



Science and Technology Committee

Corrected oral evidence: The effects of artificial light and noise on human health

Tuesday 2 May 2023

10.15 am

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Members present: Lord Krebs (In the Chair); Lord Borwick; Viscount Hanworth; Lord Holmes of Richmond; Baroness Neuberger; Baroness Neville-Jones; Baroness Northover; Lord Rees of Ludlow; Lord Sharkey; Viscount Stansgate; Lord Winston.

Evidence Session No. 11

Heard in Public

Questions 115 - 127

Witnesses

Dr Benjamin Fenech, Noise and Public Health Group Leader, UK Health Security Agency (UKHSA); Dr Luke Price, Principal Radiation Protection Scientist, UKHSA; Dr Edward Wynne-Evans, Director of Radiation, Chemicals and Environmental Hazards Directorate, UKHSA.

USE OF THE TRANSCRIPT

This is a corrected transcript of evidence taken in public and webcast on www.parliamentlive.tv.

Examination of witnesses

Dr Benjamin Fenech, Dr Luke Price and Dr Edward Wynne-Evans.

Q115 The Chair: I welcome our three witnesses to the 11th session of the committee's inquiry into the effects of artificial light and noise on human health. In this panel, we will hear from the UK Health Security Agency. Our witnesses are Dr Benjamin Fenech, the noise and public health group leader; Dr Luke Price, the principal radiation protection scientist; and Dr Edward Wynne-Evans, Director of the Radiation, Chemical and Environmental Hazards Directorate. The session is being broadcast on parliamentlive.tv and a full transcript will be made available shortly after the meeting so that our witnesses can make minor corrections.

Without further ado, I will kick off with an opening question. As the witnesses know, we are particularly interested in the role that UKHSA plays in this area. I will start by addressing Dr Fenech primarily. Could you outline the roles that the agency plays in assessing and understanding the evidence base for noise pollution that supports any environmental noise policy? We are keen to understand how robust the evidence base is, so perhaps you could give us a sense of that. We have also heard that the noise team in UKHSA is expanding. Could you tell us a bit about that? Why is it expanding, what extra work will you do, and which departments and stakeholders do you interact with?

Dr Benjamin Fenech: I will take those questions in order. If I miss any, please let me know. I will summarise our role in government. It is to make sure that the Department of Health and Social Care and other government departments and stakeholders have up-to-date information about the evidence on the health effects of noise. We do that primarily by reviewing and translating the scientific evidence. Our long-term aim is to build up the evidence on actions to reduce the health burden.

As you noted, we are expanding, and there are two reasons for that. First, the scientific evidence is developing rapidly, and we anticipate increased demand for the interpretation and translation of it. But we also wanted to strengthen our in-house expertise in a number of areas, including behavioural and social science, epidemiology and data science. As I said, that is all linked to the growing body of evidence. Do you want me to talk about that?

The Chair: We will dig into the evidence in later questions, but, just to be clear, is your role essentially to review and assess the literature, rather than to have people doing new research?

Dr Benjamin Fenech: We partner with a number of universities on specific items of research, but that is not our main function. We also have a role in identifying and promoting new areas of research; we work, for example, with funding bodies on calls for new evidence and on the prioritisation of evidence.

The Chair: As you know from the title and theme of our inquiry, we are particularly interested in the health effects. In your collaborations with

universities, do you collaborate with medical scientists and epidemiologists who study the health effects of noise?

Dr Benjamin Fenech: Yes, absolutely. Currently, our main partners are the University of Leicester, led by Professor Anna Hansell, through a Health Protection Research Unit Development Award in Environmental Exposures and Health. So we have a framework for research, including on noise. We also collaborate with Professor Charlotte Clark; currently, we are collaborators on a proposal for new research. Both Professor Hansell and Professor Clark gave evidence to this inquiry. We are in regular conversation with them and other international epidemiologists and health researchers.

The Chair: Would Dr Price or Dr Wynne-Evans like to add anything, or is this really Dr Fenech's area?

Dr Luke Price: I have nothing to add.

Dr Edward Wynne-Evans: I have nothing specifically to add.

Q116 **Lord Borwick:** Dr Price, what role do you currently play in assessing the evidence base for light pollution as a public health problem? Is it accurate to say that the epidemiological science is less advanced for light than it is for noise? Is it possible to calculate the burden of disease and economic cost analysis for the health effects of light pollution?

Dr Luke Price: These are important questions to me and in my work. But it is important to emphasise that light pollution is a part of what I study and give advice on—namely, the effects of light on health, including light exposure at all times of the day. In the last 14 years, I have looked primarily at circadian rhythms, and light pollution can have a disruptive role in the regulation of them. I am aware that the evidence base for light has been sufficient for a while now to consider taking action, but I could not comment on the evidence base for noise because I do not know it very well.

One potential difference is that, 20 years ago, there was a series of breakthroughs in light and health. We now recognise that the eye has additional photoreceptors that are instrumental in helping to set the central clocks that synchronise the circadian rhythms of all the different tissues around the body. So the literature has flourished and expanded rapidly since then, and we are starting to see many more investigations into specific health conditions now—whereas, earlier on, they looked more at the central area of how that synchronisation was going on and how these photoreceptors were working. In light's systemic physiological health role, it is the primary giver of time information into the system, so as an agent for health it has a particular central role, which would not compare to other agents as easily.

Lord Borwick: It would be easy to do studies on, for example, pilots regularly upsetting their circadian rhythm as they fly to the Far East or America. On the other side, studies could look at blind people, who are presumably not upset by light.

Dr Luke Price: Because a subset of blind people's pupils did not respond when light was shone in their eyes, it was thought that they did not have functioning eyes, but in several cases, if the light was shone in their eyes for 30 seconds, their pupils would have constricted. There were others whose eyes were removed for health. Once these people's eyes were removed, they went from having a well-regulated circadian rhythm, and being able to sleep at night, to free-running, which means that their period of sleep would drift. So they would go through periods where they might sleep in the middle of the day and it was very difficult for them to function in society. This was on top of them being blind.

Lord Borwick: But does that result in a lower life expectancy?

Dr Luke Price: I do not think the epidemiology has followed those people to see whether it results in a lower life expectancy, but I would be extremely surprised if it did not, because their quality of sleep is not being regulated by the normal system.

Lord Borwick: What about pilots and cabin crew?

Dr Luke Price: Our group studied pilots, but our opportunity was to look at their exposure to ultraviolet radiation and any relationship with cataracts. I was not involved in that work, but I could provide some evidence afterwards if that is interesting.

Lord Borwick: But did it come out with big health effects from the light pollution that they face?

Dr Luke Price: I would not want to comment on my colleagues' work without verifying that, but we did not get an opportunity to study sleep or circadian rhythms.

Baroness Northover: When were those operations done on blind people, and what on earth was the reason behind that?

Dr Luke Price: Again, I am aware of this, but was not involved in it. I imagine that the reasons are some other types of eye diseases that it was felt might spread.

Baroness Northover: When was that?

Dr Luke Price: From what I understand, that was going on into the 21st century.

Baroness Northover: Was it over a span of decades?

Dr Luke Price: Potentially.

The Chair: If there is any further information, could you give it in writing?

Dr Luke Price: Yes, of course.

Q117 **Viscount Hanworth:** Some 50 years ago, I was working on the construction of the Victoria Tube line. We alternated between one week on day shifts and one on night shifts. Are there now any regulations to prevent such an injurious schedule?

Dr Luke Price: I am very conscious that the Health and Safety Executive—the HSE—is the lead on shift-work regulations. We have undertaken research on nurses undergoing shift work in order to ascertain their light exposure, both in the UK and with our partners in Germany at the Federal Institute for Occupational Safety and Health. In the UK, we saw NHS nurses with 12 and a half hour shifts, often working three or four night shifts on their schedules, which did not rotate; they were allocated, with time for a break after doing some night shifts, and fitted into the roster as well as possible.

In Germany, we saw nurses from around the hospital, rather than in one concentrated team, doing eight and a half hour shifts, and largely rotating. We saw some advantage to that system: it had shorter hours, and their exposure to light, when they went home from the night shift, was not as great as in the UK. The big sleep opportunity for the nurses in the UK, as well as for all the social activities they had to do, came immediately after they commuted home. So they had a large outdoor exposure to light, and then they had to try to sleep and get ready for the following 12 and a half hour shift.

Viscount Hanworth: I was wondering about the strength of the discouragements nowadays, if there are any, to prevent the sort of thing that we were exposed to. But are you saying that a different department regulates this?

Dr Luke Price: Yes, as I understood it when we did the research, the regulations come through the working time directive.

Dr Edward Wynne-Evans: I feel that the committee is trying to get at a slightly wider point on both light and noise. One of our big challenges is, as always, how you show where the risks potentially are with environmental hazards. Our challenge has been moving from “It’s all about Covid” to “It’s infectious diseases” to “Actually, the main thing is an all-hazards approach”. In the all-hazards space, it is often easier to show what the risks are for acute hazards and show why they are important.

Particularly in the teams I lead, we try to demonstrate the risks and potential risks from chronic exposures to light and noise, which is what we are talking about. It is fair to say that, although the evidence base for both is good, it is certainly better to demonstrate the burden of disease in the noise area. On light, we want to work with other bodies to expand that base and demonstrate the potential costs, which you can then balance against other benefits from shift work and other things.

The Chair: So, just to play that back to you, are you saying that for light, unlike for sound, we do not yet have the data to carry out a cost-benefit analysis of quality, adjusted life years or whatever metric you use as the currency of benefit or cost?

Dr Edward Wynne-Evans: We have it for some parts of sound, particularly traffic noise, but we do not have as good an evidence base for light. We would like researchers to help us to generate that evidence so that we can demonstrate the potential cost, and others can show that

generating the noise or light has other benefits. It is about looking at it in the round.

The Chair: Dr Fenech, would you endorse that, for sound, there is enough data to do some calculations of the quality-adjusted life years lost through exposure to road or aircraft noise, for example?

Dr Benjamin Fenech: Yes, that is correct. To carry out a burden of disease assessment, which is what we are talking about, you need a number of things. One of the most important is a good quality quantification of the exposure to noise among the population of interest; in our case, it is the wider public. We have that for transport noise thanks to the mapping commissioned by Defra and by airports.

You then need good evidence for the link between noise and certain health outcomes, evidence of their severity, data on their prevalence and incidence in the community, and evidence of the exposure-response relationships—which link the exposure to the health outcomes. That is why we are better able to do it for sound: it is primarily because of the availability of exposure datasets.

The Chair: That leads very neatly into the next area of discussion, which Lord Winston will lead on.

Q118 **Lord Winston:** Dr Fenech, as a committee we are lost because we hear a lot of claims all the time, in virtually every meeting, about the effects of both noise and light, particularly noise, on heart disease, blood pressure and stress, whatever that means. It even goes as far as claims about cancer. The problem is that, although you say that a lot of research is increasingly going on, we have not heard of it. No one cites it to us.

First, it would be helpful to hear from you the extent to which noise pollution justifies the guidelines, or whether they should be changed or increased. You also claimed that the research councils, for example, are investing in research, but how much research is actually going on in a way that would be meaningful in epidemiological terms?

Dr Benjamin Fenech: Thank you for the question. Again, I will try to break it down. Let us start from first principles. We are talking about health, and the WHO's definition of health is "a state of complete physical, mental and social well-being". For many decades, we have known that noise affects health, primarily from a psychological perspective—for example, through long-term annoyance and sleep disturbance, which are specific to noise, so it is relatively easier to prove causality. You mentioned things like cardiovascular disease and metabolic disease. Noise is obviously not the only risk factor for the development of these diseases—there are a number of others—so proving causality is more complex, but that does not mean that it is not possible. There are well-established methods to do that. In the first evidence session, Professor Hansell made reference to the Bradford Hill criteria.

Specifically for noise, some criteria are particularly relevant, such as temporal sequence: what comes first, the exposure or the disease? So we put more emphasis on studies that follow people over time. You watch

the development of the disease in people in different exposure bands: are there more cases of people exposed to higher noise levels developing disease than people who are less exposed? There is also consistency of association. We do not rely on a single study to determine causation: we look at whether the same, or similar, effects have been observed by a number of studies carried out by different research institutes in different populations using different methods. Seeing consistency there gives you more confidence. Additionally, is there a dose-effect relationship—as the noise increases, is there an increase in the risk? Yes, we see that. Finally, is there a plausible hypothesis for these effects occurring? Yes, there is: it is all based on the stress hypothesis and how our bodies deal with stress

Lord Winston: How do you measure stress?

Dr Benjamin Fenech: Experimental studies show that when human beings are in stressful situations there are changes in heart rate, blood pressure and the release of stress hormones. That is perfectly fine if it is acute stress—if you need to deal with a situation—but the problems arise when it is long-term stress and when stress hormones, like cortisol and adrenaline, are released over months and years. This creates an imbalance in the body, which is a risk factor for cardiovascular and metabolic health outcomes.

Q119 **Baroness Northover:** On the point about the WHO, I gather that you did some research that shows that the UK's approach differs from that taken by the WHO. Could you expand on that? In particular, has the UK policy response to noise pollution caught up with the WHO's 2018 environmental noise guidance?

Dr Benjamin Fenech: We did that research shortly after the evidence reviews that informed the WHO guidelines were published. We wanted to understand in detail the evidence underpinning the guidelines and the guidance in the UK. We found that, yes, the WHO guidelines were informed by more recent evidence. Our research informed the initial discussions held by the Interdepartmental Group on Costs and Benefits (noise subgroup)—the IGCB(N). As a result, as a group, a number of reviews were commissioned. This is because, although the WHO guidelines were published in 2018, they are based on scientific evidence and studies published up to 2015. To give you an idea of the pace of the evidence, we recently did a review of transport noise and ischaemic heart disease, and we identified and included 20 studies from a period of approximately 30 years—1994 to 2022—of which half were published in the last five years, that is after the WHO guidelines' cut-off.

On your question about whether policy is keeping up, as I said, Defra, which leads the IGCB(N), has commissioned a number of reviews, and I am sure it will be happy to provide a complete list of them. On the wider question about the policy response, the scientific evidence allows you to quantify the risk. It is then up to policymakers to decide on an acceptable level of risk in a broader environmental, social and economic context. So the evidence is just one piece of information that policymakers need to consider.

The Chair: You mentioned that half of the 20 papers in your search were published post 2015. Did they tend to show that the risk to human health is bigger, smaller or about the same than was concluded by the WHO? In other words, which way is the needle moving?

Dr Benjamin Fenech: Broadly, they are the same, but you have to think about different noise sources and health outcomes. For example, we now have more studies on rail and aviation.

Coming back to your question, we are seeing studies involving larger populations of tens of thousands, of hundreds of thousands—and sometimes of populations in the millions, which is whole countries. We have better exposure datasets, so the noise-exposure models are getting more refined, which is very important when getting information at lower exposures, on whether there is a threshold of effect and whether it starts at a certain level.

There is also better controlling for confounders. As I said, ischaemic heart disease is influenced by many other factors, including social-demographic and lifestyle factors. The newer evidence has better control for these, but in general, when taken as a whole, it still shows that there is a relationship with noise when you control for these confounders.

The Chair: I read the WHO report when it came out in 2018, and the simple message was, “Noise is a worse health problem than we had thought. It is a more important health problem than previously assumed”. Is that still the case?

Dr Benjamin Fenech: It depends what you mean by worse.

The Chair: I mean that it affects more people.

Dr Benjamin Fenech: The data suggests that exposure is increasing, but we also think that the effects are starting at a lower level than we previously thought. Historically, we were talking about the 65-decibel range, whereas we are now shifting down to the 55-decibel range for long-term exposure.

Baroness Northover: So in effect you are saying that the WHO 2018 guidelines are a base and that, now that we know more, we should perhaps address this in a more nuanced, sophisticated and effective way.

Dr Benjamin Fenech: Yes, and that is the primary reason for commissioning more up-to-date and systematic reviews of the evidence—to make sure that we are capturing the latest evidence to inform decision-making and policy-making.

Baroness Northover: Is that also being done and taken forward across the EU?

Dr Benjamin Fenech: Yes. It would be fair to say that Europe leads the noise and health research field—that is not to say that other countries do not do anything in it—and there is a reason for that. One of the EU directives, in the early 2000s, was to generate strategic noise mapping across entire countries. That gave European countries better exposure datasets, which allow these epidemiological studies to take place.

Baroness Northover: Is that for noise?

Dr Benjamin Fenech: Yes.

Q120 **The Chair:** I have a couple of questions about the research. During this inquiry, some of us have felt that, as health issues, noise and light pollution are slightly like Cinderella. We read a lot about air and water quality, the loss of habitats and the degradation of the environment, but we hear relatively little about noise and light pollution. Overall, in the Health Security Agency remit, does the resource committed to noise and light pollution match its importance? This is a chance for you to advertise your work.

Dr Edward Wynne-Evans: Dr Fenech can start, and I am more than happy to help.

Dr Benjamin Fenech: Of course. From one perspective, burden of disease assessments have a role in comparing the disease burden. It is perhaps a bit simpler to do that for noise and air pollution. We know that air pollution has a bigger disease burden than noise, but you have to be careful with comparisons, because there are different assumptions and methodologies for different hazards. For example, air pollution assessments do not factor in the more psychological aspects; it is more physiological. However, it gets increasingly complex, as was mentioned, once you start to compare chronic, acute and infectious or non-infectious diseases.

Dr Edward Wynne-Evans: The committee has probably got to the heart of the matter: how do you weigh up the differences between them? My directorate has an environmental public health programme board, and one of the new programmes we are setting up looks specifically at the indoor environment and the risks across different exposures. Light and noise will be of direct interest to this committee, but it looks at other things as well: ventilation, buildings' temperatures, radon exposures and other things that may affect the internal environment.

There are potential risks in mitigating some of these. If you open a window to improve your ventilation, for example, you potentially make your risk of noise exposure greater. So how do you mitigate noise exposure compared with ventilation, when, if you improve one, you potentially make the other worse? So we are starting to work on having the resources to pull those together to have a greater understanding of where things compete.

Q121 **The Chair:** I have a couple of other quick points, primarily on noise, so I will focus on Dr Fenech. In synthesising and analysing noise research, do you identify gaps in it? You talked about one—namely, how you tease out the confounding variables—and you began to say that some of the newer literature is better at that. But do you have a list of where you need more research to fill the gaps to support policy?

Dr Benjamin Fenech: Absolutely, that is a very important point. Coming back briefly to the burden of disease, an important outcome of that work is finding out how big the burden is, but an equally important outcome is

the uncertainties when you do that, because policymakers need to understand those areas of uncertainty.

On further research, there is a long list, but, in summary, we need more longitudinal research on certain noise sources. We have less research on railway noise compared to road-traffic noise, for example. We also have less research on things like obesity compared to cardiovascular disease, and much less research on sources of noise other than transport, such as neighbourhood noise, long-term construction noise and industrial noise.

I will also mention the need of research using different noise exposure metrics. Most of the research is based on long-term average metrics, but the spatial and temporal characteristics of noise are changing. For example, individual cars are getting quieter, but there are more of them. So I suggest using different metrics. Of course, once you identify a problem you can do something about it; you can research the effectiveness of interventions, to reduce not just exposure but the health burden. That is still lacking. Finally, there are equity and equality considerations: consideration of the variability of effects across the population is also lacking.

The Chair: This is very helpful. Some of our witnesses spoke about the concept of soundscape. Is this on the radar screen of the UK Health Security Agency?

Dr Benjamin Fenech: Yes, it is. There was a lengthy conversation about that in the previous session. The way I see soundscapes, there are three concepts: the physical agent, which is the sound; the person; and the context in which the sound is experienced. From our perspective, the importance of the soundscape approach is, first, that it shifts the focus from the agent—the sound—to the effect on people and on biodiversity, of course.

The second important thing about soundscapes is that the concept includes both the negative and the positive effects. Sound can have a positive effect—for example, in good-quality green space. Linked to that, as you have probably heard, are non-acoustic factors, which are factors other than the acoustic dose that also influence the effect of noise on health. We think that is important, because non-acoustic factors have a big role to play in improving health outcomes, particularly at the lower exposures, where it can be technologically and economically unfeasible to deal with the exposure itself.

So the quick answer to your question is that it is certainly on our radar, and we are interested in it.

- Q122 **Baroness Neuberger:** I have a quick question that has probably been asked too much. In your response to Lord Winston, you spoke particularly about evidence on the health effects growing between 2018 and now, and you spoke about the literature looking much better. Could you write us a note on that? It would be enormously helpful for this committee to understand how it has changed since 2018.

Dr Benjamin Fenech: Yes, if it is useful or helpful, I can perhaps point to a couple of individual studies, and you can see the level of detail that goes into controlling for confounders, et cetera.

Baroness Neuberger: That would be hugely helpful.

The Chair: I will give Dr Fenech a rest now by moving on to Lord Sharkey, who will pick up the questions about light.

Q123 **Lord Sharkey:** Yes, I will move back to light. Dr Price, in your view, is the state of the evidence base for the health impacts of light at night sufficiently good to justify guidelines such as the Manchester guidelines? Regardless, how aware of these guidelines is the wider community? How should they be used? I know that sounds a bit like asking for guidelines about guidelines.

Dr Luke Price: I should disclose being one of the authors of the Manchester guidelines. Like my co-authors, I felt that the primary advice that was already being given could be turned into action at this point. We framed those guidelines specifically for policymakers, among others, to investigate what should be taken forward into policy. We obviously represented the strength of the evidence.

They are not premature. In the publication in 2014, we anticipated the basic review philosophy that came through in the guidelines in 2022. So we now have the benefit of a rigorous meta-analysis; support from a wide variety of different study types, including epidemiology; and a series of longitudinal studies in Japan that measured the light in people's environment, which we lack in the UK. If we got those measurements, we could translate the results to a certain extent. So we know about the timing of light exposure and that, in the case of light pollution, there is a time for darkness or a reduced level of stimulation from light. We know about the amounts that do this and about the spectrum that can be changed in order to try to avoid stimulating too much at night.

Lord Sharkey: Does this lead directly to an assessment of the burden of ill health imposed by not doing what you propose? If that is not clear, I am trying to find out the strength of the evidence base used to construct the guidelines. Does it go back to telling people the exact benefits of reducing exposure to light at night?

Dr Luke Price: The effects are mediated through circadian rhythms in a large number of aspects. In the short term, you can see sleep quality changing on the same night, or within the space of a few days. The health effects we are primarily interested in are the disruption to circadian rhythms because of light, as a mediator of, or risk factor for, long-term diseases. Lots of individual studies link disrupted circadian rhythms with different disease outcomes, and we know that light is the primary synchroniser of them. As I say, we know how to quantify and assess it; we just need to measure what people are exposed to, so that we can start to get some idea about the burden.

Lord Sharkey: Presumably, you also take account of the disbenefits from reducing lighting at night. I am thinking of safety for pedestrians

and so on. How do the guidelines weigh the disbenefits against the benefits of reduced lighting?

Dr Luke Price: This is a very important point. We considered different ways of presenting the guidelines in terms of a ratio of the lighting spectrum, so you would have a lighting spectrum that was suitable for evening use, which would support vision without stimulating the system. In the end, we felt that that could be used by engineers and designers on their own and we needed to specify what was actually having this effect. We looked at levels and said that, if you keep to this guideline in the evening, the visible amount of light you would have is not very different from what we have at the moment—in some cases more, in some cases less.

Q124 **Lord Sharkey:** I will ask about LEDs a bit. We have heard a lot about the proliferation of LEDs in this inquiry. What are the major health impacts of the rise in penetration of LEDs? We have also heard mention of flicker and glare. Do LEDs contribute significantly to those problems?

Dr Luke Price: One thing that we have seen in a couple of generations of lighting technology is that the technology itself is not associated with poor lighting, but it has particular features because of the way it is implemented. There is nothing intrinsically unhealthy about LEDs but, if they are more energy efficient, we can use more of them and light more. We can create more control of the spectrum and we particularly see a lot of lighting with a higher colour temperature and more spectral content in the area that stimulates circadian rhythms. It can also be designed so that there is less.

On glare, flicker and these other topics, we undertook some research for the Chartered Institution of Building Services Engineers and its allied professional body, the Society of Light and Lighting. In that, we included a batch of street lights that were provided to us by lighting manufacturers in 2015. We were happy to see that this sample did not have a particular problem with flicker. We noticed that they produced hot spots—so in each case the optics of the street light were not sufficient to stop you having a view of the bare LED chip. When the light was attenuated by a simple filter by a factor of a million, you could still see these hot spots, which have the potential of being visually uncomfortable. We are basically encouraging that the right optics go on the street light to stop that problem, but this is primarily a visual problem and outside our remit slightly.

On flicker, we have collaborated with the former BEIS department in responding to the EU consultation on ecodesign directives. We were successful in reducing the threshold for flickering and higher-frequency modulation through that consultation, although we did not get everything that we wanted out of that and other people were trying to have as relaxed a regulation as possible.

Lord Sharkey: What about glare?

Dr Luke Price: We did not comment on glare.

Q125 Baroness Neville-Jones: I want to talk about the communication of your research outcomes. Before that, when you talked about collaborating on research work, I got the hint that you also commission research. Do you have a research budget, which you can control, or is somebody else the budget holder and you have to bid? I just want to know whether you have any money.

Dr Benjamin Fenech: Our primary engine for noise research is via the Health Protection Research Units, which are funded by the National Institute for Health and Care Research—NIHR. They are not led by the UKHSA, but we work in partnership with different universities. On noise, we work with the University of Leicester, which has an HPRU on environmental exposure and noise is one of its topics.

We can also bid in partnership with other academic institutions for funding in specific areas, but we do not have a specific pot of money for primary research.

Baroness Neville-Jones: So you have to hunt around for bodies, organisations and people who might be interested in doing the work that you would like to see. Is that what it amounts to in practice?

Dr Edward Wynne-Evans: We are not designed to commission research; the UKHSA has not been set up to do that.

Baroness Neville-Jones: Has any body, or is this simply not considered an object of specific research?

Dr Edward Wynne-Evans: It comes through UK research institutes via the HPRUs. Potential academics may themselves be interested and there will be funding for which they could bid.

Baroness Neville-Jones: Could they do that through government?

Dr Edward Wynne-Evans: They could bid for available funding streams through government, but we do not tend to commission research in specific areas directly.

Q126 Baroness Neville-Jones: That does not make life easy, does it? I turn to the question of what happens when you do have some research outcomes. Dr Fenech, you said, it seems rightly, that the scientific evidence is expanding quite rapidly and that the great advantage is that it then gives you a basis to quantify the risk. It would be interesting to know which government departments are your main clients to quantify the risk. Who would be interested in the results that you produce? The question I want to ask is whether, as a result of your available evidence, they are actually interested in quantifying the risk. In your view, is it changing the way that departments deal with risk issues in relation to sound and light?

Dr Benjamin Fenech: The short answer is yes, government departments are interested in the best available evidence. We have been working closely with Defra on noise since I started at Public Health England. As I mentioned, Defra is responsible for the noise exposure

datasets, but it also chairs the IGCB—the Interdepartmental Group on Costs and Benefits.

I have been working with the Department for Transport on aviation noise, again for a long time. For example, I sit on a stakeholder group called the Airspace and Noise Engagement Group. When specific questions arise about the scientific evidence, I am there to provide that advice. Then I work with other government departments on a topic or project basis. For example, when the then BEIS had a review of the health effects of wind turbines, I sat on the advisory panel. I also sit on advisory panels for ongoing research commissioned by the Department for Transport.

So, yes, there is that interest across government. Once our findings from the work on the burden of disease are published, we will be engaging with the Department for Transport, Defra and others, so that they can understand what we have done, how we have done it and what the results mean.

Baroness Neville-Jones: Is the departments' interest in the context of some new aspect of policy that they are trying to introduce? Take wind turbines, for instance; I can see that there could well be arguments about noise. But are departments interested in the effects of noise more generally? I take what was said about roads; we have quieter cars but more of them. There are ongoing issues that affect people's daily lives, but not an actual event—the introduction of a new aspect of life. Is policy really evolving in that area?

Dr Benjamin Fenech: You are right that it is important to separate between new sources—or new exposures, so to speak—and existing exposure. Obviously, tackling existing exposure from something like roads or transport which has a clear societal benefit is a challenge. Again, for example, National Highways, which is responsible for the strategic road network, has a programme of tackling existing exposure. At the moment, it focuses on the top 1% of those exposed for existing noise, but I believe that the question of prioritisation, with a lot of other factors which ultimately influence health, is more suitable for it.

Dr Edward Wynne-Evans: As Ben said, our challenge, as always, for a potential chronic exposure or chronic risk, is how do you make the case and continue to make the case? It is one of the things that we do routinely across the piece, but departments have other things they need to consider too. As Ben alluded to, there are economic benefits for many of these things, and you need to consider it in the round. One of the things we are pushing is that, if you can consider your risks at this point, it may be cheaper in the longer run to have considered them and done something about them now rather than, in five, 10, 15 or 20 years, potentially mitigating against a future risk. That is the nature of the conversations that we are trying to have.

Baroness Neville-Jones: Does it have an effect?

Dr Edward Wynne-Evans: It is always a challenge, because it is a longer-term view, which is always much harder to get people to engage with, but in many of these areas—particularly Defra holding the ring on

the environmental area—there are longer-term plans where people wish to see these come through to get the benefits there.

Baroness Neville-Jones: I read the department's written evidence. It says that it reckons that government policy is—what was it?—effective and proportionate. That phrase occurs several times, in relation to both sound and light. It made me wonder, really, whether it thought that there were any gaps at all in policy. It certainly did not concede in its evidence that there were. I wonder what the nature of the dialogue is.

Dr Edward Wynne-Evans: It is pushing and saying, "What do they want to consider in the round about a particular problem? What would they like to do now? How do they look into the longer term?" It is potential short-term benefits and short-term risks against longer-term ones, and it remains our ongoing challenge. Noise or light feeds into the burden of disease work, to have a better understanding of how big, potentially, the risks are.

Q127 **Lord Holmes of Richmond:** Good morning to our witnesses, and thank you for taking the time to be with us. If you could recommend specific additional studies to improve the evidence base for policymakers concerned with noise and light pollution, what would they be? Can I start with Dr Wynne-Evans, please?

Dr Edward Wynne-Evans: I might pass the question over to my colleagues, it being on their expert areas, if I may.

Lord Holmes of Richmond: Neatly done, and very brief. Thank you.

Dr Luke Price: We would like to see studies with more measurement of the light in people's homes, in their bedrooms, and directly outside their windows as well, to see what the exposure levels are. These could be tied into a number of different prospective studies, ideally, looking at different health outcomes.

Dr Benjamin Fenech: I have already alluded to some research earlier, but I will come back to making the case for action. It is about making sure that we are quantifying as accurately as possible the burden of ill health attributable to noise. Again, we are refining those links between different noise sources and different health outcomes, but also strengthening the evidence of what you can do about it. I emphasise that it is about not just reducing the decibels—the noise exposure—but ultimately improving health outcomes, taking into consideration interactions with other environmental factors.

Lord Holmes of Richmond: Luke Price, has there been any research done on different light sources—say, a full moon shining in your window? Is moonlight light, or is that specifically different from your street light blazing in?

Dr Luke Price: The question comes down to the intensity in the spectrum of the light, because from a distance most light will fill the whole window. The level of moonlight is reasonably low, but is sufficient to cause a little bit of disturbance to sleep. In the work we did with CIBSE

and SLL that I mentioned earlier, we advised that the colour of the street lights was fairly high and could be reduced. There are other countries that have controls or recommendations to reduce the level of the colour temperature.

Lord Holmes of Richmond: Which country would it be beneficial for us to look at for that?

Dr Luke Price: France has it, and I am aware that the American Medical Association has recommended lower colour temperatures.

The Chair: I will just ask Dr Fenech a question that relates to the last point you made about the quality of light. In terms of the quality of sound, do you, in the research you analyse, consider different wavelengths—different pitches of sound—and also different patterns of intensity? You could look at a sound envelope over, say, five hours and say what was the total sound energy that people were exposed to, or if it was a pulsatile source, you could look at the peaks and ask, “Which are more damaging, the total envelope or the peaks of intensity? Does that interact with frequency?” Is that the sort of area that there is data on?

Dr Benjamin Fenech: It is starting to be looked at. As I said earlier, a lot of the evidence is based on long-term averages, and that is because of the nature of epidemiological studies when you consider large populations. However, there are some researchers, particularly from Switzerland, who have looked at what they call intermittency: is the noise constant, or is it broken up? They seem to be suggesting that both are important in different ways, both the average level but also intermittency can play a role in affecting health. This finding can be linked to the biological hypothesis. If you have a number of discrete events, every one of them increases the risk of disturbing your sleep, so there is a link there, but it is still early days.

The Chair: I thank our three witnesses for their evidence. The session has been very helpful and you have been very clear. There were one or two things that you kindly offered to follow up in writing, including the point that Baroness Neuberger raised with you. Also, if you think of any points that you would like to have made but because of our questioning you did not have a chance to make, or they slipped your mind at the time, do feel free to add those as well. As I said at the beginning, you will receive a transcript of the session very shortly, and if you wish to make any minor corrections, please feel free to do so.