Submission by the Australian Nursing and Midwifery Federation

# ANMF Submission to the Senate Inquiry into the impact of microplastics and other toxics on human health

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Australian Nursing & Midwifery Federation

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## Introduction

1. The Australian Nursing and Midwifery Federation (ANMF) is Australia's largest national union and professional nursing and midwifery organisation. In collaboration with the ANMF's eight state and territory branches, we represent the professional, industrial and political interests of more than 356,000 nurses, midwives and personal care workers (PCWs) across the country.

2. Our members work in the public and private health, aged care and disability sectors across a wide variety of urban, rural and remote locations. We work with them to improve their ability to deliver safe and best practice care in each and every one of these settings, fulfil their professional goals and achieve a healthy work/life balance.

3. Our strong and growing membership and integrated role as both a trade union and professional organisation provides us with a complete understanding of all aspects of the nursing and midwifery professions and see us uniquely placed to defend and advance our professions.

4. Through our work with members, we aim to strengthen the contribution of nursing and midwifery to improving Australia's health and aged care systems, and the health of our national and global communities.

5. This submission responds to the Committee's inquiry into the impact of microplastics and other toxics, including per- and polyfluoroalkyl substances (PFAS), on human health. Our submission calls on the Committee to recommend:

    a) Prioritised government investment in Australian microplastic and PFAS health research.

    b) The establishment of a National Plastics Mechanism encompassing both healthcare and consumer products.

    c) Stronger Australian regulatory standards aligned with international best practice

d) Workforce planning that accounts for the potential future burden of microplastic- and PFAS-related chronic disease.

## Key Points

6. Nurses, midwives, and PCWs are responsible for delivering care across the gamut of healthcare. They - and the ANMF - have a direct stake in, and a professional mandate for advocacy on hazardous environmental substances that are detrimental impact human health. The ANMF has two interconnected concerns regarding PFAS; i) the growing body of evidence linking microplastics and PFAS to human health harms, and; ii) the fact that healthcare workers are themselves directly impacted by the growing burden of delivering care to people harmed by PFAS.

7. Microplastics (plastic particles of 5 millimetres or less)[1] and per- and polyfluoroalkyl substances (PFAS) are two of the most pervasive environmental contaminants in the modern epoch. They are often ubiquitous in the everyday lives of many members of the community who are commonly unaware of both their presence and potential for harm.

8. PFAS, commonly referred to as "forever chemicals" due to their extreme persistence are persistent synthetic fluorinated chemicals used widely in firefighting foams, cookware, textiles, and consumer products. They are now pervasive in the environment and are accumulating inhuman bodies.[2] Evidence shows that microplastics and nano plastics have been detected across a broad range of human biological specimens, including blood, breastmilk, and tissues of the brain, heart, liver, kidney, spleen, and colon.[3] Much of this evidence is emerging, and as such, the strength of this growing body of knowledge is currently variable. As this is a new area of research there is much to uncover and critical research gaps remain.[4] At this time, evidence is beginning to document a variety of health

[1] Merriam-Webster.com Dictionary, (2026) Merriam-Webster, "Microplastic." https://www.merriam-webster.com/dictionary/microplastic. Accessed 10 Feb. 2026.
[2] Merriam-Webster.com Dictionary (2026), Merriam-Webster, "Forever chemical." https://www.merriam-webster.com/dictionary/forever%20chemical. Accessed 10 Feb. 2026.
[3] Landrigan, P.J., et al. (2025). The Lancet Countdown on health and plastics. The Lancet, 406(10507), 1044–1062.
[4] Roslan, N. S., Lee, Y. Y., Ibrahim, Y. S., Anuar, S. T., Ku Yusof, K. M. K., Lai, L. A., & Brentnall, T. (2024). Detection of microplastics in human tissues and organs: A scoping review. Journal of Global Health, 14, 04179. https://doi.org/10.7189/jogh.14.04179

harms are across the full PFAS product lifecycle spanning multiple organ systems including reproductive, cardiovascular, neurological, immune, and metabolic systems. These harms are also not distributed evenly across the population and vulnerable populations include pregnant women, foetuses, infants, children, workers in PFAS-related industries, and individuals with pre-existing conditions that increase their risk of PFAS-related harm. As research expands and evolves these groups should be prioritised in both PFAS regulation and research.

9. Australia's regulatory frameworks and research agenda for microplastics, toxics, and forever chemicals are suboptimal. This puts the Australian public at greater risk of harm than community members overseas and strengthens the importance of genuine government leadership and attention to PFAS-related harms.

10. Those working in healthcare including the nursing and midwifery workforce are directly affected by PFAS-related harms and lax regulation through growing patient burden, potential occupational exposure to plastic-containing healthcare products, and the moral distress of witnessing preventable harm.

11. The ANMF strongly supports a National Plastics Mechanism encompassing both consumer and healthcare products. This must occur alongside urgent investment in Australian-specific research, standardised monitoring, and proportionate regulatory action on microplastics and PFAS.

## Microplastic and PFAS Contamination

12. Microplastics have been detected across the full spectrum of environmental media through which humans are exposed. Microplastics contaminate water sources and move through the food chain to humans, originating from the breakdown of plastic waste, cosmetic microbeads, textile washing, and industrial processes.[5] This has been occurring unnoticed

[5] Inam Ö. (2025). Impact of microplastics on female reproductive health: insights from animal and human experimental studies: a systematic review. Archives of gynecology and obstetrics, 312(1), 77–92. https://doi.org/10.1007/s00404-024-07929-w

and unabated for decades resulting in a growing volume of PFAS circulating in the environment and food chains.

13. Global estimates suggest that in some contexts, humans ingest between 39,000 and 52,000 microplastic particles annually from contaminated food and water.[6,7] Studies have found that both bottled water and water stored in glass bottles can contain significant levels of microplastic contamination, with concentrations varying widely depending on packaging type and bottling process.

14. Evidence also suggests humans inhale microplastics. An Australian study found that levels of microplastic fibres in indoor house dust varied dramatically (from 22 to 6,169 fibres per square metre per day), highlighting large differences in household exposure and the need for consistent national monitoring standards.[8] A systematic review of primary research has also found that inhalation is an important exposure pathway, estimating that people may inhale around 81 microplastic particles per day from indoor and outdoor air.[9]

15. Due to the vast array of opportunities for exposure, ingestion, and inhalation microplastics have been detected in a correspondingly wide range of human tissues. Peer-reviewed studies confirm their presence in lung tissue, circulatory blood, pericardial and myocardial tissue, arterial plaque, the placenta, breast milk, infant faeces, and colectomy specimens.[10,11] This demonstrates that human exposure to PFAS is systemic and occurs across the life course, including before birth.

16. PFAS used in firefighting foams, cookware, textiles, and consumer products, have similarly

[6]Sajedi, S., An, C., & Chen, Z. (2025). Unveiling the hidden chronic health risks of nano- and microplastics in single-use plastic water bottles: A review. Journal of Hazardous Materials. https://doi.org/10.1016/j.jhazmat.2025.138948

[7] Cox, K. D., Covernton, G. A., Davies, H. L., Dower, J. F., Juanes, F., & Dudas, S. E. (2019). Human consumption of microplastics. *Environmental science & technology*, *53*(12), 7068-7074.

[8] Soltani, N., Taylor, M., & Wilson, S. (2021). Quantification and exposure assessment of microplastics in Australian indoor house dust. Environmental Pollution. https://doi.org/10.1016/j.envpol.2021.117064

[9] Eberhard, T., Casillas, G., Zarus, G., & Boyd Barr, D. (2024). Systematic review of microplastics and nanoplastics in indoor and outdoor air: identifying a framework and data needs for quantifying human inhalation exposures. Journal of Exposure Science and Environmental Epidemiology. https://doi.org/10.1038/s41370-023-00634-x

[10] Inam, Ö. (2025). Impact of microplastics on female reproductive health: insights from animal and human experimental studies: a systematic review. Archives of Gynecology and Obstetrics, 312(1), 77–92. https://doi.org/10.1007/s00404-024-07929-w

[11] Liu, S., Guo, J., Liu, X., Yang, R., Wang, H., Sun, Y., Chen, B., & Dong, R. (2023). Detection of various microplastics in placentas, meconium, infant feces, breastmilk and infant formula: A pilot prospective study. Science of the Total Environment, 854. https://doi.org/10.1016/j.scitotenv.2022.158699

been detected in human serum, follicular fluid, and reproductive tissue.[12] For example, studies examining Australian Human Biomonitoring Program data from 2002 to 2021 found that though there were significant reductions in PFOS, PFOA, and PFHxS concentrations following regulatory phase-outs in the early 2000s, concentrations remain detectable in all age groups.[13,14] Of particular concern, children aged 0–5 years showed PFOA and PFNA concentrations comparable to adults aged over 46 years, suggesting disproportionate accumulation relative to body mass. As noted above, this also highlights the disproportionate health risk and burden experienced by vulnerable children in relation to lifetime PFAS exposure.

17. Exposure to PFAS can also be geographically variable. PFAS contamination of water supplies and land is documented across three Australian communities, Katherine (Northern Territory), Oakey (Queensland), and Williamtown (New South Wales), associated with historical use of aqueous film-forming foam (AFFF) at defence bases.[15,16]

18. The multi-pathway nature of exposure, spanning food, water, air, dust, consumer products, and healthcare materials, means that population-level exposure is not satisfactorily addressed through individual behaviour change. For many people, PFAS are simply unavoidable in everyday life. Systemic regulatory intervention is urgently required to protect all community members from the risks of PFAS.

## Health Harms

***[Relevant to terms of reference: a, b, c, d, h]***

[12] Callan, A.C., Rotander, A., Thompson, K., et al. (2016). Maternal exposure to perfluoroalkyl acids measured in whole blood and birth outcomes in offspring. Science of the Total Environment. https://doi.org/10.1016/j.scitotenv.2016.06.177
[13] Taucare, G., Chan, G., Nilsson, S., et al. (2024). Temporal trends of per- and polyfluoroalkyl substances concentrations: insights from Australian Human Biomonitoring 2002–2021 and the U.S. NHANES Programs 2003–2018. Environmental Research. https://doi.org/10.1016/j.envres.2024.119777
[14] Eriksson, U., Mueller, J.F., Toms, L., et al. (2017). Temporal trends of PFSAs, PFCAs and selected precursors in Australian serum from 2002 to 2013. Environmental Pollution. https://doi.org/10.1016/j.envpol.2016.09.036
[15] Law, H.D., Randall, D., Armstrong, B., et al. (2023). Relative risks of adverse perinatal outcomes in three Australian communities exposed to per- and polyfluoroalkyl substances: data linkage study. International Journal of Environmental Research and Public Health. https://doi.org/10.3390/ijerph20196886
[16] Banwell, C., Housen, T., Smurthwaite, K., et al. (2021). Health and social concerns about living in three communities affected by per- and polyfluoroalkyl substances (PFAS): A qualitative study in Australia. PLoS ONE. https://doi.org/10.1371/journal.pone.0245141

19. Concerningly, around three-quarters of chemicals used in plastics have never been evaluated for their effects on human health,[17] and among those that have, the majority (over 4,200 substances) are considered highly hazardous due to their toxicity, persistence, capacity to bioaccumulate, and environmental mobility. Nearly 1,500 of these substances are classified as carcinogenic, mutagenic, or harmful to reproduction, and approximately 1,700 are linked to organ toxicity including hepatic impacts.[18]

20. As introduced above, microplastic and PFAS exposure has been associated with health effects spanning multiple organ systems:

    a) **Reproductive health [ToR Subsection a]:** PFAS and microplastic exposure have been linked to a range of adverse reproductive outcomes, including preterm birth, miscarriage, and stillbirth. Communities living near PFAS-contaminated sites in Australia have experienced elevated rates of pregnancy complications, including hypertension and postpartum haemorrhage.[19] There is also growing evidence of impacts on fertility in both men and women, and on menstrual and hormonal health.[20,21,22] Recent research by Muhmmad and colleagues suggests microplastic exposure is associated with adverse reproductive outcomes in men, such as reduced sperm quality, including decreased sperm count, motility, and morphology, as well as an increased risk of male infertility.[23]

    b) **Developmental pathways [ToR Subsection b]:** Microplastics have been detected in the placenta, breast milk, and infant formula, meaning exposure to begins before

[17] Geueke, B., Groh, K. J., Maffini, M. V., Martin, O. V., Boucher, J. M., Chiang, Y. T., ... & Muncke, J. (2023). Systematic evidence on migrating and extractable food contact chemicals: most chemicals detected in food contact materials are not listed for use. Critical Reviews in Food Science and Nutrition, 63(28), 9425-9435.
[18] Landrigan, P.J., et al. (2025). The Lancet Countdown on health and plastics. The Lancet, 406(10507), 1044–1062.
[19] Law, H.D., Randall, D., Armstrong, B., et al. (2023). Relative risks of adverse perinatal outcomes in three Australian communities exposed to per- and polyfluoroalkyl substances: data linkage study. International Journal of Environmental Research and Public Health. https://doi.org/10.3390/ijerph20196886
[20] Symeonides, C., Aromataris, E., Mulders, Y.R., et al. (2024). An umbrella review of meta-analyses evaluating associations between human health and exposure to major classes of plastic-associated chemicals. Annals of Global Health. https://doi.org/10.5334/aogh.4459
[21] Ding, N., Harlow, S., Randolph, J.F. Jr, et al. (2020). Perfluoroalkyl and polyfluoroalkyl substances (PFAS) and their effects on the ovary. Human Reproduction Update. https://doi.org/10.1093/humupd/dmaa018
[22] Ali-Hassanzadeh, M., et al. (2025). The effects of exposure to microplastics on female reproductive health and pregnancy outcomes: A systematic review and meta-analysis. Reproductive Toxicology, 135. https://doi.org/10.1016/j.reprotox.2025.108932
[23] Muhammad, Z., Yang, Q., and Liu, N. (2025). Microplastics Exposure Is Harmful to Male Reproductive Health.

birth and continues through early infancy. Early-life exposure to these chemicals (in the first 1,000 days) may shape long-term health trajectories.[24] Emerging evidence argues that exposure is associated with low birth weight.[25]

c) **Cardiovascular health [ToR Subsection c]:** Emerging research also links microplastic exposure to cardiovascular risk.[26,27] Evidence demonstrates that Australians living in PFAS-contaminated communities experienced elevated rates of coronary heart disease mortality.[28] A recent observational study found that among patients with asymptomatic high-grade (>70%) carotid artery stenosis who were undergoing carotid endarterectomy, those with evidence of MNPs within the carotid plaque had a greater incidence of a composite of myocardial infarction, stroke, or death from any cause than patients who did not have evidence of MNPs within the atheroma.[29] MNP exposure is also an environmental risk factor for cerebrovascular diseases, particularly stroke. Evidence suggests that MNPs may traverse the blood-brain barrier (BBB) or enter the central nervous system via sensory neural pathways, where they are likely to accumulate in key brain regions, including the hippocampus and prefrontal cortex.[30]

d) **Metabolic and endocrine effects [ToR Subsection d]:** PFAS exposure has been associated with elevated cholesterol in Australian firefighters and community members living near contaminated sites.[31] Both PFAS and microplastics interfere with the body's hormonal systems and have been linked to increased rates of type 2

[24] Liu, S., Guo, J., Liu, X., Yang, R., Wang, H., Sun, Y., Chen, B., & Dong, R. (2023). Detection of various microplastics in placentas, meconium, infant feces, breastmilk and infant formula: A pilot prospective study. Science of the Total Environment, 854. https://doi.org/10.1016/j.scitotenv.2022.158699

[25] Jinesh, S., & Aditi, P. (2025). Health Implications of Microplastic Exposure in Pregnancy and Early Childhood: A Systematic Review. *International Journal of Women's Health*, *17*, 2805–2818. https://doi.org/10.2147/IJWH.S497366

[29] Marfella, R., et al. (2024). Microplastics and Nanoplastics in Atheromas and Cardiovascular Events. *The New England journal of medicine*, *390*(10), 900–910. https://doi.org/10.1056/NEJMoa2309822

[30] Gao, H., et al. (2025). From exposure to neurotoxicity induced by micro-nanoplastics with brain accumulation and cognitive decline. *Ecotoxicology and Environmental Safety*. 304. 119114. https://doi.org/10.1016/j.ecoenv.2025.119114

[31] Nilsson, S., Smurthwaite, K., Aylward, L., et al. (2022). Associations between serum perfluoroalkyl acid (PFAA) concentrations and health related biomarkers in firefighters. Environmental Research. https://doi.org/10.1016/j.envres.2022.114370

diabetes, insulin resistance, and obesity.[32,33] Micro- and nanoplastics have been identified as a potential cardiovascular risk factor, and preliminary research links microplastic brain accumulation to cognitive decline and neurotoxicity. These diseases are major causes of death and morbidity in Australia and impact large numbers of community members and cost the healthcare system billions of dollars.

e) **Immune function:** Exposure to PFAS has been associated with reduced immune response to routine vaccinations, including tetanus, diphtheria, and rubella, raising questions about the effectiveness of standard immunisation programs in highly exposed populations.[34] Microplastic exposure has also been linked to broader immune disruption, including increased risk of autoimmune conditions.[35]

f) **Neurological effects:** Both PFAS and microplastics have been associated with neurological harm, including impaired cognitive development and IQ loss in children, and emerging evidence of neurotoxicity from microplastic accumulation in the brain.[36] [37]

g) **Psychological harm:** Beyond direct health effects, communities affected by PFAS contamination have experienced significant psychological harm, including elevated rates of anxiety and distress, economic hardship, and a profound loss of trust in government.[38] This burden is independent of, and compounded by, the underlying health risks.

[32] Symeonides, C., Aromataris, E., Mulders, Y.R., et al. (2024). An umbrella review of meta-analyses evaluating associations between human health and exposure to major classes of plastic-associated chemicals. Annals of Global Health. https://doi.org/10.5334/aogh.4459
[33] Tyc, H.J., Kłodnicka, K., Teresińska, B., Karpiński, R., Flieger, J., & Baj, J. (2025). Micro- and nanoplastics as disruptors of the endocrine system — a review of the threats and consequences associated with plastic exposure. International Journal of Molecular Sciences, 26(13), 6156. https://doi.org/10.3390/ijms26136156
[34] Xing, W.Y., Sun, J.N., Liu, F.H., et al. (2024). Per- and polyfluoroalkyl substances and human health outcomes: An umbrella review of systematic reviews with meta-analyses of observational studies. Journal of Hazardous Materials. https://doi.org/10.1016/j.jhazmat.2024.134556
[35] Kusyk, D., Górna, I., Kowalówka, M., et al. (2025). Microplastics in humans: A critical review of biomonitoring evidence and immune–metabolic associations. Applied Sciences. https://doi.org/10.3390/app152212289
[36] Rahman, A., Yadav, O., Sarkar, A., et al. (2020). Environmental exposure to microplastics: a scoping review on potential human health effects and knowledge gaps. https://doi.org/10.4103/2468-838X.303760
[37] Giri, S., Lamichhane, G., Khadka, D., & Devkota, H.P. (2024). Microplastics contamination in food products: Occurrence, analytical techniques and potential impacts on human health. Current Research in Biotechnology. https://doi.org/10.1016/j.crbiot.2024.100190
[38] Banwell, C., Housen, T., Smurthwaite, K., et al. (2021). Health and social concerns about living in three communities affected by per- and polyfluoroalkyl substances (PFAS): A qualitative study in Australia. PLoS ONE. https://doi.org/10.1371/journal.pone.0245141

h) **Economic burden:** The health costs of these exposures are substantial. Internationally, PFAS-related healthcare costs are estimated at tens of billions of euros annually in Europe alone, and plastic-related health harms are estimated to cost the global economy over US$1.5 trillion each year.[39] In Australia, where cancer and cardiovascular disease already cost the health system over $36 billion annually, reducing exposure to chemicals that contribute to these conditions represents a significant economic as well as public health opportunity.[40]

21. The following groups face disproportionate risk and warrant prioritised consideration in any regulatory, research, or public health response:

    a) Pregnant women and foetuses

    b) Infants and young children

    c) Workers in relevant industries: Occupationally exposed populations, including firefighters, textile workers, PVC manufacturing workers, and healthcare workers using single-use plastic products, may face elevated exposure through inhalation and dermal contact

    d) Individuals with pre-existing conditions

    e) Communities adjacent to contaminated sites

22. The ANMF acknowledges that the evidence regarding PFAS and microplastics is still emerging, significant gaps and limitations in the current evidence base remain, however there is growing evidence of clear risks and harms to health that must not be ignored.[41] [42] Scarce human dose-response data for both microplastics and PFAS makes health-based

[39] Landrigan, P.J., et al. (2025). The Lancet Countdown on health and plastics. The Lancet, 406(10507), 1044–1062.
[40] Australian Institute of Health and Welfare. (2025). Health system spending on disease and injury in Australia 2023–24. Retrieved from https://www.aihw.gov.au/reports/health-welfare-expenditure/health-system-spending-disease-injury-aus-2023-24
[41] Roslan, N. S., Lee, Y. Y., Ibrahim, Y. S., Anuar, S. T., Ku Yusof, K. M. K., Lai, L. A., & Brentnall, T. (2024). Detection of microplastics in human tissues and organs: A scoping review. Journal of Global Health, 14, 04179. https://doi.org/10.7189/jogh.14.04179
[42] Kusyk, D., Górna, I., Kowalówka, M., Banaszak, M., Jakubowski, K., & Drzymała Czyż, S. (2025). Microplastics in humans: A critical review of biomonitoring evidence and immune–metabolic associations. Applied Sciences, 15(22), 12289. https://doi.org/10.3390/app152212289

threshold-setting difficult, as most experimental evidence uses concentrations higher than real-world human exposure. There are no universally agreed methods for detecting or quantifying microplastics across environmental media, and current methods may miss smaller nanoplastics entirely. Most studies are cross-sectional, and longitudinal data on chronic exposure across the life course remain insufficient, elucidating the need for observation periods that extend beyond PFAS biological half-lives. Evidence quality is also a concern: an umbrella review of PFAS meta-analyses found that 88% of associations were rated low or very low certainty.[43] Contamination is widely recognised as a major source of bias in human microplastic research. Microplastics are ubiquitous in laboratory environments, and fibres shed from clothing, air and consumables can readily contaminate samples. Scoping and systematic reviews indicate that many studies inadequately account for procedural blanks and background contamination, resulting in a high risk of false positive detection, particularly for small particles and nanoplastics near analytical detection limits.[44]

23. Australia's regulatory position compounds these scientific limitations. We acknowledge the release of a new Australian Standard (AS ISO 24187:2025) for microplastics analysis. However, as a technical standard requiring purchase and voluntary uptake, its existence alone does not ensure implementation, compliance, or measurable reductions in microplastic exposure without accompanying regulatory and policy mechanisms. This is a critical oversight that must be corrected.

24. Whilst noting that the evidence strength varies across outcomes and scientific uncertainty remains in several domains, the breadth and consistency of plausible associations between microplastics and PFAS with health harms, constitute a reasonable basis for precautionary action from the Australian government.

**Recommendation 1:** Prioritise Microplastic and PFAS Research as a National Health Research

[43] Xing, W.Y., Sun, J.N., Liu, F.H., et al. (2024). Per- and polyfluoroalkyl substances and human health outcomes: An umbrella review of systematic reviews with meta-analyses of observational studies. Journal of Hazardous Materials. https://doi.org/10.1016/j.jhazmat.2024.134556
[44] Roslan, N. S., Lee, Y. Y., Ibrahim, Y. S., Anuar, S. T., Ku Yusof, K. M. K., Lai, L. A., & Brentnall, T. (2024). Detection of microplastics in human tissues and organs: A scoping review. Journal of Global Health, 14, 04179. https://doi.org/10.7189/jogh.14.04179

### Priority

25. The ANMF recommends that the Australian Government formally designate microplastic and PFAS health impacts as a health research priority and extend current investment into the research work already being pursued. Funded research must include Australian-specific human epidemiological studies; development of domestic exposure factors and biomonitoring standards; longitudinal research on chronic and cross-generational health effects; and toxicological studies **[ToR Subsection h]**.

26. The ANMF recommends that, where applicable, research investment also extend to remediation, specifically, methods for removing PFAS and microplastics from water supplies, soil, and food-chain products, and investigation of approaches to reduce or remove the accumulation or burden of PFAS and microplastics in the body **[ToR Subsection h]**.

## Increased Health Burden and Workforce Demand

27. Nursing and midwifery Codes of Ethics and Professional Standards include explicit obligations to advocate for conditions that promote health and prevent harm. The professions therefore have both an ethical obligation and a professional mandate to call for stronger regulatory action on microplastics and PFAS.

28. We recognise nurses and midwives are among the primary clinical workforce managing the consequences of chronic disease in Australia. Cancer, cardiovascular disease, and metabolic conditions, each plausibly linked through existing evidence to long-term microplastic and PFAS exposure, constitute Australia's highest categories of health system expenditure and disease burden.[45] Addressing these risks now not only stands to improve and protect the health of Australians, but also represents an opportunity to significantly reduce future spiralling healthcare costs.

[45] Australian Institute of Health and Welfare. (last updated 29 Oct 2025). *Health system spending on disease and injury in Australia 2023–24*. Retrieved from https://www.aihw.gov.au/reports/health-welfare-expenditure/health-system-spending-disease-injury-aus-2023-24/contents/summary

29. Addressing microplastics and PFAS risks now, also offers the Government an opportunity to proactively address projected health workforce shortages. The 2024 Australian Government's Nursing Supply and Demand Study projects a national undersupply of 70,707 FTE nurses by 2035.[46] This projection may significantly underestimate future need if preventable, exposure-related increases in chronic disease burden are not actively addressed before the full impact is felt.

30. The midwifery workforce has particular professional exposure to the health-related harms linked to microplastics and PFAS. Midwives managing pregnancy complications including preterm birth, foetal growth restriction, gestational hypertension, and stillbirth may increasingly be managing conditions with an environmental exposure component that current clinical frameworks do not account for. Where regulatory inaction is perceived to permit preventable harm, this creates conditions for moral injury, psychological distress arising when professionals witness or participate in circumstances that violate their ethical commitments.

31. The health and maternity care sector itself is a context that greatly contributes to the production, use, and disposal of products containing PFAS and microplastics. Hospitals, clinics, and aged care settings rely heavily on single-use plastic products, including IV lines, syringes, gloves, drapes, and packaging. Like the healthcare workforce at large, the nursing and midwifery workforce utilise a vast number of plastic products within healthcare when providing treatment to their patients, and this has increased significantly since COVID-19 with more one-use products.

32. There is emerging concern from our members that patients may face iatrogenic microplastic exposure from the very products used to treat their ailing health. It is concerning that these products could result in harm to these patients and indirectly harm other individuals and the environment. To reduce harm from medical and healthcare products there needs to be a

[46] Australian Government Department of Health, Disability and Ageing. (2024). Nursing supply and demand study. Retrieved from https://hwd.health.gov.au/supply-and-demand/nursing-supply-demand-study.html

stronger governance and policy positions around their production, use and disposal.

33. Health professionals, including nurses, midwives and carers have demonstrated that they are supportive of regulatory action on plastics in health. Indeed, a recent report conducted by the ANMF in partnership with the Climate and Health Alliance, demonstrated that many health professionals were already leading plastics stewardship models in healthcare. The report found that there was an appetite for plastics stewardship across Australian healthcare workers, however, this appetite from individuals needed to be met with support and robust regulatory measures at the State and Federal level.

34. Stewardship must not solely focus on reducing the use of plastics but must also include responsible waste disposal. Standards must be to be created to ensure that contaminated plastics are responsibly disposed of without resulting in them endangering human health and the environment, as current approaches including incineration and landfill also can result in harm to humans and the environment.

35. An example of state-based regulation that may have applicability for cross-jurisdictional optimisation and scale up nationally includes the NSW Plastics Plan 2.0. This plan released in November 2025, is the NSW Government's principal framework for reducing plastic pollution and its impacts on the environment, human health and recycling systems. Administered by the NSW Environment Protection Authority (EPA), the plan builds on the 2021 NSW Plastics Action Plan and responds to persistently low plastic recycling rates, increasing landfill pressure, and growing concern about microplastics and harmful chemical additives. It adopts a whole of lifecycle approach to plastics, addressing product design, manufacture, use, disposal and recovery. Its stated objectives are to reduce plastic litter and leakage, protect human health and recycling streams from the impacts of microplastics and hazardous chemicals and accelerate transition to reusable and recyclable alternatives.

36. A central element of the plan is the staged regulatory program running from 2026-30. This includes phased bans and restrictions on specific single use and hard to recycle plastic items, strengthened recyclability and labelling requirements for food and beverage packaging, and

measures to support reuse systems, such as requirements for food service businesses to accept reusable cups. The staged implementation is intended to provide regulatory certainty and allow industry time to transition.

37. The plan explicitly identifies microplastics as an environmental and human health concern in the Minister's introduction and under the section titled "The Plastic Pollution Crisis": it also introduces a stronger focus on chemical safety, including the development of regulatory mechanisms to identify and restrict harmful chemical additives in plastic food and beverage packaging to protect human health and recycling quality. Governance and enforcement of the plan sit with the NSW EPA under the Plastic Reduction and Circular Economy Act 2021 (NSW). Although the current plan applies across sectors, including healthcare, it is primarily an environmental and regulatory instrument. Health benefits are framed indirectly through reduced exposure pathways and safer materials, rather than through dedicated public health surveillance or clinical guidance. As such, Plastics Plan 2.0 represents a significant strengthening of plastics regulation in NSW, while leaving open questions about how emerging health risks associated with plastics and microplastics will be addressed within the health system.

38. It is critical that the public be made aware of any potential harms and prevention opportunities regarding microplastics and PFAS and this should be among the government's top priorities for proactive reform. Public awareness is not merely a matter of disseminating facts; it requires a well-orchestrated effort to translate complex scientific evidence into accessible knowledge, motivating informed decision-making, and sustainable behaviour changes across populations.[47] In additional to better government leadership and regulation, measures to reduce exposure to microplastics and PFAS should include the development of safer chemical alternatives, investment in public awareness campaigns, and continued research to safeguard reproductive health for current and future generations.[48]

[47] Muhammad, Z., Yang, Q., and Liu, N. (2025). Microplastics Exposure Is Harmful to Male Reproductive Health. DOI: 10.5772/intechopen.1012349 [Textbook - link ]

[48] Xie, Y., Peng, R., & Xiao, L. (2025). Environmental Chemicals and Female Reproductive Health: Unraveling Mechanisms and Societal Impacts — A Narrative Review. Clinical and Experimental Obstetrics & Gynecology. 52. 10.31083/CEOG39882.

**Recommendation 2:** Introduce better regulation of plastics and microplastics, and extend Regulatory Standards to Healthcare Products and Establish a National Plastics Mechanism

39. The ANMF recognises that the healthcare sector is a significant source of plastic waste and calls for systemic reform on microplastics, PFAS and plastics in healthcare, along with consumer products. The ANMF strongly supports the establishment of a National Plastics Mechanism to provide a coordinated, government-led framework governing the production, labelling, use, and disposal of plastic-containing products across all sectors, including healthcare. Such a mechanism should include: mandatory product labelling for plastic content; national standards for monitoring and measuring microplastic contamination; accountability mechanisms for manufacturers; and a requirement that healthcare procurement policies consider and act on microplastic risk. Coordinated international regulatory action, including engagement with the United Nations Environment Programme draft global plastics treaty, should accompany domestic reform. Regarding all of the recommendations above, there must be ongoing consultation with impacted health workers and their representative groups and unions as vulnerable community groups.

## Conclusion

40. Microplastics and PFAS are now present throughout the Australian environment and in human tissue at all life stages and could very well represent a greater and more widespread threat to health than lead and asbestos were for older generations. Research in this space is new and evolving and based on findings so far, is likely to find an increasing number and range of potential risks and harms as research methods improve. Although the evidence is still evolving and not yet conclusive for every outcome, there are credible and growing indications of harm across multiple body systems. The current moment is an opportunity for the Australian Government to act early and decisively in the interests of community and environment health and wellbeing. As the nursing and midwifery professions are directly implicated and intimately involved in PFAS and microplastic use as carers of those affected, as occupational users of plastic healthcare products, and as advocates for conditions that

enable health, the ANMF strongly urges the government to consider how actions and reforms made today could protect and improve the health of current and future generations for many years to come.

41. The ANMF calls on the Committee to recommend to government:

    a) Prioritised government investment in Australian microplastic and PFAS health research.
    b) The establishment of a National Plastics Mechanism encompassing both healthcare and consumer products.
    c) Stronger Australian regulatory standards aligned with international best practice
    d) Workforce planning that accounts for the potential future burden of microplastic- and PFAS-related chronic disease.