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Child environmental exposures to water and sand at the beach: Findings from studies of over 68,000 subjects at 12 beaches

Stephanie DeFlorio-Barker^{1*}, Benjamin F. Arnold², Elizabeth A. Sams¹, Alfred P. Dufour³, John M. Colford Jr², Steven B. Weisberg⁴, Kenneth C. Schiff⁴ and Timothy J. Wade¹

¹*US Environmental Protection Agency Office of Research and Development, National Health and Environmental Effects Research Laboratory, Research Triangle Park, NC*

²*University of California, Berkeley School of Public Health, Berkeley, CA*

³*National Exposure Research Laboratory, U.S. Environmental Protection Agency Office of Research and Development, Research Triangle Park, NC*

⁴*Southern California Coastal Water Research Project, Costa Mesa, CA.*

**Corresponding author: Dr. S. DeFlorio-Barker, National Health and Environmental Effects Research Laboratory, Office of Research and Development, US Environmental Protection Agency. Address: 109 TW Alexander MC 58C Research Triangle Park, NC 27711, USA.*

ABSTRACT

Swimming and recreating in lakes, oceans, and rivers is common, yet the literature suggests children may be at greater risk of illness following such exposures. These effects might be due to differences in immunity or differing behavioral factors such as poorer hygiene, longer exposures to, and greater ingestion of potentially contaminated water and sand. We pooled data from 12 prospective cohorts (n = 68,685) to examine exposures to potentially contaminated media such as beach water and sand among children compared with adults, and conducted a simulation using self-reported time spent in the water and volume of water swallowed per minute by age to estimate the total volume of water swallowed per swimming event by age category. Children aged 4–7 and 8–12 years had the highest exposures to water, sand, and algae compared with other age groups. Based on our simulation, we found that children (6–12 years) swallow a median of 36 ml (90th percentile = 150 ml), whereas adults aged ≥ 35 years swallow 9 ml (90th percentile = 64 ml) per swimming event, with male children swallowing a greater amount of water compared with females. These estimates may help to reduce uncertainty surrounding routes and durations of recreational exposures and can support the development of chemical and microbial risk assessments.

Full Text

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