PFAS Health Study

Frequently asked questions

The study overall

How was the study funded?

The Australian Government commissioned and funded the National Centre for Epidemiology and Population Health at the Australian National University (ANU) to conduct an epidemiological study examining the potential health effects resulting from PFAS exposure in three Australian communities—Katherine in the Northern Territory, Oakey in Queensland and Williamtown in New South Wales.

What is the plan for managing release of the findings?

The reports were released on 10 December 2021. The Northern Territory, Queensland and New South Wales departments of health were provided with embargoed copies of the reports in the week prior to release to ensure that they would be able to provide information and support to communities if required.

The ANU hosted a webinar on 9 December 2021 for study participants to learn about the results. Questions that were not able to be answered in the time permitted during the webinar have been taken on notice and responded to by both the ANU and the Australian Government Department of Health. Responses related to questions about the study can be found in this Frequently Asked Questions document, additional questions and responses from the Webinar that were relevant to the Australian Government, will be available on the Department of Health website.

In addition, the Study Team will provide opportunity for the communities that participated in the study to discuss findings and respond to any questions in early 2022, COVID restrictions permitted.

What value has this study added to the current literature on PFAS and health?

Our study found that blood levels of PFOS and PFHxS were elevated in the exposed communities of Katherine, Oakey and Williamtown, compared to the comparison communities.

We found higher levels of psychological distress among people in exposed communities than comparison communities. This is an important finding that acknowledges the impact of living with environmental contamination on community members.

The study also found that higher PFAS levels in blood were associated with higher blood cholesterol levels in people from Williamtown, and higher uric acid levels in people from Williamtown and Katherine. This is consistent with the findings of other existing studies. The effects are small and unlikely to lead to poor health outcomes.

The lack of association we found with many health outcomes in our study are important scientifically, as they add to the body of evidence on PFAS and health. They are consistent with previous studies, which have not conclusively found causative links between PFAS and health.

Our findings, particularly those on cancer, can be combined with results from future studies to create a more certain picture of any links between PFAS and health.

What is the future of the study? Is it going to be continued over a number of years to determine long-term impacts, or is it drawing to a close?

The PFAS Health Study has now been completed; reports have been published on our website and scientific journal papers are in preparation. Regarding longer-term exposure and impacts, a longitudinal study to monitor how PFAS levels in blood declines over time is being conducted by the Queensland Alliance for Environmental Health Sciences at the University of Queensland.

Blood serum study of PFAS exposure, related risk factors and biochemical markers of health

How do the exposure levels of PFAS in this study compare to those in other countries?

Blood levels of PFAS in the study participants from Katherine, Oakey and Williamtown were similar to those seen in some communities in the United States of America, but lower than in a community in Sweden. These communities were also affected by environmental PFAS contamination from the use of firefighting foams on military bases, which mainly contained PFOS and PFHxS.

Consuming bore water or certain locally grown foods, living in an exposed community for a long period of time and exposure to firefighting foams in the workplace were risk factors for 'high' PFAS levels in your study. Why were the risk factors different in each community?

The PFAS Management Areas in Katherine, Oakey and Williamtown have different levels of PFAS in the environment, including the soil and water sources. In Katherine, the town water supply was affected by PFAS contamination in the past, which wasn't the case in Oakey and Williamtown. We also found that there were differences in how people used bore water and the types of locally grown foods people ate in each

community which could be another reason why the main risk factors differed between the three towns.

Higher PFAS levels were associated with higher cholesterol levels in the study. Why didn't the study report on the causes of the health effects, rather than referring to an association?

When we talk about an association, we are talking about a relationship between two things. For example, participants from Williamtown who had higher PFAS levels in their blood also had a higher level of cholesterol in their blood—we can say that PFAS is associated with increased cholesterol, however we don't know whether PFAS caused the high cholesterol. It could be that the observed combination of high PFAS levels and high cholesterol are due to another, third factor that we don't know about yet or that we didn't look at in our study.

Another example is for blood tests related to kidney function. Participants from Katherine and Williamtown who had higher PFAS levels in their blood also had higher levels of uric acid in their blood. It is worth noting that these differences in biochemical markers were small and unlikely to lead to poor health. Higher PFAS levels in blood may not be the causes of the differences in biochemical markers but rather, could be the consequences of them. For example, someone with poor kidney function may not be able to excrete PFAS from their body as easily as someone with normal kidney function, which may result in higher PFAS levels in blood.

The study found associations with PFOA and health outcomes even though it wasn't a main component of the firefighting foams. How come?

The levels of PFOA in the blood of people from exposed towns were similar to people living in comparison towns. However, even at these low levels it was possible to examine the relationship between PFOA levels and cholesterol and determine that higher levels were associated with higher cholesterol. The increase in cholesterol was small and unlikely to lead to poor health. The link between higher blood PFAS levels and cholesterol have been reported in studies overseas.

My PFAS results from the Voluntary Blood Testing Program for PFAS were compared to reference values for the Australian population. Why did your study define 'high' PFAS levels differently?

In the Blood Serum Study, we compared blood levels of PFAS in people from the PFAS Management Areas to people who lived in three similar communities without known environmental PFAS contamination. We chose these comparison communities based on a range of social, economic and locational factors (e.g., whether the community was located in a remote or rural area of Australia)—Alice Springs in the NT, Dalby in Qld, and Kiama and Shellharbour in NSW. We defined 'high' PFAS levels in blood based on

the comparison communities, rather than the reference values used in the Voluntary Blood Testing Program.

The reference values used in the Voluntary Blood Testing Program were based on pooled samples collected in South-East Queensland collected In 2011–2012. People who live in this area may have different characteristics to people who live in Katherine, Oakey and Williamtown, which could mean that their exposure to PFAS or their health is different for reasons other than the environmental contamination. The reference values were also based on pooled samples collected from several years earlier than the PFAS Health Study. Australian studies of pooled samples show declines in PFOS, PFHxS and PFOA concentrations over time. Therefore, we may have underestimated the number of people from the PFAS Management Areas who had 'high' PFAS levels in their blood by comparing to the 2011–2012 study. By comparing blood levels of PFAS in people from the PFAS Management Areas and the comparison communities in the Blood Serum Study, we could more accurately examine PFAS exposure in Katherine, Oakey and Williamtown.

I don't have my PFAS results. How can I get a copy?

If you would like a copy of your PFAS results collected through the Voluntary Blood Testing Program you can contact the GP who requested the blood test to be done, or you can get in touch with the study team and they will forward your results to you.

If you had your blood tested for PFAS and live in one of the comparison communities, you should have received your results in mid-2021. You can get in touch with the study team, and they will forward your results to you if you require another copy.

Can I get my blood tested for PFAS again?

The Assessing PFAS Exposure Control Study run by University of Queensland is currently underway and residents and ex-residents of Williamtown, Oakey and Katherine, who previously participated in the PFAS Health Study or have had previous testing of their blood for PFAS concentrations, are invited to participate. This research study addresses the important question of whether PFAS levels in the blood of people living these communities are going down over time.

If you would like to express your interest in taking part, or would like further information about the study, please contact the research team by:

- Using the contact form on the UQ Study Webpage
- Phone the UQ Study Team on 1800 370 760 or 0419 110 176
- Email to PFASstudyUQ@uq.edu.au

Cross-sectional survey of self-reported physical and mental health outcomes and associations with blood serum PFAS

Did you find any health effects of exposure to PFAS?

People living in exposed communities reported higher levels of psychological distress and worry than people in comparison communities. For all other health conditions studied there was no clear evidence of an association between PFAS and health.

We considered all reported health conditions, even those that occurred before a person lived in an exposed community. Residents in Katherine were more likely to report some cancers and some liver conditions than residents of Alice Springs, and residents of Williamtown were more likely to report rheumatoid arthritis, high cholesterol, type II diabetes, and problems with fertility compared to people in Kiama and Shellharbour. However, no health conditions were related to higher PFOS and PFHxS levels in blood, which are the main active ingredients of firefighting foams used in Australia. A few health conditions (such as high cholesterol) were more common in people with higher PFOA levels, but we found that PFOA levels were the same in people in exposed communities and comparison communities without known environmental PFAS contamination.

Do the findings show an association between PFAS and cancer?

Very few cancer cases were reported in the Cross-sectional Survey. Breast cancer was more common in Katherine than Alice Springs. However, this was not seen in either Williamtown or Oakey. Cancer was not associated with higher PFAS concentrations in blood serum in any exposed community. The Data Linkage Study also reported on potential associations of PFAS and various cancers and found that rates were not elevated for any particular cancer in more than one exposed community.

Is there a link between PFAS and kidney or liver function?

We assessed the relationship between PFAS levels in blood and biochemical markers of kidney and liver function.

For markers of kidney function, we found that elevated uric acid levels were more common in people with higher PFOA and PFOS levels (in Katherine and Williamtown); however, the differences in average uric acid levels with higher PFAS levels in blood were small and unlikely to be important for health. We did not find any clear associations between PFAS levels in blood and estimated glomerular filtration rate (eGFR), which is another marker of kidney function.

For markers of liver function, we found no clear associations with PFAS levels in blood.

Further details are provided in the Blood Serum Study report available on our website.

Did you investigate the effect of PFAS on male fertility?

We assessed self-reported problems with fertility in men and women combined; details are available in the Cross-sectional Survey Report on our website. We found no association between fertility problems and PFAS levels in blood. However, we found that fertility problems were more likely to be reported by participants in one of the exposed communities, Williamtown, than the comparison communities (Kiama and Shellharbour).

What is the link between psychological distress and PFAS levels?

We found that levels of psychological distress were higher in exposed communities than comparison communities. We also assessed whether levels of psychological distress were associated with PFAS levels in blood and we did not find a link. Our findings suggest that the experience of living or working in a community with known environmental contamination may contribute to psychological distress.

Data linkage study of health outcomes associated with living in PFAS exposure areas

How was the data linkage study different to the blood serum study and cross-sectional survey in terms of how exposure and health effects were measured?

The data linkage study did not measure PFAS levels in blood, but considered people who had lived in the PFAS Management Areas since year 1984 as having been 'exposed' to PFAS. We identified these people by looking at people's address history on their Medicare records or mother's place of residence on birth records. This meant that we were able to identify all people who had lived in these communities at any time in the past, including those who had moved somewhere else.

For health effects, we used clinically diagnosed or officially recorded conditions in state-administered birth records, national cancer and death databases, or a nationwide collection of early childhood development. This is in contrast to using participant's responses to a health survey.

While the data linkage study included larger population sizes and spanned a longer period of time, one disadvantage was that we did not use precise measurements of PFAS levels in blood.

Why did you only include a small number of causes of death in the Data Linkage Study?

We included cause-specific death outcomes that were evaluated in the Systematic Literature Review. We also included some 'control' outcomes that are not known or

thought to be linked to PFAS. Rare causes of death were not included as they would not have yielded robust findings.

When using the address linkage via medical records and Medicare, was it taken into account that Defence personnel (more likely to be exposed) usually would not be registered in the Medicare system?

Yes, Medicare is unlikely to contain all Defence personnel. For those personnel who are enrolled on Medicare, it may not reflect an accurate record of address history. We had proposed including data from the Personnel Management Key Solution (PMKeyS) database to flag Defence personnel in the study. However, as the PMKeyS database only contains Defence staff from 2001 onwards, the relevant analyses would likely not have sufficient length of follow-up to observe cases, especially after applying a lag period, so these data were not used.