

IL-1 β , IL-6, and IL-8-inducing Potential of Indoor Settled Dust from Homes One and Two-Years Post-Hurricane Maria in San Juan, Puerto Rico

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Introduction

Residential water damage, as a result of Hurricane Maria in Puerto Rico (September 2017) and slow relief efforts, exposed Puerto Ricans to potentially pro-inflammatory indoor pollution in affected homes. Long-term exposure to these conditions can pose respiratory health risks via immune-activating mechanisms. While it is that microbial contamination can escalate in the aftermath of a hurricane, less is known about the pro-inflammatory potential of indoor contamination one year and two years after the impact of a major hurricane.

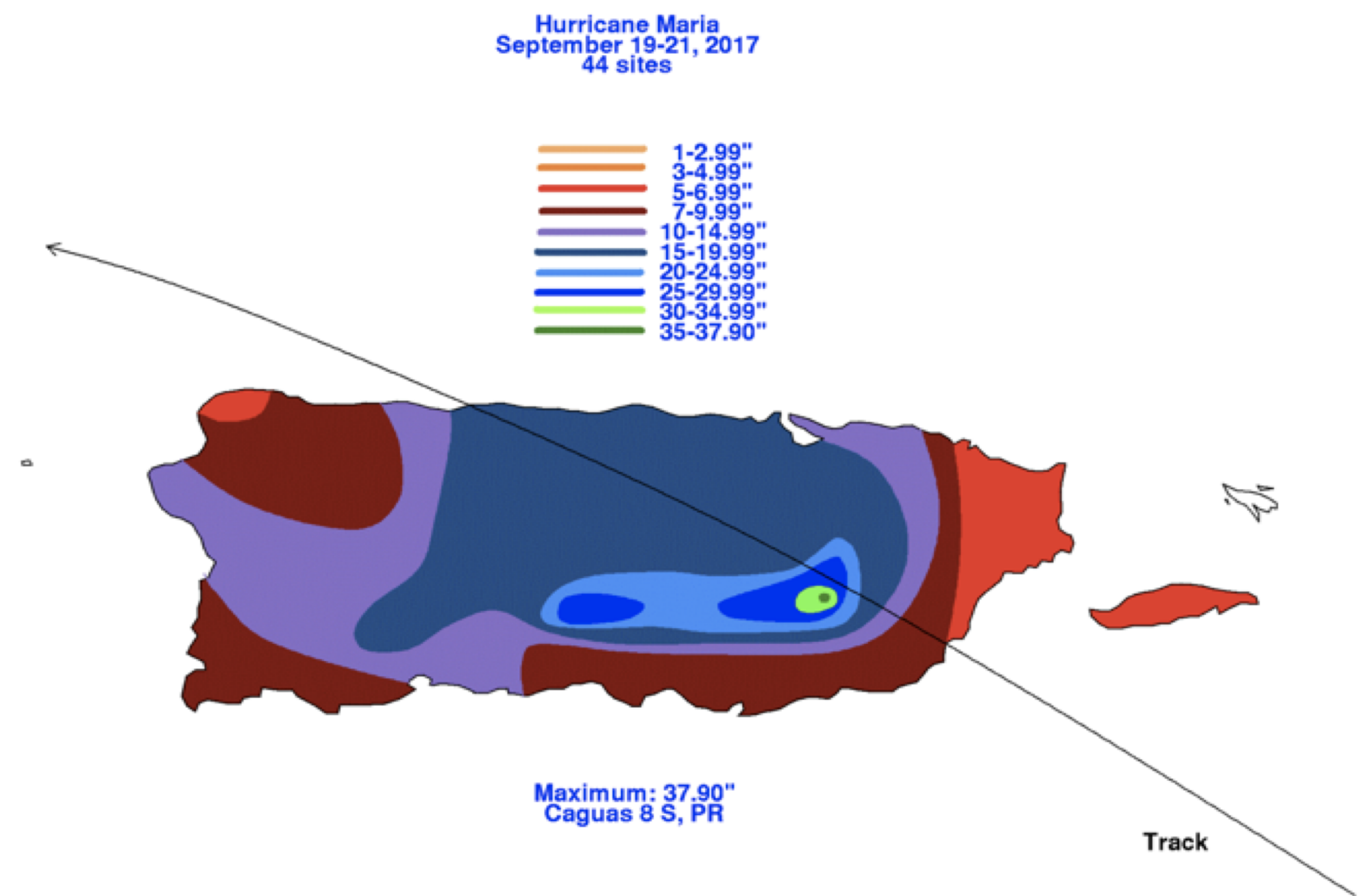


Figure 1. Map of total rainfall in Puerto Rico during the Hurricane Maria. NOAA Tropical Cyclone Report: Hurricane Maria (Accessed Feb, 2019).

Objective

To identify differences in pro-inflammatory (interleukin[IL]-1Beta, IL-6, and -8) inducing potential of indoor settled from homes with different magnitudes of water damage one year compared to two years post-Hurricane Maria.

Methods



Figure 2. Site of study (Figueroa Community) in San Juan, PR. Image retrieved with the ggmap R package.

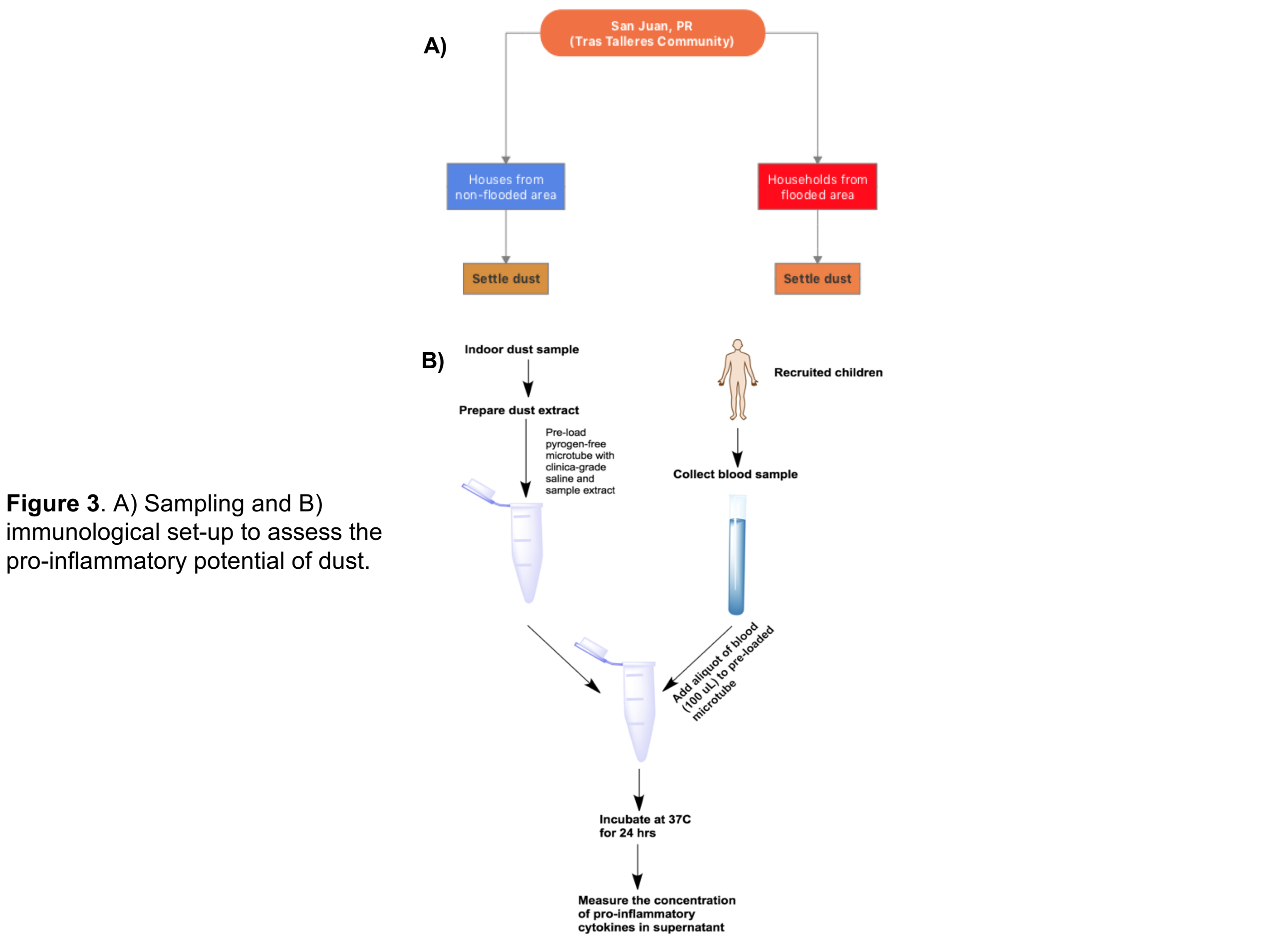


Figure 3. A) Sampling and B) immunological set-up to assess the pro-inflammatory potential of dust.

Results

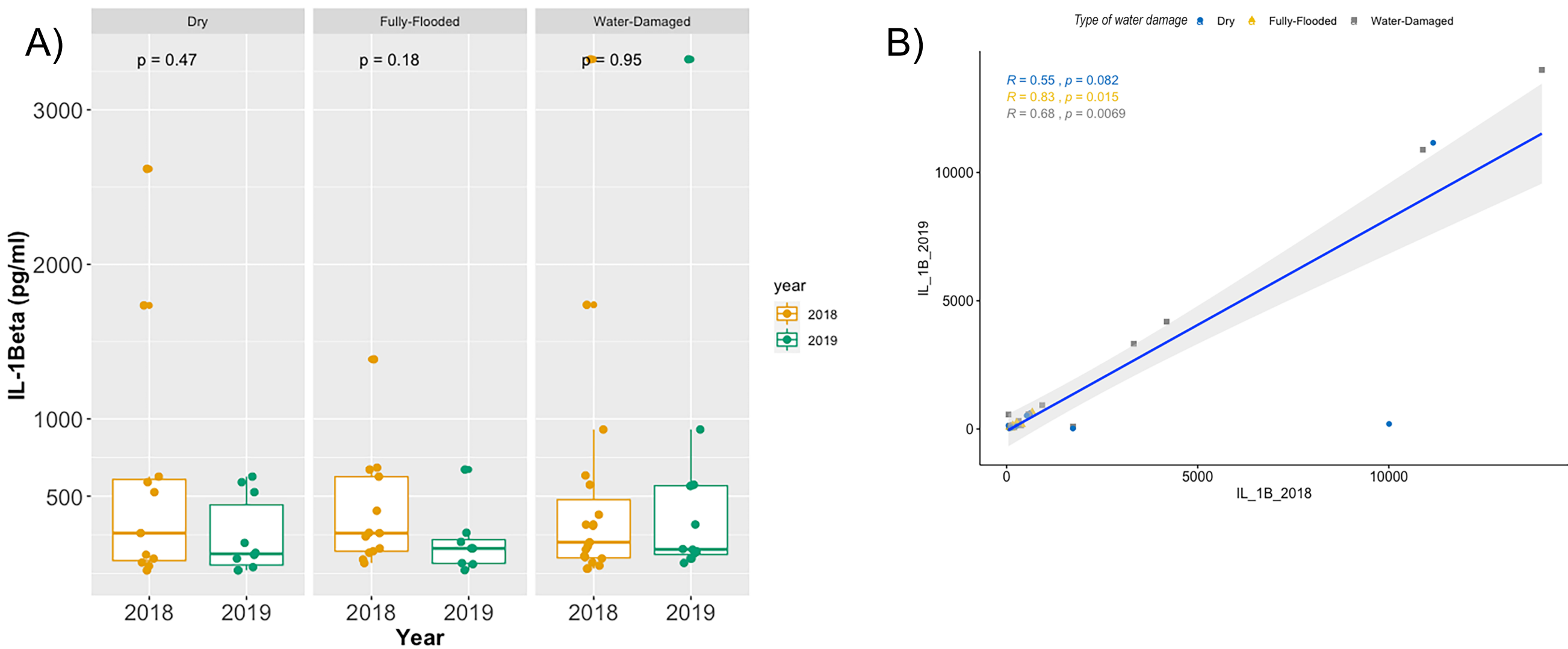


Figure 4: A) The induced concentration of IL-1beta was lower two years after Hurricane Maria irrespective of the magnitude of water damage, but not statistically significant. B) Year 1 (2018) and year 2 (2019) induced concentration strongly were correlated if the home experienced a water damage (i.e. Fully-Flooded or Water-Damage without flooding).

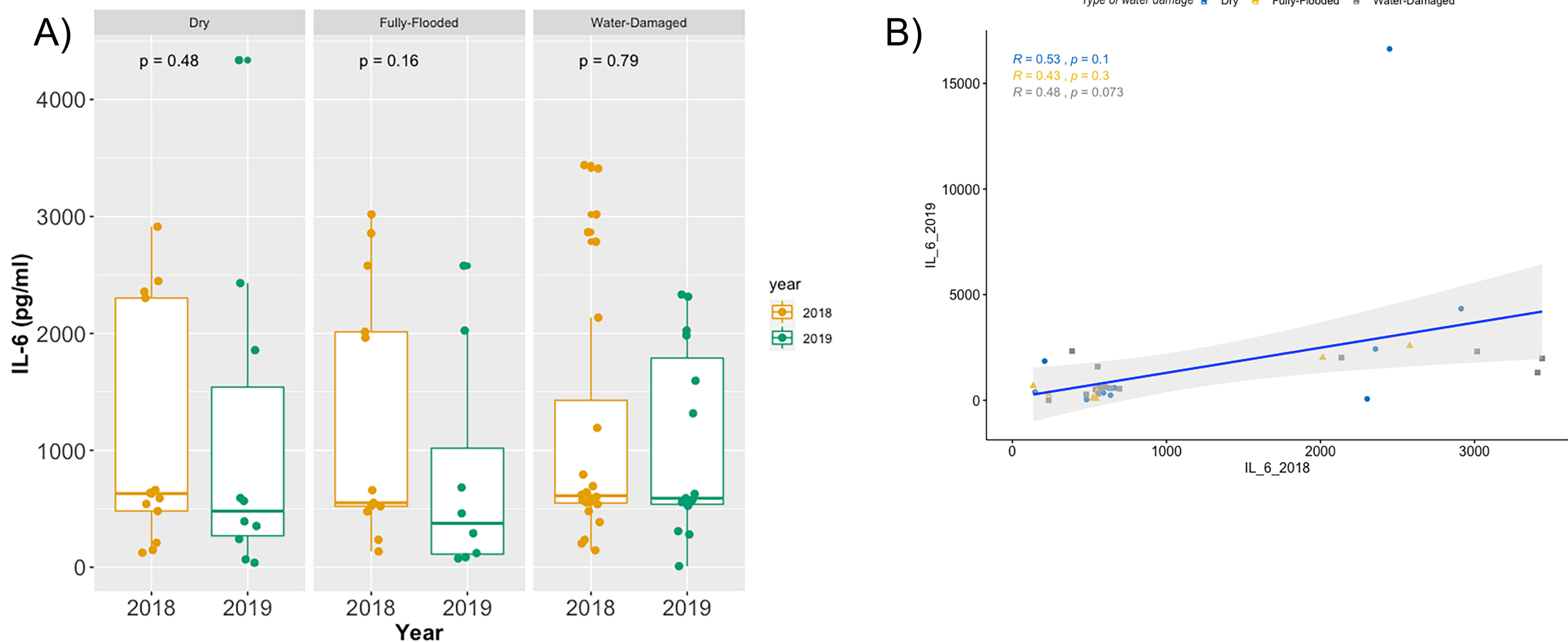


Figure 5: Similar to IL-1beta, A) the induced concentration of IL-6 was lower two years after Hurricane Maria irrespective of the magnitude of water damage, but not statistically significant. Contrary to IL-1beta, B) these concentration strongly correlated between sampling years only if the water damage did not include indoor flooding.

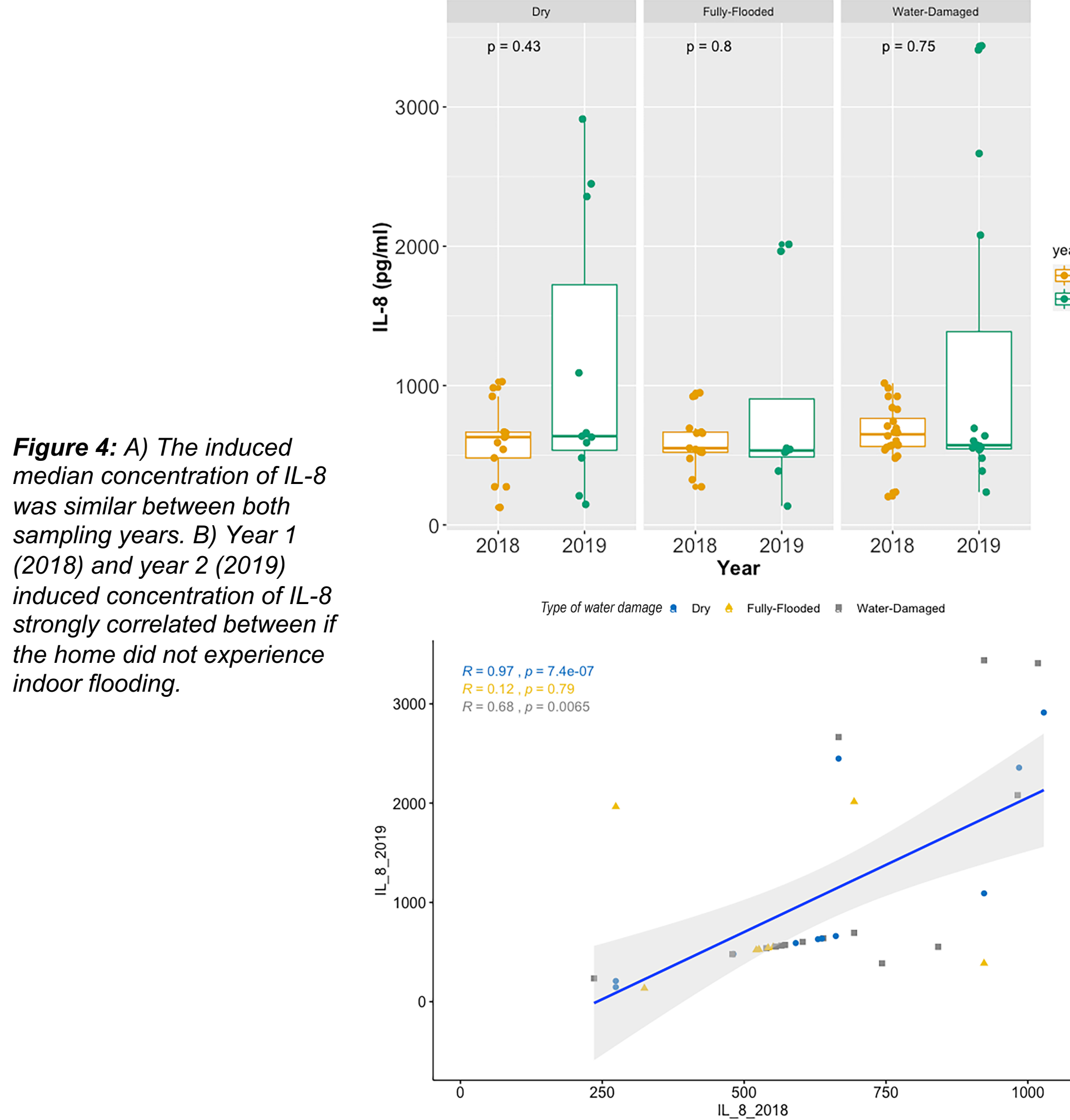


Figure 4: A) The induced median concentration of IL-8 was similar between both sampling years. B) Year 1 (2018) and year 2 (2019) induced concentration of IL-8 strongly correlated between if the home did not experience indoor flooding.

Conclusion

- Although no statistical differences, one-year post-Hurricane Maria induce slightly higher pro-inflammatory cytokines (except for IL-8).
- These results, together with different magnitudes of correlation between both years and modified level of water damage, suggest that the mechanisms of pro-inflammatory activation differed one year compared to two years post-Hurricane Maria.

Future Studies

Further immunotoxicological studies will evaluate the potential of the indoor settled dust samples to induced epigenetic changes on pro- or anti-inflammatory genes.

Acknowledgments

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- The Field Team for their remarkable job administering the surveys and carrying out the indoor sampling of the homes.

Conflict of Interest

- The authors have no conflict of interest to disclose.