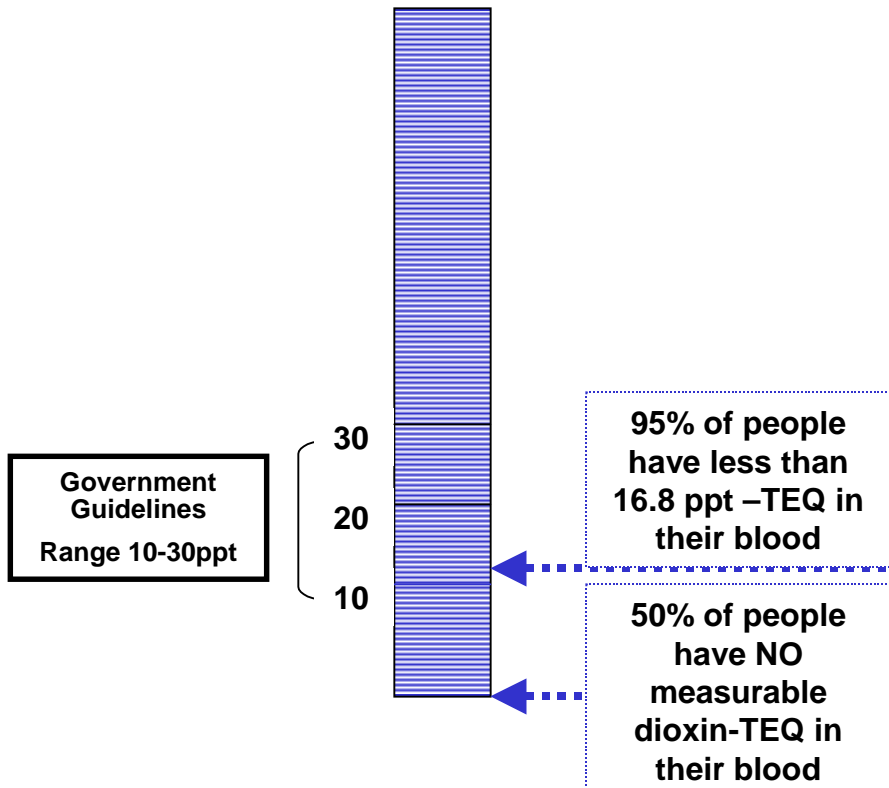


Understanding the CDC Dioxin-TEQ Biomonitoring Data

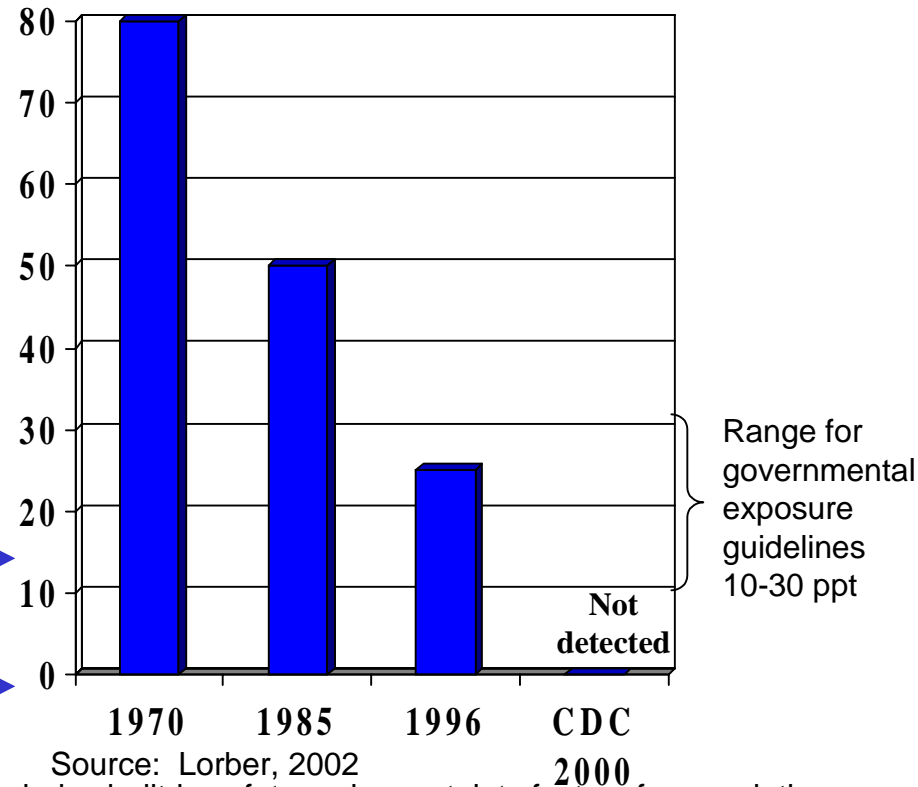
CDC dioxin TEQ blood levels are in the lower range of government safety guidelines*

Dioxin TEQ levels in humans have fallen for the past 30 years

Dioxin-TEQ in parts per trillion (ppt)



Estimated Average dioxin-TEQ in ppt



* World Health Organization 1998 acceptable exposure guidelines includes built-in safety and uncertainty factors for population variations and experimental assumptions

Understanding the CDC Dioxin-TEQ Biomonitoring Data

Background Information

Table 1: Summary of Results of CDC Dioxin Biomonitoring [TEQ basis]

<u>TEQ Lipid Levels (ppt):</u>	<u>Mean</u>
US Population (mean)	Not detectable
(95%)	less than 16.8 ppt

Table 2: U.S. Government and International Acceptable Exposure Guidelines, Dioxin-TEQ

<u>Tolerable Intake Level</u>	<u>Equivalent Serum Lipid Level</u>
ATSDR: 1 pg/kg/day	10 ppt
JECFA/WHO: 70 pg/kg/month	20 ppt
ECSCF: 14 pg/kg/week	25 ppt
WHO (1998): 1-4 pg/kg/day	10-30 ppt

- USEPA estimates that *average* dioxin intakes in the U.S. are 0.6 pg TEQ/kg per day, below tolerable levels set by JECFA/WHO and ATSDR.

Table 3: Estimated Average Dioxin-TEQ Levels

<u>Year</u>	<u>Parts per trillion [ppt]</u>
1970	80
1985	50
1995	25
2000	Not detected [CDC data]

Source: Lorber, M. (2002), A pharmacokinetic model for estimating exposure of Americans to dioxin-like compound in the past, present, and future. *Sci. Tot. Environ.* 288, 81-95.

Table 4: Derivation of blood levels corresponding to intake guidelines

ATSDR: LOAEL: 120 pg/kg/day intake based on animal study. Safety factor: 90. Yields tolerable intake of 1.3 pg/kg/day.

MRL set at 1 pg/kg/day. Serum lipid level associated with intake of 1 pg/kg/day is about 10 ppt, assuming 7.5 year half-life of elimination and 60 percent absorption.

WHO JECFA: Tolerable body burden: NOAEL/safety factor. NOAEL: 16 ng/kg; Identified safety factor: 3.2

Tolerable body burden: $16/3.2 = 5$ ng/kg.

Corresponding serum lipid level: Assume 25% body fat: $5/0.25 = 20$ ppt

ECSCF: (European Commission Scientific Committee on Food) NOAEL body burden of 20 ng/kg; 3.2-fold safety factor. Tolerable body burden: $20/3.2 = 6.25$ ng/kg

Corresponding serum lipid level: Assume 25% body fat: $6.25/0.25=25$ ppt tolerable serum lipid level

WHO (1998) level: Range of maternal body burdens associated with LOAELs in animal studies: 28-73 ng/kg. Identified safety factor: 10.

Tolerable body burden range: $28/10$ to $73/10 = 2.8$ to 7.3 ng/kg

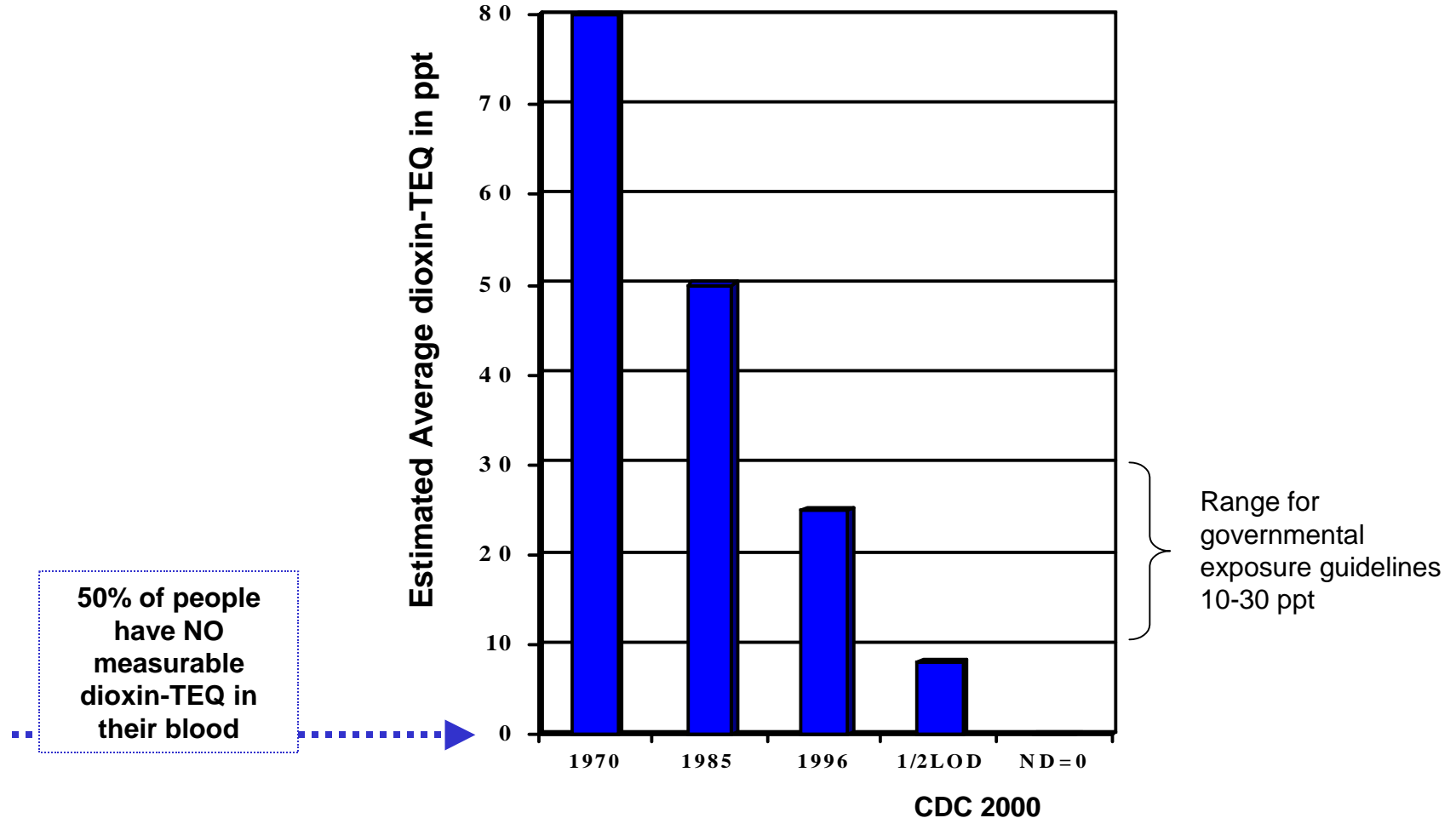
Corresponding serum lipid level: Assume 25%body fat: 11-29 ppt range of tolerable serum levels

Government public health agency safe exposure levels include built-in safety margins to account for variations in the human population as well as the uncertainties associated with drawing health conclusions for humans from data obtained in animal studies.

Depicting Dioxin-TEQ Biomonitoring Data

Assuming Non-detects = LOD/2 versus Non-detects = 0

Dioxin TEQ levels in humans have fallen for the past 30 years



Source: Data for 1970, 1985 and 1996 are from Lorber, 2002
CDC 2000 reported non-detects for the 50th percentile.