Transgenerational Health Outcomes Following Occupational Exposure to Camp Lejeune Water Contamination (1953–1987)

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ABSTRACT

From 1953-1987, CL water was highly contaminated with various chemicals, causing adverse health effects in exposed military personnel and their families.

Interviews captured demographics, health conditions, and quality-of-life data of unexposed descendants.

Among 26 participants, there was an average of 9.5 health conditions reported, with 30.6% having conditions related to the reproductive system. Anger (26.2%) and grief (21.5%) were the most frequently reported quality of life categories.

This is one of the first studies to examine potential health effects of CL water contamination on descendants compared to directly exposed individuals.

INTRODUCTION

- From 1953–1987, military personnel and their families at Camp Lejeune (CL) experienced occupational and environmental exposures to contaminated drinking water.[1]
  - The highest contaminations were at:
    - Tarawa Terrace with 43 times the current maximum levels of perchloroethylene (PCE).[2]
    - Hadnot Point with 280 times the current maximum levels of trichloroethylene (TCE).[2]
  - Several adverse health outcomes, including cancers and Parkinson's disease, were documented among directly exposed individuals.

- Potential effects among unexposed descendants have not been studied, raising social justice concerns as they may experience health consequences from military service exposures they did not consent to.

- We hypothesized that the unexposed generations would report conditions similar to the directly exposed service members and their families currently covered by the VA.
  - Conditions include cancer, Non-Hodgkin's Lymphoma, multiple myeloma, blood disorders, autoimmune disorders, and issues within the reproductive, liver, kidney, and central nervous systems.[1]
  - It is possible that epigenetic changes in DNA have caused potential negative intergenerational and transgenerational health outcomes in the offspring of those directly exposed to environmental hazards.[3]

MATERIALS & METHODS

- Participants were recruited through CL exposure-related social media platforms.
- Eligibility was defined as:
  - Being ≥18 years old
  - Unexposed to Camp Lejeune water
  - Having a biological parent and/or grandparent occupationally exposed for ≥30 days between 1953 and 1987.
- Virtual interviews captured physical and mental health, exposure, demographic, and quality-of-life information.

RESULTS

- Among 26 participants
  - 80.8% were women (n=21)
  - 100% Caucasian
  - Mean age was 42.7 years (range, 24–67 years)
  - Participants reported an average of 9.5 health conditions (range, 1–21 conditions)

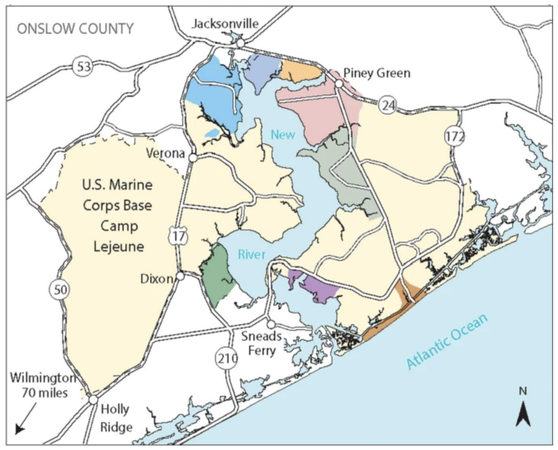
- Among women, the most common conditions were irregular menstrual cycles (66.7%); infertility (38.1%); and ADHD, multiple allergies, miscarriages, and hysterectomies (33.3% each).

- Among men, ADHD (60%), infertility (40%), and depression (40%), were the most commonly reported conditions.

Counts and Percentages of Self-Reported Health Condition Categories (n=248)

Category	Count	Percentage
Reproductive System	**76**	**30.6%**
Immune System	**30**	**12.1%**
Neurobehavioral	**26**	**10.5%**
Mental Health	23	9.3%
Cardiovascular System	13	5.2%
Musculoskeletal System	11	4.4%
Birth Defect (all)	8	3.2%
Gastrointestinal	8	3.2%
Dental	7	2.8%
Biliary System/Liver	6	2.4%
Blood disorder	6	2.4%
Respiratory System	6	2.4%
Central Nervous System	5	2.0%
Dermatological	5	2.0%
Endocrine System	5	2.0%
Vision	5	2.0%
Cancer/pre-cancer	4	1.6%
Premature Birth	3	1.2%
Bladder	1	0.4%
Total	**248**	**100%**

Note. Bolded values indicate categories representing greater than 10%



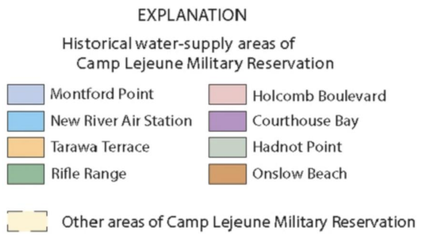


Figure 1. Historical water-supply areas of Camp Lejeune Military Reservation

"And I'll joke about my condition. We make light of it because if you think about it, it's depressing. This condition took my whole world"
- Participant 27 (grief)

"I got a s*** life dealt to me and [I thought] that's what I deserve. But not now. I'm mad. You poisoned us. You poisoned my mother before she took a breath."
- Participant 6 (anger)

"I was finding as much work as I could for a f****** 10-year-old, doing construction work to put food on the table, pay bills, you know, that kind of thing."
- Participant 41 (financial)

"I think going through this whole process of watching my father deteriorate to such a heartbreaking degree made me just kind of look over my shoulder a bit"
- Participant 60 (fear)

Most Significant Counts and Percentages of Categories of Quality of Life Issues (n = 130)

QOL Category	Count	Percentage
Anger	**34**	**26.2%**
Grief	**28**	**21.5%**
Financial	14	10.8%
Fear	13	10.0%
Important Decisions	13	10.0%
Social/Family Relationships	10	7.7%
Trauma	8	6.2%
Career	5	3.8%
Mistrust	2	1.5%
Gratitude	1	0.8%
Guilt	1	0.8%
Bitterness	1	0.8%

Note. Bolded values indicate categories representing greater than 20% of sample

DISCUSSION

- To our knowledge, this is the first study exploring the health effects of the descendants of those affected by CL water.

- A study by Gorina & Kramarow[6] found that adults aged 85 years and older had a mean of only 4 health conditions, while our participants reported 9.5. This age group was selected to highlight the relatively high number of health conditions reported by our younger participants. However, differences in how conditions were assessed limit direct comparisons.

- The prevalence of reproductive health concerns including excessive period bleeding (including with large clots, pain and/or anemia and with multiple women choosing or planning on having a hysterectomy due to these symptoms); missing or late periods; miscarriages; ovarian cysts; cervical dysplasia/abnormal Pap smears; endometriosis, fibroids; low progesterone; PCOS (now PMOS); reproductive birth defects; uterine polyps; and an inconclusive uterine mass among female descendants.

- Anger was expressed in various ways, including frustration over the delayed disclosure of CL contamination, perceived lack of government accountability, feelings of being "disposable," and inadequate compensation.

- Limitations include potential recall and sampling bias, as well as inadequate representation of the total affected population.

REFERENCES

1. U.S. Department of Veterans Affairs. Camp Lejeune: past water contamination. Updated April 15, 2025. Accessed October 22, 2026. https://www.publichealth.va.gov/exposures/camp-lejeune/
2. Agency for Toxic Substances and Disease Registry. Camp Lejeune health effects. Updated November 12, 2024. Accessed October 22, 2026. https://www.atsdr.cdc.gov/camp-lejeune/risk-factors/index.html
3. Korolenko A, Skinner MK. Generational stability of epigenetic transgenerational inheritance facilitates adaptation and evolution. Epigenetics. 2024;19(1):2380929. doi:10.1080/15592294.2024.2380929
4. WCTI Staff. Navy receives over 550,000 claims under Camp Lejeune Justice Act. ABC News 4. Published October 18, 2024. https://abcnews4.com/news/nation-world/navy-receives-over-550000-claims-under-camp-lejeune-justice-act-many-duplicative
5. Maslia ML, ed. Expert Panel Assessing ATSDR's Methods and Analyses for Historical Reconstruction of Groundwater Resources and Distribution of Drinking Water at Hadnot Point, Holcomb Boulevard, and Vicinity, U.S. Marine Corps Base Camp Lejeune, North Carolina. Eastern Research Group, Inc; 2009. https://www.atsdr.cdc.gov/camp-lejeune/media/pdfs/ExpertPanel_ReportFinal_508.pdf
6. Gorina Y, Kramarow EA. Chronic conditions in adults age 85 and older: United States, 2022-2023. NCHS Health E-Stat. 2025;(105):1-5. doi:10.15620/cdc/174611

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