Anonymous written evidence

Introduction

I am writing this as a clinical psychologist, and as someone affected by multiple chemical sensitivity (MCS) and chronic fatigue syndrome. I am submitting evidence for the following reasons.

- People affected by MCS do not receive adequate recognition, healthcare provision or support. Their voices are largely unheard.
- My impression is that environmental factors are neglected in healthcare provision across a wide range of conditions e.g. medically unexplained symptoms, cancers, neurodevelopmental conditions etc. Current health service provision appears to neglect the social determinants of health.
- Concerns about the prevalence and impacts(s) of conditions like chronic fatigue, autism, and cancer.

Terms of reference

1. What evidence exists of the extent of air pollution directly or indirectly impacting individuals or communities in England.

General health impacts

It has been estimated that 6% of the world's disease burden (including cancers, chronic diseases, neurological and developmental disorders) and 8% of deaths are attributable to chemicals (European Environment Agency (EEA), 2022). Everyday exposure to multiple chemicals have also been suggested to contribute to the increasing prevalence of asthma, autism, childhood cancer, medically unexplained symptoms (Zhang & Smith, 2003). In relation to psychological wellbeing, a wealth of neuropsychiatric, neurodegenerative, and neurodevelopmental conditions have been associated with synthetic chemicals and pollutants (Arab & Mostafalou, 2022; Dickerson et al., 2020; Farrow et al., 2003; Jacobson et al., 2022; Kaikai et al., 2023; Moore et al., 2022; Rauh & Margolis, 2016; Umukoro et al., 2019; Zhuang et al., 2023; Zundel et al., 2022). For example, Zhuang et al's (2023) cross sectional study provided evidence that benzene and ethylbenzene exposure are positively associated with depression. This is concerning given that these chemicals are found in products like inks, dyes, plastics, and detergents. Equally, Zundel et al.'s (2022) literature review reported that 73% of the 111 studies that they evaluated associated air pollution with increased internalising symptoms. In an experiment in mice, Umukoro et al. (2019) found that exposure to a commercially available solid air freshener was associated with anxiety and depression type behaviours and impaired memory.

Research to date has been fraught with methodological challenges and limitations and this has limited how conclusive studies have been. Common issues have included an over-reliance on cross-sectional studies, use of small samples, crude measures of chemical exposures and self-reporting (Arab & Mostafalou, 2022; Freire & Koifman, 2013). More research is also needed regarding how synthetic chemicals and pollutants might impact health. Currently, studies have implicated a variety of direct and indirect pathways such as inducing oxidative stress, inflammatory responses, immune dysregulation, endocrine disruption, genetic alterations, neurotoxicity, and altered neurotransmission (Arab & Mostafalou, 2022; Umukoro et al., 2019).

One promising avenue of exploration is the microbiota-gut-brain axis which has increasingly been implicated in some neurodevelopmental, neuropsychiatric, and neurodegenerative conditions (Kaikai et al., 2023).

The case of MCS

MCS is also known as ‘toxicant induced loss of tolerance’ and ‘idiopathic environmental intolerance’ (Azuma et al., 2015; Steinemann, 2018b). It is a chronic condition characterised by adverse reactions to low levels of everyday synthetic chemicals and pollutants (Driesen, Patton, & John, 2020). For example, those found in many perfumes, air fresheners, cleaning products, toys, exhaust fumes, food, furniture, new carpet, paint, and renovation materials (Driesen, Patton, & John, 2020; European Environment Agency, 2022; Steinemann, 2018a). At least 151 different symptoms have been associated with MCS (Labarge & McCaffrey, 2000). However, commonly reported symptoms include migraines, depression, anxiety, fatigue, irritability. cognitive impairment, breathing difficulties, nausea, heart palpitations and skin problems (Labarge & McCaffrey, 2000; Steinemann, 2018a, 2018b, 2019).

Nationally representative population studies (in Australia and the United States) reported that 6.5% and 12.8% of their populations respectively have been formally diagnosed with MCS (Steinemann, 2018a, 2018b). However, these figures likely underestimate the scale of the problem given that the prevalence of self-reported chemical sensitivities tends to be higher. Steinmann (2019) estimated this to affect 16.3% of the UK population. The proportion of people with MCS appears to be increasing too. In the last decade, the prevalence of medically diagnosed and self-reported chemical sensitivities have increased 300% and 200% in the US (Steinmann, 2018b). That said, these changes could reflect improved awareness and diagnosis of the condition.

MCS lacks diagnostic recognition and has uncertain aetiology. Some researchers have concluded that MCS is a psychological disorder, but recent research is indicative of a biological aetiology (Eaton et al., 2022; Molot, Sears & Anisman, 2022).

The lack of diagnostic recognition and psychologising of MCS has had considerable ramifications for people living with the condition. This has been to the detriment of their quality of life. This is because it has led to stigma, disbelief, and lack of support from significant others (Driesen et al., 2020). This includes health and welfare services (Gibson, Horan, & Billy, 2016; Lipson, 2004; Soderholm, Soderberg, & Nordin, 2011). For example, people (like friends, family, and employers) are often unable and / or unwilling to make the kinds of accommodations that people with MCS need to access everyday environments where chemical use is ubiquitous (Driesen et al., 2020). As a result, people with MCS are often excluded from social and occupational activities and forced to live painfully isolated lives (Driesen et al., 2020). The shocking lack of care and compassion directed at people with MCS was most recently highlighted by the tragic case of Sophia who was a 51-year-old Ontario woman (Cecco, 2022). Sophia was reportedly granted medically assisted suicide when authorities repeatedly failed to meet her needs for suitable housing. She simply needed an affordable place to live that was free of cigarette smoke and chemical cleaners. Similarly, Ms Lucas (a 61-year-old woman) drowned herself owing to the distress caused by living with the condition (Vincent, 2021).

Are the current national targets for outdoor air pollution ambitious and wide ranging enough to provide adequate protection for public health.

Over two thirds (of the 300 million tonnes) of chemicals that were consumed in the EU in 2018 were classified as hazardous to health (EEA, 2022). Furthermore, many chemicals that are in use are insufficiently tested for their health impacts. A report by the EEA (2019) suggested that, of the 100,000 chemicals on the market in the EU, 70,000 are poorly characterised for their hazards and exposures (EEA, 2019). A particular limitation of safety testing is that classic toxicology is based on establishing safe limits for isolated chemicals (Eaton et al., 2000). This situation is divorced from the reality of everyday exposures in which chemicals and pollutants combine. Just because individual chemicals are safe, it does not mean that this holds true when they combine with others (Eaton et al., 2000). Equally, it is notoriously difficult to establish causal links between exposures and health if the effects are long-term and / or involve other factors. This was evident in the challenges involved in linking smoking. dietary factors and coronary heart disease (Eaton, 2000). A further concern is that when specific subgroups are more susceptible, the hazard(s) could remain concealed unless the effects are very acute. Finally, there is the issue of the cumulative effects in the context of persistent chemicals (Eaton et al., 2000).

What are the differential impacts (geographical and across socioeconomic groups) of poor outdoor and indoor air quality?

Synthetic chemical and pollutants are an equality issue because some structurally disadvantaged groups will be more vulnerable to chemical exposures by virtue of low-quality housing, food, and nutrition (Rauh & Margolis, 2016). Additionally, their potential to be harmed by these exposures will be increased by the psychosocial stress of living in adversity which will add to their overall level of 'toxic stress' (Rauh & Margolis, 2016). Children and young people are particularly vulnerable given critical windows for development and their greater consumption of food, water, and air per pound of body weight (Rauh & Margolis, 2016).

Proposed actions

Research

Promote research in the following areas;

- The aetiology and treatment of multiple chemical sensitivity.
- The health impacts (and mechanisms of action) of synthetic chemicals and pollutants; particularly in relation to neurodevelopmental, neurodegenerative, and chronic conditions (including medically unexplained symptoms such as chronic pain, chronic fatigue. and fibromyalgia).

Regulate

- Prohibit the use of fragranced products e.g. perfumes, scented cleaning products and air fresheners in public places (including places of work).
- Improve safety testing in indoor public establishments.
- Impose stricter air quality regulations which require regular testing by owners of public establishments.
- Require the use of air filters in indoor public places.

- Make MCS a recognised disability in the UK for which people can receive reasonable adjustments from employers and access to benefits such as suitable accommodation.
- Improve legislation around the use of words like 'natural' on products.

Educate

- Increase public and professional awareness of the impact of synthetic chemicals and pollutants found in everyday products on health. This should include health professionals who can support patients in these regards.

Service provision

- Develop holistic, specialised, evidence-based healthcare provision for people with MCS. This should be underpinned by NICE recommended care.
- Incorporate guidance on managing indoor air quality in the assessment and treatment of people with all relevant conditions (as indicated by research).

May 2023

References

Arab, A., & Mostafalou, S. (2022). Neurotoxicity of pesticides in the context of CNS chronic diseases. In *International Journal of Environmental Health Research*, *32*(12), 2718–2755. https://doi.org/10.1080/09603123.2021.1987396

Azuma, K., Uchiyama, I., Katoh, T., Ogata, H., Arashidani, K., & Kunugita, N. (2015). Prevalence and Characteristics of Chemical Intolerance: A Japanese Population-Based Study. *Archives of Environmental and Occupational Health*, *70*(6), 341–353. https://doi.org/10.1080/19338244.2014.926855

British Psychological Society (2019). Standards for the accreditation of Doctoral programmes in clinical psychology Retrieved May 11, 2023, from https://cms.bps.org.uk/sites/default/files/2022-07/Clinical%20Accreditation%20Handbook%202019.pdfCecco, L. (2022, May 11).

Cecco, L. (2022, May 11). Are Canadians being driven to assisted suicide by poverty or healthcare crisis? *The Guardian.* Retrieved May 11, 2023, from https://www.theguardian.com/world/2022/may/11/canada-cases-right-to-die-laws

Das-Munshi, J., Rubin, G. J., & Wessely, S. (2006). Multiple chemical sensitivities: A systematic review of provocation studies. In *Journal of Allergy and Clinical Immunology*. *18*(6), 1257–1264. https://doi.org/10.1016/j.jaci.2006.07.046

Dickerson, A. S., Wu, A. C., Liew, Z., & Weisskopf, M. (2020). A *Scoping* Review of Non-Occupational Exposures to Environmental Pollutants and Adult Depression, Anxiety, and Suicide. In *Current Environmental Health Reports*, *7*(3), 256–271. https://doi.org/10.1007/s40572-020-00280-7

Dries en, L., Patton, R., & John, M. (2020). The impact of multiple chemical sensitivity on people's social and occupational functioning; a systematic review of qualitative research studies. In *Journal of Psychosomatic Research* (Vol. 132). Elsevier Inc. https://doi.org/10.1016/j.jpsychores.2020.109964

Eaton, K.K., Anthony, H.M., Birtwistle, S., Downing, D.L., Freed, J., McLaren, H., Maberly, D. J., Mansfield, J. R., Myhill, S., & Radcliffe, M. J. (2000). Multiple Chemical Sensitivity: Recognition and Management. A document on the health effects of everyday chemical exposures and their implications. In *Journal of Nutritional & Environmental Medicine*, *10,* 39-84. https://doi.org/10.1080/13590840050000889.

European Environment Agency (EEA) (2019). *The European environment - state and outlook 2020 Knowledge for transition to a sustainable Europe*. Retrieved May 11, 2023 from https://www.eea.europa.eu/publications/soer-2020.

European Environment Agency (2022, December 6). Living Healthily in a Chemical world. Retrieved May 11, 2023, from https://www.eea.europa.eu/signals/signals-2020/articles/living-healthily-in-a-chemical-world

Farrow, A., Taylor, H., Northstone, K., & Golding, J. (2003). Symptoms of mothers and infants related to total volatile organic compounds in household products. *Archives of Environmental Health*, *58*(10), 633–641. https://doi.org/10.3200/AEOH.58.10.633-641

Freire, C., & Koifman, S. (2013). Pesticides, depression and suicide: A systematic review of the epidemiological evidence. In *International Journal of Hygiene and Environmental Health*, 216(4), 445–460). https://doi.org/10.1016/j.ijheh.2012.12.003

Gibson, P.R., Horan, M.C., & Billy, J. (2016). Women growing older with environmental sensitivities: a grounded theory model of meeting one's needs. *Health Care Women Int*, *37*, 1289–1303. https://doi.org/ https://doi.org/10.1080/07399332.2016.1191495.

Hassall, R., & Clements . (2011). Clinical Psychology getting lost? Accident, strategy or symptom? *Clinical Psychology Forum,* 217.

Jacobson, M. H., Ghassabian, A., Gore, A. C., & Trasande, L. (2022). Exposure to environmental chemicals and perinatal psychopathology. In *Biochemical Pharmacology, 195.* https://doi.org/10.1016/j.bcp.2021.114835

Johnson, D., & Colman, I. (2017). The association between multiple chemical sensitivity and mental illness: Evidence from a nationally representative sample of Canadians. *Journal of Psychosomatic Research*, *99*, 40–44. https://doi.org/10.1016/j.jpsychores.2017.06.002

Kaikai, N., Ba-M′hamed, S., Slimani, A., Dilagui, I., Hanchi, A. L., Soraa, N., Mezrioui, N., Bennis, M., & Ghanima, A. (2023). Chronic exposure to metam sodium-based pesticide in mice during adulthood elevated anxiety and depression-like behaviors: Involvement of serotoninergic depletion and gut microbiota dysbiosis. *Environmental Toxicology and Pharmacology*, *98,* 1-11. https://doi.org/10.1016/j.etap.2023.104066

Labarge, A. S., & McCaffrey, R. J. (2000). Multiple-Chemical Sensitivity; A review of the theoretical and research literature. *Neuropsychology Review*, *10*(4), 183-211.

Lacour, M., Zunder, T., Schmidtke, K., Vaith, P., & Schiedt, C. (2005). Multiple chemical sensitivity syndrome (MCS) - suggestions for an extension of the U.S. MCS-case definition. *Int. J. Hyg. Environ. Health*, *208*, 141–151.

Lipson, J. G. (2001). We Are the Canaries: Self-Care in Multiple Chemical Sensitivity Sufferers. *Qualitative Health Research, 11*(1), 103-116. https://doi.org/10.1177/104973201129118966.

Lipson, J.G. (2004). Multiple Chemical Sensitivities: Stigma and Social Experiences. *Medical Anthropology Quarterly*, *18*(2), 200–213. https://doi.org/10.1525/maq.2004.18.2.200

Masri, S., Miller, C. S., Palmer, R. F., & Ashford, N. (2021). Toxicant-induced loss of tolerance for chemicals, foods, and drugs: assessing patterns of exposure behind a global phenomenon. *Environmental Sciences Europe*, *33*(1), 1-19. https://doi.org/10.1186/s12302-021-00504-z

Molot, J., Sears, M., & Anisman, H. (2022). *The cellular response to pollution*. Retrieved May 11, 2023, from https://ssrn.com/abstract=4373616.

Moore, S., Paalanen, L., Melymuk, L., Katsonouri, A., Kolossa-Gehring, M., & Tolonen, H. (2022). The Association between ADHD and Environmental Chemicals—A Scoping Review. In *International Journal of Environmental Research and Public Health*. 19(5), 1-13. https://doi.org/10.3390/ijerph19052849

Rauh, V. A., & Margolis, A. E. (2016). Research Review: Environmental exposures, neurodevelopment, and child mental health – new paradigms for the study of brain and behavioral effects. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *57*(7), 775–793. https://doi.org/10.1111/jcpp.12537

Soderholm, A., Soderberg, A., & Nordin, S. (2011). *The experience of living with sensory hyperreactivity-accessibility, financial security, and social relationships*. *32*, 686–707. https:// org.doi.10.1080/07399332.2011.585727

Steinemann, A. (2018a). National Prevalence and Effects of Multiple Chemical Sensitivities. *Journal of Occupational and Environmental Medicine*, *60*(3), 152–156. https://doi.org/10.1097/JOM.0000000000001272

Steinemann, A. (2018b). Prevalence and effects of multiple chemical sensitivities in Australia. *Preventive Medicine Reports*, *10*, 191–194. https://doi.org/10.1016/j.pmedr.2018.03.007

Steinemann, A. (2019). International prevalence of chemical sensitivity, co-prevalences with asthma and autism, and effects from fragranced consumer products. *Air Quality, Atmosphere and Health*, *12*(5), 519–527. https://doi.org/10.1007/s11869-019-00672-1

Umukoro, S., Apara, M., Ben-Azu, B., Ajayi, A. M., & Aderibigbe, A. O. (2019). Iranian Journal of Toxicology Neurobehavioral Effects of Prolonged Exposure to Solid Air Freshener in Mice. In *Iran J Toxicol*, 13(3), 45-51.

Vincent, M. Cecco, L. (2021, April 6). Company director, 61, who developed rare extreme allergy disorder that left her suicidal 'after being exposed to sheep dip chemicals' drowned in pond of her £1.3m country house with rocks tied to her, inquest hears. *The Daily Mail.* Retrieved May 11, 2023, from https://www.dailymail.co.uk/news/article-9440667/Company-director-61-developed-rare-extreme-allergy-disorder-drowned-pond-inquest-hears.html

World Health Organisation (WHO). (ND). *Chemical safety*. Retrieved May 11, 2023, from https://www.who.int/health-topics/chemical-safety#tab=tab_1

World Health Organisation (WHO). (2016). *The public health impact of chemicals: knowns and unknowns.* Retrieved May 11, 2023, from https://www.who.int/publications/i/item/WHO-FWC-PHE-EPE-16-01

Zhang, j. Smith, K.R. (2003) Indoor air pollution: a global health concern, *British Medical Bulletin*, 68(1), 209–225, https://doi.org/10.1093/bmb/ldg029

Zhuang, Y., Zhang, X., Sun, X., Liu, Z., Yu, Q., Dong, C., Guan, Q., & Xu, Q. (2023). Association of environmental volatile organic compounds with depression in adults: NHANES 2013-2018. *Hygiene and Environmental Health Advances*, *6*, 1-8. https://doi.org/10.1016/j.heha.2023.100058

Zundel, C. G., Ryan, P., Brokamp, C., Heeter, A., Huang, Y., Strawn, J. R., & Marusak, H. A. (2022). Air pollution, depressive and anxiety disorders, and brain effects: A systematic review. *NeuroToxicology*, *93,* 272–300. https://doi.org/10.1016/j.neuro.2022.10.011.