

An Assessment of the
Feasibility of Conducting Future
Epidemiological Studies at
USMC Base Camp Lejeune.

http://www.atsdr.cdc.gov/sites/lejeune/docs/feasibility_assessment_Lejeune.pdf

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ATSDR Science Advisory Panel on Camp Lejeune, 2005

- Panel recommended that ATSDR
 - identify cohorts with potential exposure
 - adults who lived on base
 - adults who worked on base
 - children who lived on base (including pregnancies)
 - address feasibility of issues involved in planning future studies at the base

H.R. 4986: National Defense Authorization for FY 2008 (Section 315)

- Enacted January 28, 2008
- Requires ATSDR to develop a health survey
- Requires the Navy to send health surveys to all individuals possibly exposed to contaminated drinking water at Camp Lejeune
- Survey should begin one year after enactment

Data Sources Reviewed

- Defense Manpower Data Center (DMDC)
 - personnel data on active duty and employees
- ATSDR 1999-2002 survey participants
- DOD Education Activity microfiche tapes
 - high school transcripts, other grade level data
- Naval Health Research Center (NHRC)
 - Career History Archival Medical and Personnel System (“CHAMPS”)
- Camp Lejeune family housing records

DMDC Active Duty Personnel Data

- partial last name (before 1977)
- full name (1977 onward)
- social security number
- date of birth
- sex and race/ethnicity
- home state of record
- unit code available starting in June 1975
 - can be used to identify base location
- occupational specialty
- pay grade
- dates and years of service
- marital status

DMDC Active Duty Personnel Data

- 210,222 Marines and Navy personnel stationed at the base anytime, 6/75 – 12/85
 - 198,805 Marines; 11417 Navy
 - 8,214 women (3.9%)
 - 30% married
 - 95% enlisted; 5% commissioned officers
 - 25% African American; 4% Hispanic
 - Average tour length is 3 years
 - 88% under the age of 55 in 2007

DMDC Civilian Employee Personnel Data

- full name (12/81 onward)
 - name not available before 12/81
- social security number
- date of birth
- sex and race/ethnicity
- home state of record
- occupational code and location of occupation (December 1972 onward)
- employee start date (June 1974 onward)
- years of service
- pay grade

DMDC Civilian Employee Personnel Data

- 8,085 civilians employed at the base anytime, 12/72–12/85
 - 3,687 women (45.6%)
 - 21.7% African American
 - Half were employed for 5 years or more
 - 80% aged ≥ 55 years in 2007

ATSDR 1999-2002 Survey

- Telephone survey of parents who
 - had a child born during 1968-1985, and
 - resided on base anytime during the pregnancy
- Conducted to identify potential birth defects and childhood cancers for the current case-control study
- Parents of 12,598 children were interviewed
 - slightly more than half of the respondents were the mother
- About 4,000 of the Marines/Navy personnel in this survey are not in the DMDC database because they left the base before 1975
- Includes dependents (spouse, child) who are not in the DMDC databases

ATSDR 1999-2002 Survey

- Data available
 - Most survey respondents (either the mother or father) provided his/her social security number
 - Full name, date of birth, and address at time of survey are available for both parents and the index child
 - Dates the parents lived on base

DOD Education Activity Records

- 1940s through 1979
 - data cartridges are severely damaged and most cannot be read
 - data prior to 1974 and for 1979 could not be read
- 1980 onward
 - plastic reels can be read
- During 1974-1984, annual graduating class ranged from 78 to 132 students

DOD Education Activity Records

- Available data
 - high school transcripts
 - student's name
 - date of birth
 - gender
 - social security number for some students
 - a parent's name and address on base
 - non-graduates
 - name
 - address
 - date of birth

NHRC's "CHAMPS" Database

- Hospitalizations among active duty personnel
- Data for Marines from 1980 onward
- Uses DMDC personnel database
- 126,015 Marines at base anytime <1986 were identified
 - diseases requiring hospitalization, 1980-2000
 - 3 liver cancers
 - 6 kidney cancers
 - 121 cases of kidney diseases
 - 9 cases of liver disease without mention of alcohol
 - 3 cases of liver necrosis

Camp Lejeune Family Housing Records

- About 90,000 entries on index cards, 1942 - 1994
- ATSDR computerized database has 75,000 records
 - excludes those who moved in after December 1985
- Data items
 - full name of “sponsor” (active duty Marine/Navy)
 - street address
 - dates moved in and out
 - rank

ATSDR-Convened Panel of Epidemiologists, March 2008

- Panel Members

- Han Kang, Dept Veteran Affairs
- Kyle Steenland, Emory U
- Elizabeth Delzell, U AL-Birmingham
- Kenneth Cantor, NCI
- Maria Schymura, NYS Cancer Registry
- Chris Rennix, Navy/USMC Public Health Center
- Richard Clapp, Boston U; member of Lejeune CAP

Recommendations from ATSDR- Convened Panel of Epidemiologists

- Conduct mortality study
 - active duty Marines/Navy
 - began active duty on or after June 1975
 - were stationed at Lejeune anytime, 1975-1985
 - civilian employees
 - began DOD employment on or after June 1974
 - were employed at Lejeune anytime 1974-1985
 - comparison cohorts from Camp Pendleton
 - began active duty (sample of 50,000) or civilian DOD employment (sample of 10,000) on or after June 1975
 - never stationed at Lejeune during water contamination

Recommendations from ATSDR- Convened Panel of Epidemiologists

- Conduct “data-linkage”, cancer incidence study
 - using cancer registries from 50 states, VA and DOD
 - same three cohorts as mortality study
 - include parents and children in the ATSDR 1999-2002 survey with complete base residence info
- Obtain information on cancers and other diseases in the congressionally-mandated health survey
 - if survey has a participation rate $\geq 65\%$, then the data-linkage, cancer incidence study may not be necessary

Congressionally-Mandated Health Survey

- Marines/Navy personnel stationed at Lejeune anytime 6/75 – 12/85 (N=210,222)
- Civilians employed at Lejeune anytime 12/72 – 12/85 (N=8,085)
- Camp Pendleton samples (N= 50,000 + 10,000)
- Parents/children in ATSDR survey (N=12,598 families)
- Next of kin of decedents (identified in mortality study)
- Also includes anyone who registers with DOD or ATSDR, but will be analyzed separately

Health Survey Questionnaire Items

- Residential history on base
- Work activities on base
- Occupational history
- Other risk factors
 - Smoking
 - alcohol consumption
 - SES factors

Health Survey Questionnaire Items

- Information on cancers
 - type
 - date, state and hospital of diagnosis
 - name of health care provider
- Information on other diseases associated with solvent exposure
 - similar information as cancers
- Open-ended question about other health concerns
- Request for signed medical records release form or copies of medical records in respondent's possession
- Consent form

Survey Methods

- Dillman's Tailored Design Method for mailed surveys
- Pre-notice letter
 - signed by highest ranking officer of the USMC/Navy
 - notifies that survey will be mailed soon (1-2 weeks)
 - strongly encourages participation
- Health survey mailing
 - preaddressed stamped return envelope
 - letter signed by the highest ranking officer of USMC/Navy
 - provides website for on-line version of survey if they prefer to answer electronically
 - email will also be sent if email address is available

Survey Methods

- Thank you/reminder postcard (and email) sent 2 weeks later to all respondents
- Second survey mailed/emailed to non-responders four weeks after postcard reminder
- Telephone reminders to non-responders after 2 weeks of second mailing

Diseases Associated with Solvent Exposure

kidney cancers (TCE)
liver cancer and liver disease (TCE, VC)
leukemias (TCE, benzene, PCE)
cervical cancer (TCE, PCE)
bladder cancer (PCE)
lung cancer (PCE, VC)
soft tissue sarcoma (VC)
breast cancer (PCE)
scleroderma (TCE, PCE)
generalized skin disorders (TCE)
infertility (PCE, TCE, solvents)
aplastic anemia (benzene)
motor neuron disease/ALS (solvents)

kidney diseases (TCE, PCE)
NHL (TCE, PCE, benzene)
multiple myeloma (TCE, benzene)
Hodgkin's disease (TCE)
pancreatic cancer (PCE)
esophageal cancer (PCE)
brain cancer (VC)
Parkinson's disease (TCE)
Lupus (TCE)
spontaneous abortion (PCE, benzene)
endometriosis (solvents)
multiple sclerosis (solvents)

State of Residence for USMC Retirees and Cancer Registry Data by State

State	% retirees	Cancer registry data available	% complete	State	% retirees	Cancer registry data available	% complete
CA	15.38	1988	100.0	NJ	1.01	1979	99.0
NC	10.24	1990	93.0	WI	1.01	1978	100.0
VA	8.52	1990	88.6	KY	.95	1991	99.4
FL	7.79	1981	99.7	HI	.89	1973	100.0
TX	6.52	1992	92.9	AR	.87	1996	85.6
GA	3.52	1995	79.5	MS	.86	.	.
AZ	3.17	1995	86.0	MN	.73	1988	99.9
PA	2.93	1985	100.0	NM	.73	1973	94.9
SC	2.76	1996	97.3	KS	.72	.	.
TN	2.26	1989	.	WV	.63	1993	99.5
MD	2.16	1982	.	IA	.56	1973	100.0
OH	2.15	1996	94.1	ID	.52	1970	97.8
WA	2.06	1992	100.0	CT	.46	1935	100.0
NY	1.97	1976	100.0	ME	.45	1983	97.4
MO	1.96	1985	100.0	UT	.43	1966	96.0
IL	1.76	1986	100.0	NH	.38	1987	95.8
AL	1.58	1996	79.3	MT	.37	1979	97.1
MI	1.52	1985	100.0	NE	.33	1987	99.7
NV	1.43	1995	91.2	RI	.21	1986	100.0
IN	1.34	1987	91.2	DE	.21	1972	99.2
CO	1.32	1988	100.0	SD	.16	.	.
OR	1.22	1996	99.2	DC	.14	1987	100.0
LA	1.18	1988	95.5	AK	.14	1996	100.0
MA	1.11	1982	98.7	WY	.14	1962	94.8
OK	1.04	.	.	VT	.13	.	.
				ND	.07	1997	97.3

Home State of Residence

Home State	% retirees	Cancer registry data available	% complete	Home State	% retirees	Cancer registry data available	% complete
NY	10.3	1976	100.0	MS	1.0	.	.
PA	7.2	1985	100.0	WA	0.9	1992	100.0
OH	7.0	1996	94.1	AR	0.8	1996	85.6
FL	5.0	1981	99.7	CO	0.8	1988	100.0
IL	4.7	1986	100.0	OK	0.8	.	.
CA	4.4	1988	100.0	AZ	0.7	1995	86.0
MI	4.2	1985	100.0	ME	0.7	1983	97.4
NC	4.1	1990	93.0	KS	0.7	.	.
TX	4.1	1992	92.9	NH	0.6	1987	95.8
NJ	3.9	1979	99.0	OR	0.6	1996	99.2
VA	3.2	1990	88.6	DC	0.5	1987	100.0
MA	2.9	1982	98.7	NE	0.5	1987	99.7
IN	2.9	1987	91.2	RI	0.5	1986	100.0
MD	2.8	1982	.	NM	0.5	1973	94.9
GA	2.8	1995	79.5	DE	0.4	1972	99.2
MO	2.1	1985	100.0	ID	0.2	1970	97.8
TN	2.1	1989	.	VT	0.2	.	.
WI	2.1	1978	100.0	SD	0.2	.	.
AL	2.1	1996	79.3	MT	0.2	1979	97.1
SC	1.9	1996	97.3	ND	0.2	1997	97.3
KY	1.8	1991	99.4	NV	0.2	1995	91.2
CT	1.6	1935	100.0	UT	0.2	1966	96.0
LA	1.5	1988	95.5	HI	0.1	1973	100.0
MN	1.4	1988	99.9	WY	0.1	1962	94.8
WV	1.2	1993	99.5	AK	0.1	1996	100.0
IA	1.0	1973	100.0				