

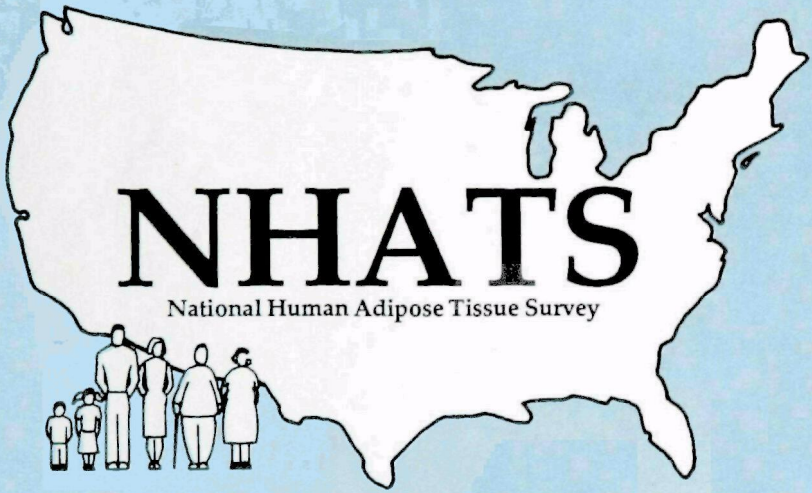


United States
Environmental Protection
Agency

August 1990

Toxic Substances

National Human Adipose Tissue Survey



NHATS

National Human Adipose Tissue Survey

BACKGROUND

The U.S. Environmental Protection Agency (EPA) through the National Human Monitoring Program (NHMP) has conducted a number of programs to monitor pesticides and other toxic substances in human tissues and fluids since the early 1970s. The National Human Adipose Tissue Survey (NHATS) is EPA's primary program under the NHMP. Monitoring data are used in exposure assessments and are important elements in the quantitative evaluations of hazard and risk.

PURPOSE

To Collect Human Adipose Tissue for Research Purposes.

Researchers use the adipose tissue to monitor the prevalence and levels of selected toxic substances in the general United States population. Data collected are used to provide average baseline levels in the general population, identify trends in exposure, and assess the effects of regulatory action.

DESIGN

Specimens are collected in 47 metropolitan statistical areas (MSAs) according to a statistically determined survey design. The design specifications are based on the age, sex, and race of the U.S. Census population figures for the census division to which the MSA belongs. The geographic stratification used in the design ensures a representative sample for all regions of the country for use in determining estimates of levels of toxic substances in the adipose tissue.

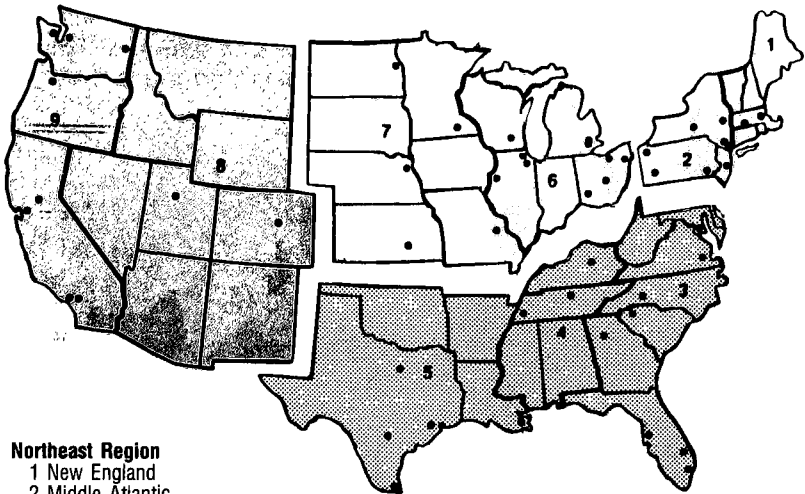
OPERATIONS

1990 Survey Design						
Age Group Sex Census Region	Number of Specimens Collected					
	0-14 Years		15-44 Years		45+ Years	
	Male	Female	Male	Female	Male	Female
North Central	45	45	90	90	60	75
Northeast	30	30	60	60	40	50
South	53	48	96	98	64	73
West	30	30	66	70	34	40

*Noncaucasians constitute 8% of the 1,377 total specimens

COLLECTION SITES

More Than 90 Pathologists and Medical Examiners
in 47 Metropolitan Statistical Areas



Northeast Region
1 New England
2 Middle Atlantic

South-Region
3 South Atlantic
4 East South Central
5 West South Central

North Central Region
6 East North Central
7 West North Central

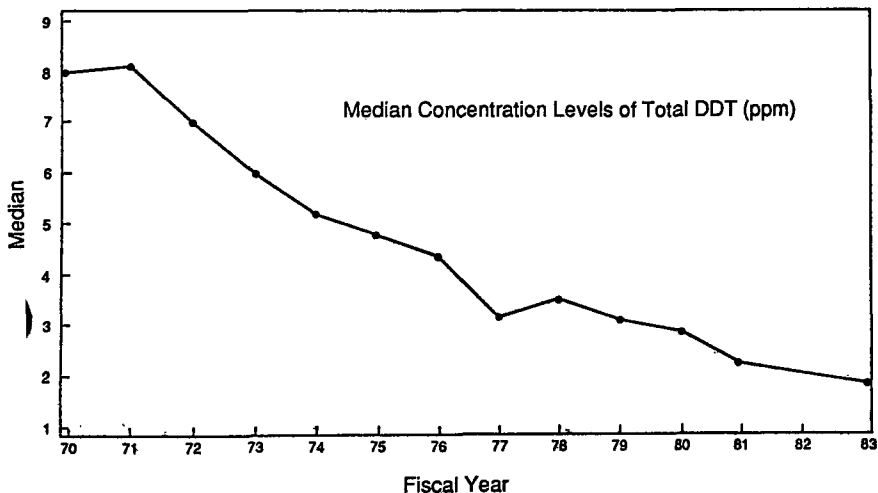
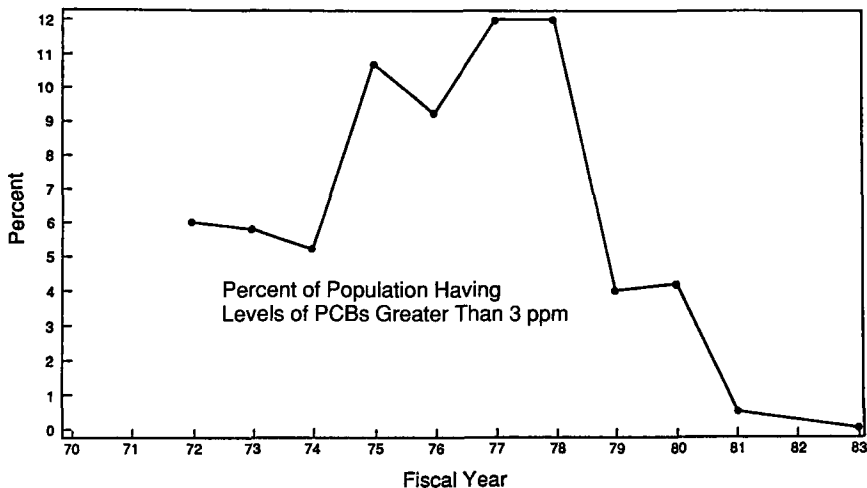
West Region
8 Mountain
9 Pacific

RESULTS

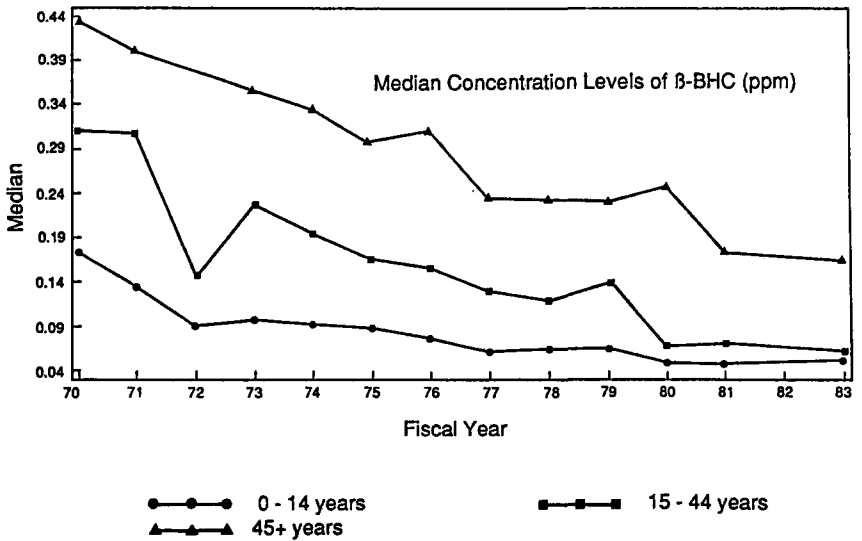
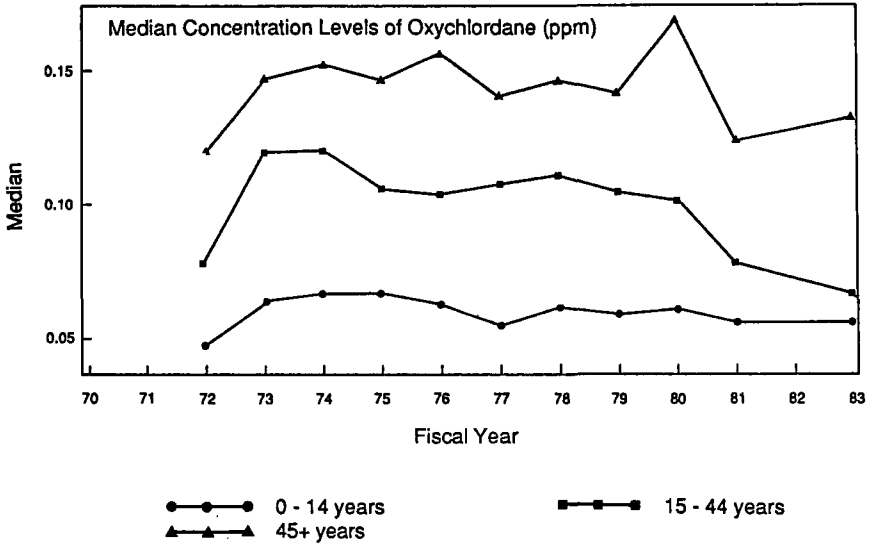
ORGANOCHLORINE PESTICIDES AND PCBs

EPA through the NHATS program has conducted human monitoring efforts since the early 1970's designed to estimate average concentrations of organochlorine pesticides and other toxic substances (specifically PCBs) in the general population. The results of these surveys have shown that almost all of the general population contained low levels of these environmentally persistent compounds. More recent monitoring efforts have demonstrated that as a result of restriction or ban of specific compounds there is a corresponding reduction in body burden levels of these substances.

Estimated Time Trends of Concentration Levels

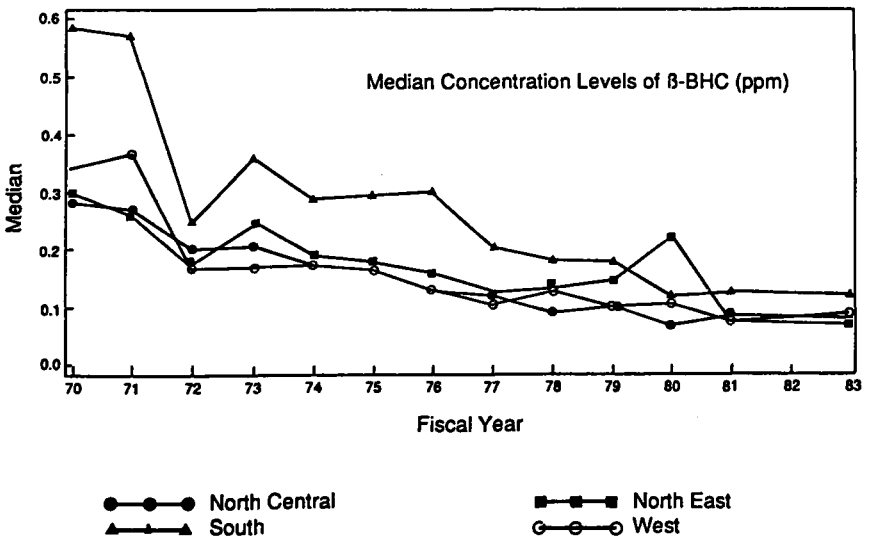
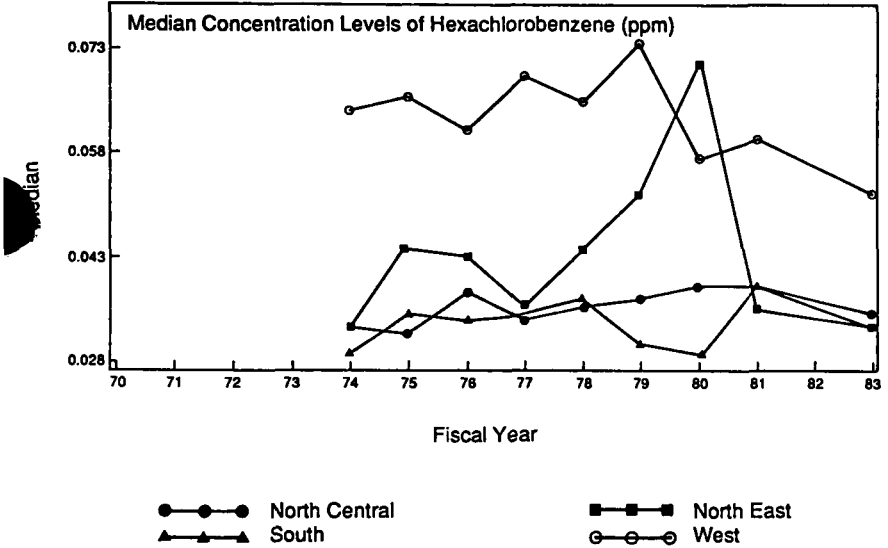


Across Age Groups



of Chemical Concentration Levels

Across Census Regions



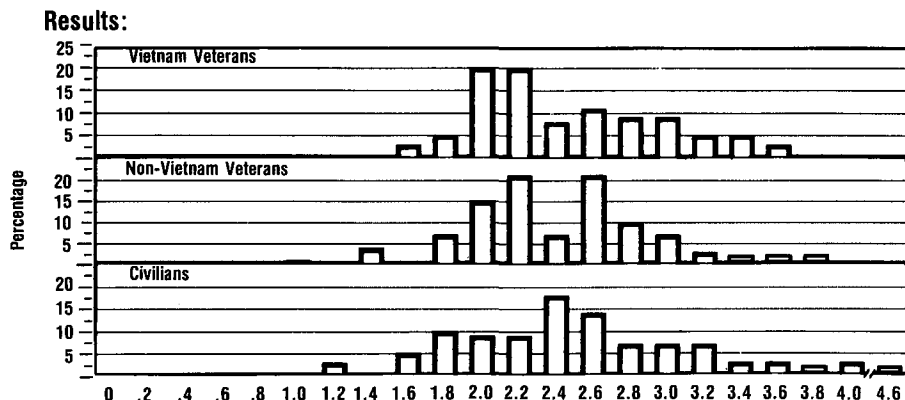
DIOXINS AND FURANS

Polychlorinated dibenzo-p-dioxins (PCDDs) and dibenzofurans (PCDFs) have been the subject of much concern in recent years as a result of the extreme toxicity of some of the isomers. The compound 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD), commonly referred to as "dioxin", has been demonstrated to be one of the most highly toxic compounds evaluated in animal studies.

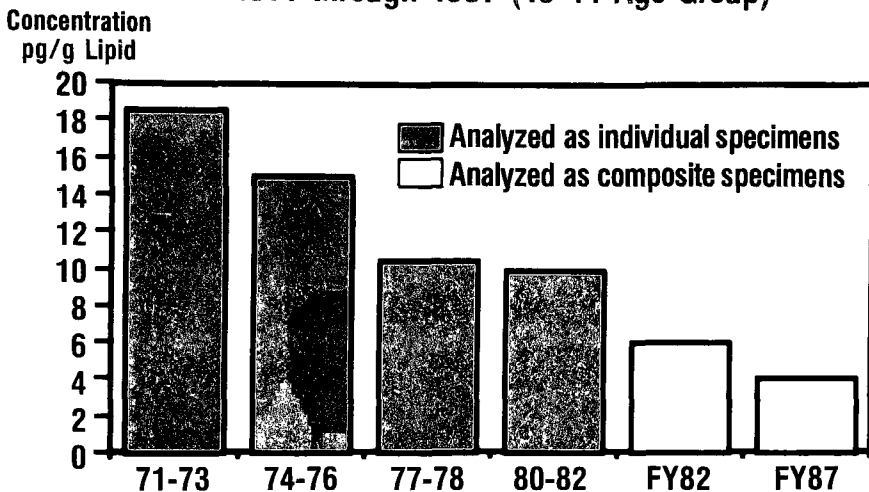
The dioxins and furans originate from multiple sources which include commercial products (contaminants in herbicides such as Agent Orange and 2,4,5-T; wood preservatives such as pentachlorophenol; trichlorophenols; etc.), emissions from incineration sources (municipal refuse incinerators, hospital waste incinerators, metal reclamation facilities, automobiles, and wood stoves) and bleaching processes used in the pulp and paper industry.

The NHATS program has generated data on the background & levels of these chemicals in the general U.S. population. Examples of the results for TCDDs showing trends from 1971 to 1987, levels across age categories and a comparison between Vietnam veterans, non-Vietnam veterans, and civilians are shown below.

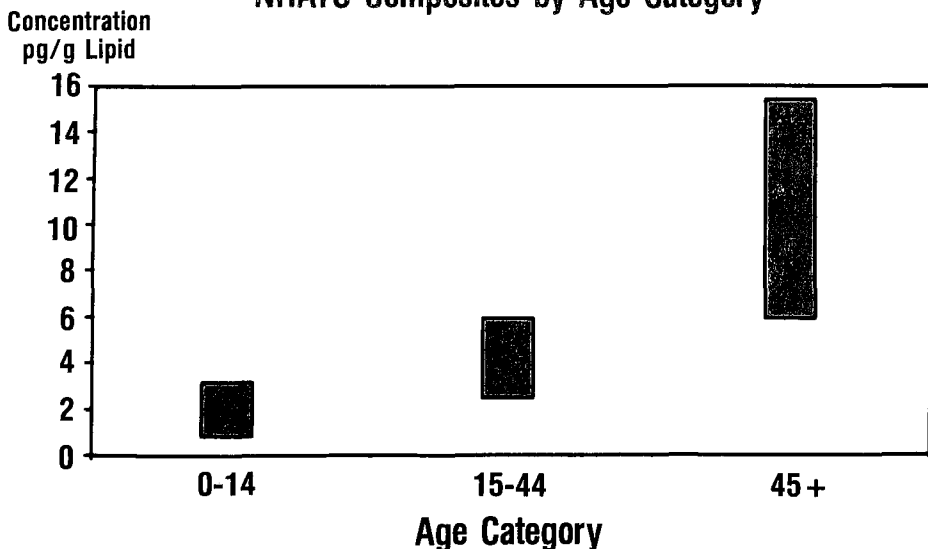
**Log TCDD Level in pg/g (ppt)
Histogram of 2,3,7,8-TCDD Levels
by Study Group After Log Transformation**



Mean 2,3,7,8-TCDD Concentration for Samples Collected from 1971 through 1987 (15-44 Age Group)



Ranges of 2,3,7,8-TCDD Concentrations for the FY87 NHATS Composites by Age Category



SPECIAL STUDY

As part of an effort to expand the capabilities of EPA's unique human monitoring program, special studies were conducted. One of these studies involved the further evaluation of the specimens collected in FY1982 for the presence of compounds that are cited in the Superfund Amendments and Reauthorization Act (SARA) as chemicals of interest or identified at hazardous waste sites. Some of the results for the determination of SARA related compounds and other frequently detected chemicals are shown in the table below.

Volatile Compounds

Compound	Frequency of Detection (%)	Sources
Trichloroethylene	43	Solvent for fats, waxes, resins, etc. Used for solvent extraction in many industries. Also used as a degreasing agent in dry cleaning.
Dichlorobenzene	81	Active ingredient in moth balls.
Styrene	100	Used in the manufacture of plastics.
Xylene	100	Solvent.
Chloroform	76	Used as a solvent for fats, oils, rubber, waxes, and resin; cleaning agent.
Benzene	96	Used in the manufacture of medicinal chemicals, dyes, and many other organic compounds.
Toluene	91	Used in the manufacture of dyes, explosives, and other organic compounds; a solvent for paints, lacquer, and resins.
Ethyl Isovalerate	96	Used in alcoholic solution for flavoring confectionary and beverages.
Limonene	100	Found in various ethereal oils, particularly oils of lemon and orange. Lemon-like odor. Used as a solvent in the manufacture of resins, and as a wetting and dispersing agent.
Pentyl Alcohol	83	Solvent.

Semivolatile Compounds

Biphenyl	20	Used as a heat transfer agent, fungistat for oranges (applied to inside of shipping container or wrappers).
2-Phenyl phenol	48	Used as germicide and fungicide.
Bis(ethylhexyl) Phthalate	91	Plasticizer, vacuum pump oil.
Cresol	88	Used as local antiseptic, parasiticide, disinfectant, in photographic developing solutions, in manufacture of explosives.
Diphenyl ether	91	Used as a heat transfer medium and in perfuming soaps.