because I am just curious.

Dr FORRESTER — I could try to respond to that subsequently. I notice that the first point they were talking about was shale gas operations, and I think they were talking about a range of unconventional gas extraction practices, but I would have to confirm that subsequently.

Mr DALLA-RIVA — I am not an engineer either, so if you could find out.

The CHAIR — Dr Forrester, thank you for your information and submission. We appreciate the references, and there will probably be some further contact through the secretariat.

Dr FORRESTER — You are very welcome.

Witness withdrew.