

# Per- and polyfluoroalkyl substances (PFAS) in Old Crow, YK and Dehcho Communities, NWT

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## Introduction

Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals used to make various products such as food packaging. They do not degrade in the body or the environment, and there is evidence that exposure may lead to health effects.

Although levels appear to be decreasing in Canada's south, environmental levels have been increasing in the Arctic due to long-range transport. The implications of this on human exposures in northern populations in Canada have yet to be established.



Contaminant biomonitoring projects were conducted in Dene communities of the Dehcho region Northwest Territories (NWT) and a Gwich'in community in the Yukon (YK) which **recorded blood levels of PFAS**.

## Methods and Analysis

- Biomonitoring projects were conducted in partnership with communities who provided guidance on research objectives
- Blood PFAS samples were collected from adults residing in seven northern First Nations.
- Nine PFAS were analyzed by liquid chromatography–mass spectrometry (LC-MS)
- Descriptive statistics were generated including geometric means (GMs). Statistics were also calculated after stratifying by sex and age. Results were compared to two nationally representative samples. Associations between PFAS were calculated using Spearman correlations.

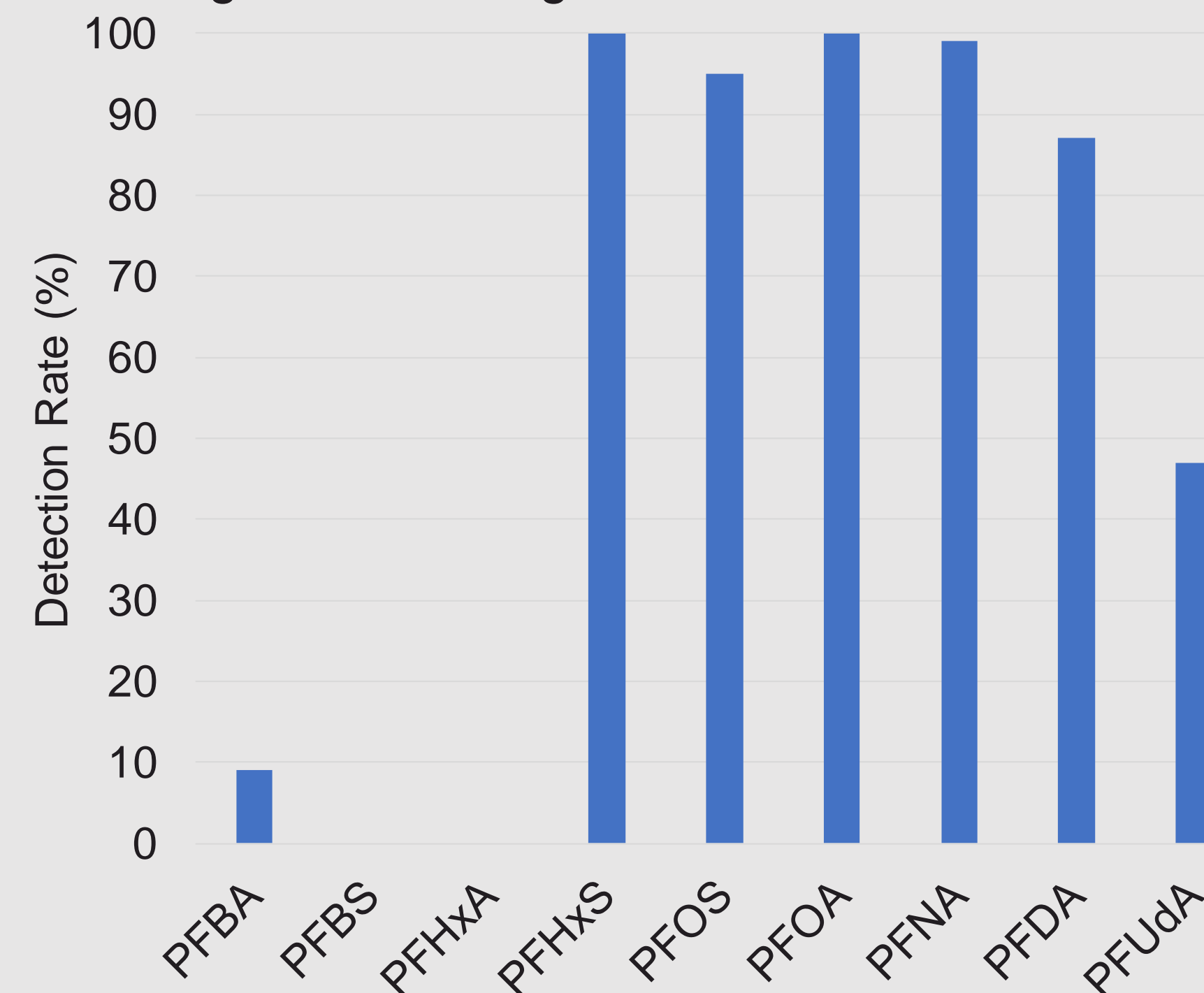
## Results and Discussion

In the Dehcho (n = 125), five PFAS had a detection rate >50% including PFOS, PFOA, PFHxS, PFNA, and PFDA. In addition to these, PFUdA was also detected >50% of the samples collected in Old Crow (n = 54) (Fig 1, Table 1).

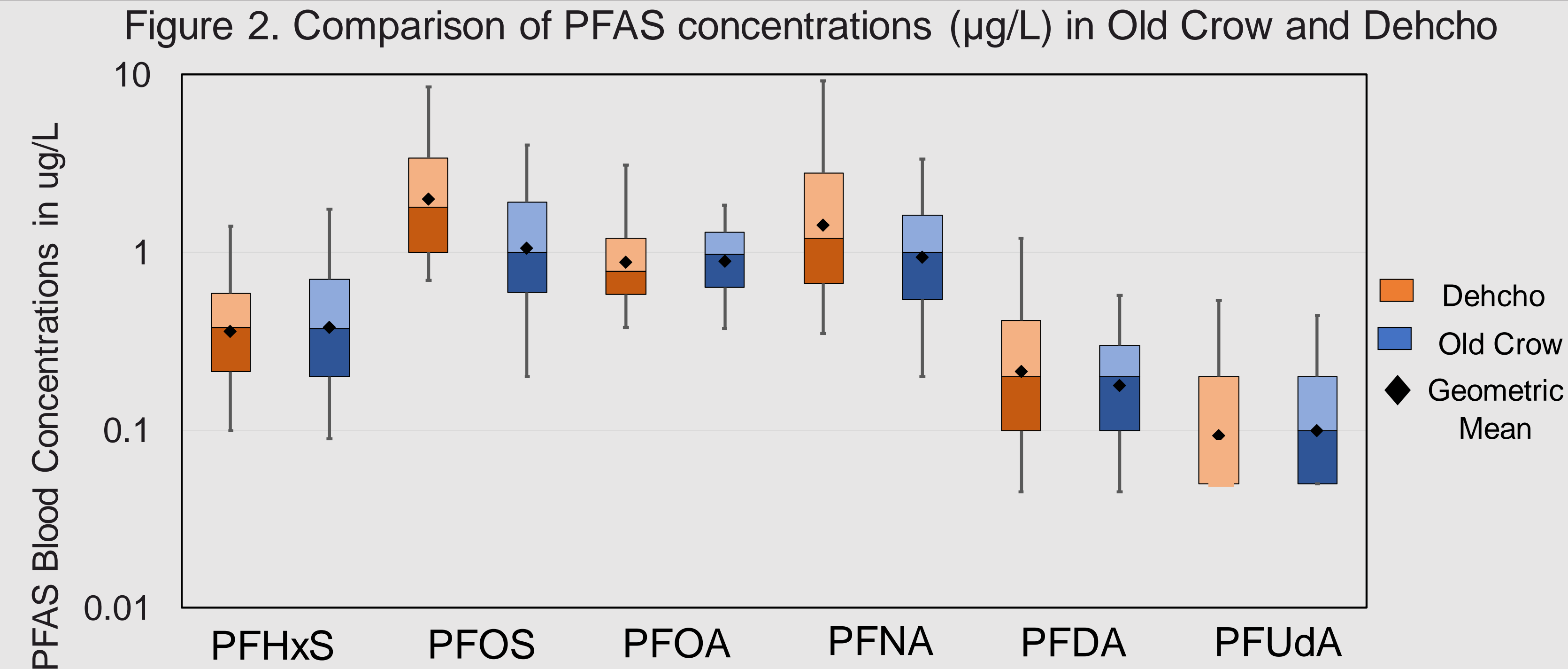
Table 1. Participant demographics

Demographic		Old Crow	Dehcho
Age	10-24	N/A	24
	25-44	28	38
	45-59	16	31
	60+	10	26
	Total	54	119
Sex	Male	26	61
	Female	28	64
	Total	54	125

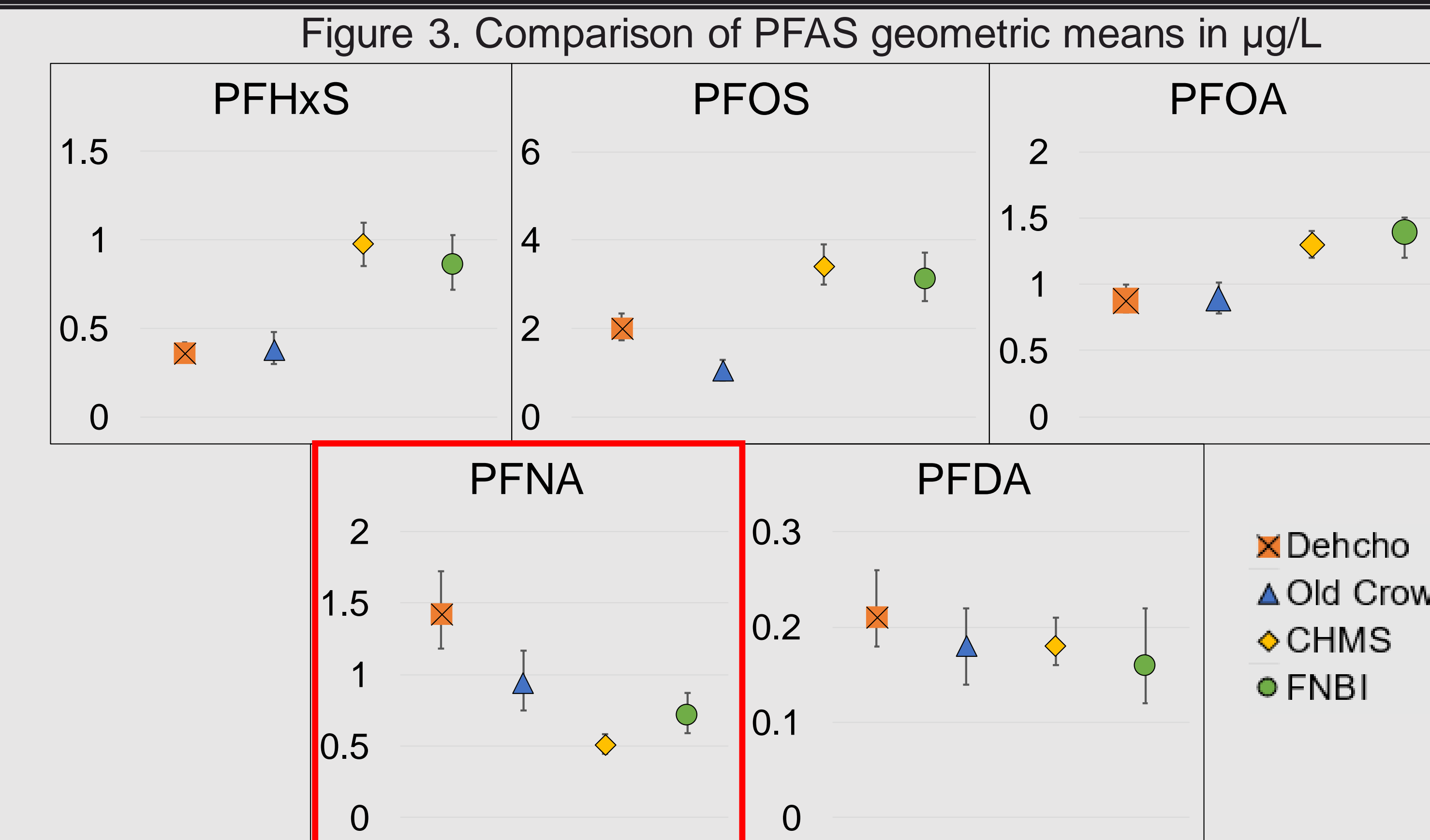
Figure 1. Average PFAS detection rates



## Results and Discussion Continued



**Overall PFAS in Old Crow and Dehcho:** PFAS GMs were generally similar between Old Crow and Dehcho participants with the exception of PFNA and PFOS, which were significantly higher in the Dehcho (Figure 2). Different blood matrices used between study locations (plasma versus serum) may explain this variation.



### Comparison among reference populations:

- Most PFAS levels in Old Crow and Dehcho were similar or significantly lower than those in the CHMS and FNBI (Fig. 3). **On average 2.1 times lower.**
- **Some levels of PFNA were significantly higher** compared to the reference populations, especially in Dehcho (Fig. 3,4).
- Relatively high concentrations of PFNA compared to reference populations are consistent with the hypothesis that long-range transport of PFAS and PFAS precursors are likely to most contribute to PFAS in northern regions.

## Conclusion

- This is the first time PFAS levels have been reported in Indigenous populations from these locations which will help address a knowledge gap regarding the level of exposure to PFAS in Canadian sub-Arctic and Arctic communities.
- Future research should investigate site-specific PFNA exposure sources and monitor temporal trends in these regions.

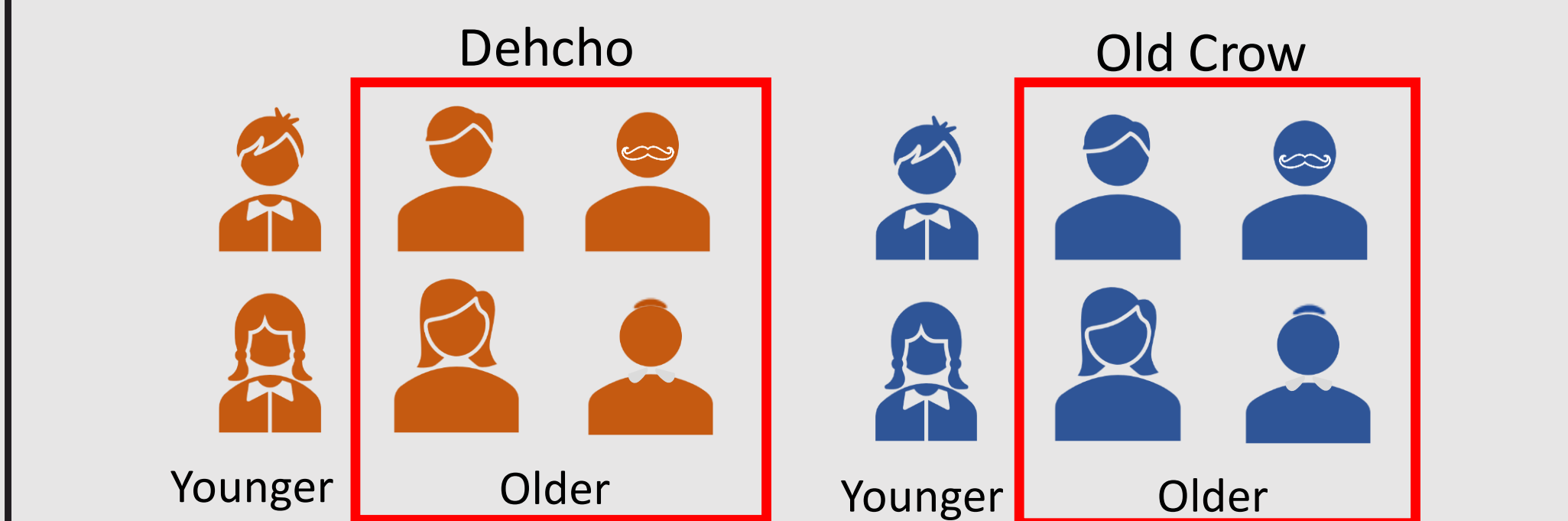
## Acknowledgements

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### Demographic Determinants of PFAS:



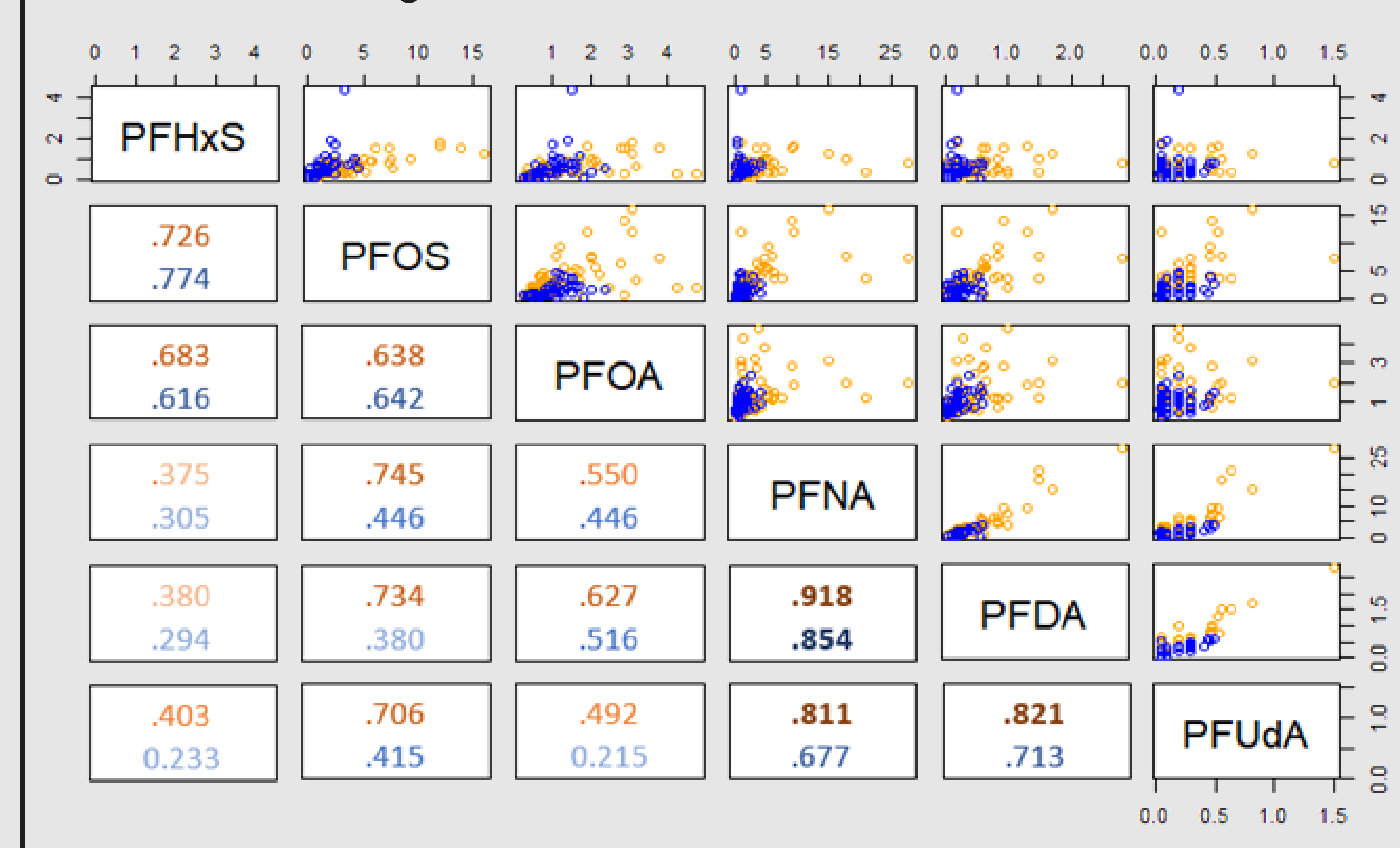
**By Sex:** Male participants generally had higher concentrations for all PFAS compared to female participants, consistent with findings suggesting elimination rates may be sex-specific.



**By Age:** Older participants generally had higher PFAS than observed in younger participants. Bioaccumulation of PFAS or differences in traditional food consumption habits may explain observed patterns.

**Correlations between PFAS:** Greater bioaccumulation potential of PFAS with longer chains might explain the correlation patterns found since stronger associations were observed: i) among PFAS of similar carbon chain length; and ii) with increasing chain length.

Figure 4. PFAS Correlation Matrix



## Article Reference

This poster summarizes the findings of the following peer reviewed article: Garcia-Barrios, J., Drysdale, M., Ratelle, M., Gaudreau, É., LeBlanc, A., Gamberg, M., & Laird, B. D. (2021). Biomarkers of poly- and perfluoroalkyl substances (PFAS) in Sub-Arctic and Arctic communities in Canada. International Journal of Hygiene and Environmental Health, 235, 113754.  
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