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Baseline Estimates and Time Trends for Beta-benzene hexachloride, Hexachlorobenzene, and Polychlorinated Biphenyls in Human Adipose Tissue 1970-1983

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Baseline Estimates and Time Trends for β-BHC, HCB and PCBs in Human Adipose Tissue 1970-1983

Document No. NHATS-SS-01

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PREFACE

This document is one in a series that collective. describes the operation and results of the National Human Adipo Tissue Survey (NHATS). Each document provides the comple details for a particular aspect of the NHATS program. This repo presents the results of a statistical analysis of baseline leve. and time trends for several toxic compounds. The analys addresses the three compounds: Beta-benzene hexachloride (β-BHC hexachlorobenzene (HCB), and polychlorinated biphenyls (PCBs) a is based on data collected through fiscal year 1983.

Other documents in the NHATS series describe t statistical survey design, the chemical analysis and techniques, and other statistical analyses and special studi related to NHATS. (See the list of documents on the next page.)

References to the series provide interested individua. complete information concerning the NHATS program. Each docume in the series is being maintained and updated as modifications the NHATS program requires it. Additional documents will added as special analyses or studies are conducted.

ACKNOWLEDGMENTS

The authors would like to thank the EPA Task Manager, Mr. Rich Levy, for his assistance in performing this study. His suggestions and technical comments were invaluable in producing a more comprehensive, higher quality statistical analysis.

Documentation Series for the National Human Adipose Tissue Survey

NHATS-ST-01	Mack, G.A., and Stanley, J. "Program Strategy for the National Human Adipose Tissue Survey", prepared by Battelle's Columbus Laboratories and Midwest Research Institute for the Office of Toxic Substances of the U.S. Environmental Protection Agency, Washington, D.C., 20460 (August, 1984).
NHATS-SD-01	Mack, G.A., Leczynski, B., Chu, A., and Mohadjer, L. "Survey Design for the National Human Adipose Tissue Survey", prepared by Battelle's Columbus Laboratories and Westat, Inc. for the Office of Toxic Substances of the U.S. Environmental Protection Agency, Washington, D.C., 20460 (November, 1984).
NHATS-SS-01	Mack, G.A., and Mohadjer, L. "Statistical Analysis of Toxic Residue Levels of β-BHC, HCB, and PCBs in Human Adipose Tissue 1970-1983", prepared by Battelle's Columbus Laboratories and Westat, Inc. for the Office of Toxic Substances, U.S. Environmental Protection Agency, Washington, D.C., 20460 (November, 1984).
NHATS-SS-02	Leczynski, B., and Stockrahm, J. "An Evaluation of Hexachlorobenzene Body Burden Levels in the General U.S. Population", presented by Battelle's Columbus Laboratories for the Office of Toxic Substances of the U.S. Environmental Protection Agency, Washington, D.C., 20460 (January, 1985).
NHATS-DM-01	"National Human Adipose Tissue Survey, Documentation Manual, Data Base Structures and Program Descriptions", prepared by Battelle's Columbus Laboratories for the Office of Toxic Substances of the U.S. Environmental Protection Agency, Washington, D.C., 20460 (May, 1985).

EXECUTIVE SUMMARY

The National Human Adipose Tissue Survey (NHATS) is a annual program to collect and chemically analyze a nationwid sample of adipose tissue specimens for the presence of specifie toxic compounds. The objective of the program is to detect an quantify the prevalences of toxic compounds in the genera population. The specimens are collected from autopsied cadaver and surgical patients according to a statistical survey design The survey design ensures that specified geographical regions an demographic categories are appropriately represented to permi valid and precise estimates of baseline levels, time trends an comparisons across subpopulations. The NHATS data are used t address part of OTS's mandate under TSCA to assess chemica exposure risk and environmental burden to the U.S. population Since NHATS involves human monitoring, it provides direc evidence of exposure of the toxic chemicals to humans.

In order to obtain full use of the NHATS program statistical analyses are periodically conducted on the collecte data. This report presents the analysis results for the compound beta-benzene hexachloride (β-BHC), hexachlorobenzene (HCB), an polychlorinated biphenyls (PCBs). These compounds were selecte for this study due to their prevalence and toxicity and thei industrial uses which put them under the jurisdiction of TSCA The analyses involve data collected through fiscal year 1983 with the results for 1981 and 1983 being of particular interes since they are based on additional data collected since the las statistical analysis.

The major findings of the analysis are as follows:

β-BHC

- The estimated 1983 national median* level is 0.08 ppm compared to an historic** level of 0.14 ppm.
- The median levels tend to increase with age but do not differ across sexes or race groups.
- The South Census Region has a higher median level than any of the other regions.
- The median level has been steadily decreasing over time but the percentage of the population having at least a detectable level has remained near 100 percent.

HCB

- The estimated 1983 national median level is 0.031 ppm compared to an historic level of 0.037 ppm.
- The levels do not differ significantly across the age, sex and race groups.
- The West Census Region has a higher median level than any of the other regions.
- Median levels have remained relatively the same over the past ten years with the exception of a modest estimated drop of about 0.01 ppm in 1983. The percentage of the population having at least a detectable level of HCB has remained near 100 percent.

---

* Median level refers to that value for which half the population have residue levels exceeding this value and half have residue levels below it.

** Historic level refers to the median level computed using data for all years for which NHATS data are available.

PCBs

- The 1983 estimated percentage of the population having a PCB level exceeding 1 ppm is 5.5 percent compared to an historic level of 28.9 percent.

- The percentage having a PCB level exceeding 1 ppm increases with age. Males have a higher percentage exceeding 1 ppm than females. No significant race difference exists.

- The Northeast Census Region historically had the greatest percentage exceeding 1 ppm but the difference has disappeared in recent years.

- The percentage of the population having PCB levels exceeding 1 ppm is steadily decreasing over time; however, the percentage having at least a detectable level has increased to nearly 100 percent.

1.0 INTRODUCTION

1.1 Background

The National Human Adipose Tissue Survey (NHATS) is one of the main programs of the National Human Monitoring Program (NHMP). NHMP is an ongoing chemical monitoring network designed to fulfill the human and environmental monitoring mandates of the Toxic Substances Control Act (TSCA). The NHMP was first established by the U.S. Public Health Service in 1967, and was subsequently transferred to EPA in 1970. During 1979 the program was transferred within EPA to the Exposure Evaluation Division of the Office of Toxic Substances (OTS).

The data for the National Human Adipose Tissue Survey are generated on an annual basis by collecting and chemically analyzing adipose tissue specimens for selected toxic substances, historically organochlorine compounds and polychlorinated biphenyls (PCBs). The 20 compounds that have been monitored are listed in Table 1-1.

TABLE 1-1 COMPOUNDS MONITORED IN THE NATIONAL HUMAN ADIPOSE TISSUE SURVEY

p, p' - DDT	Aldrin
o, p' - DDT	Dieldrin
p, p' - DDE	Endrin
o, p' - DDE	Heptachlor
p, p' - DDD	Heptachlor epoxide
o, p' - DDD	PCBs
α - BHC	Oxychlordane
β - BHC	Mirex
γ - BHC (Lindane)	trans-Nonachlor
δ - BHC	Hexachlorobenzene

The adipose tissue specimens are obtained from statistically selected sample of surgical patients and autopsie cadavers. Selected pathologists and medical examiners collect th tissue specimens on a continuing basis throughout the fiscal yea along with a limited amount of demographic, occupational, an medical information on the individual.

Statistical analyses are periodically conducted on th collected data. The analyses provide updated informatio concerning baseline levels of the toxic residues in the U.S population and provide evidence of any changes in time trends This report presents the results of the most recent statistica analysis for the compounds: β-BHC, HCB, and PCBs. The analyse were conducted during the summer of 1984 and include ne information on residue levels through fiscal year 1983.

1.2 Objectives and Scope of the Statistical Analysis

The purpose of the NHATS program is the detection an quantification of the prevalences of selected toxic compounds the general population. The presence of toxic substances in th adipose tissue of the U.S. population is an indication of the presence in the environment. By selecting and chemical analyzing the tissues of a representative sample of individual information is gathered concerning existing toxic residue leve in the U.S. population and its various subpopulations. T specific objectives of the NHATS program are:

1. To assess the prevalences of toxic substances in the adipose tissue of the U.S. population
2. To establish baseline levels for these compounds in adipose tissue
3. To measure time trends of these concentrations, and
4. To assess the effects of regulatory actions.

These objectives are addressed by statistically analyzing the collected data. The analyses include:

- Estimation of percentages of the population having detectable residue levels or levels exceeding specified values;
- Estimation of average residue levels for the entire nation and for various subpopulations involving geographic (census regions) and demographic (age, sex, and race) categories;
- Estimation of trends to assess changes over time in various population residue level characteristics such as:
  - average residue level
  - median level
  - percentage of population having detectable residue levels
  - percentages of the population exceeding various specified levels
- Regression analyses to assess differences in the trends across the various geographic and demographic subpopulations.

The specific data used in the analyses are described in the next section along with information concerning their collection and preparation.

2.0 DATA COLLECTION AND PREPARATION

2.1 Survey Design

The NHATS program uses a statistical based surve sampling design to obtain adipose tissue specimens from national sample of autopsied cadavers and surgical patients. Th use of a statistical design provides for control of the possibl estimation errors due to sampling only a portion of th population of interest. The use of a statistical design allow the magnitudes of the sampling errors to be quantified and thu used to calculate bounds on the likely errors (standard errors associated with the population residue level estimates that ar made.

The target population for this study corresponds to th set of all non-institutionalized individuals in the conterminou U.S. However, due to the invasive nature of collecting adipos tissue samples, the sampling population is limited to cadaver and surgical patients. The sampling procedure used to addres this population is a complex multi-stage process. The 4 conterminous states are stratified into the nine U.S. censu divisions (Refer to the U.S. map given in Figure 2-1). Withi each census division, population centers (ie. SMSAs-standar metropolitan statistical areas) are selected with probabilitie proportional to their respective populations. The number o SMSAs selected from each census division is determined by th division's total SMSA population relative to the total SMS population of the entire U.S. Within each selected SMSA one o more hospitals and/or associated pathologists/medical examiner are identified and asked to contribute tissue specimens accordin to design specifications involving age, sex, and race. Th categories considered are:

- Age group (0-14 years, 15-44 years, 45+ years)
- sex (male, female)
- race (white, non-white).

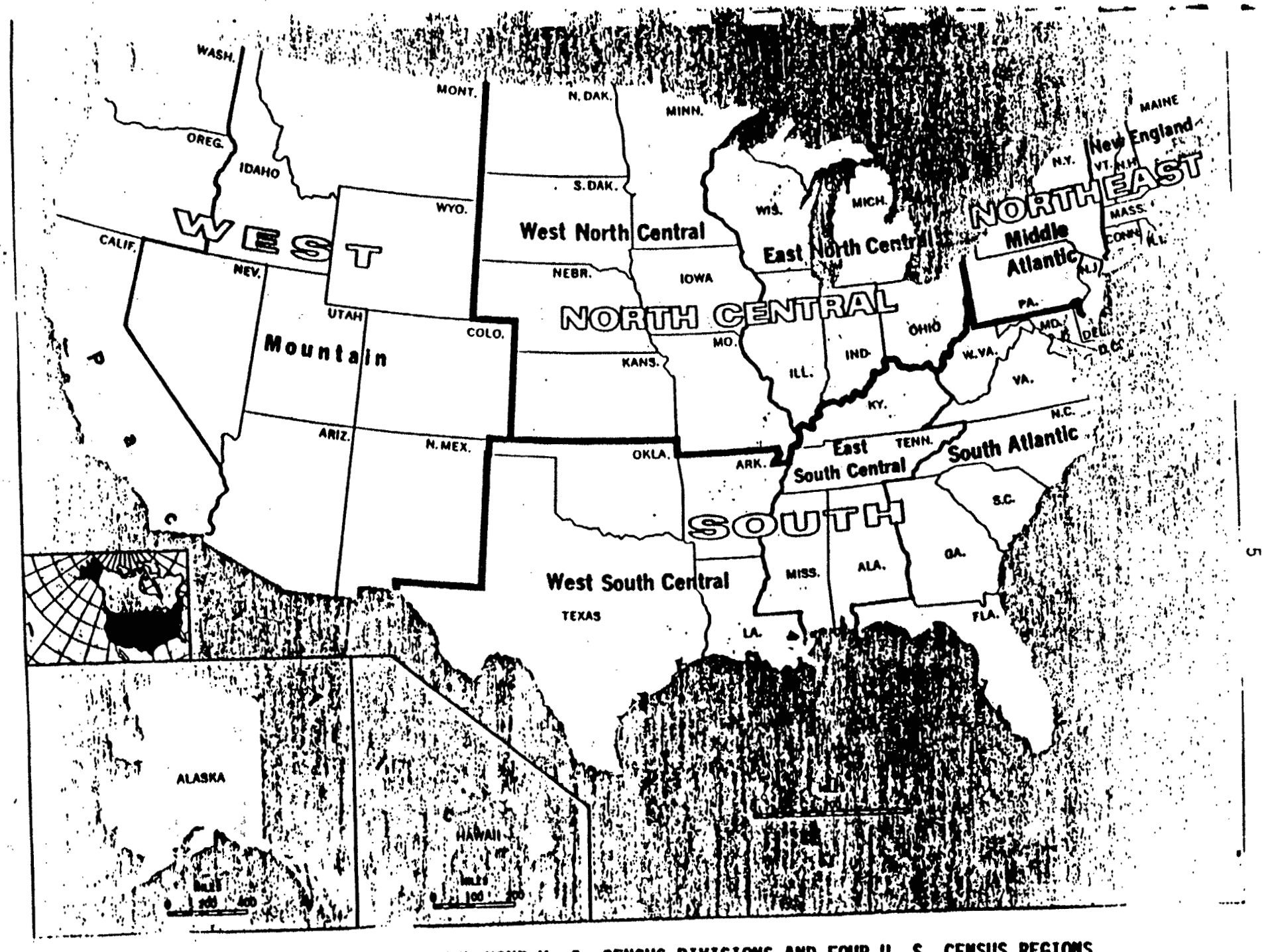

FIGURE 2-1. OVERVIEW OF THE NINE U. S. CENSUS DIVISIONS AND FOUR U. S. CENSUS REGIONS

The design specifications are based on the corresponding age, sex and race U.S. census population figures for the census division to which the SMSA belongs. The actual specimens are otherwise selected in a non-probabilistic manner according to the judgement of the pathologists/medical examiners involved.

An overview of the sampling stages is presented in Figure 2-2. The geographic stratification used in the design ensures a representative sample from all regions of the country. Design specifications for the age, sex and race categories ensure the proper representation for each of these different subpopulations. A detailed description of the current survey design can be found in Mack et. al. (5).

Although the actual survey design uses census division as the stratification variable, geographical comparisons in the statistical analyses are based on census regions (See Figure 2-1). The use of census regions in the analysis reduces the number of subpopulation comparisons and reduces the degree-of-freedom needed for model fitting. No additional technical problems are introduced and all results remain statistically valid.

2.2 Available Data and Data Preparation

2.2.1 Available Data

The amount of data used in the statistical analyses varied for the three compounds of interest due to missing data and various problems encountered during the earlier years of the NHATS program. Table 2-1 summarizes the specific years and numbers of specimens available for the analysis for each compound.

The data for 1981 and 1983 correspond to only a portion of the specimens actually collected. For each of these two years, subsamples of specimens were selected and chemically analyzed so that some information would be available as quickly as possible concerning existing residue levels. Each subsample

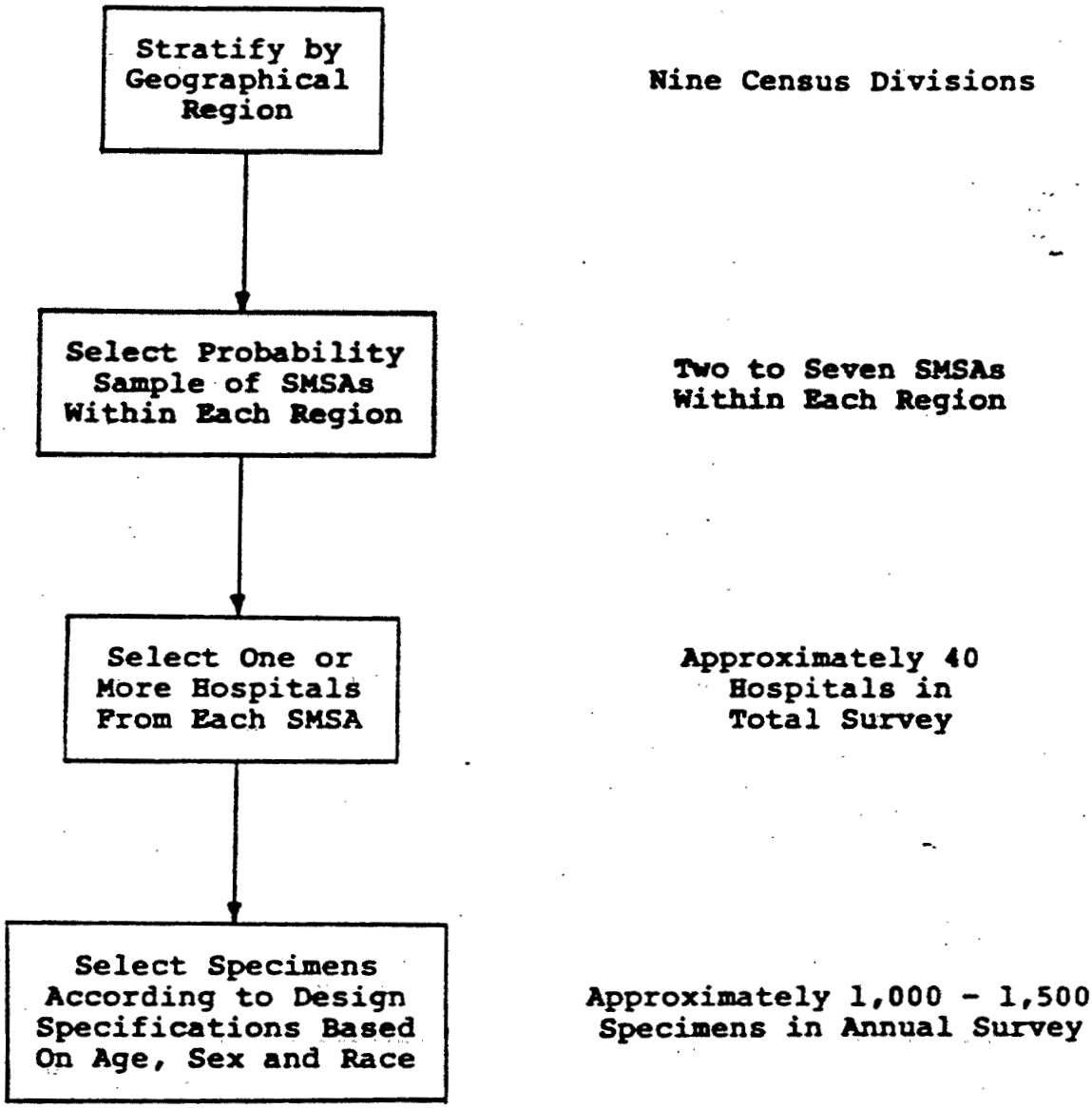

Figure 2.2. Overview of the annual selection process

TABLE 2-1. SUMMARY OF DATA USED IN THE ANALYSES FOR EACH COMPOUND

Fiscal Year	β-BHC	HCB	PCBs
1970	1403	--	--
1971	1587	--	--
1972	1993	--	1826
1973	1186	--	1183
1974	1025	1025	1025
1975	895	895	895
1976	778	777	779
1977	926	927	927
1978	948	947	951
1979	910	908	910
1980	--	--	--
1981	402	402	402
1982	--	--	--
1983	200	200	200

corresponded to a representative sample of the entire collectic of that year's specimens. Additional subsamples are to b analyzed as money and time permit. The fiscal year 198 data included in this study correspond to three separat subsamples while the 1983 data correspond to two subsamples Since the sample size affects the size of the standard erro associated with a population estimate, estimates for 1981 ar 1983 tend to have larger error bounds associated with them.

2.2.2 Data Preparation

Due to the nature of the chemical analysis proces there exists a threshold value below which the chemist cann accurately quantify the residue level of a target compound in given specimen. This threshold is called the level quantification (LOQ). Below the LOQ there exists anoth threshold called the level of detection (LOD) below which t chemist cannot even declare that the presence of the compound detected. Values below the LOD are recorded as "not detected

Measured values between the LOD and LOQ are called trace values. Trace values indicate the target compound has been detected but at a level below which an accurate determination can be made of the specific amount. See Table B.1 in Appendix B for approximate values of the LOD and LOQ for each of the compounds addressed in this study.

In the statistical analyses, residue values reported as being below the LOD ("not detected") were set equal to zero. Trace values for a given compound and fiscal year were all set equal to the minimum positive residue value, above the LOD, reported for that year.

The residue data were also adjusted for the percent lipid content of the associated tissue specimen. The adjustment formula used is as follows:

$$\text{Adjusted Level} = \frac{\text{Unadjusted Level}}{\text{\% Lipid}} \times 100\%$$

Since the chemicals addressed in the report tend to be located only in the lipid portion of the tissue, the adjustment makes the observed residue levels more comparable across tissue samples having varying levels of percent lipid. The statistical analyses excluded any specimens having less than 10 percent lipid content. Such specimens do not permit precise determinations to be made of the actual residue level.

In some of the statistical analyses the data were transformed by taking logarithms of the original data. In those cases where the original data value was zero (e.g., no analyte was detected), a small positive number (e.g., .0005 ppm), representing a value between zero and the LOD, was substituted for zero. Any resulting bias is expected to be negligible since there were relatively few such cases.

The data for PCBs were handled somewhat differently. The PCB level for each specimen was reported by the chemical analysis labs only as belonging to one of four categories:

- Not detected (below LOD)
- Detected but less than 1 ppm
- Between 1 and 3 ppm
- Greater than 3 ppm.

The PCB data were categorized due to the nature of th chemical analysis methods that made it difficult to obtain a accurate determination of the actual amount.

Due to the categorical nature of the reported PCB data they were not lipid adjusted (however, Lucas (3) has shown tha the effect of not lipid adjusting is inconsequential for PCBs) and the statistical analyses did not address the estimation o average levels. Rather, estimates were made of the populatio percentages belonging to various range levels of interest.

2.3 Sample Weights

Calculation of unbiased estimates of regional ar national population residue levels and trends require the use c weighted statistical data. Individuals from some demographi groups represent smaller segments of the U.S. population ar therefore the observed residue levels associated with the deserve less weight when estimating population residue levels Although design specifications are given regarding the number c specimens to be collected from each age, race, sex and censu division category, the NHATS program does not produce self weighting samples for several reasons:

- The small sample sizes for each SMSA (approximately 27 specimens) do not permit the exact proportionate selection of the appropriate number of specimens from each age, race, and sex category and geographical region; and
- Discrepancies between the actual number of samples collected and the design specifications for each collection site.

The weight assigned to each individual specimen reflects the number of individuals in the general population represented by that specimen. Various adjustments are performed so that the sum of the sample weights for a given geographical region and demographic category equals the corresponding population count according to the U.S. Census. The weights for 1970 through 1972 are based on the 1960 Census; the 1973 through 1979 weights are based on the 1970 Census; and the 1981 and 1983 weights are based on the 1980 Census. The details of the methodology used to construct the sample weights are given in Appendix A of a report by Lucas et.al. (3).

2.4 Limitations of Statistical Inference

The sampling population for the NHATS program includes only surgical patients and autopsied cadavers. Since the sampled population is different from the target population (i.e., the entire U.S.), validity of any inferences requires the assumption that the prevalences and levels of the toxic substances of interest are the same in both populations.

Other limitations result from the survey design and its implementation. Since population centers (SMSAs) form the sampling frame, areas that are rural in character are excluded from the sample. A sizable percent of the U.S. population resides in these rural areas. The real percentage of omission is most likely somewhat less, however, because the service areas of hospitals in the SMSAs extend into neighboring rural areas. Nonetheless, the urban nature of the sample does result in some undercoverage of the rural population.

Limitations also result from the purposeful selection of the medical examiners and pathologists and the lack of probability sampling used by them in selecting tissue specimens for the study. The purposeful selection methods may result in biases in estimates derived from the sample. However, the biases are expected to be minimal for several reasons:

(1) The selection of specimens are done on a pseudo-random basis without regard to any factors that are likely to be systematically related to toxic residue levels.

(2) The specimens are screened so that the selected ones involve only traumatic deaths and specific diseases not expected to influence the toxic residue levels in the body.

(3) Target quotas control the number of specimens collected with respect to some of the most important factors: age, race, and sex. Further, deviations from target quotas are minimized by the use of weights applied to each specimen when making statistical estimates.

Any remaining biases are expected to be negligible relative the magnitudes of the trends and other subpopulation differen that have been observed.

The chemical analysis techniques employed over years in the NHATS program is another potential source for bi The analysis methods changed at the end of 1974. However, investigation by Lucas et.al. (3) of the possible effects of change on PCB trends indicated that the effects are incon quential.

3.0 RESULTS OF THE STATISTICAL ANALYSIS

The objective of the NHATS program is the detection and quantification of the prevalences of selected toxic chemicals in the U.S. population. To address this objective a statistical analysis was performed on the collected data. The analysis included:

- Estimation of population residue levels for the purpose of establishing baseline levels;
- Estimation of time trends to assess changes in residue levels over time; and
- Comparison of various subpopulations to identify geographic and demographic factors associated with differences in the toxic residue levels.

The results of these analyses for the compounds β-BHC, HCB and PCBs are described in the following sections.

3.1 Estimates of Population Baseline Levels

Estimation of population baseline levels involves the calculation of various summary values that characterize particular aspects of the distribution of residue levels. The following population characteristics were estimated:

- Average individual residue level
- Median (50th percentile) residue level
- Percentage of individuals having detectable levels of the toxic compound
- Percentage of individuals having quantifiable levels
- Percentages of individuals having residue levels exceeding specific values of interest.

To provide support concerning the reliability of the estimates the following auxiliary information is also given:

- Standard errors of the estimates
- Sample sizes used in the calculations
- Size of the population represented by each estimate.

The estimates were made both for a single combin population representing the entire nation, and for vario subpopulations defined by age, sex, race, and geographic regi categories. The estimates were calculated in two different way (1) using combined data for all fiscal years; and (2) separate by fiscal year.

A computer program called SESUDAAN (6) was used calculate the estimates. The techniques used by SESUDAAN we required because of the complex survey design used to collect t sample specimens. The results for the three compounds address in this report are presented in the following sections.

3.1.1 Population Estimates for β-BHC

Table 3.1-1 presents estimated population resid levels for the compound β-BHC. Estimates are given separately f each subpopulation as well as for the entire nation. T estimates are based on combined data for all fiscal years a represent baseline levels for the presence of β-BHC in the U. population. For the entire nation the estimated levels are:

- Average individual residue level--0.27 ppm
- Median residue level--0.14 ppm

TABLE 3.1-1. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR β-BHC FOR ALL FISCAL YEARS

Subpopulation	Sample Size	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
		estimate (standard error)			
Age (in year):					
0-14	1933	0.08 (0.007)	0.16 (0.017)	97.8 (0.54)	82.0 (2.17)
15-44	3876	0.14 (0.011)	0.24 (0.021)	98.9 (0.28)	95.7 (0.82)
45+	6444	0.26 (0.013)	0.39 (0.023)	99.3 (0.21)	98.7 (0.30)
Sex:					
Male	6350	0.14 (0.010)	0.26 (0.018)	98.4 (0.39)	92.0 (1.05)
Female	5903	0.15 (0.010)	0.27 (0.020)	99.0 (0.24)	93.6 (0.97)
Race:					
White	10268	0.14 (0.010)	0.26 (0.017)	98.7 (0.28)	93.2 (0.98)
Non-White	1985	0.16 (0.018)	0.33 (0.036)	98.5 (0.50)	89.9 (1.94)
Census Region:					
Northeast	3117	0.13 (0.010)	0.20 (0.016)	99.3 (0.20)	94.2 (1.25)
North Central	3391	0.12 (0.016)	0.20 (0.020)	98.3 (0.58)	90.3 (2.33)
South	4211	0.21 (0.023)	0.38 (0.040)	99.0 (0.52)	94.9 (1.08)
West	1534	0.12 (0.019)	0.25 (0.041)	98.0 (0.72)	91.2 (2.42)
Entire Nation	12253	0.14 (0.010)	0.27 (0.018)	98.7 (0.27)	92.8 (0.94)

*parts per million, adjusted for lipid content of specimen.

- Percent of the population having detectable levels of β-BHC--98.7 percent
- Percent of the population having quantifiable levels of β-BHC--92.8 percent.

The baseline levels vary across the differe geographic and demographic groups. A comparison of these subpo ulations indicate:

- AVERAGE β-BHC LEVELS
  - Average levels increase with age*
  - South Census Region has a higher average level than the Northeast and North Central regions
- MEDIAN β-BHC LEVELS
  - Levels increase with age
  - South Census Region has a higher median level than all the other regions
- DETECTABLE LEVELS OF β-BHC
  - There are no differences in subpopulations with respect to the percentage of individuals having detectable levels of β-BHC
- QUANTIFIABLE LEVELS OF β-BHC
  - The "0-14 yrs" age group has a lower percentage of individuals having quantifiable levels of β-BHC; no other differences exist among subpopulations

*A difference in levels was declared whenever individual 9 confidence intervals for the true average levels for two or mo subpopulations were non-overlapping.

Tables A.1 - A.12 in Appendix A present the baseline estimates separately for each fiscal year. Comparison of the subpopulations separately for each fiscal year indicates the same general results as obtained for the combined data. The increasing trend in β-BHC levels with age group tends to hold for each year. Similarly, the South Census Region consistently had much higher average levels than the others. Although the differences are often not statistically significant for a given year (due to smaller sample sizes), the differences are meaningful since they consistently occur over the different years.

Tables A.11 and A.12 for fiscal years 1981 and 1983, respectively, show that the baseline levels for the median residue amounts have decreased relative to earlier years. Table 3.1-2 on the next page summarizes the differences.

3.1.2 Population Estimates for HCB

Table 3.1-3 presents the baseline estimates for HCB. The estimates are based on the combined data for all fiscal years. The estimated baseline levels for the nation are as follows:

- Average individual residue level--0.053 ppm
- Median (50th percentile) residue level--0.037 ppm
- Percentage of the population having detectable levels of HCB--98.8 percent
- Percentage having quantifiable levels--92.9 percent.

TABLE 3.1-2. COMPARISON OF β-BHC BASELINE MEDIAN LEVELS FO
FOR 1981 AND 1983 AGAINST ALL YEARS COMBINED

Subpopulation	Estimated Median Residue Level*		
	All Years Combined	1981	1983
Age (in years):			
0-14	.08	.05	.06
15-44	.14	.08	.06
45+	.26	.18	.17
Sex:			
Male	.14	.08	.08
Female	.15	.11	.09
Race:			
White	.14	.09	.08
Non-White	.16	.12	.08
Census Region:			
Northeast	.13	.07	.07
North Central	.12	.09	.07
South	.21	.14	.13
West	.12	.06	.06
Entire Nation	.14	.09	.08

*parts per million, adjusted for lipid content of specimen

TABLE 3.1-3. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR HEXACHLOROBENZENE (HCB) FOR ALL FISCAL YEARS

Subpopulation	Sample Size	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
		estimate (standard error)			
Age (in year):					
0-14	1246	0.030 (0.003)	0.049 (0.006)	97.8 (0.69)	79.4 (2.24)
15-44	2231	0.039 (0.001)	0.052 (0.003)	99.5 (0.13)	98.3 (0.31)
45+	2604	0.042 (0.002)	0.057 (0.003)	98.7 (0.38)	97.3 (0.49)
Sex:					
Male	3059	0.039 (0.002)	0.054 (0.004)	98.9 (0.28)	92.6 (0.89)
Female	3022	0.035 (0.001)	0.051 (0.004)	98.8 (0.30)	93.2 (0.81)
Race:					
White	5094	0.037 (0.002)	0.053 (0.003)	98.9 (0.24)	93.4 (0.71)
Non-White	987	0.033 (0.002)	0.048 (0.005)	98.4 (0.64)	89.3 (2.09)
Census Region:					
Northeast	1392	0.036 (0.002)	0.054 (0.007)	98.5 (0.63)	93.1 (0.95)
North Central	1684	0.033 (0.002)	0.044 (0.003)	98.2 (0.55)	93.3 (1.31)
South	2217	0.030 (0.002)	0.042 (0.003)	99.0 (0.30)	90.5 (1.73)
West	788	0.063 (0.005)	0.082 (0.010)	99.8 (0.12)	96.4 (0.91)
Entire Nation	6081	0.037 (0.001)	0.053 (0.003)	98.8 (0.238)	92.9 (0.73)

*parts per million, adjusted for lipid content of specimen.

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Comparison of the residue levels across the subpo ulations indicates the following results:

- AVERAGE HCB LEVELS
  - No age, sex or race differences exist
  - West Census Region has a higher average level than the North Central and South regions
- MEDIAN HCB LEVELS
  - "0-14 yrs" age group has a lower median level than the older age groups; no other age, sex or race differences exist
  - West Census Region has a significantly higher median than all the other regions
- DETECTABLE LEVELS OF HCB
  - No differences exist among any of the subpopulations
- QUANTIFIABLE LEVELS OF HCB
  - The "0-14 yrs" age group has a much lower percentage than the older groups; no other age, sex, race or census region differences exist.

Tables A.13 through A.20 in Appendix A present t baseline estimates separately for each fiscal year. T differences among subpopulations are generally not statistical significant and not always consistent in trend. However, appears that some meaningful differences do exist since certa differences tend to be present for many of the years. The We Region has much higher HCB levels than the others; and the "0- years" age group has lower percentages of individuals havi quantifiable levels.

Table 3.1-4 presents a comparison of median HCB levels for 1981 and 1983, respectively, against the overall median calculated using data for all years combined. The values for 1983 show a decline in HCB levels relative to the levels calculated for all years and also relative to the 1981 levels alone.

3.1.3 Population Estimates for PCBs

Since only categorical data are available for PCBs, the statistical analyses were directed at estimating population percentages falling into various residue range levels. Table 3.1-5 presents these results for the range levels of interest. The estimated national baseline percentages are as follows:

- Percentage of the population having detectable levels of PCBs -- 95.3 percent
- Percentage having levels exceeding 1 ppm -- 28.9 percent
- Percentage having levels exceeding 3 ppm -- 5.1 percent

Comparison of results across subpopulations indicate the following:

- PERCENTAGE HAVING DETECTABLE LEVELS
  - The "0-14 yrs" age group has a smaller percentage having detectable levels of PCBs
- PERCENTAGE EXCEEDING 1 PPM
  - The "0-14 yrs" age group has a smaller percentage of individuals exceeding 1 ppm
  - Males have a higher percentage exceeding 1 ppm than females

TABLE 3.1-4. COMPARISON OF HCB MEDIAN LEVELS FOR 1981 AND 1983 AGAINST ALL YEARS COMBINED

Subpopulation	Estimated Median Residue Level*		
	All Years Combined	1981	1983
Age (in years):			
0-14	.030	.033	.028
15-44	.039	.041	.029
45+	.042	.050	.037
Sex:			
Male	.039	.043	.034
Female	.035	.040	.028
Race:			
White	.037	.041	.031
Non-White	.033	.044	.031
Census Region:			
Northeast	.036	.036	.031
North Central	.033	.040	.032
South	.030	.038	.024
West	.063	.059	.044
Entire Nation	.037	.041	.031

*parts per million, adjusted for lipid content of specimen

TABLE 3.1-5. WEIGHTED PERCENTAGE DISTRIBUTION OF PCB RESIDUE LEVELS IN ADIPOSE TISSUES FOR ALL FISCAL YEARS

Subpopulation	Sample Size	Percent Not Detected	Percent Detected but less than 1 PPM*	Percent Greater than 1 PPM*	Percent Greater than 3 PPM*
		estimate (standard error)			
Age (in year):					
0-14	1660	9.6 (1.46)	78.1 (2.43)	12.3 (1.85)	1.3 (0.48)
15-44	3097	2.6 (0.55)	65.1 (2.15)	32.2 (1.97)	5.4 (0.58)
45+	4339	3.1 (0.62)	57.6 (2.60)	39.3 (2.36)	8.1 (0.92)
Sex:					
Male	4641	4.6 (0.78)	62.5 (2.18)	32.9 (1.94)	6.1 (0.66)
Female	4455	4.8 (0.62)	70.2 (1.97)	25.1 (1.75)	4.1 (0.50)
Race:					
White	7646	4.4 (0.56)	67.2 (1.83)	28.4 (1.64)	4.7 (0.47)
Non-White	1450	7.1 (1.95)	60.5 (3.35)	32.4 (2.75)	7.8 (1.13)
Census Region:					
Northeast	2226	5.2 (1.56)	57.7 (4.77)	37.1 (3.98)	8.3 (0.89)
North Central	2520	4.5 (1.15)	69.0 (3.18)	26.5 (2.88)	3.9 (0.73)
South	3141	4.9 (0.98)	68.0 (3.02)	27.2 (2.93)	4.7 (0.84)
West	1209	3.8 (1.15)	71.4 (3.91)	24.8 (3.32)	3.3 (1.03)
Entire Nation	9096	4.7 (0.62)	66.4 (1.87)	28.9 (1.63)	5.1 (0.48)

*PPM denotes part per million.

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- PERCENTAGE EXCEEDING 3 PPM

  - The "0-14 yrs" age group has a smaller percentage of individuals exceeding 3 ppm

  - The percentage of non-whites exceeding 3 ppm is greater than the percentage of whites

  - Northeast Census Region has a greater percentage of individuals exceeding 3 ppm than all the other regions.

Baseline data for the individual fiscal years are presented in Tables A.21 through A.30. The trends previously cited generally hold for the individual years as well. The percentages of individuals having PCB levels exceeding 1 ppm are consistently smaller for the "0-14 years" age group. Males consistently had greater percentages exceeding 1 ppm than did females. The Northeast Census Region historically had higher percentages exceeding both 1 and 3 ppm; however, in recent years this difference has disappeared. Non-whites had greater percentages exceeding 3 ppm than did whites.

The baseline levels given in Table 3.1-6 for 1981 and 1983 indicate a considerable decline in the percentage of individuals having PCB levels greater than 1 ppm. This corresponds to a similar drop in the percentage of PCB levels exceeding 3 ppm cited in an earlier report by Lucas et.al. (3) and confirmed in this report by Tables A.29 and A.30. Note, however, from Tables A.29 and A.30 that the percentage of sampled individuals having <u>detectable</u> levels of PCBs has increased to 100 percent for the 1981 and 1983 fiscal years.

3.2 Time Trend Analyses

The investigation of trends involves the estimation of changes in residue level distributions over time. Specifically this involves the comparison over time of residue distributio

TABLE 3.1-6. COMPARISON OF PCB BASELINE LEVELS FOR 1981 AND 1983 AGAINST ALL YEARS COMBINED

Subpopulation	Estimated Percent Greater than 1 ppm		
	All Years Combined	1981	1983
Age (in years):			
0-14	12.3	12.1	3.1
15-44	32.2	16.1	3.6
45+	39.3	23.7	9.9
Sex:			
Male	32.9	17.7	10.9
Female	25.1	17.4	0.3
Race:			
White	28.4	15.0	6.0
Non-White	32.4	31.5	1.9
Census Region:			
Northeast	37.1	12.2	2.4
North Central	26.5	18.9	10.2
South	27.2	17.8	4.9
West	24.8	21.3	3.5
Entire Nation	28.9	17.5	5.5

characteristics. Since the distribution of individual residue levels is skewed, it is useful to address a number of different distribution characteristics to adequately describe the changes in residue levels.

The population average amount and median (50th percentile) are both measures of central tendency that characterize the "typical" residue level. The percentage of detectable levels and percentage of quantifiable levels characterize the prevalences of a toxic compound while the upper percentiles of a distribution characterize the extreme values.

The estimation of time trends and their differences across geographic and demographic subpopulations are based on the use of a statistical model. The model expresses the assumed form of the relationship between the residue level characteristic under investigation and the temporal, geographic and demographic factors of interest. Details concerning the various forms of models used in this study are given in Appendix B.

This report presents estimates of national trends for a variety of different population characteristics. The national trends represent weighted averages over the different subpopulations to give a single estimated trend for the entire U.S.

This report also presents separate trends for the individual subpopulations. The subpopulation trends are presented only for two population characteristics considered to be the most important and meaningful: percentage of individuals having detectable levels and the median levels. For statistical reasons the median was considered to be more appropriate than the average level. The skewness of the residue distribution makes the statistical analysis more valid when based on averages of log-transformed data, which then correspond to an analysis of medians when transformed back to the original data scale (ppm).

The following sections present a summary of the major results for each of the three compounds of interest: β-BHC, HCB and PCBs. The effects of the fiscal years 1981 and 1983 on the

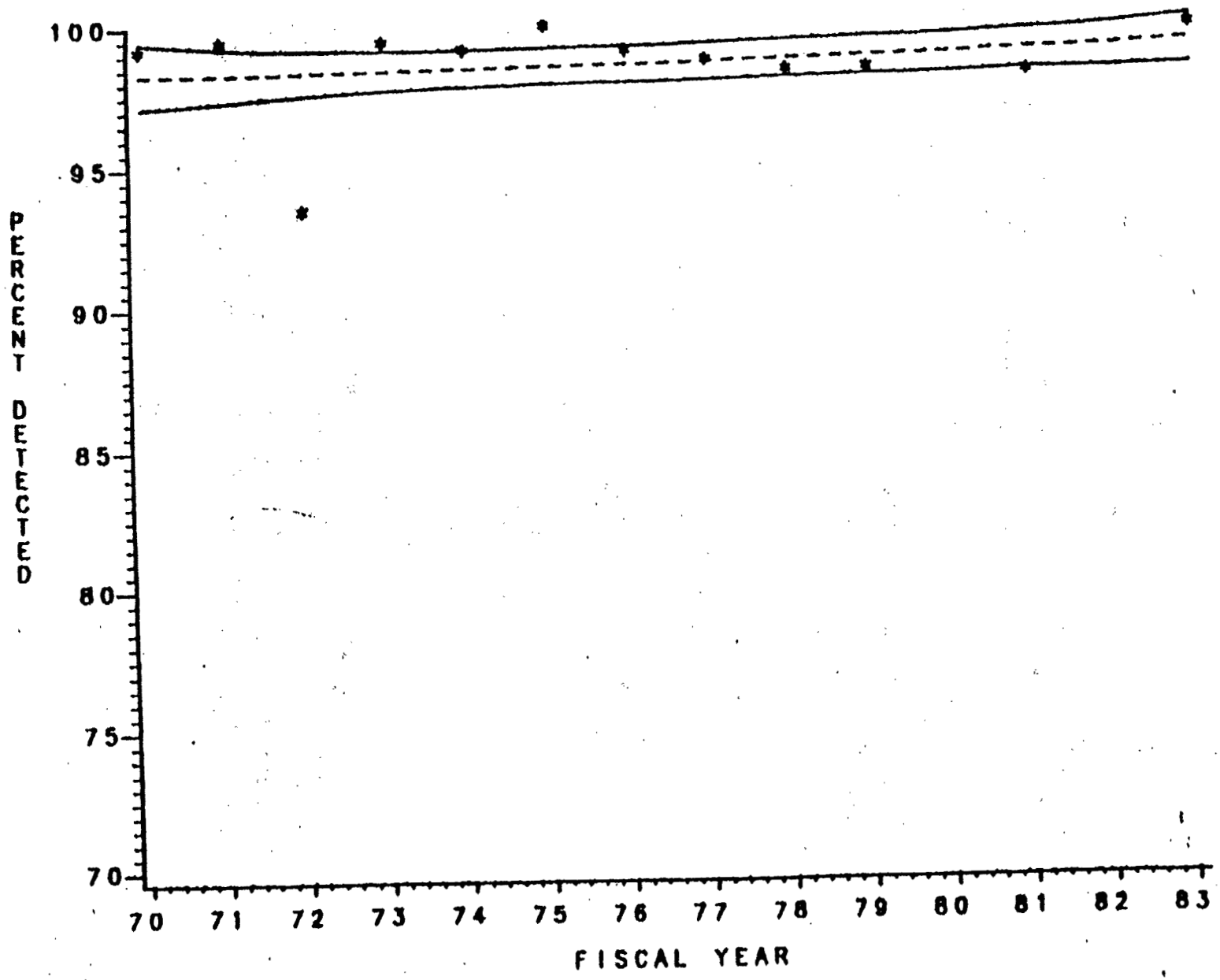
estimated trends are of particular interest since the data for these years have been updated to include additional information since the last statistical analysis of the NHATS data.

3.2.1 Time Trend Estimates for β-BHC

Plots of national time trend estimates for β-BHC are given in Figures 3.2-1 through 3.2-4 for the different residue distribution characteristics of interest. The estimated trend given in each figure is represented by the dashed line while the solid lines represent 95 percent confidence bands for the trend. The individual plotted points correspond to point estimates computed separately from the data for each fiscal year. The points provide a comparison of how well the estimated trend describes the actual changes in levels across the fiscal years. The national trends for β-BHC indicate the following:

- The percentage of individuals having detectable levels of β-BHC has remained fairly constant near 100 percent
- The percentage of individuals having quantifiable levels is decreasing
- The average β-BHC level is declining from an estimated level of 0.45 ppm in 1970 to about 0.16 since 1981
- The median level is also estimated to be decreasing

Summarizing the results for the national trends, it appears that the percentage of the population having at least a detectable level of β-BHC is remaining near 100 percent. However, the actual levels of β-BHC are decreasing. Further information concerning the estimated model coefficients and associated significance levels are given in Table B.2 in Appendix B.


100
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FISCAL YEAR

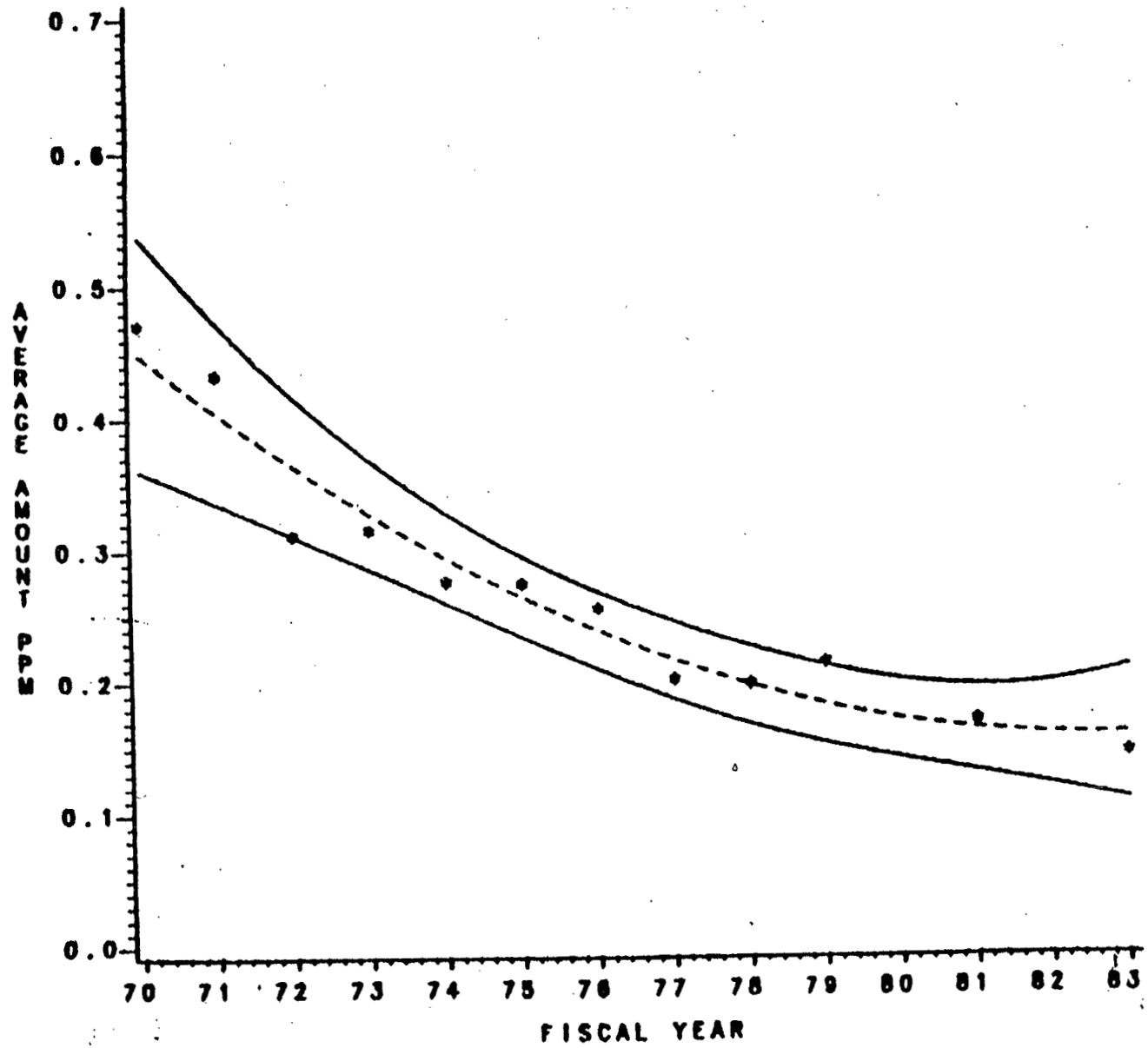

Figure 3.2-3. National time trend and 95 percent confidence bands for the average amount of β-BHC

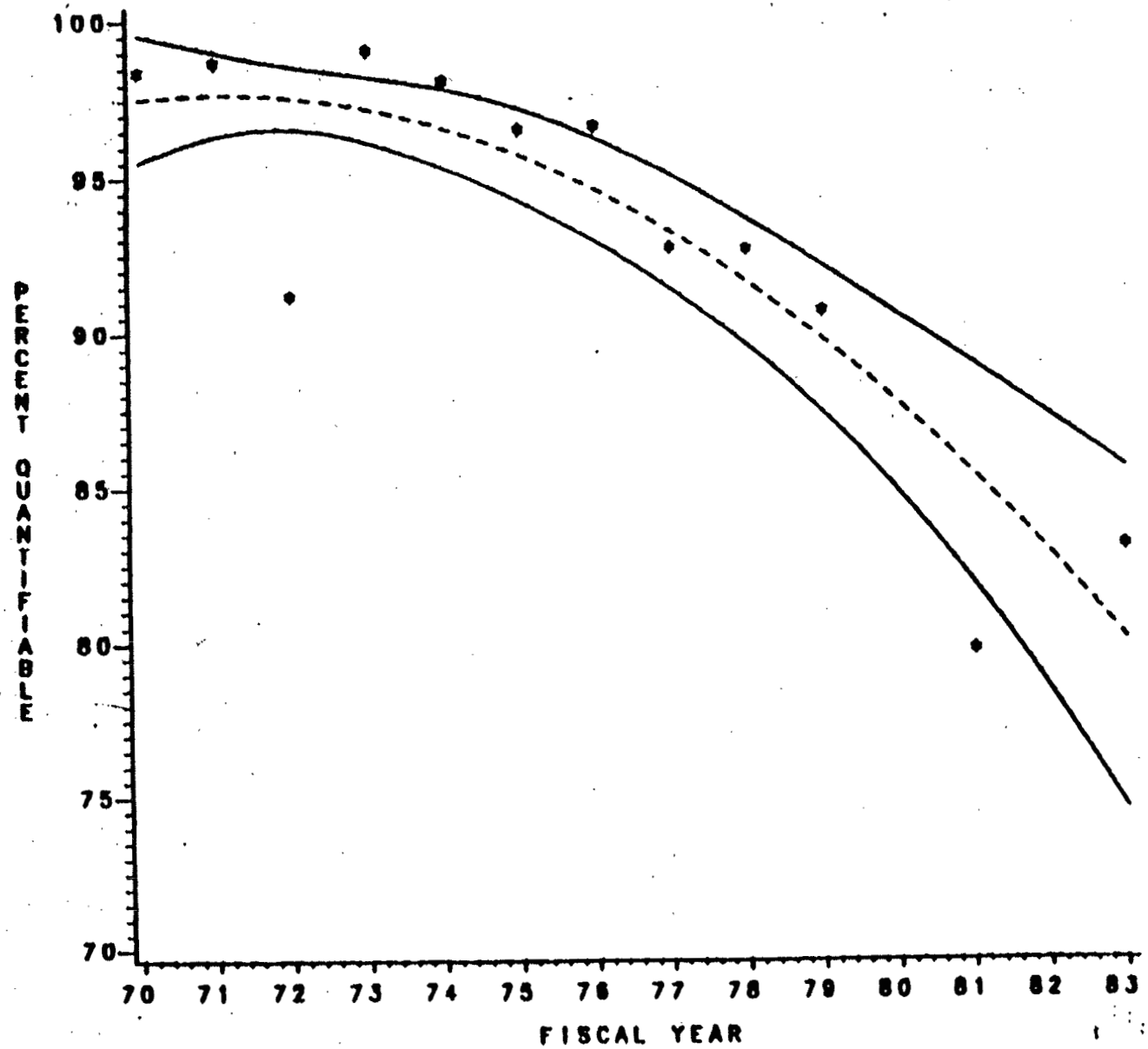

Figure 3.2-2. National time trend and 95 percent confidence bands for the percent of population having quantifiable levels of β-BHC

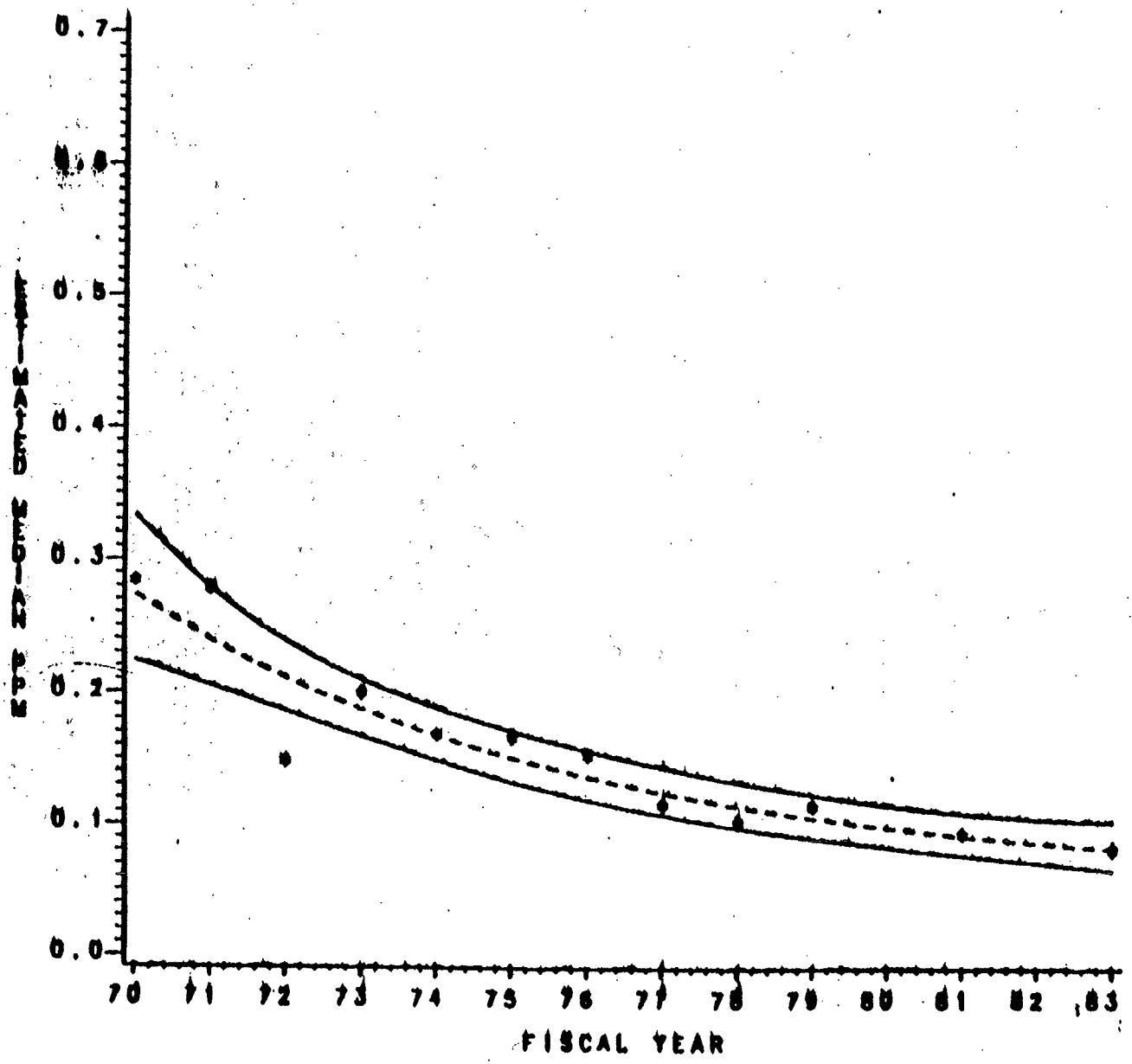

Figure 3.2-4. National time trend and 95 percent confidence bands for the median amount of β-BHC

Figures 3.2-5 through 3.2-8 present the estimated trends for the different demographic and geographic subpopulations for the percentage of individuals having detectable levels of β-BHC. Figures 3.2-9 through 3.2-12 present the trend estimates for the median level of β-BHC. The plotted trends correspond to predicted values generated from statistical models described in Table B.8. For further details concerning how the trend plots were generated, see Appendix B.

For the percentage of individuals having detectable levels of β-BHC the comparison of trends across the different subpopulations reveal there are no practical differences. The only statistical differences involve the absolute levels across the age groups; there are no statistically significant trend differences.

Analysis of trends for the median level of β-BHC indicate the following results:

- The time trends are significantly different across the age groups. The medians are declining for all three age groups, however, the youngest age group has declined less since the levels were already lower than the other older groups.
- There is no significant difference in the time trends or the absolute levels between the two race groups
- There is no significant difference in the time trends between sexes but there is a difference in the absolute level between sexes (females tend to have slightly higher levels)
- There are no significant differences in time trends among the four census regions; however, there are differences in the absolute levels among the regions. The South Region has the highest levels.

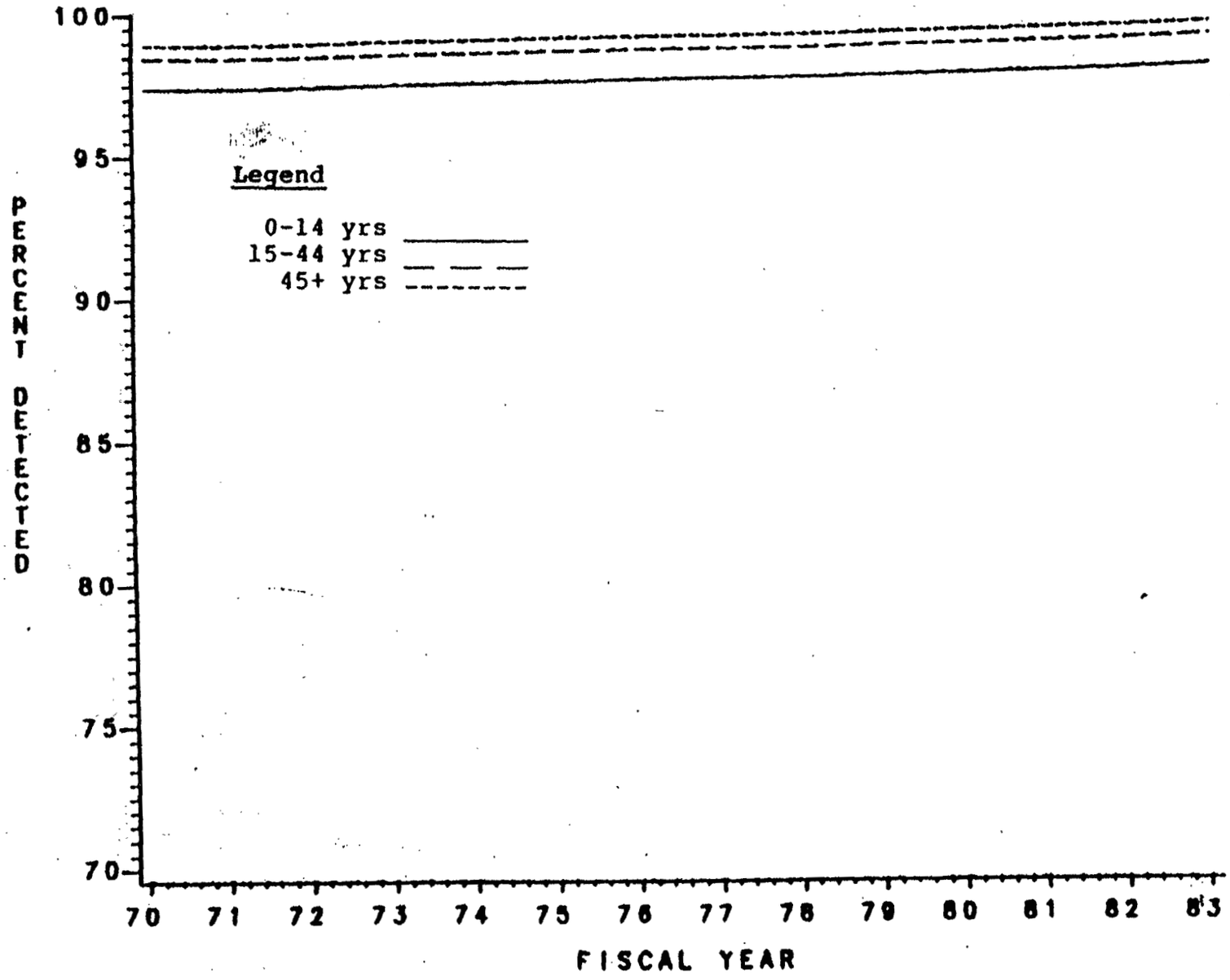

Figure 3.2-5. Estimated time trends across the different age groups for the percentage of the population having detectable levels of β-BHC

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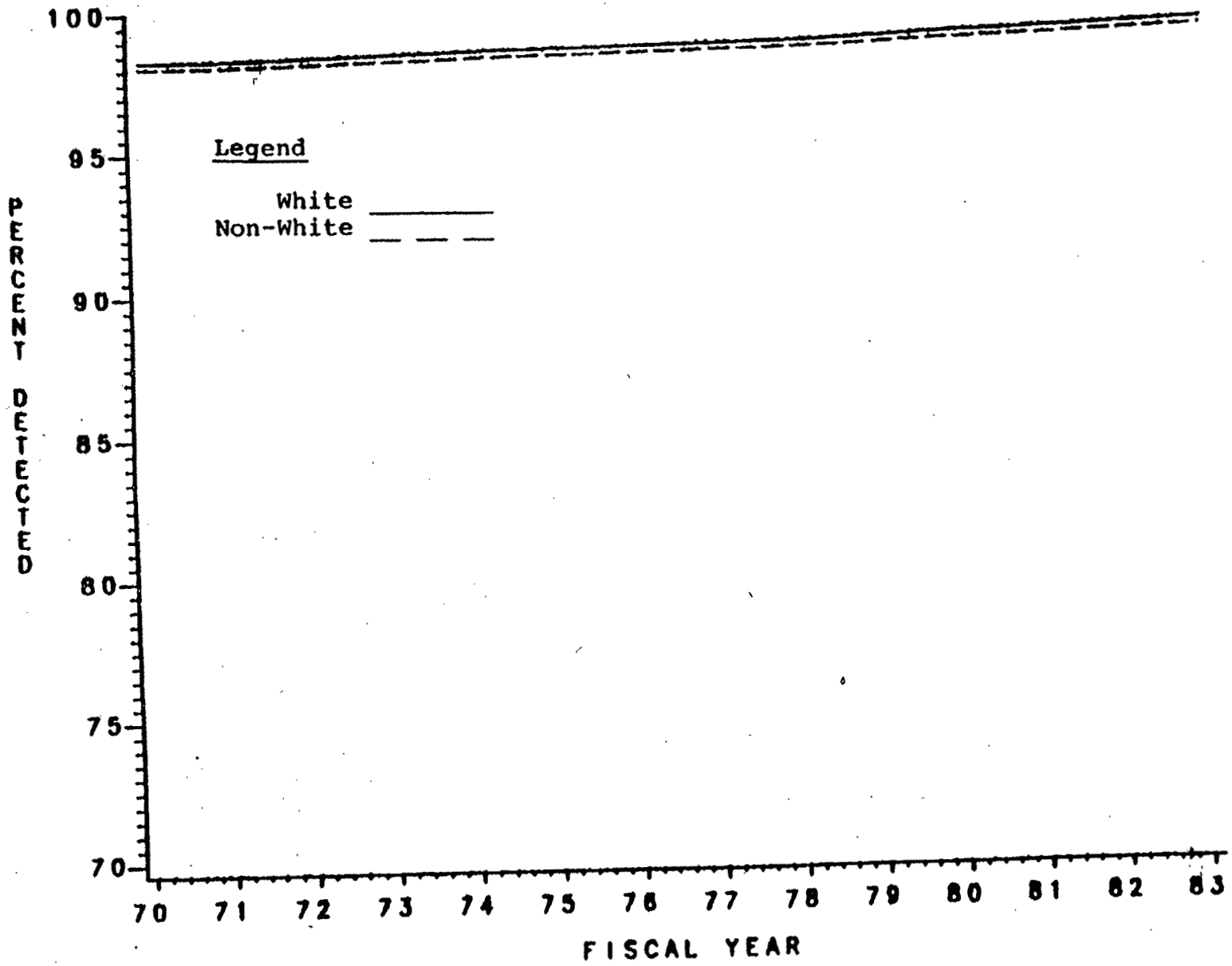

Figure 3.2-6. Estimated time trends across the different race groups for the percentage of the population having detectable levels of β-BHC

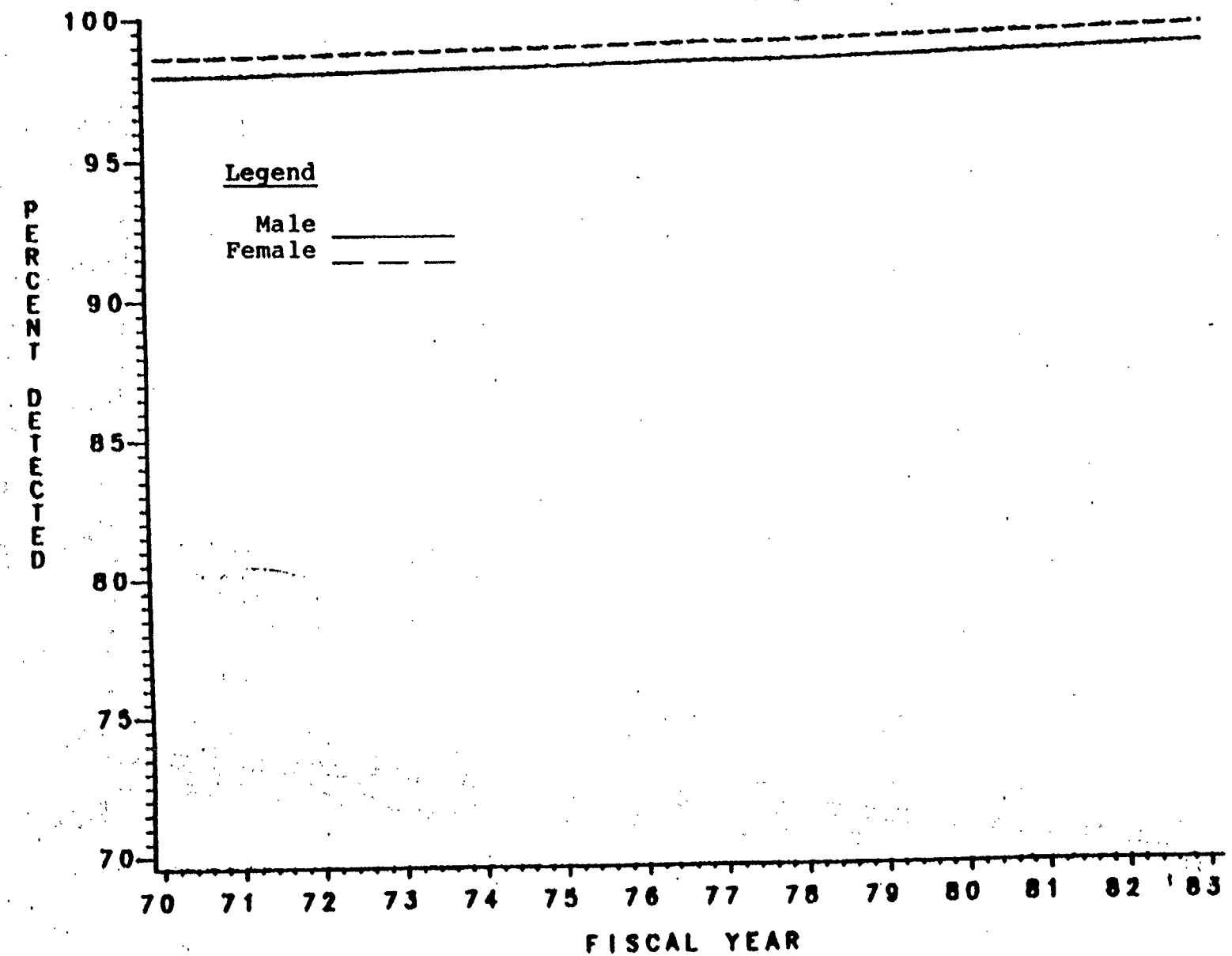

Figure 3.2-7. Estimated time trends across the different sexes for the percentage of the population having detectable levels of β-BHC

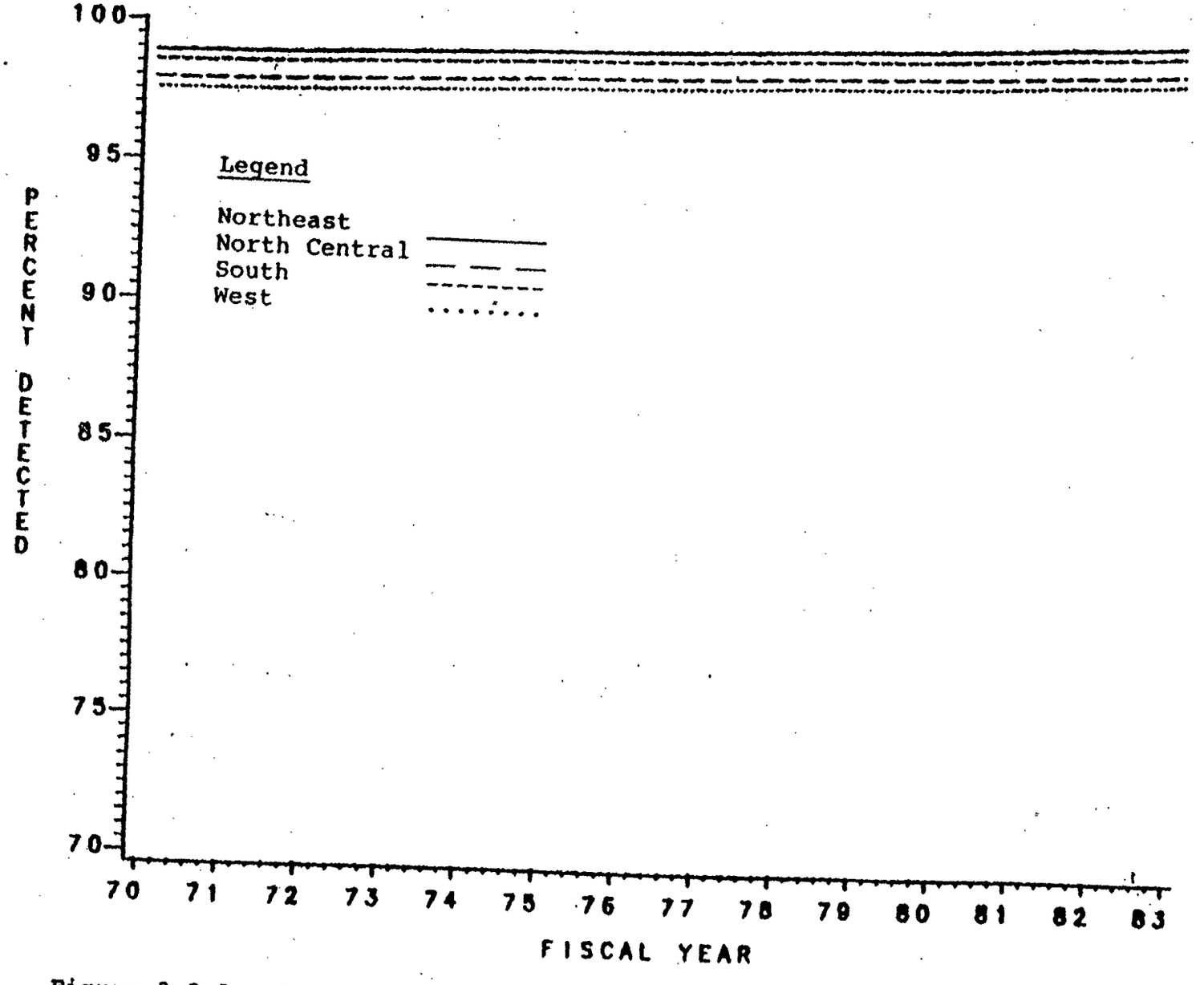

Figure 3.2-8. Estimated time trends across the different census regions for the [illegible] having detectable levels of β-BHC

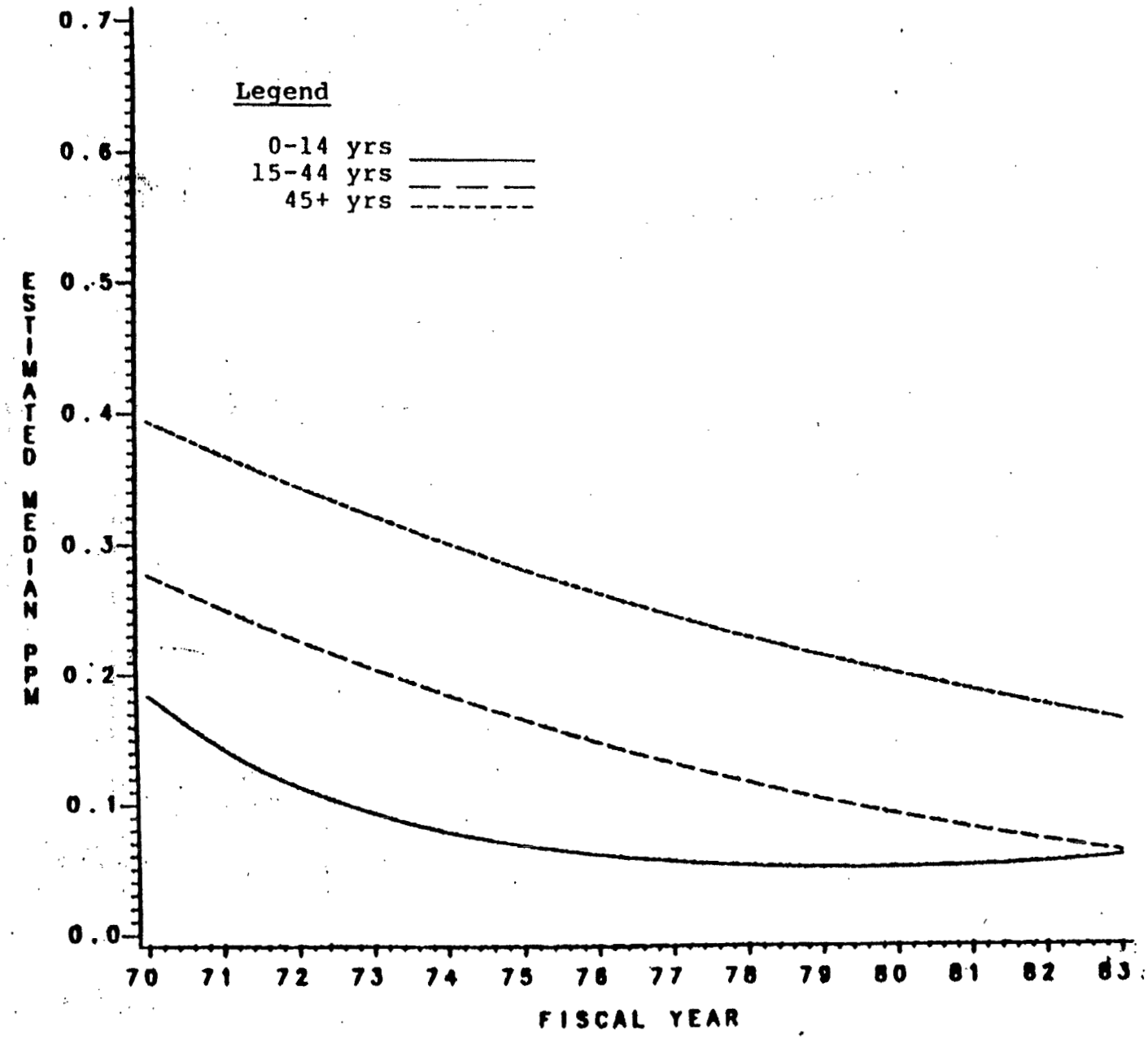

Figure 3.2-9. Estimated time trends across the different age groups for the median amount of β-BHC

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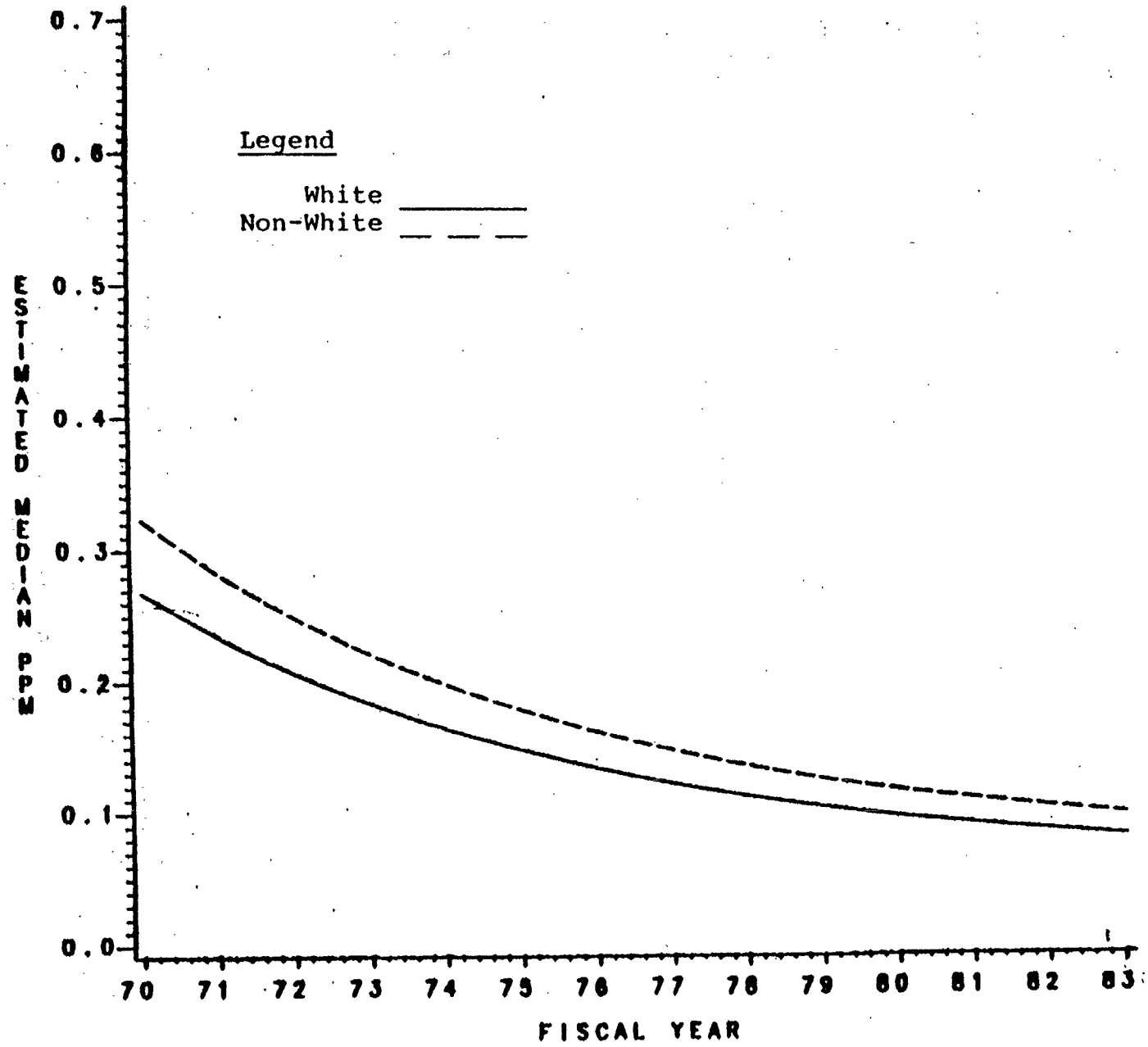

Figure 3.2-10. Estimated time trends across the different race groups for the median amount of β-BHC

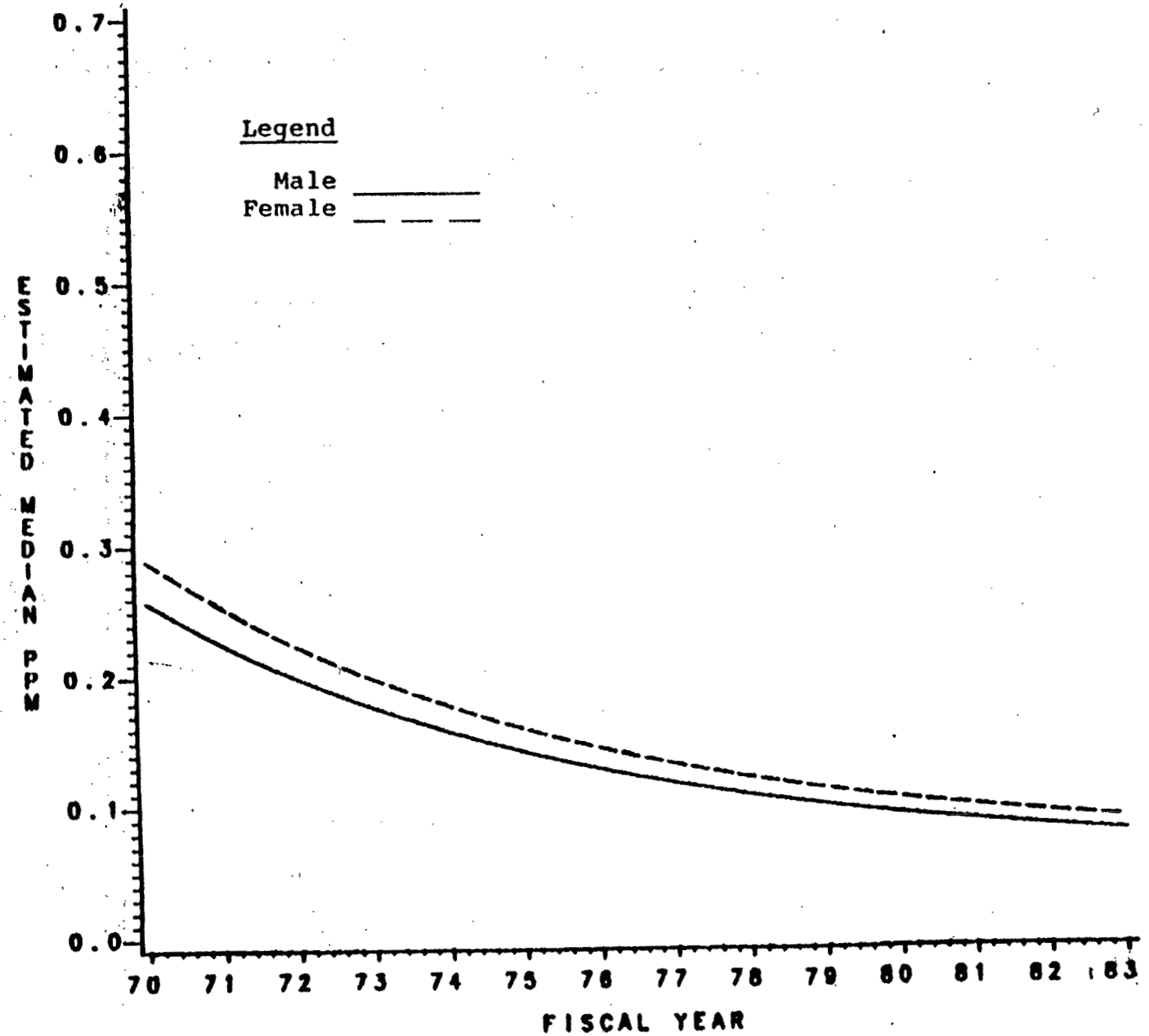

Figure 3.2-11. Estimated time trends across the different sexes for the median amount of β-BHC

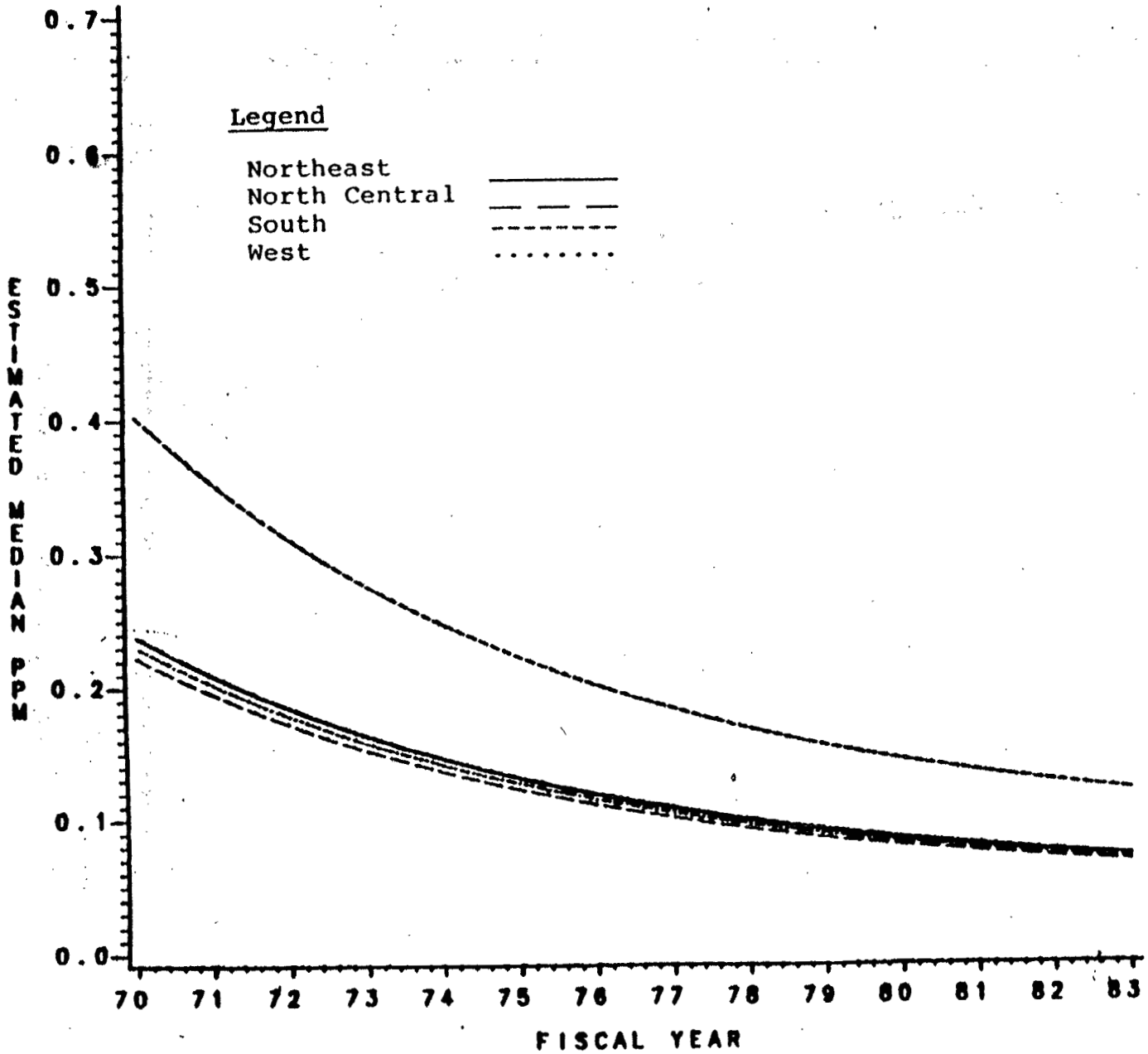

Figure 3.2-12. Estimated time trends across the different census regions for the median amount of β-BHC

3.2.2 Time Trend Estimates for HCB

Plots of national estimates of time trends, 95 percent confidence bands, and individual point estimates for HCB are given in Figures 3.2-13 through 3.2-16 for several population residue characteristics. The results indicate:

- The percentage of individuals having detectable levels of HCB has remained near 100 percent
- There is no signficant trend in the percentage of individuals having quantifiable levels
- The trends for both the average and median levels of HCB indicate a statistically significant quadratic trend; however, the actual changes in levels are minimal with the exception of about a .01 ppm drop in 1983.

Summarizing the national trends for HCB, the prevalence of HCB in the population is remaining near 100 percent and the actual levels have remained relatively constant with the exception of a drop in 1983. Information concerning the estimated model coefficients and the associated statistical significance levels are given in Table B.3 in Appendix B.

Figures 3.2-17 through 3.2-20 present the estimated time trends for the different demographic and geographic groups for the percentage of individuals having detectable HCB levels. Figures 3.2-21 through 3.2-24 present the estimated trends for the median levels. The statistical models used to estimate the trends presented in these figures are described in Table B.9 in Appendix B.

The comparison of HCB trends indicate there are no significant differences among any of the subpopulations with respect to the percentage of individuals having detectable levels of HCB. For the median levels, comparison of the subpopulations indicates the following results:

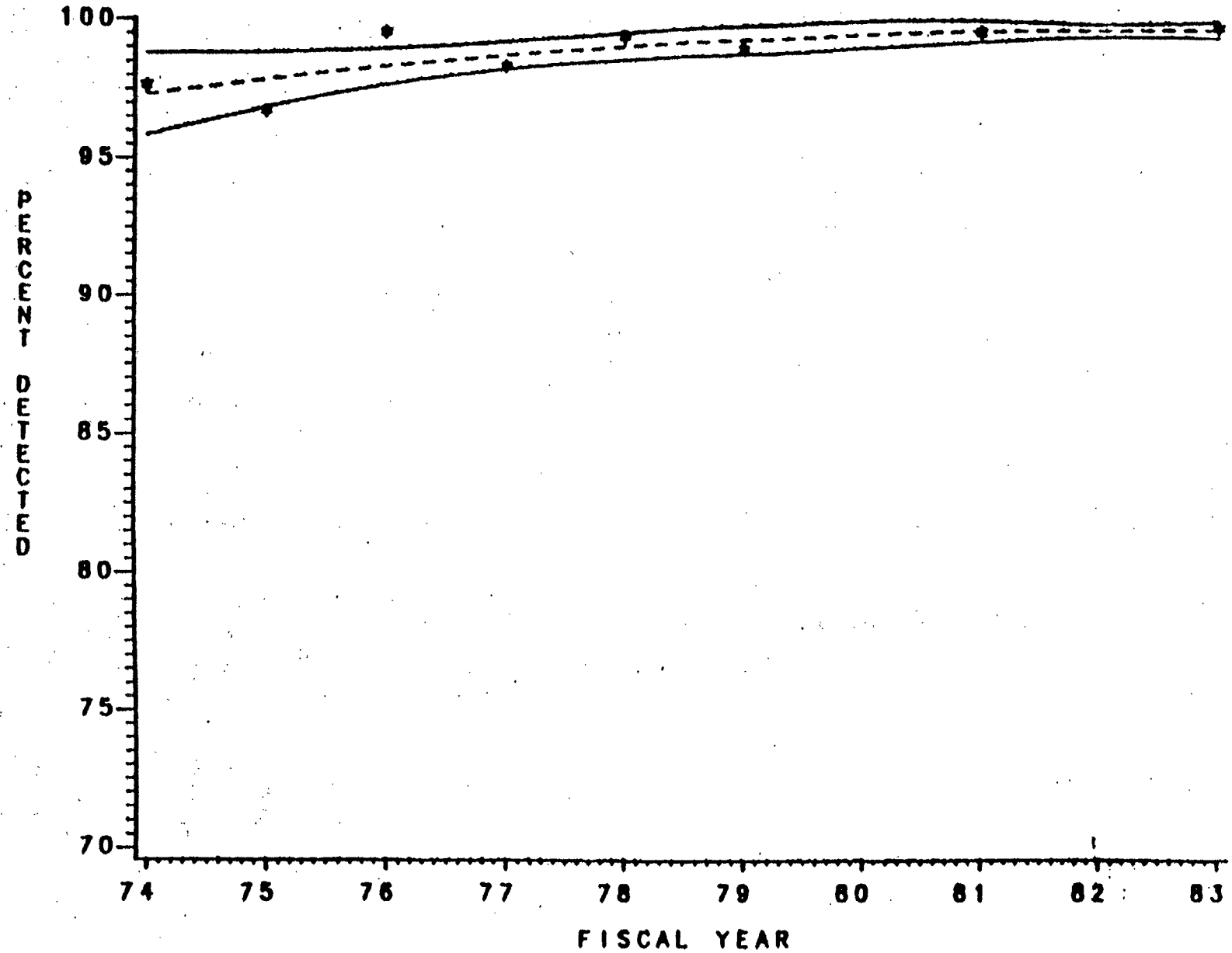

Figure 3.2-13. National time trend and 95 percent confidence bands for the percent

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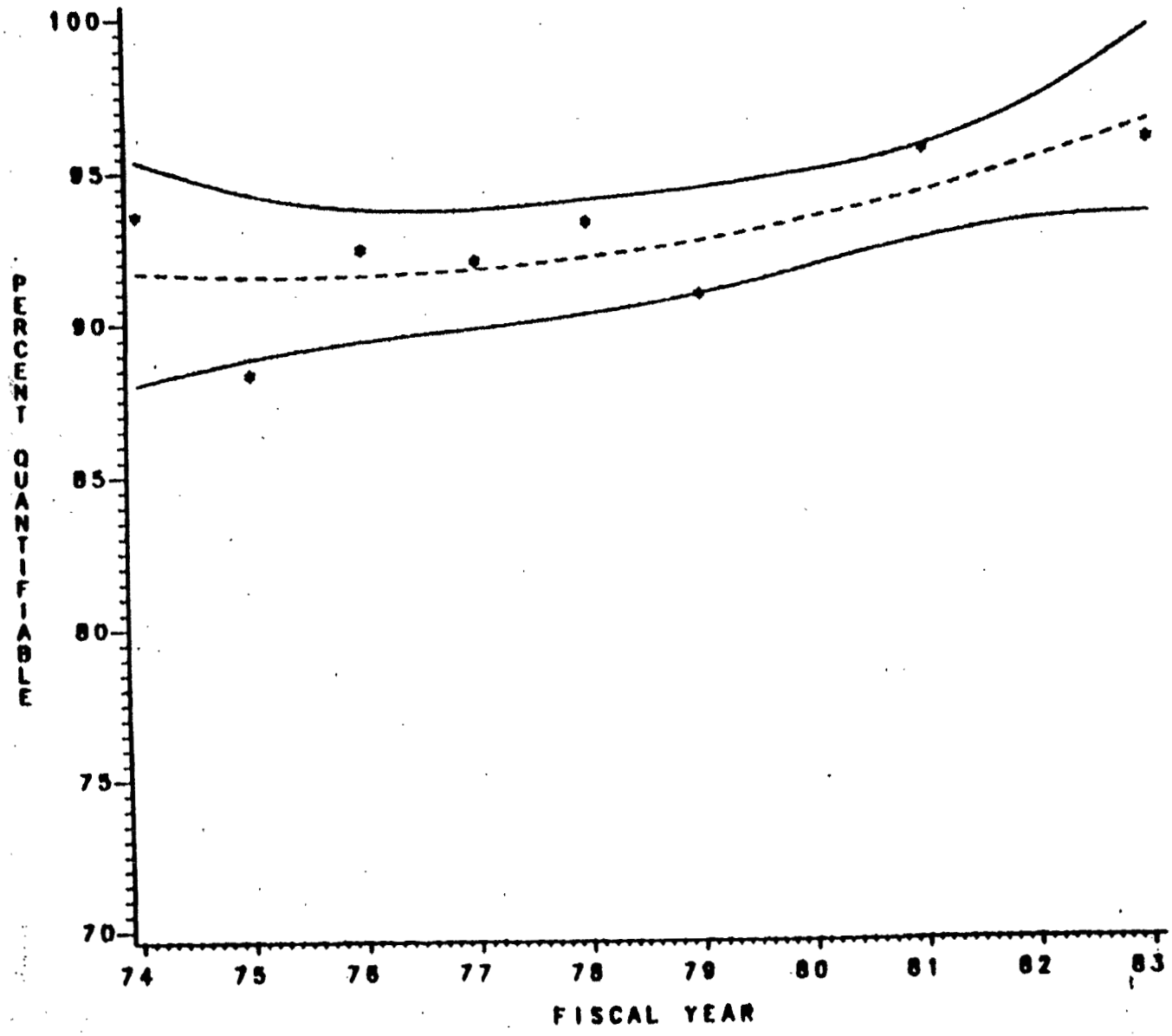

Figure 3.2-14. National time trend and 95 percent confidence bands for the percent of population having quantifiable levels of HCB

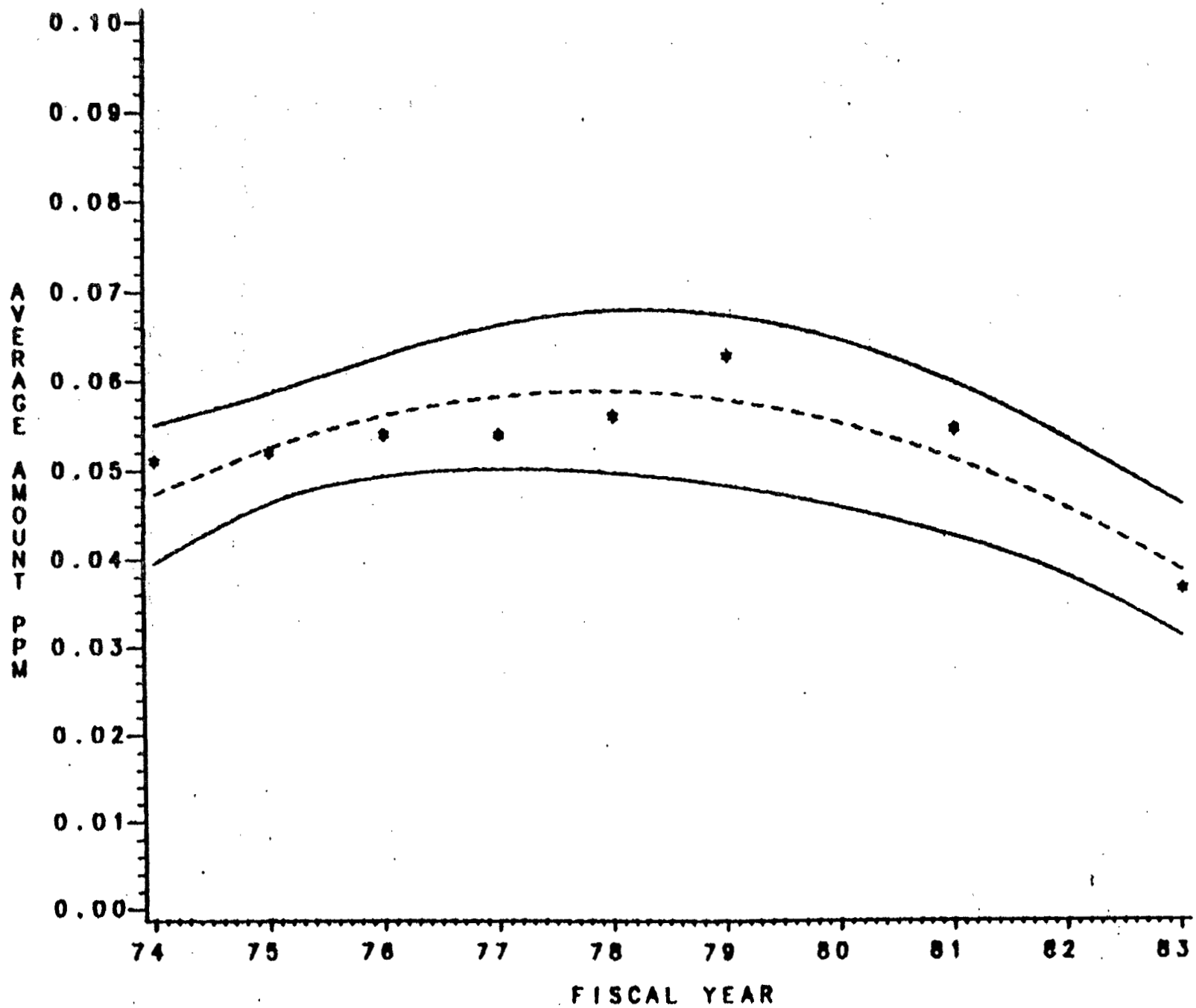

Figure 3.2-15. National time trend and 95 percent confidence bands for the average amount of HCB

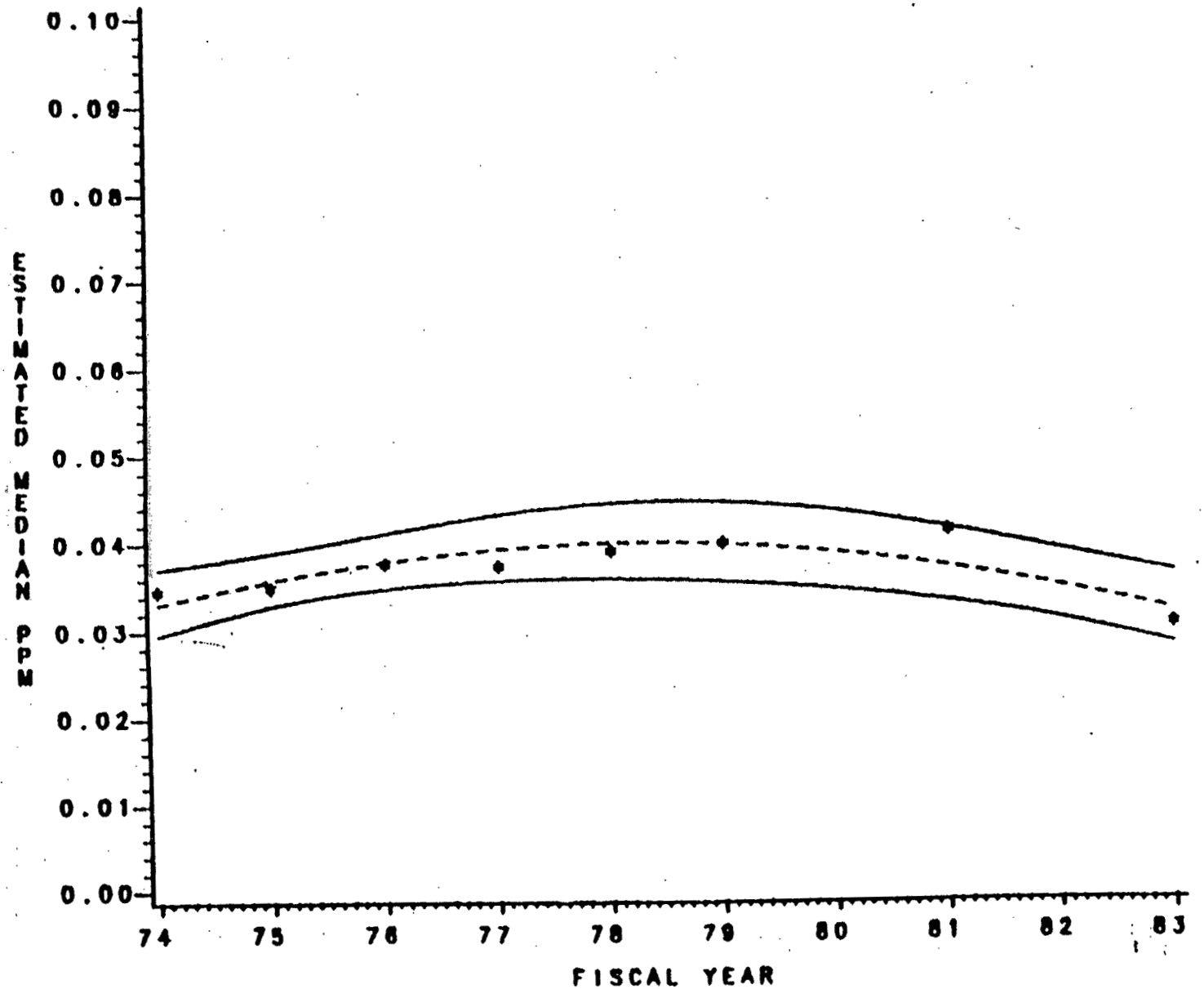

Figure 3.2-16. National time trend and 95 percent confidence bands for the median amount of HCB

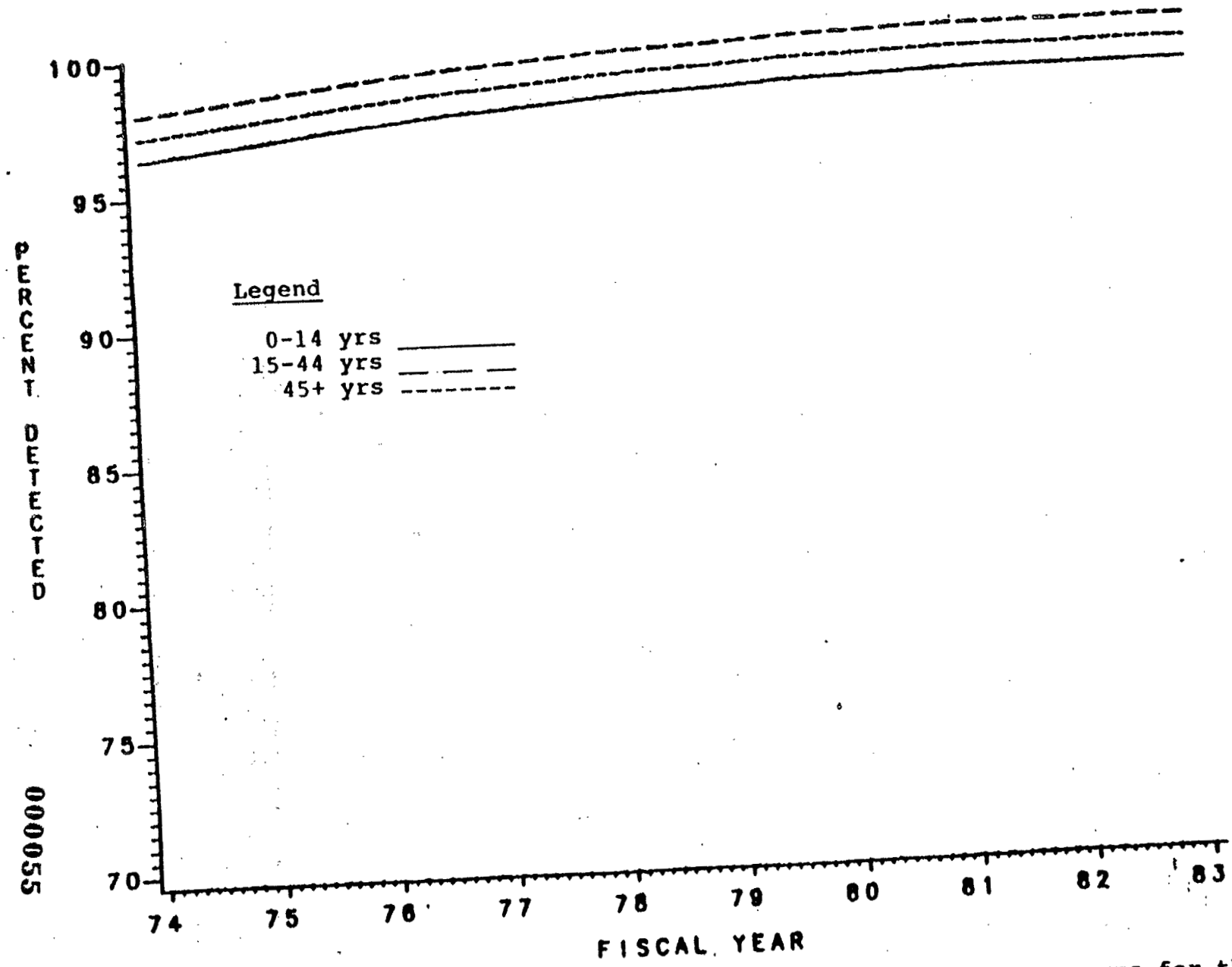

Figure 3.2-17. Estimated time trends across the different age groups for the percentage of the population having detectable levels of HCB

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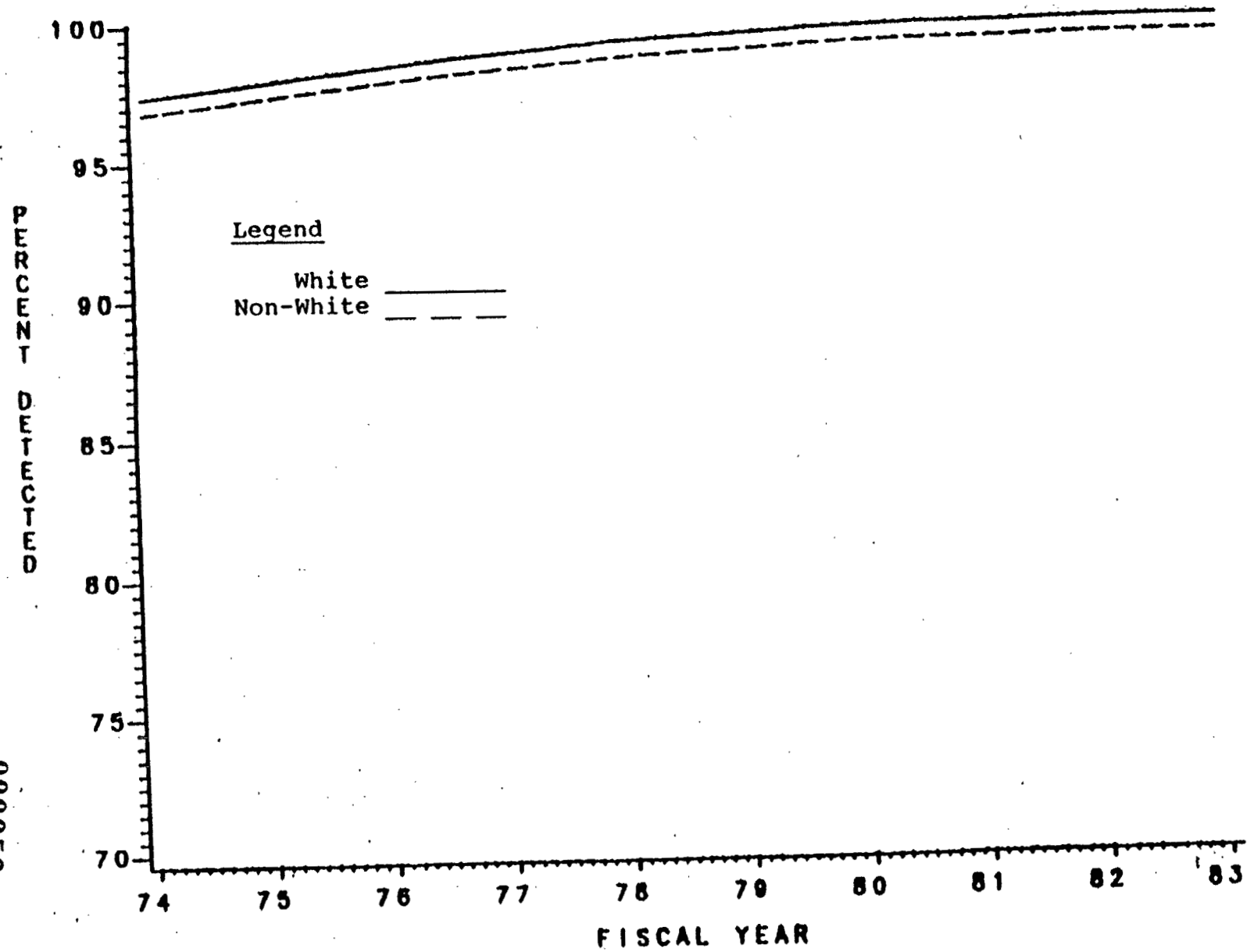

Figure 3.2-18. Estimated time trends across the different race groups for the percentage of the population having detectable levels of HCB

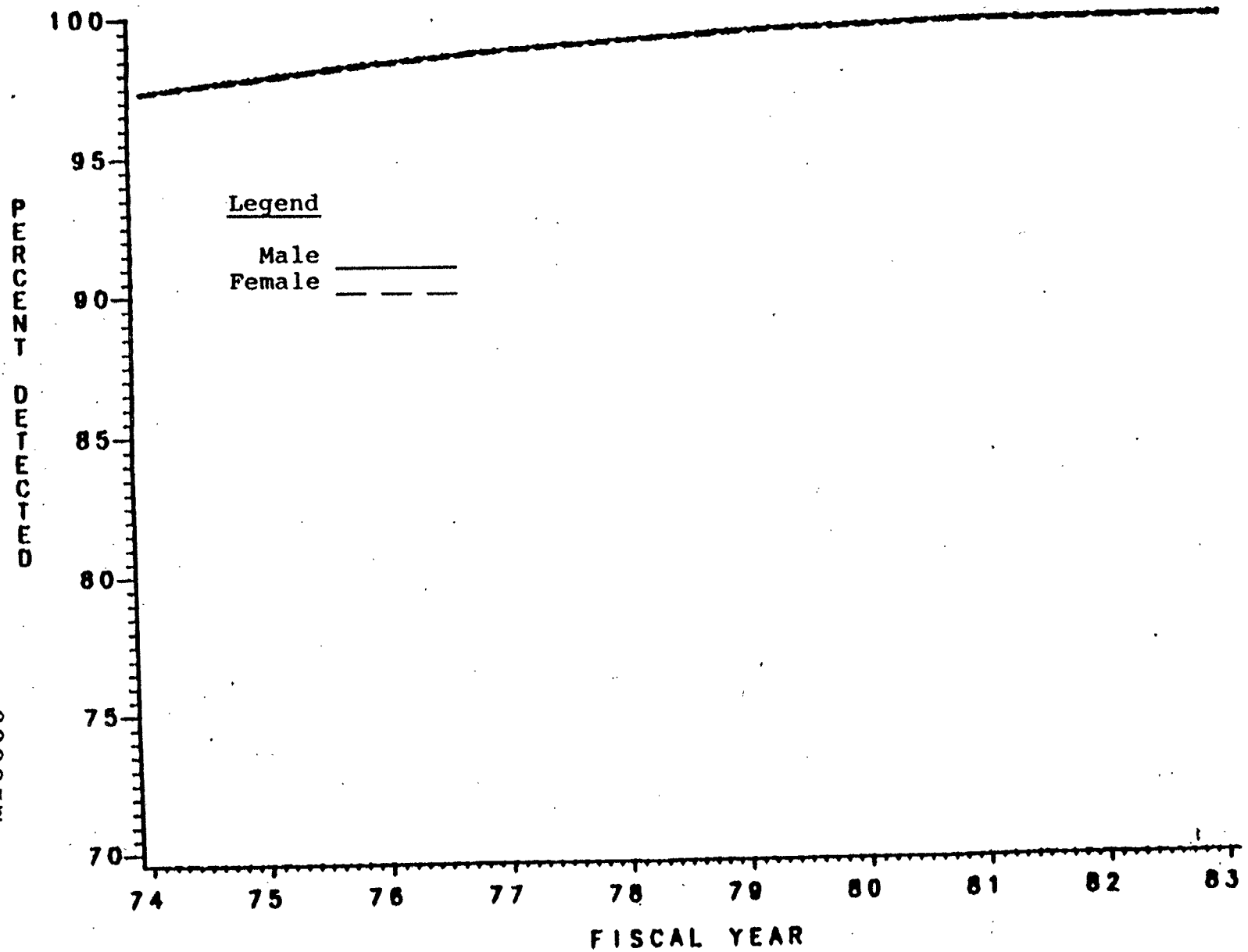

Figure 3.2-19. Estimated time trends across the different sexes for the percentage of the population having detectable levels of HCB

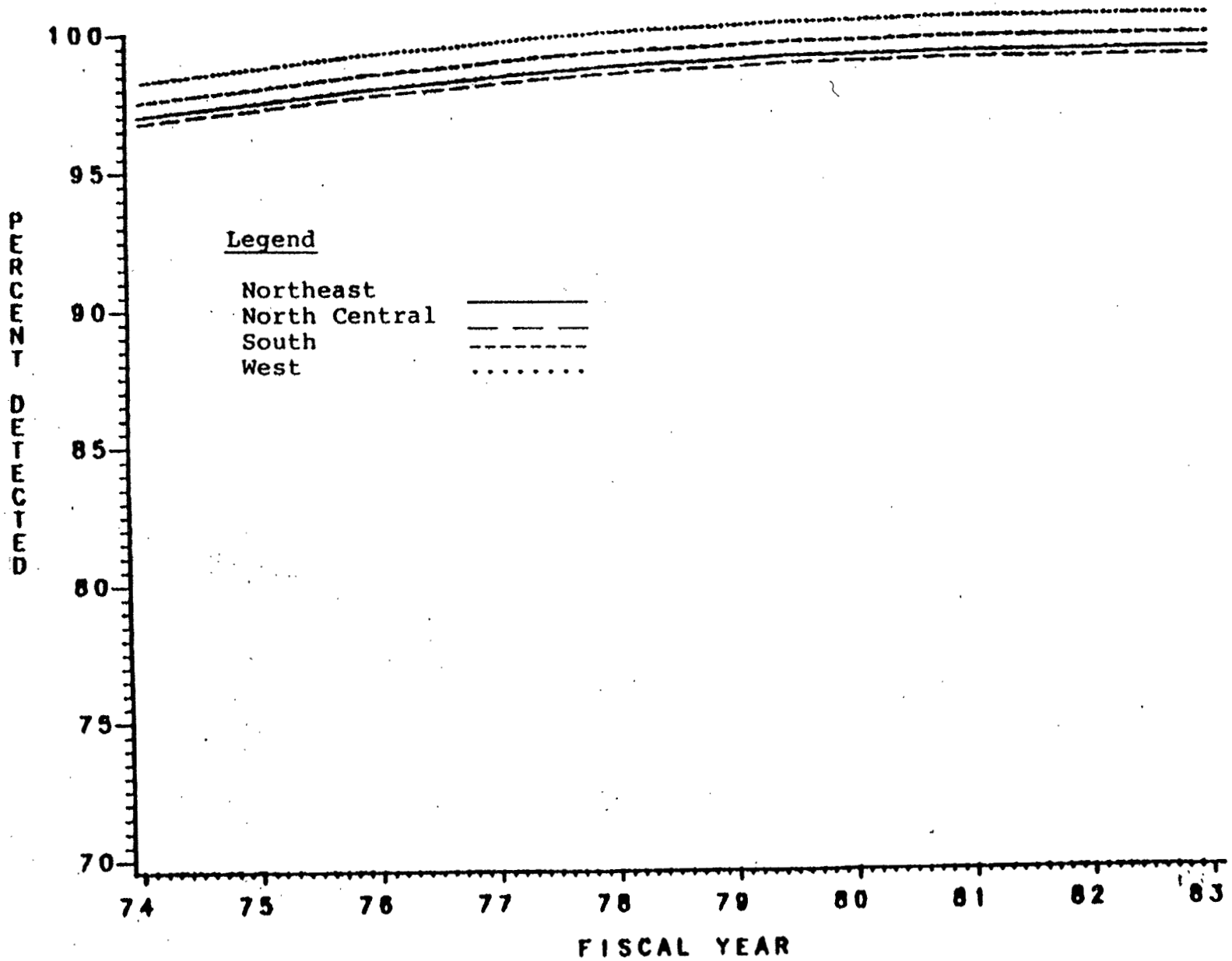

Figure 3.2-20. Estimated time trends across the different census regions for the percentage of the population having detectable levels of HCB

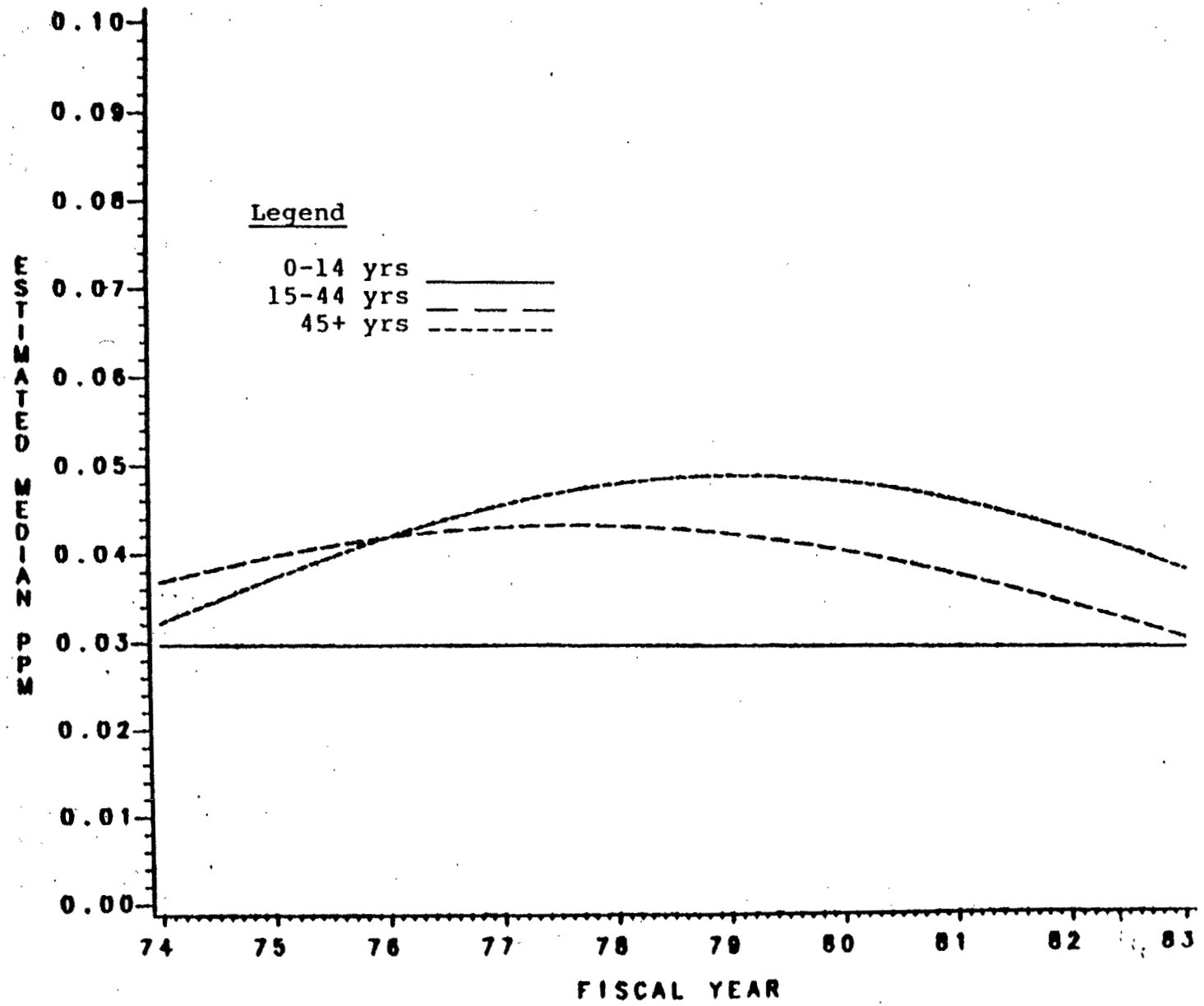

Figure 3.2-21. Estimated time trends across the different age groups for the median amount of HCB

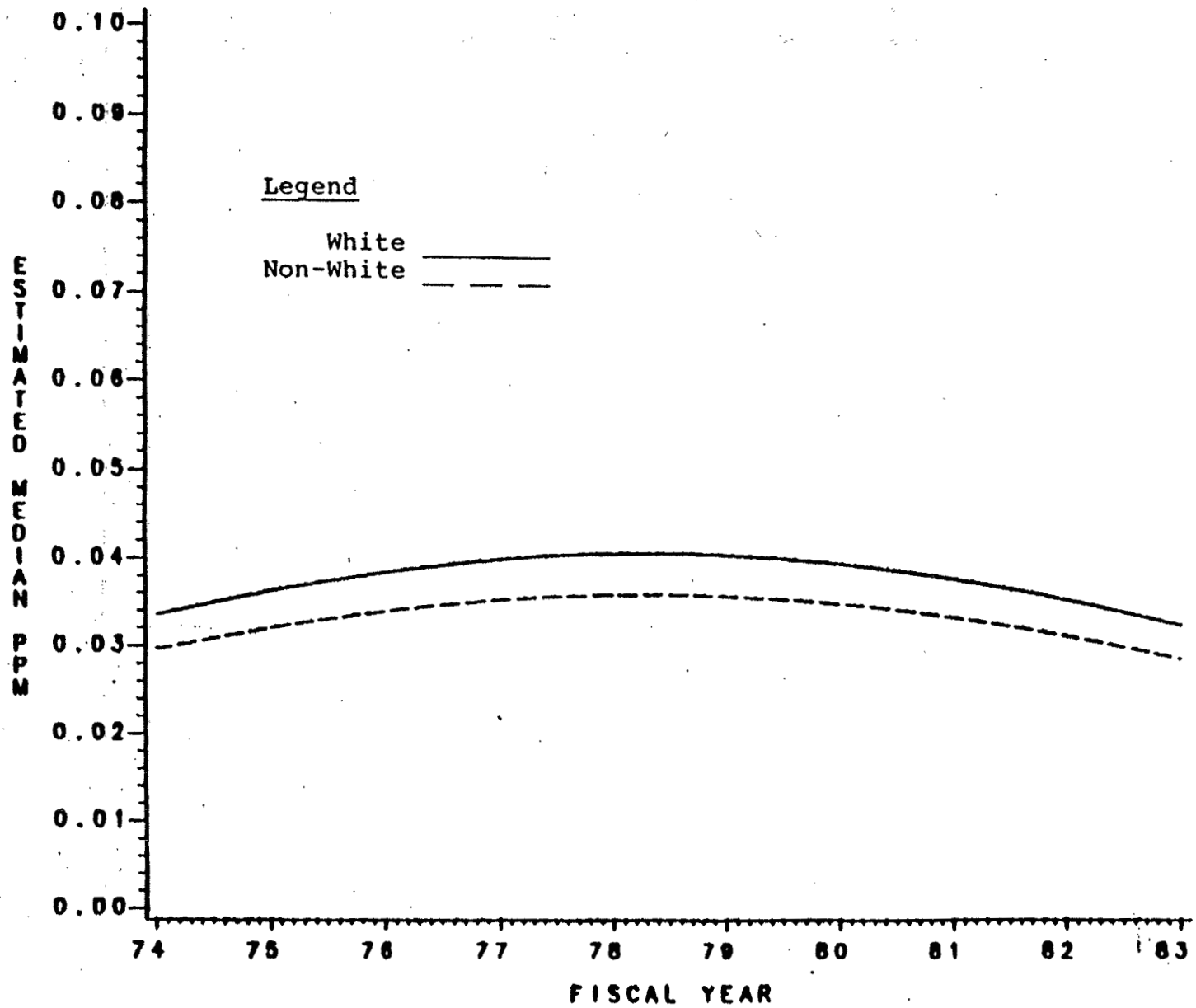

Figure 3.2-22. Estimated time trends across the different race groups for the median amount of HCB

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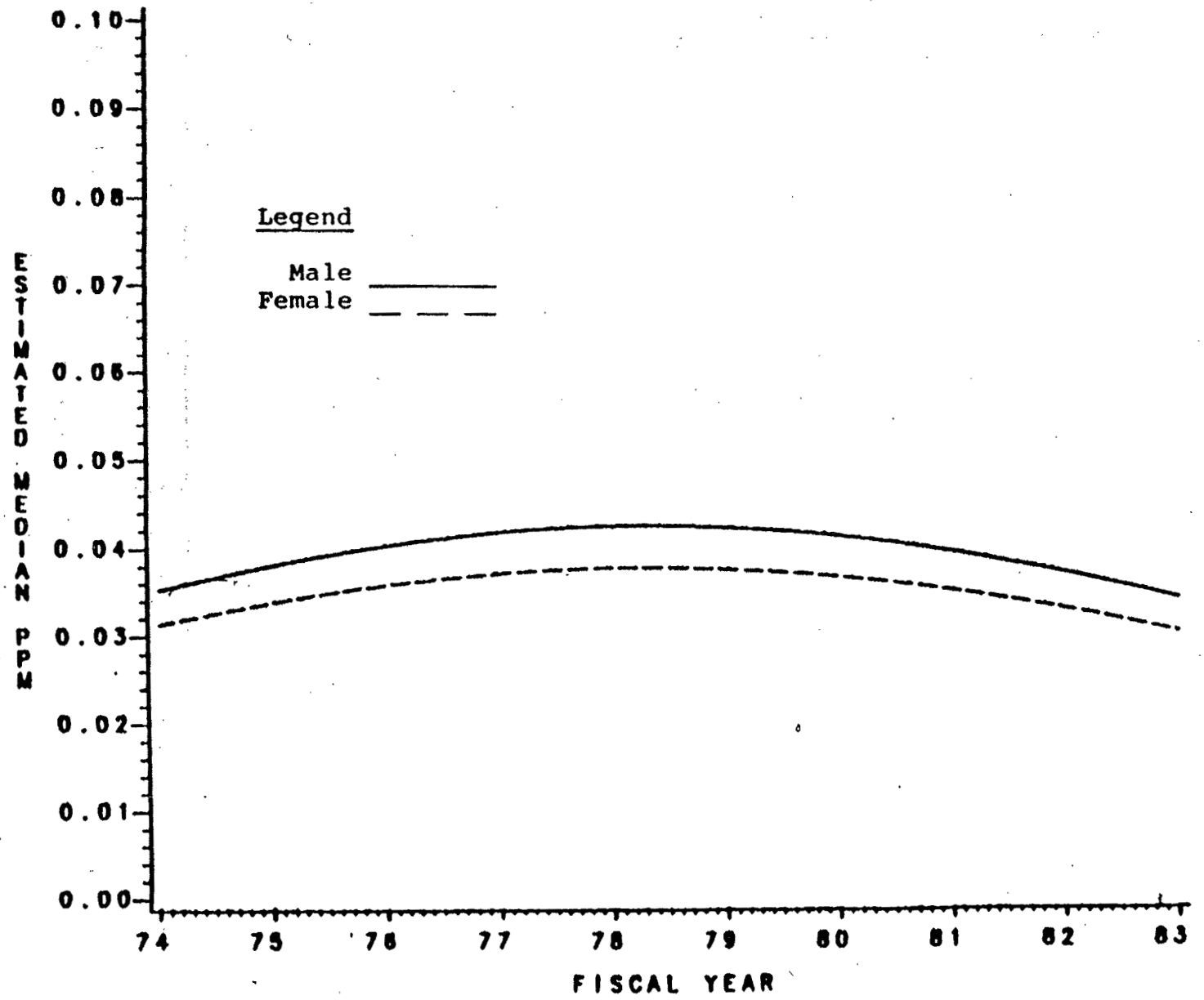

Figure 3.2-23. Estimated time trends across the different sexes for the median amount of HCB

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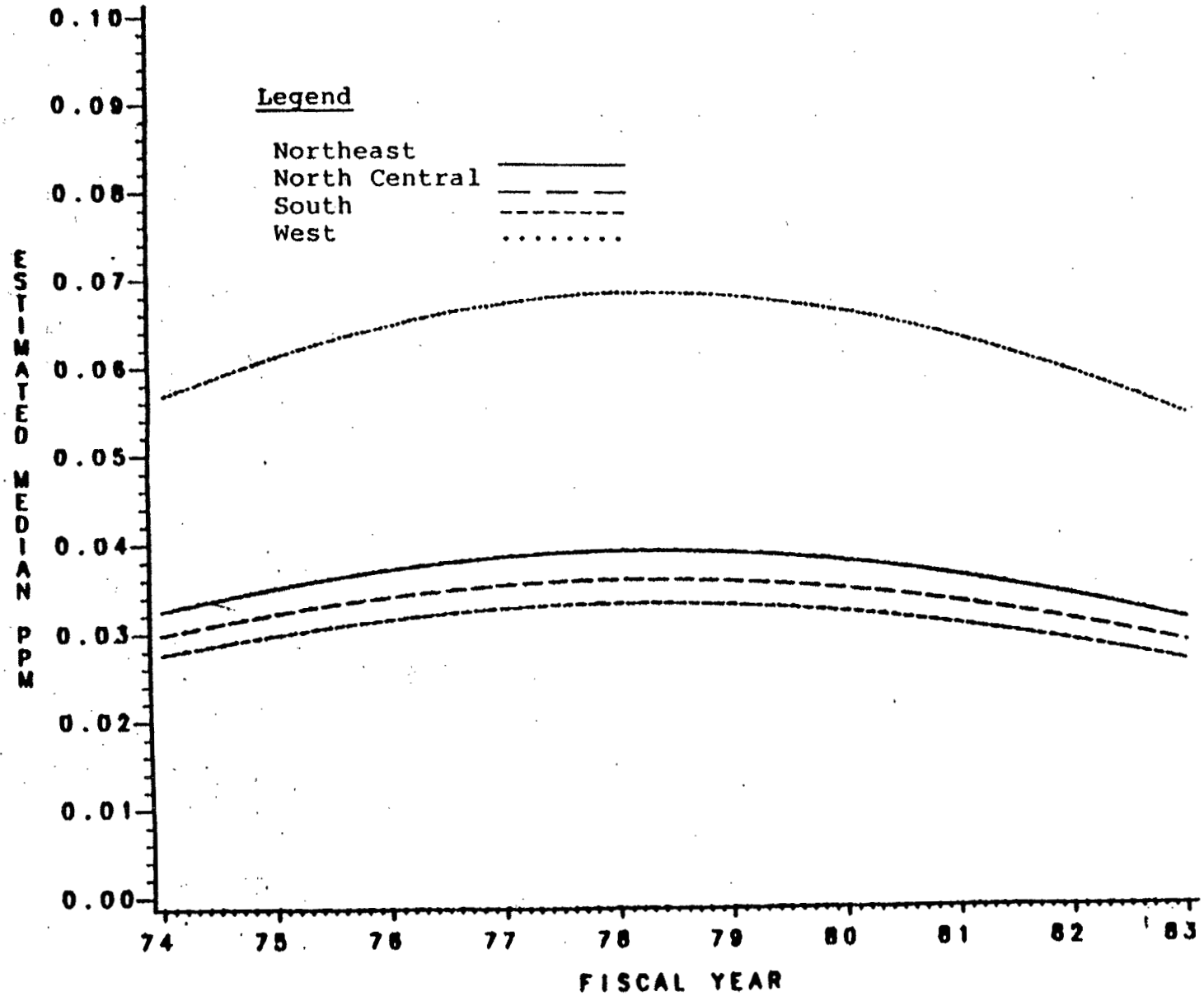

Figure 3.2-24. Estimated trends across the different census regions for the median amount of HCB

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- The time trends are different across the age groups; the "0-14 yrs" age group levels have remained fairly constant while the other groups (particularly the oldest group) had elevated levels for several years during the late seventies

- There is no significant difference in time trends or absolute levels between the two race groups

- There is no significant difference in time trends between the sexes; however, there is a difference in the absolute levels (males have higher levels)

- There are no significant differences in time trends across the census regions; however, there are differences in the absolute levels. The West Region has the highest levels.

3.2.3 Time Trend Estimates for PCBs

Since the data for PCBs indicate only the residue level range to which a tissue specimen belongs, the results presented here correspond to the population percentages of individuals estimated to have PCB levels exceeding specific values.

An earlier NHATS report by Lucas et.al (3) indicated that the estimated population percentage of individuals having total PCB levels greater than 3 ppm had fallen to near zero. Figure 3.2-25 indicates that additional data collected since then also confirms this finding. The emphasis in this study therefore involved the estimation of the percentage of individuals having PCB levels greater than 1 ppm. Figure 3.2-26 presents the estimated trend for the percentage of PCB levels exceeding 1 ppm. This indicates a significant decreasing trend from a high value near 50 percent in 1972 to a low value near 9 percent in 1983.

Although the PCB amounts are decreasing, the percentage of individuals having <u>detectable</u> levels is increasing up to a 1983 value near 100 percent. Figure 3.2-27 presents a plot of the estimated time trend for the percentage of individuals having

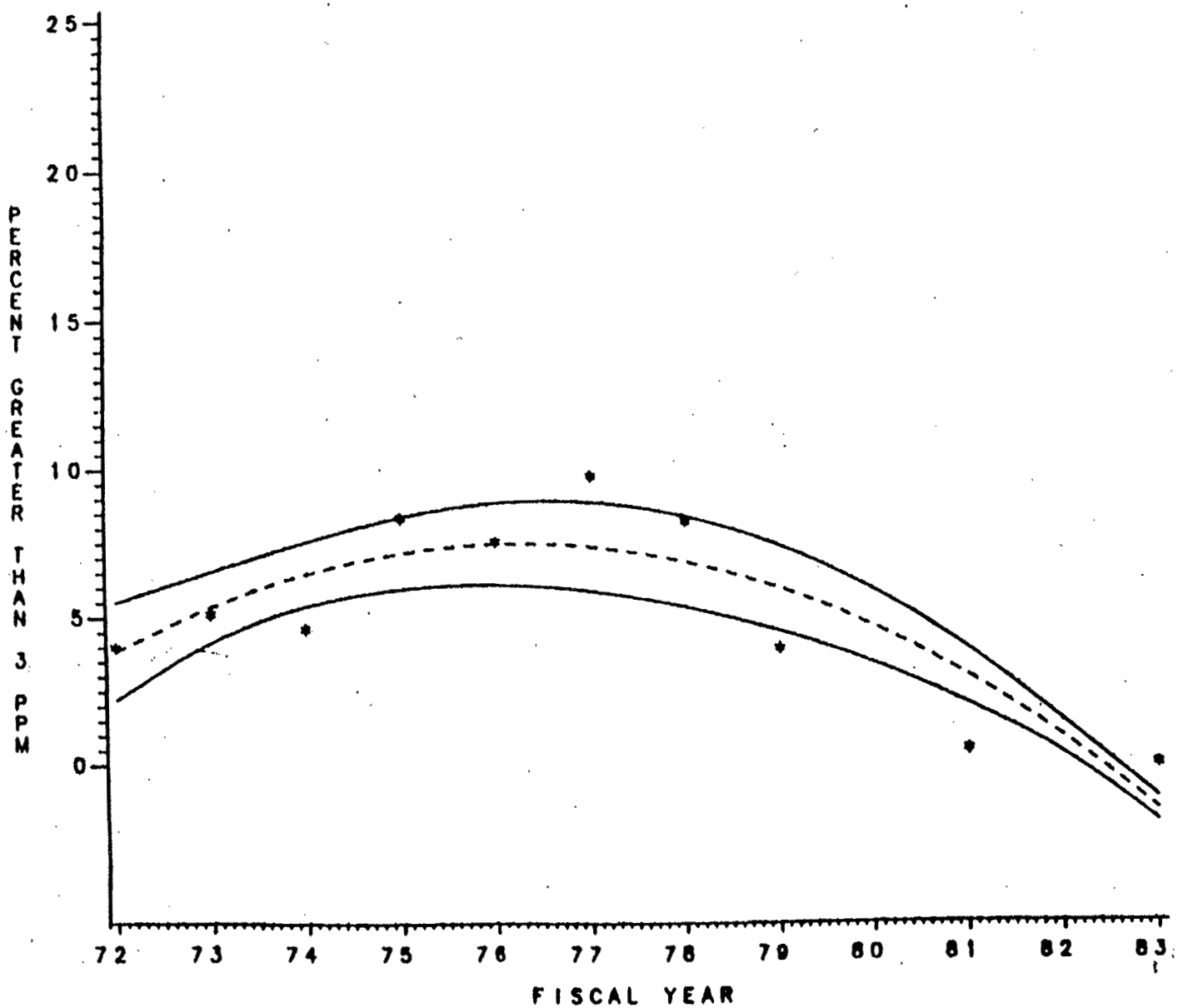

Figure 3.2-25. National time trend and 95 percent confidence bands for the percent of population having PCB residue levels exceeding 3 ppm

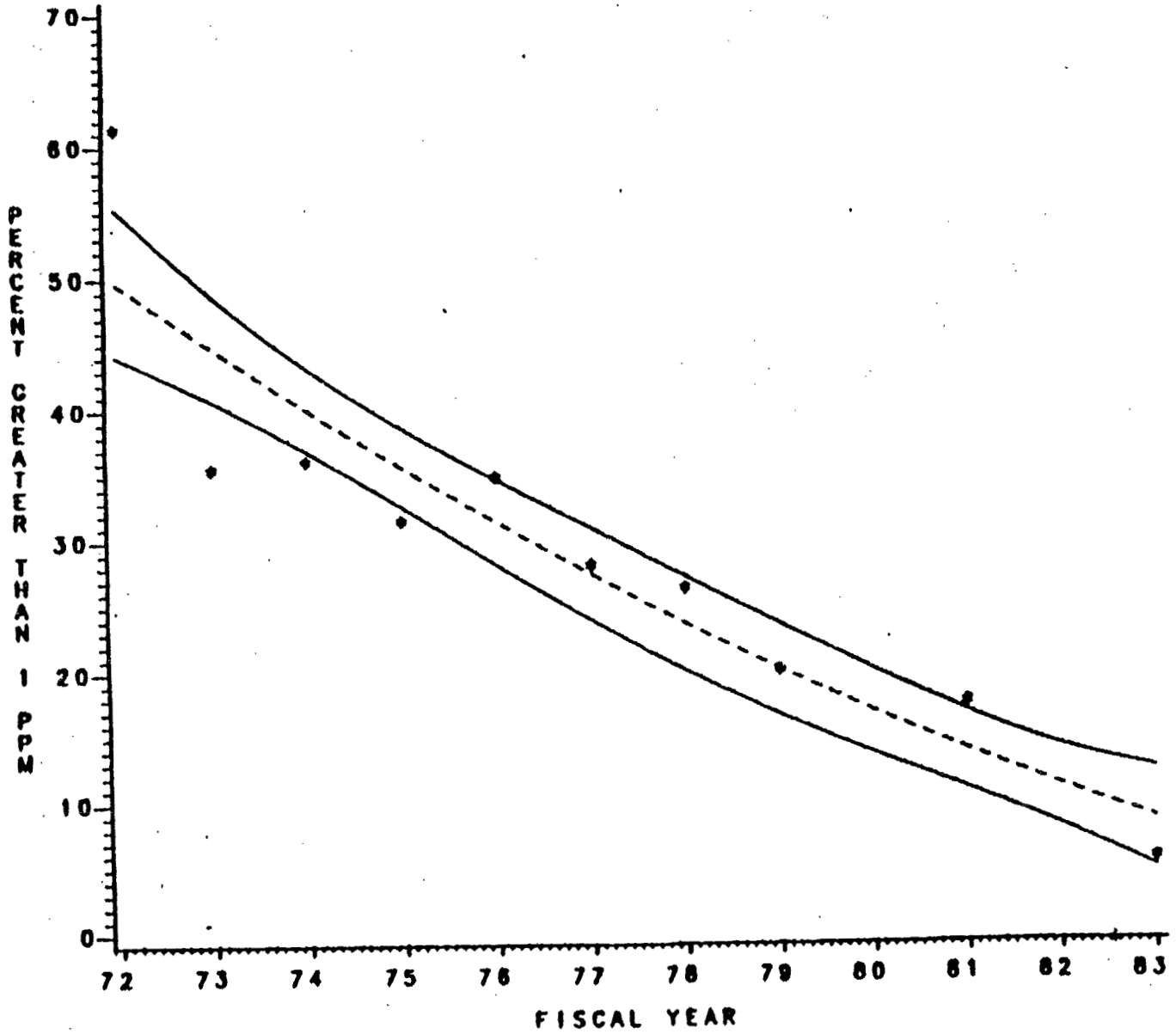

Figure 3.2-26. National time trend and 95 percent confidence bands for the percent of population having PCB residue levels exceeding 1 ppm

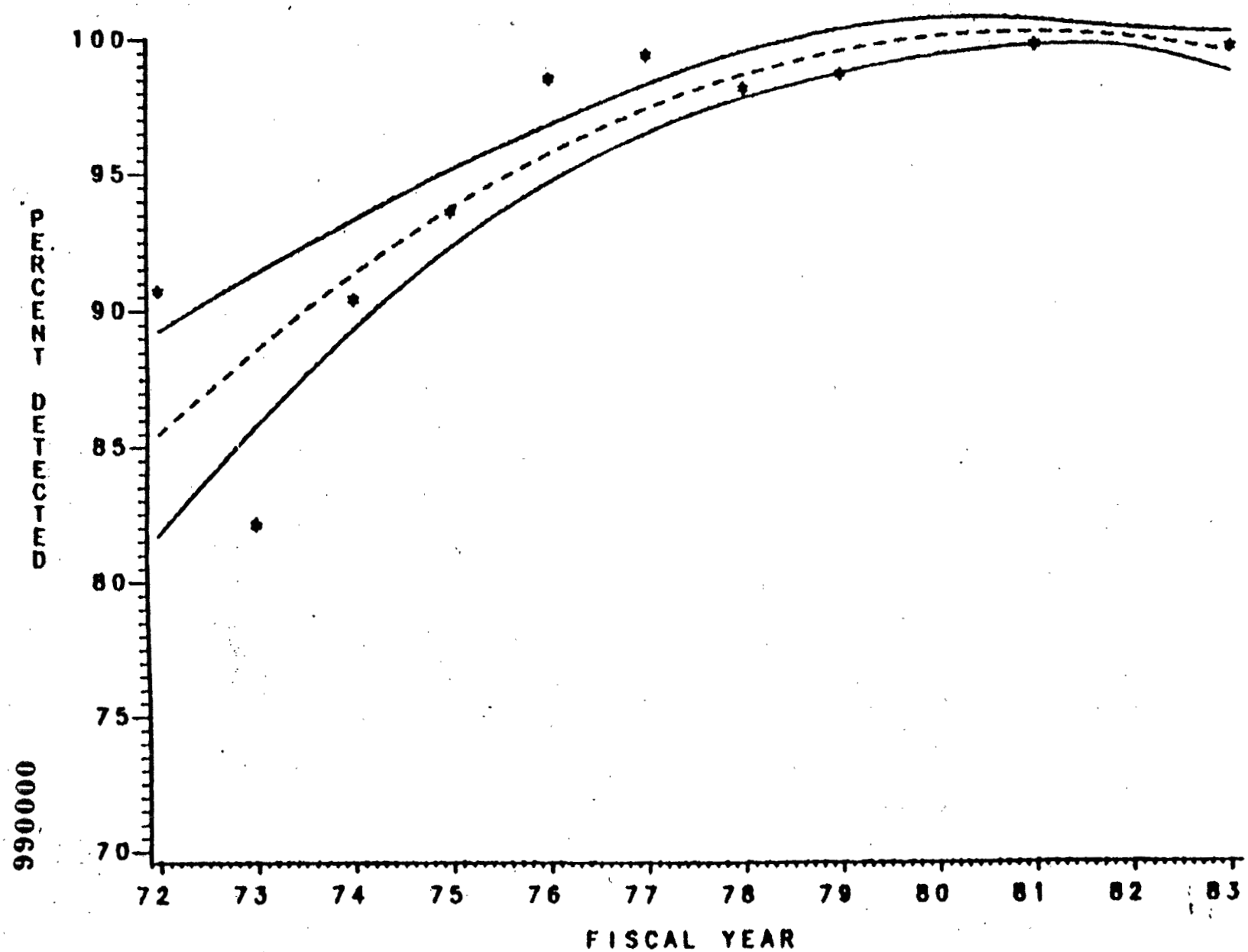

Figure 3.2-27. National time trend and 95 percent confidence bands for the percent of population having detectable levels of PCBs

990000

detectable PCB levels. Information concerning the estimated trend model coefficients and their associated significance levels is presented in Table B.4 in Appendix B.

Figures 3.2-28 through 3.2-31 present the estimated trends for "percent detected" across the different demographic and geographic subpopulations. These comparisons indicate significant trend differences only across the age groups. The "0-14 years" group has generally had lower levels but a greater increasing trend.

Figures 3.2-32 through 3.2-35 present the estimated trend comparisons for the percentage of individuals having PCB levels greater than 1 ppm. Comparison of the subpopulations indicate the following results:

- There are significant differences in time trends across the age groups; the trend for the "0-14 yrs" age group leveled off during the late seventies. The sharp increase in trend indicated in Figure 3.2-32 for the recent years is an artifact due to the curve fitting for the earlier years. Such an increase is not indicated in the actual data for these years.

- There is no significant difference in trends between the race groups; however, there is a difference in absolute levels (non-whites have higher levels)

- There is no significant difference in time trends between the sexes; however, there is a difference in absolute levels (males have higher levels)

- There are no significant differences in time trends across the census regions; however, there are differences in the absolute levels. The Northeast Region has the highest levels.

Figures 3.2-36 through 3.2-39 present the comparison of trends across the various demographic and geographic subpopulations for the percentage of individuals having PCB levels exceeding 3 ppm. The results indicate the following:

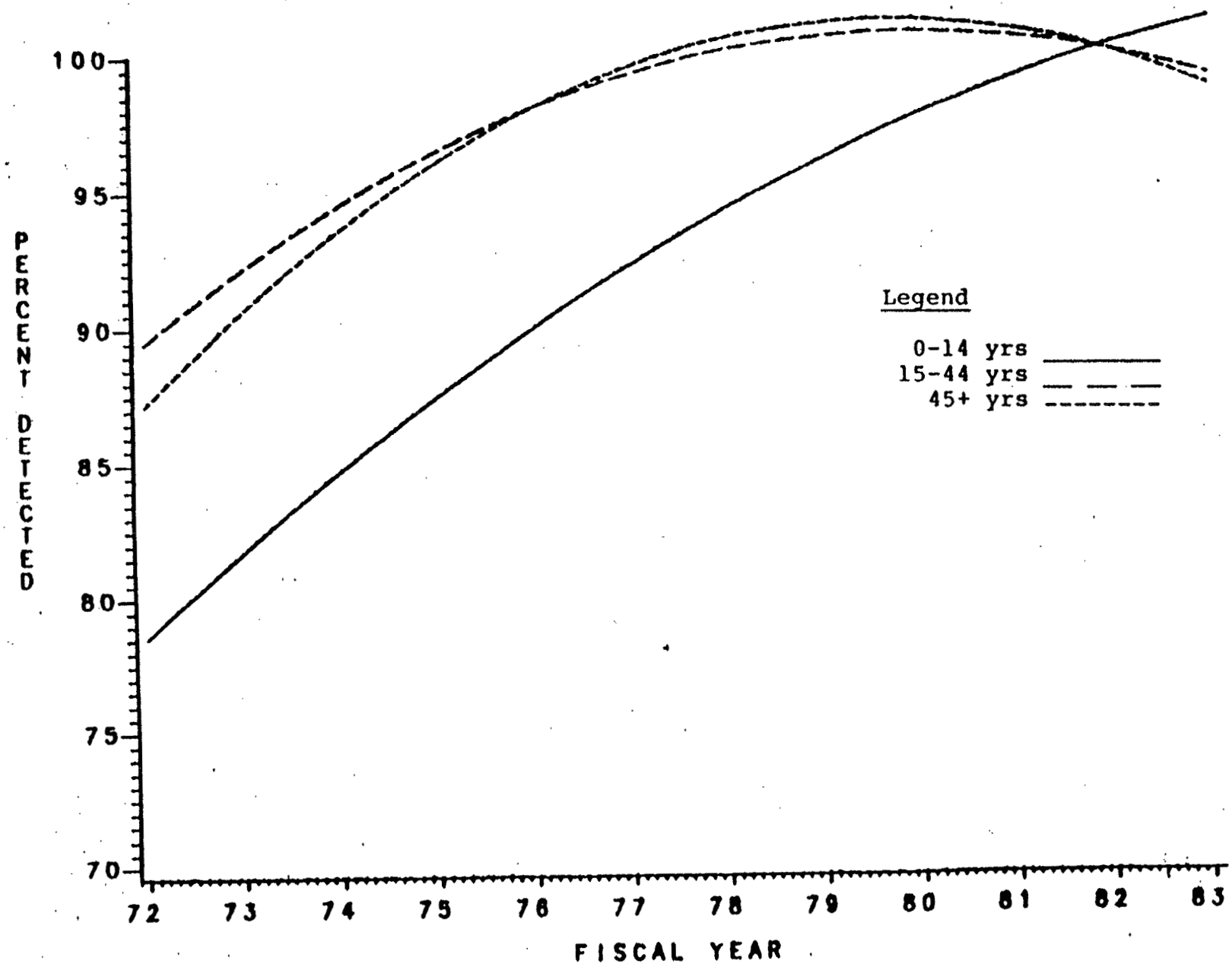

Figure 3.2-28. Estimated time trends across the different age groups for the percentage of the population having detectable levels of PCBs

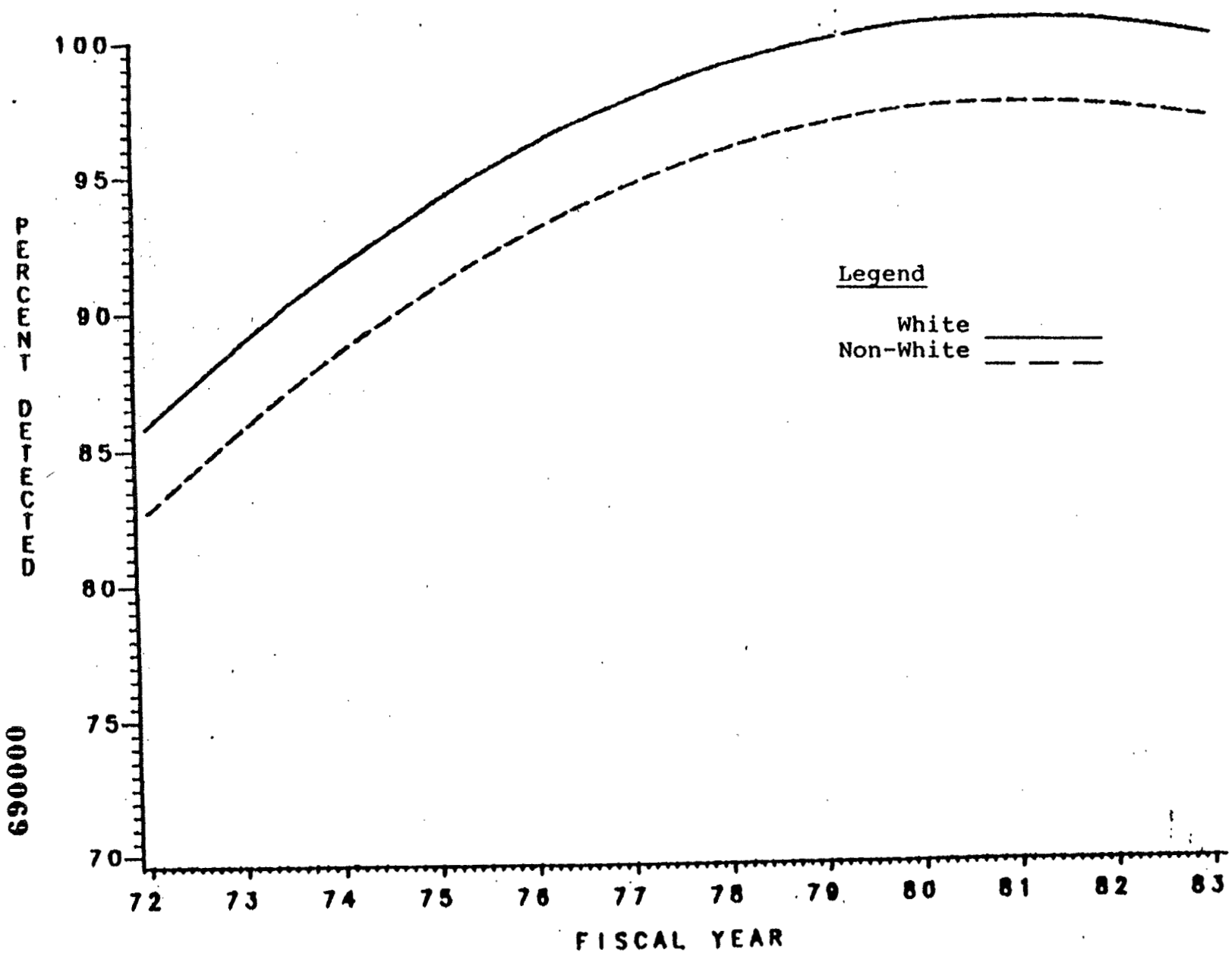

Figure 3.2-29 Estimated time trends across the different race groups for the

690000

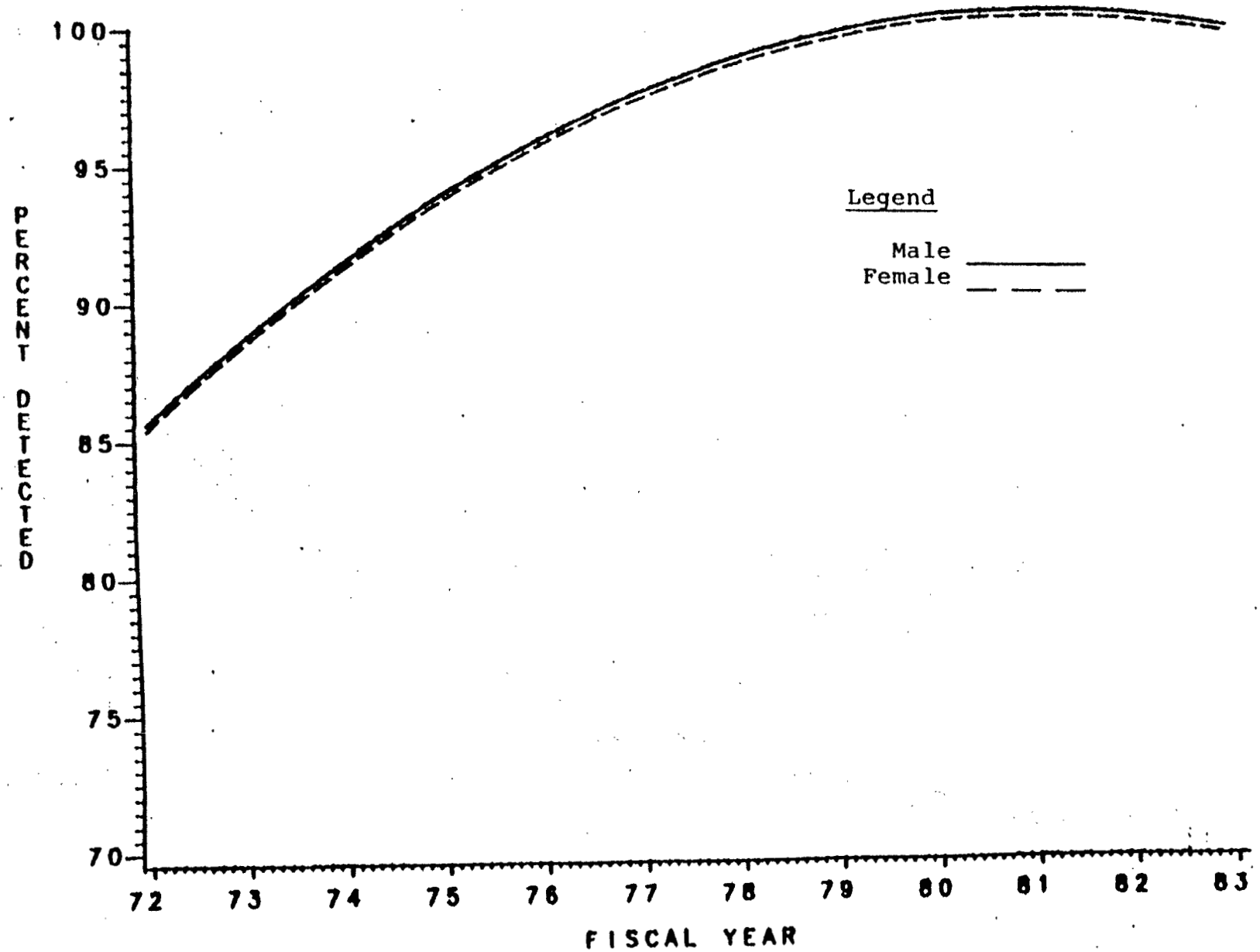

Figure 3.2-30. Estimated time trends across the different sexes for the percentage of the population having detectable levels of PCBs

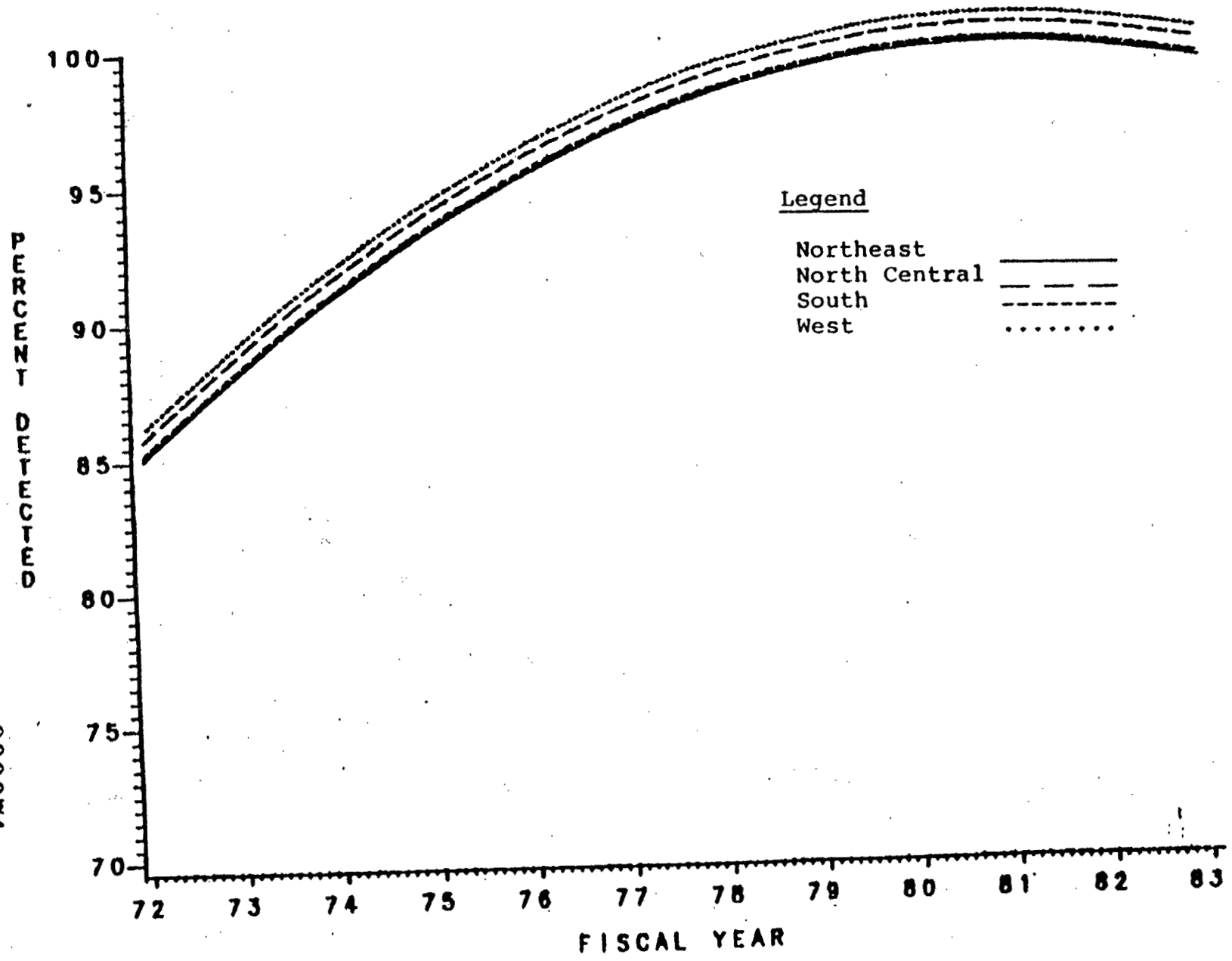

Figure 3.2-31. Estimated time trends across the different census regions for

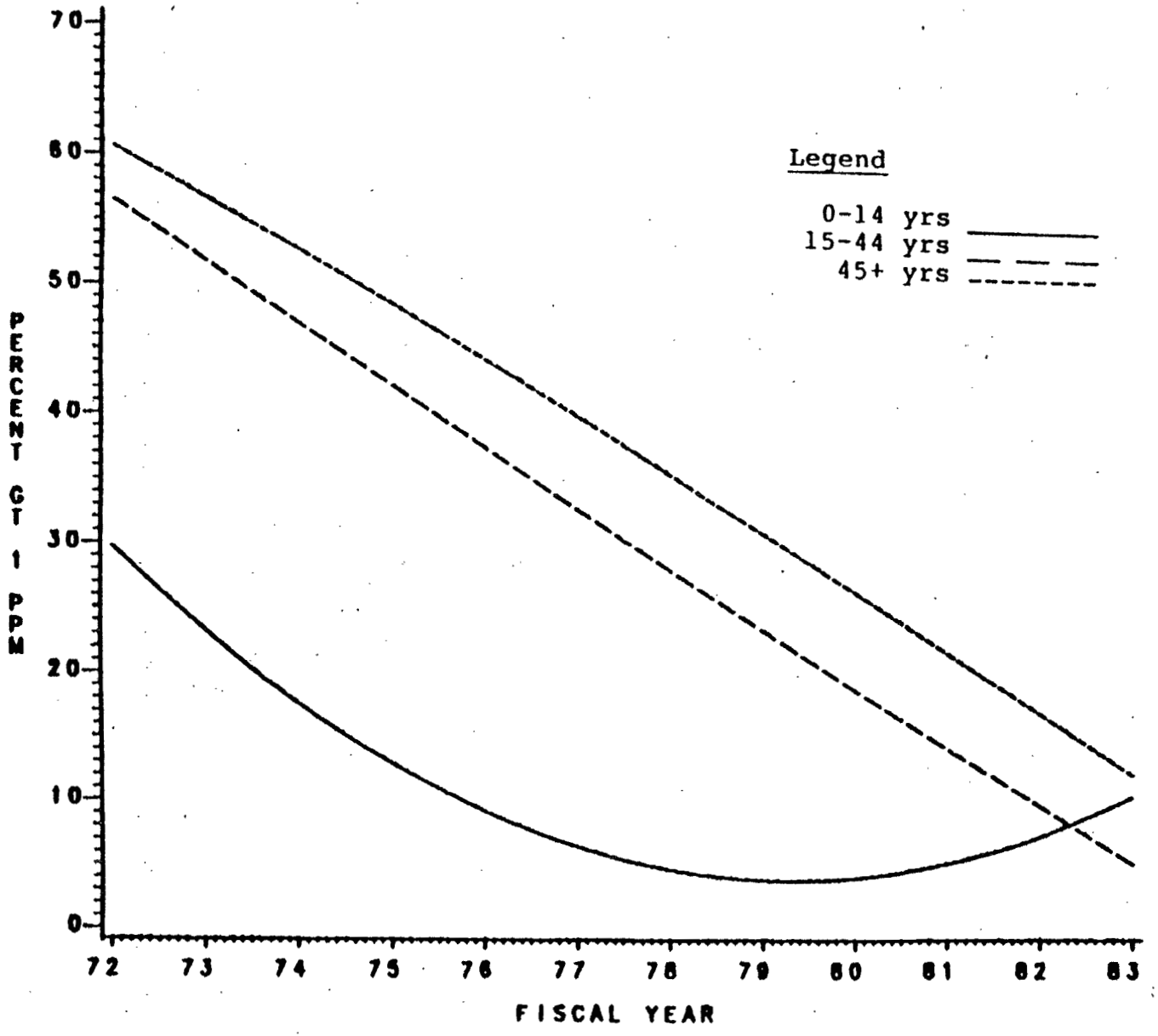

Figure 3.2-32. Estimated time trends across the different age groups for the percentage of the population having a PCB level exceeding 1 ppm

000072

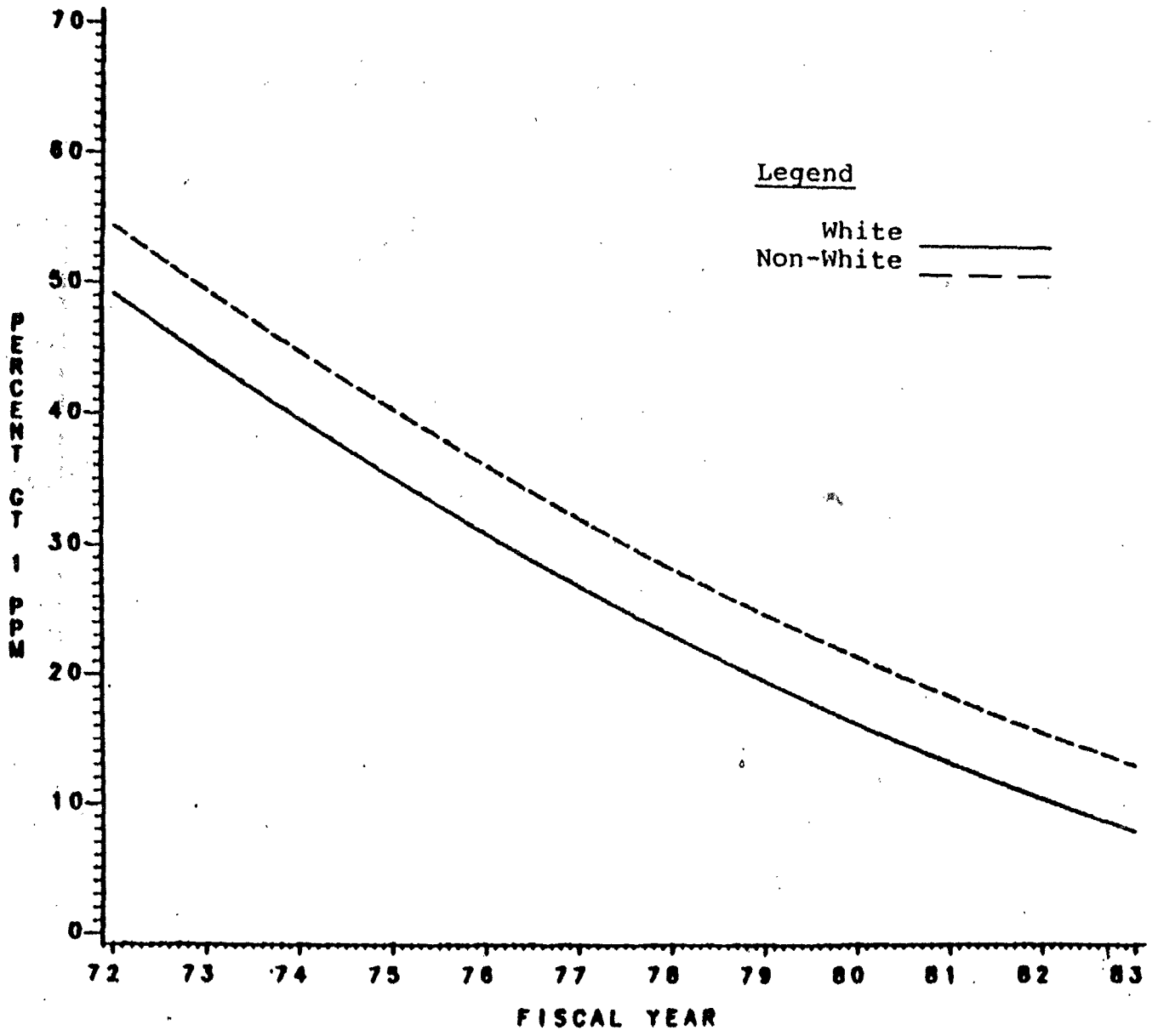

Figure 3.2-33. Estimated time trends across the different race groups for the percentage of the population having a PCB level exceeding 1 ppm

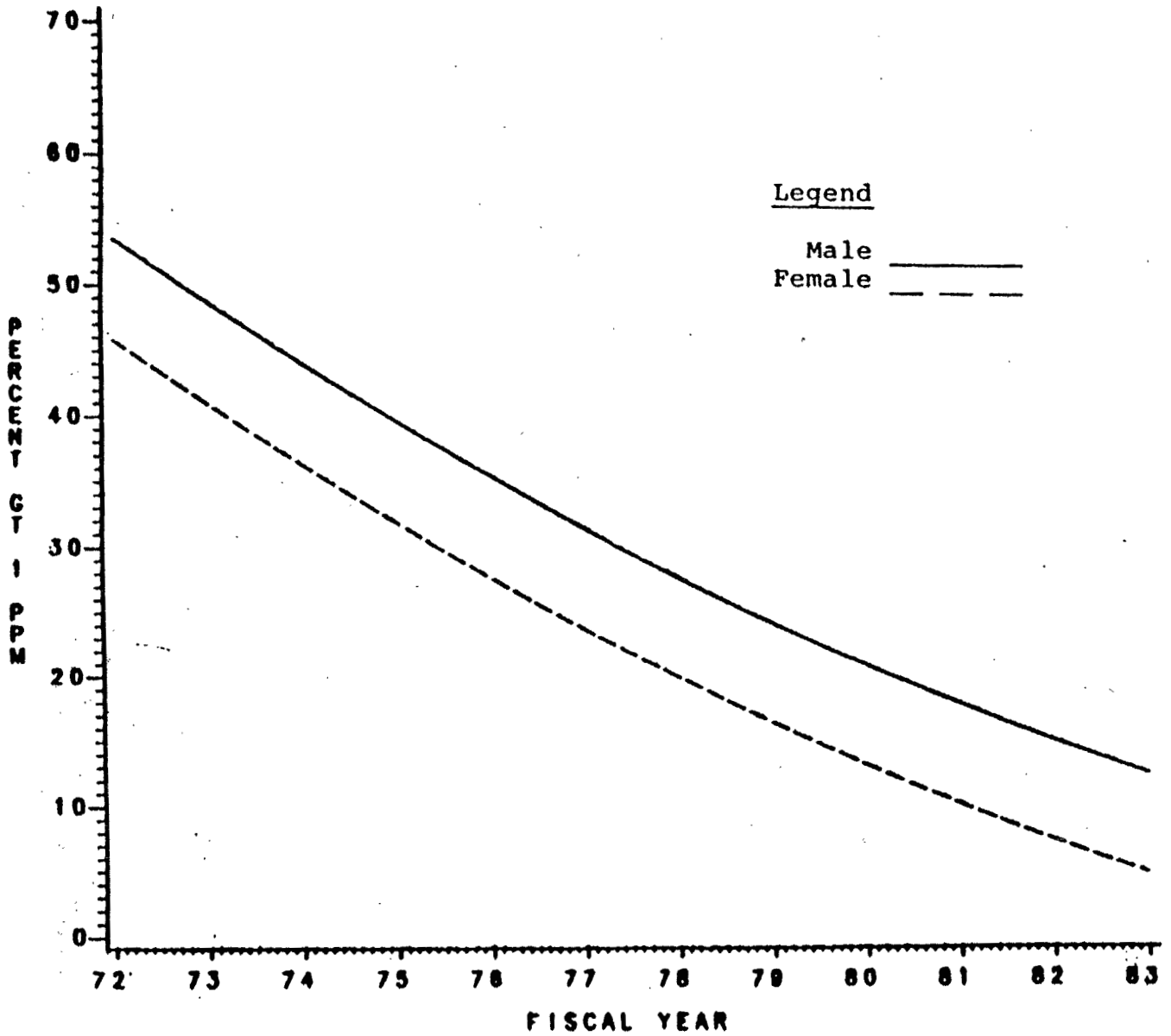

Figure 3.2-34. Estimated time trends across the different sexes for the percentage of the population having a PCB level exceeding 1 ppm

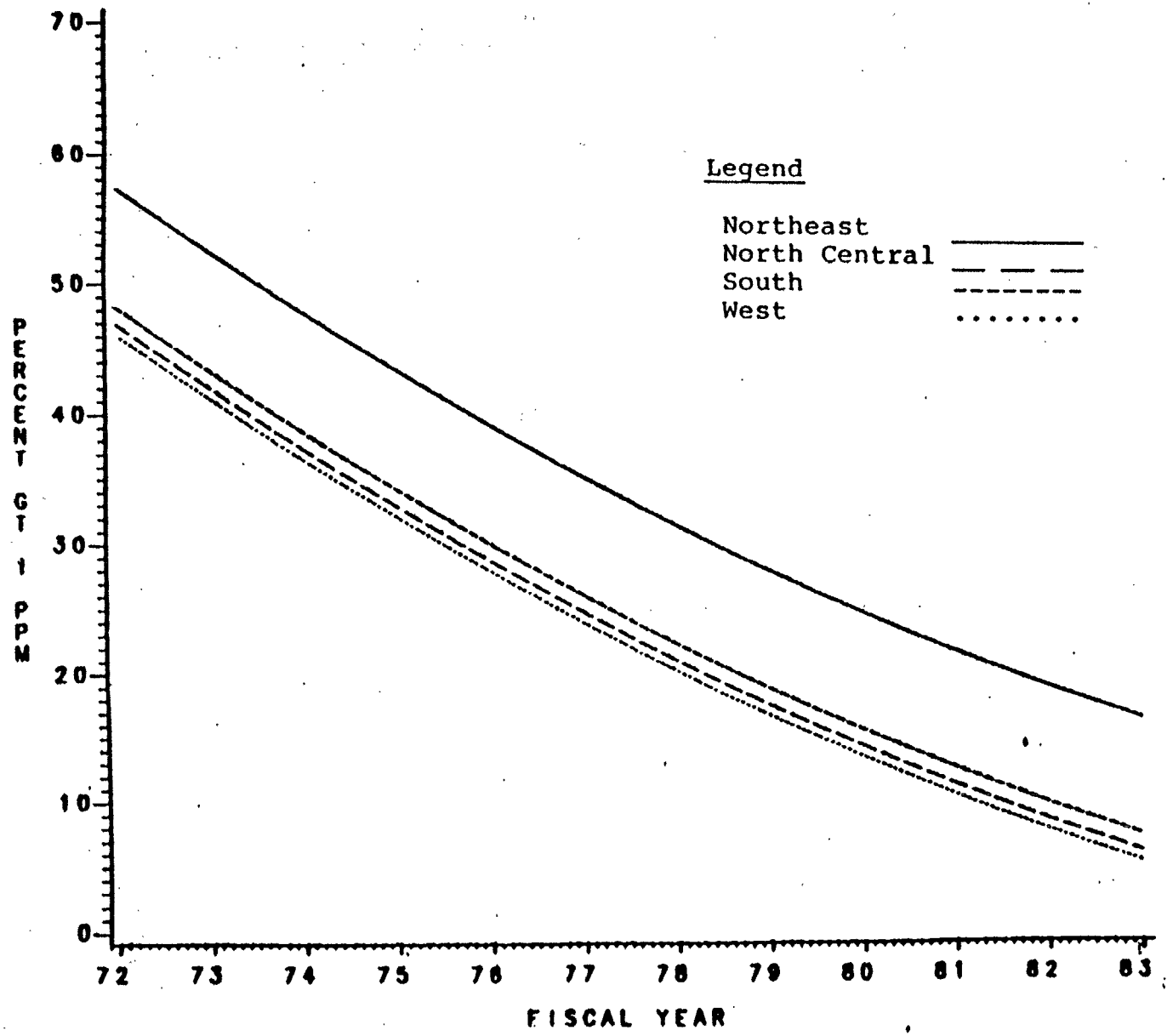

Figure 3.2-35. Estimated time trends across the different census regions for the percentage of the population having a PCB level exceeding 1 ppm

000075

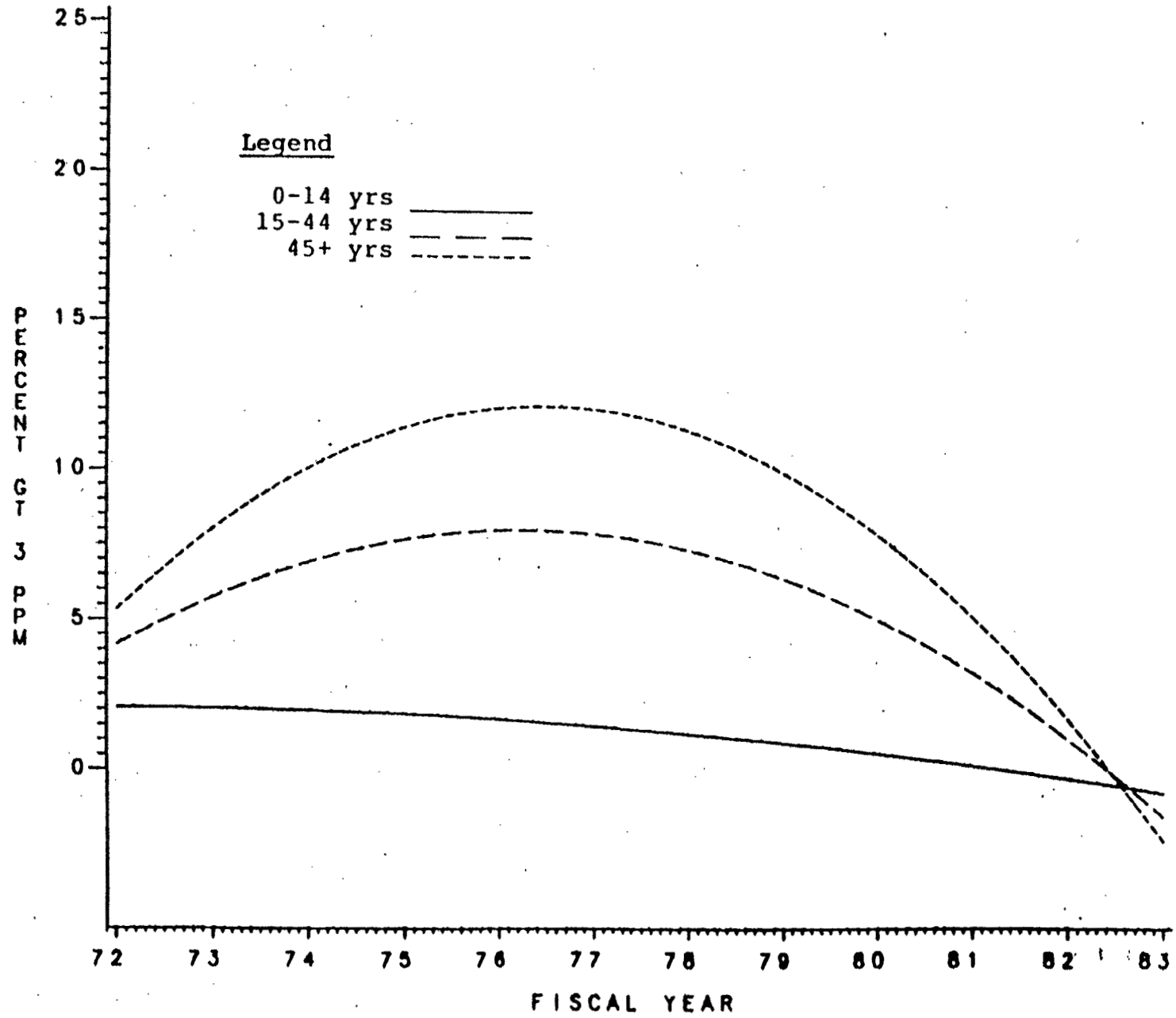

Figure 3.2-36. Estimated time trends across the different age groups for the percentage of the population having a PCB level exceeding 3 ppm

000076

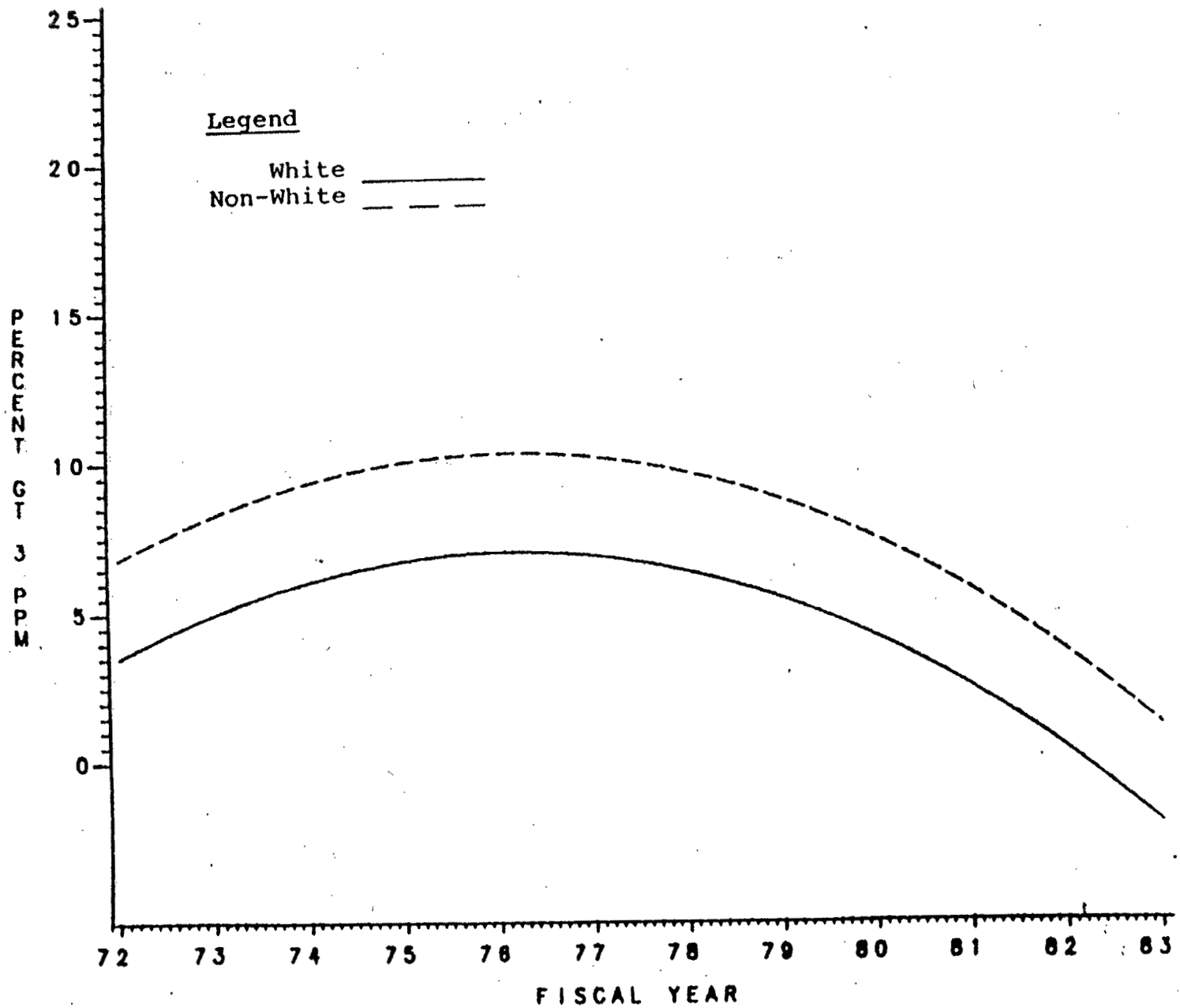

Figure 3.2-37. Estimated time trends across the different race groups for the percentage of the population having a PCB level exceeding 3 ppm

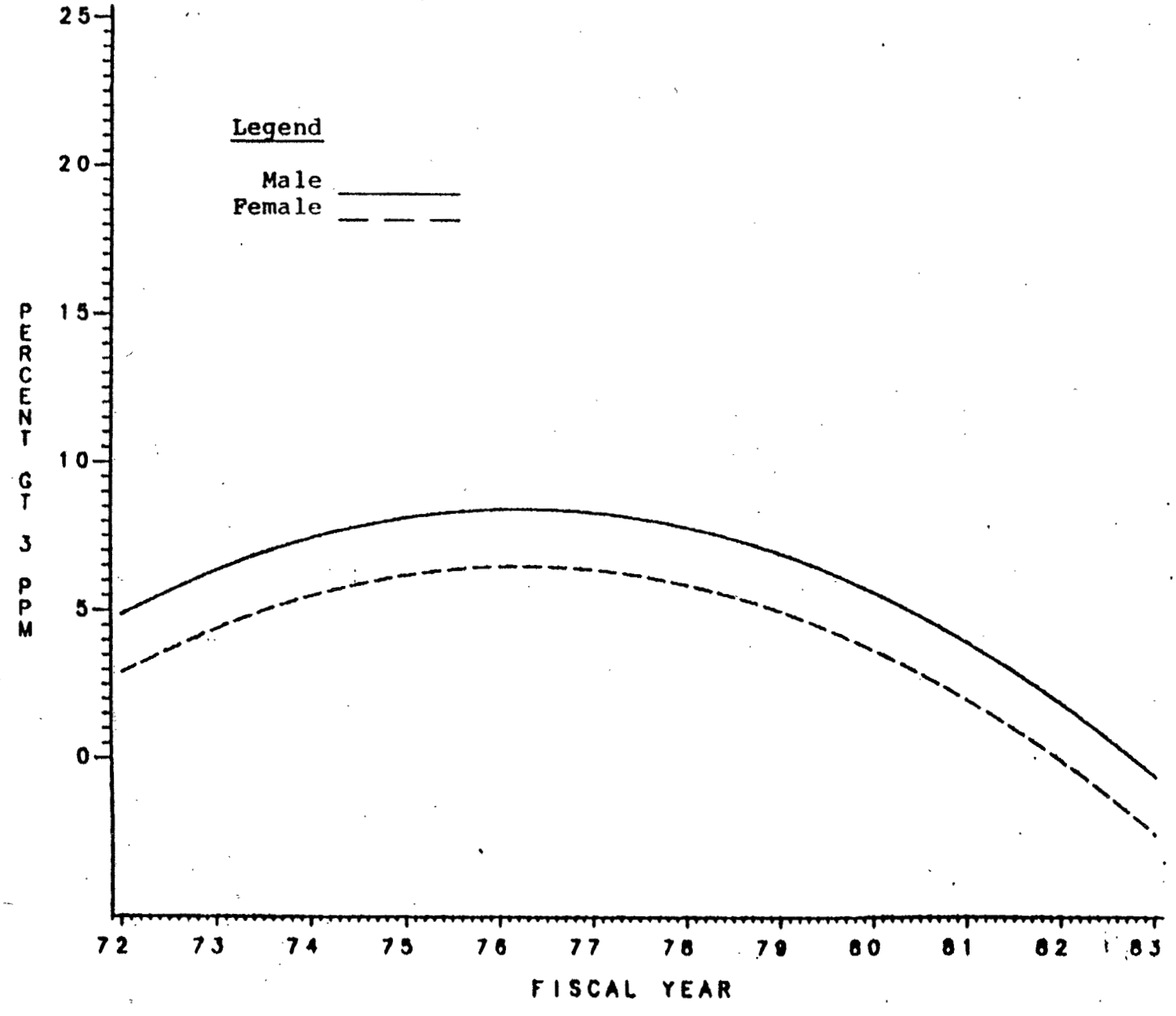

Figure 3.2-38. Estimated time trends across the different sexes for the percentage of the population having a PCB level exceeding 3 ppm

000078

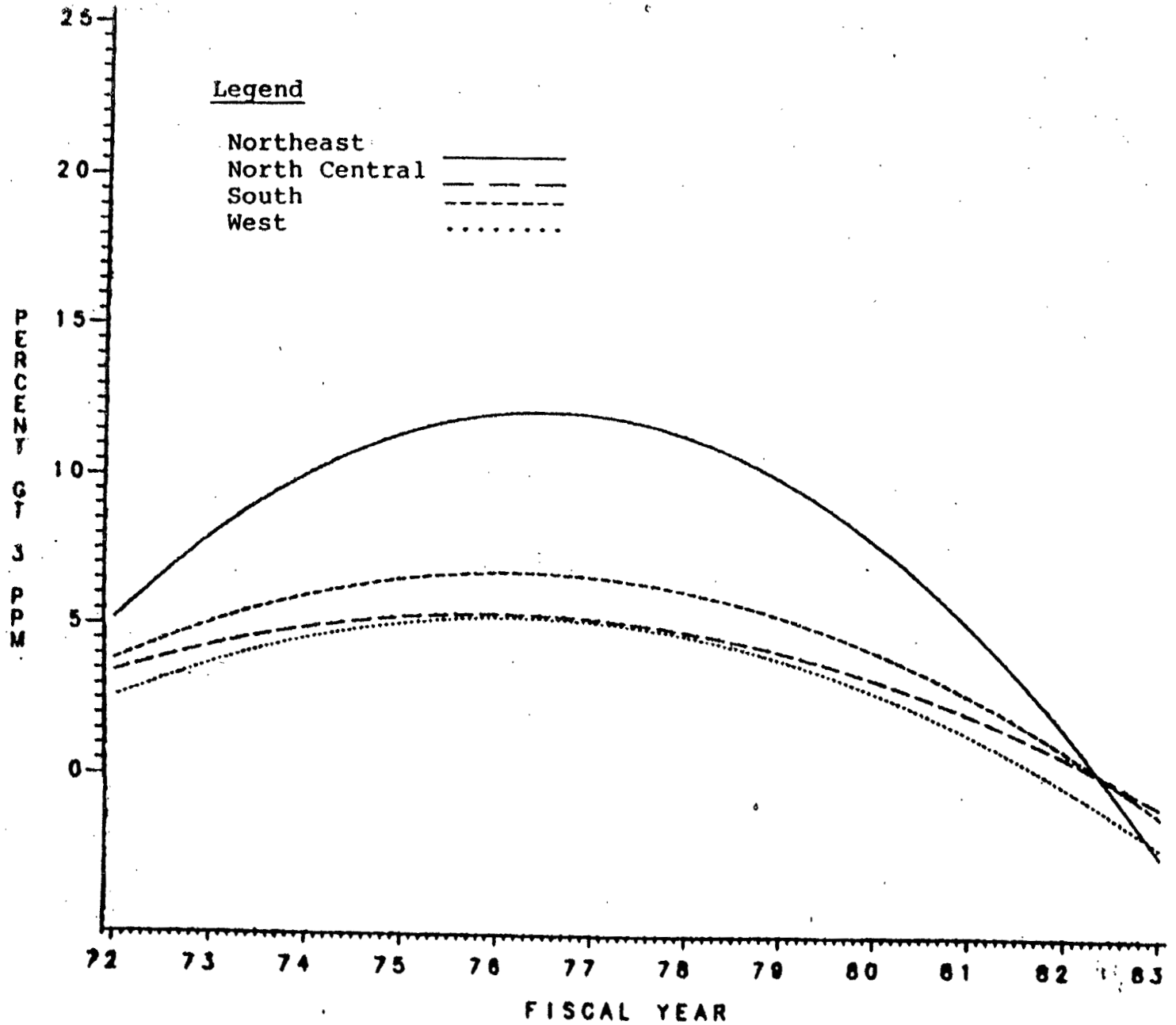

Figure 3.2-39. Estimated time trends across the different census regions for the percentage of the population having a PCB level exceeding 3 ppm

000079

- There are trend differences among the age groups; the levels for the "0-14 yrs" group have always been low while the other groups had elevated levels during the middle and late seventies. Following the passage of regulations limiting the production of PCBs, the levels have since declined so that all age groups now have very few individuals with levels exceeding 3 ppm.

- There is no trend difference between whites and nonwhites. However, non-whites have higher absolute levels.

- There is no trend difference between males and females. However, males have higher absolute levels.

- There are trend differences among the different census regions; the Northeast Census Region had a much larger percentage of individuals exceeding 3 ppm in the middle seventies. Since the PCB regulations have been enacted, the levels have since declined to the point where very few individuals have levels exceeding 3 ppm.

4.0 REFERENCES

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(6) Shah BV 1979. SESUDAAN: Standard errors program for computing of standardized rates from sample survey data. Research Triangle Institute, Research Triangle Park, NC 27709. RTI/1789/00-01F.

(7) Johnson, NL and Kotz S 1980. "Continuous Univariate Distributions - I Distributions in Statistics", John Wiley and Sons, New York, NY.

APPENDIX A

ESTIMATED BASELINE RESIDUE LEVELS FOR INDIVIDUAL FISCAL YEARS

TABLE A.1. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR β-BHC FOR FISCAL YEAR 1970

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	132	161055	0.20 (0.036)	0.35 (0.054)	98.5 (1.11)	96.4 (1.73)
15-44	335	70920	0.29 (0.026)	0.45 (0.049)	99.4 (0.45)	99.0 (0.53)
45+	936	52626	0.41 (0.035)	0.63 (0.081)	99.7 (0.23)	99.7 (0.23)
Sex:						
Male	707	88340	0.28 (0.031)	0.47 (0.051)	98.7 (0.75)	98.0 (1.00)
Female	696	90992	0.29 (0.024)	0.47 (0.045)	99.7 (0.32)	98.7 (0.70)
Race:						
White	1211	161055	0.27 (0.023)	0.44 (0.040)	99.1 (0.45)	98.2 (0.71)
Non-White	192	18277	0.46 (0.082)	0.45 (0.125)	100.0 (-)	100.0 (-)
Census Region:						
Northeast	379	44678	0.26 (0.028)	0.38 (0.080)	99.9 (0.14)	99.9 (0.14)
North Central	384	51628	0.22 (0.038)	0.35 (0.050)	98.2 (1.14)	96.3 (1.83)
South	449	54973	0.40 (0.047)	0.66 (0.087)	99.7 (0.25)	99.7 (0.25)
West	191	28053	0.27 (0.056)	0.48 (0.056)	98.8 (1.10)	97.4 (1.23)
Entire Nation	1403	179332	0.28 (0.025)	0.47 (0.045)	99.2 (0.41)	98.4 (1.64)

* parts per million, adjusted for lipid content of specimen.
(-) Standard error cannot be calculated since the estimated percentage is 100 percent.

TABLE A.2. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR β-BHC FOR FISCAL YEAR 1971

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	123	44904	0.14 (0.018)	0.20 (0.028)	100.0 (-)	96.8 (2.02)
15-44	399	81802	0.33 (0.043)	0.49 (0.083)	99.7 (0.34)	99.7 (0.34)
45+	1065	52626	0.39 (0.040)	0.55 (0.060)	98.7 (1.18)	98.7 (1.18)
Sex:						
Male	899	89474	0.27 (0.029)	0.41 (0.042)	99.7 (0.32)	98.9 (0.82)
Female	688	89858	0.29 (0.037)	0.46 (0.083)	99.3 (0.69)	98.5 (0.83)
Race:						
White	1293	162090	0.27 (0.030)	0.42 (0.062)	99.4 (0.56)	99.1 (0.58)
Non-White	294	17242	0.37 (0.080)	0.59 (0.103)	100.0 (-)	94.9 (5.02)
Census Region:						
Northeast	476	44678	0.21 (0.018)	0.28 (0.028)	100.0 (-)	100.0 (-)
North Central	448	51628	0.19 (0.036)	0.29 (0.041)	98.2 (1.79)	95.4 (2.13)
South	541	54973	0.46 (0.039)	0.68 (0.094)	100.0 (-)	100.0 (-)
West	122	28053	0.30 (0.052)	0.47 (0.079)	100.0 (-)	100.0 (-)
Entire Nation	1587	179332	0.28 (0.32)	0.43 (0.059)	99.5 (0.51)	98.7 (0.77)

* parts per million, adjusted for lipid content of specimen.
(-) Standard error cannot be calculated since the estimated percentage is 100 percent.

TABLE A.3. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR β-BHC FOR FISCAL YEAR 1972

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	244	55786	0.09 (0.011)	0.17 (0.019)	96.1 (1.64)	89.9 (3.54)
15-44	492	70920	0.14 (0.028)	0.30 (0.033)	90.5 (2.90)	89.7 (3.19)
45+	1257	52597	0.27 (0.045)	0.48 (0.051)	94.7 (2.19)	94.7 (2.19)
Sex:						
Male	1130	88311	0.14 (0.023)	0.32 (0.035)	93.0 (2.33)	90.4 (2.51)
Female	863	90992	0.15 (0.025)	0.31 (0.034)	94.0 (2.06)	92.0 (2.26)
Race:						
White	1622	159619	0.14 (0.023)	0.30 (0.031)	93.3 (2.31)	91.1 (2.47)
Non-White	371	19684	0.19 (0.040)	0.44 (0.074)	94.7 (1.93)	91.9 (2.58)
Census Region:						
Northeast	666	44678	0.15 (0.023)	0.23 (0.025)	96.5 (2.13)	95.5 (2.37)
North Central	515	51628	0.16 (0.027)	0.30 (0.036)	95.2 (2.39)	89.8 (2.72)
South	565	54944	0.14 (0.053)	0.38 (0.081)	89.0 (5.46)	88.5 (5.88)
West	247	28053	0.14 (0.065)	0.34 (0.114)	94.1 (3.23)	92.3 (4.65)
Entire Nation	1993	179303	0.15 (0.023)	0.31 (0.033)	93.5 (2.11)	91.2 (2.27)

*parts per million, adjusted for lipid content of specimen.

TABLE A.4. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR β-BHC FOR FISCAL YEAR 1973

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	188	54952	0.10 (0.012)	0.15 (0.018)	98.8 (0.75)	97.6 (1.03)
15-44	419	83437	0.21 (0.016)	0.33 (0.042)	99.5 (0.38)	99.5 (0.38)
45+	579	61875	0.35 (0.017)	0.44 (0.027)	99.9 (0.08)	99.9 (0.08)
Sex:						
Male	551	98912	0.20 (0.014)	0.33 (0.037)	99.4 (0.42)	98.9 (0.54)
Female	635	101351	0.20 (0.019)	0.30 (0.020)	99.4 (0.31)	99.3 (0.36)
Race:						
White	1044	178228	0.20 (0.015)	0.31 (0.027)	99.5 (0.26)	99.1 (0.34)
Non-White	142	22036	0.23 (0.030)	0.34 (0.034)	98.9 (0.95)	98.9 (0.95)
Census Region:						
Northeast	205	46092	0.16 (0.031)	0.23 (0.036)	99.5 (0.05)	99.5 (0.49)
North Central	360	56572	0.18 (0.016)	0.23 (0.017)	99.7 (0.31)	99.7 (0.31)
South	440	62795	0.30 (0.027)	0.44 (0.032)	99.1 (0.63)	98.3 (0.80)
West	181	34804	0.17 (0.022)	0.34 (0.102)	99.5 (0.38)	99.0 (0.62)
Entire Nation	1186	200264	0.20 (0.015)	0.32 (0.025)	99.4 (0.26)	99.1 (0.31)

*parts per million, adjusted for lipid content of specimen.

TABLE A.5. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR β-BHC FOR FISCAL YEAR 1974

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	207	57900	0.07 (0.011)	0.15 (0.029)	97.9 (1.21)	94.4 (1.56)
15-44	361	83200	0.19 (0.013)	0.27 (0.023)	99.4 (0.43)	99.4 (0.43)
45+	457	61875	0.31 (0.021)	0.41 (0.032)	99.8 (0.21)	99.8 (0.21)
Sex:						
Male	520	98676	0.17 (0.017)	0.27 (0.022)	98.6 (0.73)	97.2 (1.00)
Female	505	104300	0.17 (0.016)	0.29 (0.027)	99.6 (0.34)	98.9 (0.55)
Race:						
White	875	180939	0.17 (0.015)	0.27 (0.024)	99.8 (0.36)	98.1 (0.63)
Non-White	150	22036	0.19 (0.037)	0.31 (0.036)	97.7 (2.22)	97.8 (2.22)
Census Region:						
Northeast	225	49041	0.13 (0.016)	0.19 (0.017)	98.2 (0.95)	97.1 (1.49)
North Central	303	56335	0.14 (0.028)	0.22 (0.030)	99.0 (0.90)	98.8 (0.90)
South	375	62795	0.26 (0.025)	0.43 (0.052)	99.2 (0.58)	98.7 (0.71)
West	122	34804	0.15 (0.027)	0.22 (0.024)	99.6 (0.36)	97.3 (1.67)
Entire Nation	1025	202975	0.17 (0.014)	0.28 (0.023)	99.1 (0.39)	98.1 (0.58)

*parts per million, adjusted for lipid content of specimen.

TABLE A.6. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR β-BHC FOR FISCAL YEAR 1975

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	163	57900	0.08 (0.008)	0.26 (0.091)	100.0 (-)	88.1 (3.34)
15-44	304	83437	0.17 (0.012)	0.23 (0.020)	99.9 (0.13)	99.9 (0.13)
45+	428	61875	0.29 (0.021)	0.38 (0.032)	100.0 (-)	100.0 (-)
Sex:						
Male	445	98912	0.16 (0.013)	0.23 (0.017)	99.9 (0.05)	96.3 (1.40)
Female	450	104300	0.17 (0.015)	0.31 (0.054)	100.0 (-)	96.8 (1.41)
Race:						
White	762	181176	0.16 (0.012)	0.27 (0.034)	99.9 (0.06)	96.5 (1.30)
Non-White	133	22036	0.18 (0.031)	0.28 (0.044)	100.0 (-)	97.0 (2.12)
Census Region:						
Northeast	206	49041	0.13 (0.014)	0.19 (0.023)	100.0 (-)	97.9 (1.29)
North Central	339	56572	0.14 (0.017)	0.20 (0.018)	99.8 (0.19)	93.5 (3.33)
South	231	62795	0.24 (0.037)	0.36 (0.046)	100.0 (-)	97.4 (1.67)
West	119	34804	0.16 (0.022)	0.36 (0.145)	100.0 (-)	98.4 (1.01)
Entire Nation	895	203212	0.17 (0.013)	0.27 (0.031)	99.9 (0.05)	96.6 (1.18)

* parts per million, adjusted for lipid content of specimen.
(-) Standard error cannot be calculated since the estimated percentage is 100 percent.

TABLE A.7. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR β-BHC FOR FISCAL YEAR 1976

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	165	57900	0.08 (0.011)	0.16 (0.023)	97.8 (1.10)	92.2 (2.18)
15-44	248	83437	0.15 (0.013)	0.21 (0.021)	99.7 (0.32)	99.1 (0.60)
45+	365	61620	0.28 (0.029)	0.41 (0.048)	99.5 (0.47)	97.5 (1.42)
Sex:						
Male	396	98657	0.13 (0.016)	0.25 (0.032)	98.2 (0.72)	94.5 (1.44)
Female	382	104300	0.17 (0.017)	0.26 (0.022)	99.9 (0.06)	98.7 (0.84)
Race:						
White	653	180921	0.15 (0.015)	0.25 (0.025)	99.3 (0.34)	96.7 (1.15)
Non-White	125	22036	0.16 (0.029)	0.30 (0.045)	97.7 (2.03)	96.8 (2.09)
Census Region:						
Northeast	228	48786	0.13 (0.021)	0.17 (0.020)	99.4 (0.57)	99.0 (0.56)
North Central	205	56572	0.11 (0.018)	0.19 (0.026)	98.4 (0.83)	95.5 (1.52)
South	254	62795	0.26 (0.034)	0.41 (0.055)	100.0 (-)	99.1 (0.84)
West	91	34804	0.12 (0.033)	0.20 (0.031)	98.2 (1.30)	90.9 (3.67)
Entire Nation	778	202957	0.15 (0.015)	0.26 (0.024)	99.1 (0.36)	96.7 (1.02)

* parts per million, adjusted for lipid content of specimen.
(-) Standard error cannot be calculated since the estimated percentage is 100 percent.

TABLE A.8. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR β-BHC FOR FISCAL YEAR 1977

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	174	57900	0.05 (0.007)	0.09 (0.014)	96.1 (1.82)	74.9 (4.81)
15-44	356	83092	0.13 (0.009)	0.18 (0.017)	100.0 (-)	99.3 (0.40)
45+	396	61875	0.23 (0.020)	0.33 (0.037)	99.6 (0.42)	99.0 (0.61)
Sex:						
Male	457	98912	0.11 (0.012)	0.19 (0.019)	99.8 (0.16)	90.5 (3.26)
Female	469	103955	0.12 (0.013)	0.22 (0.021)	97.7 (1.26)	93.9 (1.65)
Race:						
White	797	179122	0.12 (0.012)	0.20 (0.019)	98.7 (0.71)	92.8 (2.05)
Non-White	129	23745	0.11 (0.017)	0.20 (0.022)	99.3 (0.70)	88.0 (3.82)
Census Region:						
Northeast	205	48696	0.11 (0.008)	0.19 (0.007)	100.0 (-)	94.3 (2.98)
North Central	257	56572	0.09 (0.013)	0.14 (0.013)	98.9 (1.05)	89.5 (3.25)
South	341	62795	0.18 (0.026)	0.29 (0.047)	99.7 (0.25)	95.8 (2.17)
West	123	34804	0.08 (0.021)	0.15 (0.020)	95.1 (2.56)	87.2 (7.40)
Entire Nation	926	202867	0.12 (0.011)	0.20 (0.018)	98.8 (0.63)	92.8 (1.79)

* parts per million, adjusted for lipid content of specimen.
(-) Standard error cannot be calculated since the estimated percentage is 100 percent.

TABLE A.9. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR β-BHC FOR FISCAL YEAR 1978

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	202	57900	0.04 (0.009)	0.16 (0.069)	96.1 (2.72)	77.7 (4.38)
15-44	365	83437	0.10 (0.010)	0.15 (0.016)	98.8 (0.88)	98.1 (0.94)
45+	381	61875	0.22 (0.017)	0.29 (0.034)	100.0 (-)	99.8 (0.16)
Sex:						
Male	475	98912	0.10 (0.015)	0.22 (0.039)	97.4 (1.88)	91.1 (2.69)
Female	473	104300	0.11 (0.012)	0.18 (0.021)	99.4 (0.62)	94.4 (1.70)
Race:						
White	769	177749	0.10 (0.012)	0.16 (0.017)	98.4 (0.99)	92.7 (1.88)
Non-White	179	25463	0.13 (0.029)	0.43 (0.147)	98.2 (1.29)	93.6 (1.97)
Census Region:						
Northeast	216	49041	0.10 (0.013)	0.18 (0.037)	100.0 (-)	93.0 (3.04)
North Central	210	56572	0.07 (0.023)	0.13 (0.025)	94.7 (3.03)	90.3 (4.99)
South	371	62795	0.15 (0.026)	0.25 (0.047)	99.6 (0.39)	94.8 (2.21)
West	151	34804	0.09 (0.009)	0.23 (0.094)	100.0 (-)	92.9 (1.32)
Entire Nation	948	203212	0.10 (0.013)	0.20 (0.026)	98.4 (1.00)	92.8 (1.79)

* parts per million, adjusted for lipid content of specimen.
(-) Standard error cannot be calculated since the estimated percentage is 100 percent.

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TABLE A.10. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR β-BHC FOR FISCAL YEAR 1979

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	203	57900	0.05 (0.009)	0.12 (0.020)	96.6 (1.49)	75.7 (5.33)
15-44	346	84167	0.12 (0.011)	0.21 (0.022)	99.5 (0.36)	96.2 (1.09)
45+	361	61145	0.22 (0.018)	0.31 (0.027)	98.8 (0.83)	97.8 (1.05)
Sex:						
Male	477	104131	0.10 (0.012)	0.21 (0.023)	97.8 (0.90)	91.0 (1.72)
Female	433	99081	0.13 (0.015)	0.22 (0.021)	99.2 (0.38)	90.7 (1.46)
Race:						
White	740	178897	0.11 (0.013)	0.21 (0.019)	98.3 (0.66)	91.2 (2.04)
Non-White	170	24315	0.14 (0.019)	0.25 (0.034)	100.0 (-)	88.6 (4.43)
Census Region:						
Northeast	189	49041	0.13 (0.018)	0.23 (0.024)	97.4 (1.17)	90.9 (2.38)
North Central	189	56572	0.08 (0.023)	0.14 (0.027)	98.4 (1.54)	87.8 (5.20)
South	438	62795	0.16 (0.027)	0.28 (0.039)	99.8 (0.19)	92.4 (2.89)
West	94	34804	0.10 (0.012)	0.20 (0.039)	97.8 (1.25)	92.8 (4.40)
Entire Nation	910	203212	0.12 (0.013)	0.21 (0.019)	98.5 (0.59)	90.9 (2.00)

* parts per million, adjusted for lipid content of specimen.
(-) Standard error cannot be calculated since the estimated percentage is 100 percent.

000092

TABLE A.11. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR β-BHC FOR FISCAL YEAR 1981

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	86	51290	0.05 (0.009)	0.09 (0.021)	95.8 (3.51)	40.8 (8.16)
15-44	166	105203	0.08 (0.008)	0.13 (0.025)	98.6 (0.79)	86.7 (3.80)
45+	150	70052	0.18 (0.018)	0.29 (0.041)	100.0 (-)	98.2 (3.89)
Sex:						
Male	198	110053	0.08 (0.011)	0.13 (0.015)	97.4 (1.94)	78.4 (4.40)
Female	204	116493	0.11 (0.012)	0.21 (0.034)	99.3 (0.46)	81.3 (3.78)
Race:						
White	340	191746	0.09 (0.009)	0.16 (0.023)	98.7 (0.72)	80.9 (3.68)
Non-White	62	34800	0.12 (0.029)	0.24 (0.053)	96.5 (3.25)	74.4 (6.29)
Census Region:						
Northeast	91	49135	0.07 (0.004)	0.09 (0.007)	100.0 (-)	77.6 (5.29)
North Central	127	58866	0.09 (0.019)	0.16 (0.043)	98.8 (1.10)	71.7 (8.70)
South	130	75372	0.14 (0.023)	0.26 (0.046)	100.0 (-)	89.7 (2.88)
West	54	43173	0.06 (0.010)	0.12 (0.012)	93.1 (3.95)	76.4 (9.30)
Entire Nation	402**	226546	0.09 (0.010)	0.17 (0.022)	98.4 (1.06)	79.9 (3.45)

* parts per million, adjusted for lipid content of specimen.
** These specimens represent only a subsample of the entire set of specimens actually collected this year.
(-) Standard error cannot be calculated since the estimated percentage is 100 percent.

TABLE A.12. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR β-BHC FOR FISCAL YEAR 1983

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	46	51290	0.06 (0.013)	0.09 (0.024)	100.0 (-)	57.5 (10.64)
15-44	85	105203	0.06 (0.008)	0.09 (0.018)	100.0 (-)	85.6 (03.93)
45+	69	70052	0.17 (0.024)	0.28 (0.085)	100.0 (-)	98.6 (01.25)
Sex:						
Male	95	110053	0.08 (0.009)	0.16 (0.052)	100.0 (-)	82.8 (05.01)
Female	105	116493	0.09 (0.014)	0.13 (0.021)	100.0 (-)	83.7 (04.57)
Race:						
White	162	198489	0.08 (0.009)	0.15 (0.034)	100.0 (-)	84.7 (03.68)
Non-White	38	28059	0.08 (0.021)	0.13 (0.031)	100.0 (-)	73.5 (11.08)
Census Region:						
Northeast	31	49135	0.07 (0.010)	0.08 (0.009)	100.0 (-)	87.2 (04.96)
North Central	54	58866	0.07 (0.011)	0.09 (0.013)	100.0 (-)	77.3 (06.29)
South	76	75372	0.13 (0.028)	0.26 (0.079)	100.0 (-)	87.5 (06.14)
West	39	41173	0.06 (0.012)	0.10 (0.029)	100.0 (-)	79.5 (11.47)
Entire Nation	200**	226546	0.08 (0.010)	0.15 (0.031)	100.0 (-)	83.3 (03.80)

* parts per million, adjusted for lipid content of specimen.
** These specimens represent only a subsample of the specimens actually collected this year.
(-) Standard error cannot be calculated since the estimated percentage is 100 percent.

TABLE A.13. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR HEXACHLOROBENZENE (HCB) FOR FISCAL YEAR 1974

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	207	57900	0.033 (0.004)	0.060 (0.011)	97.5 (1.44)	85.3 (3.31)
15-44	361	83200	0.038 (0.002)	0.047 (0.003)	99.1 (0.60)	98.4 (0.93)
45+	457	61875	0.033 (0.004)	0.046 (0.003)	95.8 (2.45)	94.8 (2.44)
Sex:						
Male	520	98676	0.036 (0.003)	0.052 (0.005)	97.3 (1.77)	91.9 (2.21)
Female	505	104300	0.034 (0.002)	0.049 (0.006)	97.9 (1.14)	95.1 (1.67)
Race:						
White	875	180939	0.036 (0.002)	0.052 (0.005)	98.4 (0.86)	94.2 (1.56)
Non-White	150	22036	0.024 (0.005)	0.039 (0.005)	91.6 (4.61)	88.3 (5.57)
Census Region:						
Northeast	225	49041	0.032 (0.003)	0.045 (0.006)	97.9 (1.66)	96.0 (2.16)
North Central	303	56335	0.029 (0.004)	0.048 (0.010)	96.5 (2.59)	88.8 (4.50)
South	375	62795	0.029 (0.003)	0.039 (0.003)	97.3 (1.72)	94.1 (2.62)
West	122	34804	0.070 (0.009)	0.082 (0.010)	99.6 (0.36)	96.9 (1.62)
Entire Nation	1025	202975	0.035 (0.002)	0.051 (0.004)	97.6 (0.99)	93.6 (1.61)

*parts per million, adjusted for lipid content of specimen.

TABLE A.14. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR HEXACHLOROBENZENE (HCB) FOR FISCAL YEAR 1975

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	163	57900	0.025 (0.005)	0.050 (0.014)	93.0 (4.02)	66.3 (8.15)
15-44	304	83437	0.042 (0.002)	0.053 (0.003)	99.1 (0.52)	98.0 (0.80)
45+	428	61875	0.037 (0.003)	0.052 (0.004)	97.0 (1.28)	95.9 (1.44)
Sex:						
Male	445	98912	0.037 (0.003)	0.053 (0.006)	97.9 (1.08)	87.6 (4.13)
Female	450	104300	0.033 (0.003)	0.050 (0.004)	95.6 (1.78)	89.0 (2.95)
Race:						
White	762	181176	0.035 (0.003)	0.053 (0.005)	96.7 (1.34)	89.4 (3.03)
Non-White	133	22036	0.032 (0.005)	0.045 (0.004)	96.8 (2.56)	79.9 (7.19)
Census Region:						
Northeast	206	49041	0.031 (0.005)	0.043 (0.004)	95.3 (4.01)	90.6 (4.82)
North Central	339	56572	0.028 (0.003)	0.039 (0.002)	94.6 (2.08)	86.4 (4.54)
South	231	62795	0.032 (0.003)	0.045 (0.004)	98.3 (1.12)	83.7 (8.21)
West	119	34804	0.069 (0.006)	0.096 (0.017)	99.4 (0.63)	96.6 (2.19)
Entire Nation	895	203212	0.035 (0.002)	0.052 (0.004)	96.7 (1.24)	88.3 (3.17)

*parts per million, adjusted for lipid content of specimen.

000096

TABLE A.15. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR HEXACHLOROBENZENE (HCB) FOR FISCAL YEAR 1976

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	165	57900	0.033 (0.005)	0.052 (0.009)	99.8 (0.19)	80.9 (6.85)
15-44	247	83437	0.040 (0.003)	0.056 (0.009)	99.6 (0.34)	97.1 (1.00)
45+	365	61620	0.040 (0.003)	0.053 (0.004)	99.2 (0.46)	96.9 (1.33)
Sex:						
Male	395	98657	0.041 (0.004)	0.061 (0.008)	99.7 (0.19)	91.6 (2.40)
Female	382	104300	0.035 (0.002)	0.048 (0.004)	99.4 (0.32)	93.2 (3.00)
Race:						
White	652	18092	0.039 (0.003)	0.056 (0.006)	99.6 (0.21)	93.3 (1.88)
Non-White	125	22036	0.027 (0.003)	0.037 (0.004)	98.7 (0.73)	85.2 (7.52)
Census Region:						
Northeast	228	48786	0.041 (0.006)	0.065 (0.017)	99.3 (0.28)	93.6 (2.30)
North Central	204	56572	0.036 (0.003)	0.046 (0.004)	99.4 (0.44)	95.1 (1.38)
South	254	62795	0.028 (0.003)	0.041 (0.007)	99.6 (0.43)	87.6 (6.65)
West	91	34804	0.062 (0.003)	0.077 (0.007)	100.0 (-)	95.1 (2.39)
Entire Nation	777	202957	0.038 (0.003)	0.054 (0.005)	99.5 (0.20)	92.4 (2.27)

* parts per million, adjusted for lipid content of specimen.
(-) Standard error cannot be calculated since the estimated percentage is 100 percent.

000097

TABLE A.16. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR HEXACHLOROBENZENE (HCB) FOR FISCAL YEAR 1977

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	174	57900	0.027 (0.005)	0.048 (0.010)	96.6 (1.84)	79.6 (4.05)
15-44	357	83437	0.040 (0.002)	0.050 (0.003)	99.2 (0.48)	98.2 (0.98)
45+	396	61875	0.045 (0.004)	0.066 (0.008)	98.6 (0.70)	95.4 (1.60)
Sex:						
Male	457	98912	0.040 (0.003)	0.056 (0.006)	98.9 (0.44)	92.1 (1.93)
Female	470	104300	0.035 (0.003)	0.053 (0.006)	97.7 (0.99)	92.0 (1.90)
Race:						
White	798	179467	0.038 (0.003)	0.056 (0.005)	98.3 (0.67)	92.6 (1.44)
Non-White	129	23745	0.033 (0.003)	0.044 (0.004)	98.3 (1.45)	87.9 (4.34)
Census Region:						
Northeast	206	49041	0.034 (0.003)	0.053 (0.008)	97.6 (1.12)	90.6 (3.75)
North Central	257	56572	0.033 (0.003)	0.042 (0.004)	98.4 (1.16)	94.7 (1.45)
South	341	62795	0.031 (0.004)	0.047 (0.007)	97.8 (1.27)	87.6 (2.44)
West	123	34804	0.070 (0.009)	0.089 (0.012)	100.0 (-)	97.8 (1.61)
Entire Nation	927	203212	0.037 (0.003)	0.054 (0.005)	98.3 (0.59)	92.0 (1.41)

* parts per million, adjusted for lipid content of specimen.
(-) Standard error cannot be calculated since the estimated percentage is 100 percent.

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TABLE A.17. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR HEXACHLOROBENZENE (HCB) FOR FISCAL YEAR 1978

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	204	57900	0.030 (0.003)	0.054 (0.014)	99.0 (0.84)	80.7 (3.32)
15-44	365	83437	0.039 (0.003)	0.053 (0.007)	99.4 (0.36)	98.1 (0.71)
45+	378	61875	0.050 (0.004)	0.063 (0.006)	99.8 (0.19)	98.5 (0.80)
Sex:						
Male	474	98912	0.041 (0.003)	0.055 (0.005)	99.0 (0.61)	94.3 (1.35)
Female	473	104300	0.037 (0.003)	0.058 (0.012)	99.8 (0.21)	92.3 (1.88)
Race:						
White	767	177749	0.039 (0.003)	0.057 (0.008)	99.3 (0.35)	94.5 (1.32)
Non-White	180	25463	0.037 (0.004)	0.052 (0.007)	100.0 (-)	84.9 (3.55)
Census Region:						
Northeast	216	49040	0.040 (0.003)	0.072 (0.023)	99.7 (0.24)	91.4 (3.78)
North Central	211	56572	0.033 (0.003)	0.042 (0.004)	99.0 (0.90)	95.1 (2.71)
South	372	62795	0.033 (0.003)	0.041 (0.004)	99.5 (0.35)	91.4 (6.68)
West	148	34804	0.066 (0.010)	0.085 (0.013)	99.5 (0.55)	96.4 (1.23)
Entire Nation	947	203212	0.039 (0.003)	0.056 (0.007)	99.4 (0.30)	93.3 (1.35)

* parts per million, adjusted for lipid content of specimen.
(-) Standard error cannot be calculated since the estimated percentage is 100 percent.

000099

TABLE A.18. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR HEXACHLOROBENZENE (HCB) FOR FISCAL YEAR 1979

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	201	57900	0.029 (0.004)	0.046 (0.007)	98.2 (0.88)	74.4 (3.73)
15-44	346	84169	0.046 (0.005)	0.070 (0.014)	99.7 (0.29)	98.3 (0.68)
45+	361	61145	0.044 (0.003)	0.069 (0.011)	98.8 (0.85)	96.5 (1.21)
Sex:						
Male	475	104131	0.042 (0.004)	0.067 (0.011)	98.5 (0.63)	89.7 (1.94)
Female	433	99081	0.038 (0.003)	0.059 (0.009)	99.5 (0.32)	92.3 (1.86)
Race:						
White	738	178897	0.041 (0.003)	0.061 (0.006)	98.9 (0.46)	91.6 (1.68)
Non-White	170	24315	0.035 (0.004)	0.079 (0.035)	100.0 (-)	86.4 (2.93)
Census Region:						
Northeast	189	49041	0.047 (0.007)	0.078 (0.016)	97.9 (1.26)	90.6 (3.99)
North Central	189	56572	0.034 (0.004)	0.048 (0.007)	98.9 (0.68)	92.6 (3.66)
South	438	62795	0.029 (0.002)	0.038 (0.003)	99.7 (0.32)	87.8 (2.18)
West	92	34804	0.074 (0.008)	0.110 (0.021)	99.6 (0.45)	94.6 (1.69)
Entire Nation	908	203212	0.040 (0.003)	0.063 (0.008)	99.0 (0.41)	91.0 (1.61)

* parts per million, adjusted for lipid content of specimen.
(-) Standard error cannot be calculated since the estimated percentage is 100 percent.

000100

TABLE A.19. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR HEXACHLOROBENZENE (HCB) FOR FISCAL YEAR 1981

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	86	51290	0.033 (0.003)	0.042 (0.004)	98.7 (1.26)	85.1 (3.70)
15-44	166	105203	0.041 (0.003)	0.055 (0.009)	100.0 (-)	98.5 (0.99)
45+	150	70052	0.050 (0.004)	0.065 (0.012)	100.0 (-)	99.4 (0.61)
Sex:						
Male	198	110053	0.043 (0.003)	0.051 (0.003)	99.4 (0.58)	94.4 (2.04)
Female	204	116493	0.040 (0.002)	0.059 (0.010)	100.0 (-)	97.0 (1.51)
Race:						
White	340	191746	0.041 (0.003)	0.056 (0.007)	99.7 (0.33)	95.3 (1.47)
Non-White	62	34800	0.044 (0.003)	0.051 (0.004)	100.0 (-)	98.1 (1.43)
Census Region:						
Northeast	91	49135	0.036 (0.002)	0.043 (0.002)	100.0 (-)	92.7 (2.52)
North Central	127	58866	0.040 (0.003)	0.049 (0.003)	98.9 (1.03)	94.6 (3.04)
South	130	75372	0.038 (0.002)	0.054 (0.013)	100.0 (-)	98.4 (1.15)
West	54	43173	0.059 (0.010)	0.079 (0.021)	100.0 (-)	96.3 (2.74)
Entire Nation	402**	226546	0.041 (0.002)	0.055 (0.006)	99.7 (0.28)	95.8 (1.22)

*parts per million, adjusted for lipid content of specimen.
**these specimens represent only a subsample of the specimens actually collected this year.

TABLE A.20. ESTIMATED POPULATION VALUES FOR THE MEDIAN AMOUNT, MEAN AMOUNT, PERCENT DETECTED, AND PERCENT QUANTIFIABLE FOR HEXACHLOROBENZENE (HCB) FOR FISCAL YEAR 1983

Subpopulation	Sample Size	Population Estimate (in thous)	Median Amount*	Mean Amount*	Percent Detected	Percent Quantifiable
			estimate (standard error)			
Age (in year):						
0-14	46	51290	0.028 (0.004)	0.035 (0.006)	100.0 (-)	84.4 (6.51)
15-44	85	105203	0.029 (0.002)	0.033 (0.003)	100.0 (-)	99.3 (0.52)
45+	69	70052	0.037 (0.003)	0.042 (0.004)	100.0 (-)	100.0 (-)
Sex:						
Male	95	110053	0.034 (0.003)	0.041 (0.004)	100.0 (-)	98.5 (1.08)
Female	105	116493	0.028 (0.002)	0.032 (0.002)	100.0 (-)	93.9 (3.38)
Race:						
White	162	198489	0.031 (0.002)	0.037 (0.003)	100.0 (-)	95.9 (2.03)
Non-White	38	28057	0.031 (0.004)	0.036 (0.005)	100.0 (-)	97.8 (1.54)
Census Region:						
Northeast	31	49135	0.031 (0.002)	0.034 (0.003)	100.0 (-)	99.1 (0.66)
North Central	54	58866	0.032 (0.001)	0.038 (0.003)	100.0 (-)	98.6 (0.88)
South	76	75372	0.024 (0.004)	0.030 (0.005)	100.0 (-)	91.7 (4.68)
West	39	41173	0.044 (0.002)	0.049 (0.005)	100.0 (-)	97.2 (1.97)
Entire Nation	200**	226546	0.031 (0.002)	0.037 (0.003)	100.0 (-)	96.1 (1.75)

* parts per million, adjusted for lipid content of specimen.
** these specimens represent only a subsample of the specimens actually collected this year.
(-) Standard error cannot be calculated since the estimated percentage is 100 percent.

TABLE A.21. WEIGHTED PERCENTAGE DISTRIBUTION OF PCB RESIDUE LEVELS IN ADIPOSE TISSUES FOR FISCAL YEAR 1972

Subpopulation	Sample Size	Population Estimate (in thous)	Percent Not Detected	Percent Detected but less than 1 PPM*	Percent Greater than 1 PPM*	Percent Greater than 3 PPM*
			percent (standard error)			
Age (in year):						
0-14	223	55786	11.7 (3.3)	42.2 (6.6)	46.1 (5.5)	2.0 (1.4)
15-44	446	70920	7.0 (2.1)	24.6 (4.1)	68.4 (3.8)	5.1 (1.7)
45+	1157	52626	9.8 (2.7)	22.0 (3.2)	68.2 (4.1)	4.8 (0.9)
Sex:						
Male	1029	89990	8.0 (1.5)	27.6 (4.3)	64.4 (3.9)	6.2 (1.9)
Female	797	89342	10.6 (2.0)	31.0 (3.5)	58.4 (4.1)	1.9 (0.6)
Race:						
White	1501	159081	9.0 (1.6)	29.5 (3.2)	61.2 (3.4)	3.9 (1.1)
Non-White	325	20252	11.5 (3.9)	27.4 (6.3)	62.8 (6.2)	5.3 (2.0)
Census Region:						
Northeast	630	44678	11.2 (3.5)	15.9 (6.1)	73.0 (7.9)	5.3 (2.8)
North Central	476	51628	13.1 (3.6)	35.8 (6.0)	51.1 (3.7)	2.9 (1.2)
South	486	54973	6.1 (2.5)	28.0 (5.0)	65.8 (4.3)	5.8 (2.4)
West	234	28053	5.3 (1.7)	41.3 (12.4)	53.4 (11.5)	0.6 (0.3)
Entire Nation	1826	179332	9.3 (1.6)	29.3 (3.3)	61.4 (3.4)	4.0 (1.1)

* PPM denotes part per million.

000103

TABLE A.22. WEIGHTED PERCENTAGE DISTRIBUTION OF PCB RESIDUE LEVELS IN ADIPOSE TISSUES FOR FISCAL YEAR 1973

Subpopulation	Sample Size	Population Estimate (in thous)	Percent Not Detected	Percent Detected but less than 1 PPM*	Percent Greater than 1 PPM*	Percent Greater than 3 PPM*
			percent (standard error)			
Age (in year):						
0-14	188	57900	26.8 (5.9)	61.3 (6.4)	11.9 (3.3)	2.1 (1.4)
15-44	419	83437	13.6 (3.7)	45.9 (4.3)	40.5 (4.5)	4.1 (1.3)
45+	576	61875	15.4 (3.8)	33.6 (3.8)	51.0 (4.2)	9.2 (1.6)
Sex:						
Male	549	101124	18.0 (4.0)	38.7 (3.9)	43.4 (4.1)	6.2 (1.3)
Female	634	102088	17.9 (3.7)	54.3 (4.1)	27.8 (3.4)	4.0 (1.0)
Race:						
White	1026	176345	15.8 (2.9)	49.1 (3.6)	35.4 (3.4)	4.2 (0.9)
Non-White	157	26867	31.8 (10.3)	29.7 (7.0)	37.0 (7.9)	10.8 (2.8)
Census Region:						
Northeast	204	49041	19.0 (11.1)	34.5 (11.2)	46.5 (10.1)	6.8 (2.4)
North Central	359	56572	11.1 (3.7)	51.9 (5.7)	37.0 (6.6)	5.0 (2.3)
South	439	62795	24.1 (5.8)	47.4 (4.7)	28.5 (3.5)	4.9 (1.1)
West	181	34804	16.5 (7.3)	53.2 (6.0)	30.3 (4.8)	3.3 (2.1)
Entire Nation	1183	203212	17.9 (3.6)	46.5 (3.5)	35.5 (3.3)	5.1 (1.0)

* PPM denotes part per million.

000104

TABLE A.23. WEIGHTED PERCENTAGE DISTRIBUTION OF PCB RESIDUE LEVELS IN ADIPOSE TISSUES FOR FISCAL YEAR 1974

Subpopulation	Sample Size	Population Estimate (in thous)	Percent Not Detected	Percent Detected but less than 1 PPM*	Percent Greater than 1 PPM*	Percent Greater than 3 PPM*
			percent (standard error)			
Age (in year):						
0-14	207	57900	19.1 (5.6)	72.9 (6.5)	8.0 (1.9)	0.0 (-)
15-44	362	83437	5.5 (1.9)	50.7 (4.2)	43.9 (4.5)	5.2 (1.6)
45+	456	61875	6.3 (2.6)	41.7 (4.3)	52.0 (4.3)	8.1 (2.5)
Sex:						
Male	521	98912	9.8 (2.9)	49.3 (3.5)	41.0 (4.2)	4.0 (1.0)
Female	504	104300	9.5 (2.7)	59.1 (3.3)	31.5 (3.4)	5.2 (1.9)
Race:						
White	868	177066	9.2 (2.2)	55.5 (2.8)	35.2 (3.3)	4.5 (1.3)
Non-White	157	26146	12.8 (5.0)	46.0 (7.3)	43.7 (5.0)	5.7 (2.0)
Census Region:						
Northeast	225	49041	13.5 (5.4)	40.7 (4.9)	45.8 (8.2)	8.0 (4.1)
North Central	304	56572	13.4 (5.3)	55.0 (4.8)	31.8 (5.1)	3.0 (1.4)
South	374	62795	6.5 (2.4)	57.4 (3.6)	36.1 (3.4)	4.9 (1.7)
West	122	34804	3.9 (2.2)	66.7 (8.9)	29.4 (8.6)	2.0 (1.1)
Entire Nation	1025	203212	9.6 (2.2)	54.3 (2.6)	36.1 (3.1)	4.6 (1.2)

* PPM denotes part per million.
(-) Standard error cannot be calculated since estimated percentage is zero.

000105

TABLE A.24. WEIGHTED PERCENTAGE DISTRIBUTION OF PCB RESIDUE LEVELS IN ADIPOSE TISSUES FOR FISCAL YEAR 1975

Subpopulation	Sample Size	Population Estimate (in thous)	Percent Not Detected	Percent Detected but less than 1 PPM*	Percent Greater than 1 PPM*	Percent Greater than 3 PPM*
			percent (standard error)			
Age (in year):						
0-14	163	57900	19.7 (6.8)	71.1 (7.9)	9.1 (2.6)	0.5 (0.4)
15-44	304	83437	1.5 (0.7)	59.5 (4.1)	39.0 (4.1)	8.4 (1.9)
45+	428	61875	0.7 (0.4)	57.0 (5.0)	42.4 (4.9)	15.4 (3.6)
Sex:						
Male	445	98912	6.9 (3.1)	63.0 (4.4)	30.1 (3.7)	8.7 (2.3)
Female	450	104300	6.0 (2.0)	61.1 (4.7)	32.9 (3.9)	7.9 (1.6)
Race:						
White	747	177067	6.5 (2.6)	62.9 (4.1)	30.7 (3.0)	7.7 (1.4)
Non-White	148	26145	6.0 (2.3)	56.4 (6.8)	38.5 (6.3)	12.4 (3.3)
Census Region:						
Northeast	206	49041	7.0 (3.9)	54.9 (10.6)	38.1 (7.8)	16.3 (3.0)
North Central	339	56572	4.6 (2.2)	62.6 (6.9)	32.9 (5.9)	7.8 (2.9)
South	231	62795	7.1 (6.1)	63.0 (6.1)	29.8 (5.1)	6.1 (3.1)
West	119	34804	7.5 (3.4)	69.4 (9.0)	23.1 (5.7)	2.0 (2.1)
Entire Nation	895	203212	6.4 (2.3)	62.0 (4.0)	31.5 (3.1)	8.3 (1.5)

* PPM denotes part per million.

TABLE A.25. WEIGHTED PERCENTAGE DISTRIBUTION OF PCB RESIDUE LEVELS IN ADIPOSE TISSUES FOR FISCAL YEAR 1976

Subpopulation	Sample Size	Population Estimate (in thous)	Percent Not Detected	Percent Detected but less than 1 PPM*	Percent Greater than 1 PPM*	Percent Greater than 3 PPM*
			percent (standard error)			
Age (in year):						
0-14	165	57900	4.5 (1.8)	86.6 (3.4)	8.9 (2.8)	1.2 (0.8)
15-44	248	83437	0.5 (0.5)	56.3 (2.6)	43.2 (3.0)	7.4 (2.2)
45+	366	61875	0.0 (0.0)	52.4 (5.1)	47.8 (5.3)	13.4 (3.0)
Sex:						
Male	397	97391	1.8 (0.8)	56.5 (4.2)	41.9 (4.1)	9.3 (2.1)
Female	382	105821	1.3 (0.8)	70.4 (3.7)	28.3 (4.2)	5.8 (2.0)
Race:						
White	642	177887	1.2 (0.7)	64.2 (2.8)	34.6 (3.2)	6.8 (1.5)
Non-White	137	25325	3.7 (2.5)	60.3 (6.5)	36.8 (6.2)	12.6 (3.6)
Census Region:						
Northeast	229	49041	0.1 (0.1)	47.4 (3.0)	52.8 (3.0)	15.5 (3.4)
North Central	205	56572	2.1 (1.9)	77.1 (6.1)	20.7 (5.9)	1.3 (0.6)
South	254	62795	1.4 (1.0)	62.5 (5.4)	36.1 (5.3)	6.5 (2.5)
West	91	34804	2.6 (1.0)	67.2 (10.1)	30.2 (8.9)	8.0 (5.2)
Entire Nation	779	203212	1.5 (0.6)	63.7 (2.8)	34.8 (3.1)	7.5 (1.5)

*. PPM denotes part per million.

000107

TABLE A.26. WEIGHTED PERCENTAGE DISTRIBUTION OF PCB RESIDUE LEVELS IN ADIPOSE TISSUES FOR FISCAL YEAR 1977

Subpopulation	Sample Size	Population Estimate (in thous)	Percent Not Detected	Percent Detected but less than 1 PPM*	Percent Greater than 1 PPM*	Percent Greater than 3 PPM*
			percent (standard error)			
Age (in year):						
0-14	174	57900	2.0 (1.6)	90.1 (2.9)	7.9 (2.8)	4.2 (2.3)
15-44	357	83437	0.0 (0.0)	66.8 (3.6)	33.2 (3.6)	8.3 (2.1)
45+	396	61875	0.0 (0.0)	59.8 (4.1)	40.2 (3.9)	16.6 (3.5)
Sex:						
Male	457	98912	0.3 (0.3)	66.7 (3.4)	32.9 (3.5)	10.5 (2.5)
Female	470	104300	0.8 (0.8)	75.6 (2.6)	23.6 (2.2)	8.9 (1.8)
Race:						
White	794	178972	0.7 (0.5)	71.5 (2.3)	27.8 (2.2)	9.0 (1.7)
Non-White	133	24240	0.0 (0.0)	69.7 (5.1)	30.9 (5.1)	14.4 (4.6)
Census Region:						
Northeast	206	49041	0.7 (0.7)	69.5 (3.4)	29.9 (3.0)	10.7 (4.5)
North Central	257	56572	0.0 (0.0)	68.6 (4.8)	31.4 (4.6)	9.7 (2.4)
South	341	62795	1.3 (1.3)	75.2 (5.2)	23.5 (4.4)	9.6 (3.2)
West	123	34804	0.0 (0.0)	71.2 (4.2)	28.8 (4.0)	8.2 (3.7)
Entire Nation	927	203212	0.6 (0.4)	71.3 (2.4)	28.1 (2.2)	9.7 (1.7)

* PPM denotes part per million.

TABLE A.27. WEIGHTED PERCENTAGE DISTRIBUTION OF PCB RESIDUE LEVELS IN ADIPOSE TISSUES FOR FISCAL YEAR 1978

Subpopulation	Sample Size	Population Estimate (in thous)	Percent Not Detected	Percent Detected but less than 1 PPM*	Percent Greater than 1 PPM*	Percent Greater than 3 PPM*
			percent (standard error)			
Age (in year):						
0-14	205	57900	5.7 (1.7)	85.1 (4.3)	9.2 (3.4)	2.7 (1.6)
15-44	365	83437	0.3 (0.3)	67.9 (4.4)	31.8 (4.3)	12.2 (2.8)
45+	381	61875	0.3 (0.2)	64.7 (5.1)	35.0 (5.1)	8.0 (2.5)
Sex:						
Male	475	98912	1.0 (0.5)	67.0 (3.9)	32.0 (3.7)	11.7 (2.8)
Female	476	104300	2.6 (0.9)	76.4 (3.6)	21.0 (3.5)	5.0 (1.5)
Race:						
White	771	177749	1.5 (0.6)	72.8 (3.8)	25.8 (3.6)	8.0 (2.0)
Non-White	180	25463	4.4 (3.0)	65.2 (5.6)	30.4 (4.1)	10.1 (3.4)
Census Region:						
Northeast	216	49041	0.6 (0.5)	69.4 (8.9)	30.0 (8.2)	7.4 (3.3)
North Central	211	56572	2.0 (1.1)	70.9 (5.4)	27.1 (6.0)	7.5 (3.4)
South	372	62795	1.6 (1.1)	74.0 (7.5)	24.4 (7.0)	10.6 (4.3)
West	152	34804	3.6 (2.0)	72.8 (3.9)	23.6 (2.4)	6.4 (3.6)
Entire Nation	951	203212	1.8 (0.6)	71.8 (3.5)	26.4 (3.4)	8.2 (1.9)

* PPM denotes part per million.

000109

TABLE A.28. WEIGHTED PERCENTAGE DISTRIBUTION OF PCB RESIDUE LEVELS IN ADIPOSE TISSUES FOR FISCAL YEAR 1979

Subpopulation	Sample Size	Population Estimate (in thous)	Percent Not Detected	Percent Detected but less than 1 PPM*	Percent Greater than 1 PPM*	Percent Greater than 3 PPM*
			percent (standard error)			
Age (in year):						
0-14	203	57900	4.1 (2.2)	89.0 (3.5)	6.9 (3.0)	0.0 (-)
15-44	346	84167	0.0 (0.0)	80.3 (4.2)	19.7 (4.7)	4.7 (2.9)
45+	361	61145	0.2 (0.2)	66.6 (3.9)	33.2 (5.3)	6.6 (4.3)
Sex:						
Male	477	104131	1.3 (0.6)	76.5 (3.5)	22.2 (3.9)	4.5 (1.9)
Female	433	99081	1.2 (0.8)	80.9 (3.5)	17.9 (4.0)	3.3 (3.2)
Race:						
White	740	78897	1.0 (0.4)	79.5 (3.2)	19.5 (3.8)	3.7 (2.5)
Non-White	170	24315	3.1 (2.3)	72.7 (6.1)	24.2 (5.5)	5.8 (2.8)
Census Region:						
Northeast	189	49041	0.9 (0.7)	55.7 (11.7)	43.4 (11.0)	12.9 (10.5)
North Central	189	56572	0.0 (0.0)	93.0 (2.8)	7.0 (2.7)	0.1 (0.1)
South	438	62795	2.7 (1.5)	81.4 (4.4)	15.9 (3.4)	0.6 (0.4)
West	94	34804	1.1 (1.3)	82.9 (5.7)	15.9 (4.6)	3.5 (2.1)
Entire Nation	910	203212	1.2 (0.6)	78.7 (3.3)	20.1 (3.8)	3.9 (2.5)

* PPM denotes part per million.
(-) Standard error cannot be calculated since estimated percentage is zero.

TABLE A.29. WEIGHTED PERCENTAGE DISTRIBUTION OF PCB RESIDUE LEVELS IN ADIPOSE TISSUES FOR FISCAL YEAR 1981

Subpopulation	Sample Size	Population Estimate (in thous)	Percent Not Detected	Percent Detected but less than 1 PPM*	Percent Greater than 1 PPM*	Percent Greater than 3 PPM*
			percent (standard error)			
Age (in year):						
0-14	86	51290	0.0 (-)	87.9 (7.2)	12.1 (7.2)	0.0 (-)
15-44	166	105203	0.0 (-)	83.9 (4.0)	16.1 (4.0)	0.6 (0.6)
45+	150	70052	0.0 (-)	76.3 (4.4)	23.6 (4.4)	0.6 (0.6)
Sex:						
Male	198	110053	0.0 (-)	82.3 (4.3)	17.7 (4.3)	1.0 (0.7)
Female	204	116493	0.0 (-)	82.6 (4.0)	17.4 (4.0)	0.0 (-)
Race:						
White	340	191746	0.0 (-)	85.0 (3.2)	15.0 (3.2)	0.2 (0.2)
Non-White	62	34800	0.0 (-)	68.5 (8.9)	31.5 (8.9)	1.9 (1.9)
Census Region:						
Northeast	91	49135	0.0 (-)	87.8 (2.8)	12.2 (2.8)	0.0 (-)
North Central	127	58866	0.0 (-)	81.0 (7.2)	18.9 (7.2)	1.9 (1.2)
South	130	75372	0.0 (-)	82.2 (7.6)	17.8 (7.4)	0.0 (-)
West	54	43173	0.0 (-)	78.7 (6.8)	21.3 (6.8)	0.0 (-)
Entire Nation	402**	226546	0.0 (-)	82.5 (3.5)	17.5 (3.5)	0.5 (0.3)

* PPM denotes part per million.
** These specimens represent only a subsample of the specimens actually collected this year.
(-) Standard error cannot be calculated since estimated percentage is zero.

TABLE A.30. WEIGHTED PERCENTAGE DISTRIBUTION OF PCB RESIDUE LEVELS IN ADIPOSE TISSUES FOR FISCAL YEAR 1983

Subpopulation	Sample Size	Population Estimate (in thous)	Percent Not Detected	Percent Detected but less than 1 PPM*	Percent Greater than 1 PPM*	Percent Greater than 3 PPM*
			percent (standard error)			
Age (in year):						
0-14	46	51290	0.0 (-)	96.9 (3.1)	3.1 (3.1)	0.0 (-)
15-44	85	105203	0.0 (-)	96.4 (2.8)	3.6 (2.8)	0.0 (-)
45+	69	70052	0.0 (-)	90.1 (4.2)	9.9 (4.2)	0.0 (-)
Sex:						
Male	95	110053	0.0 (-)	89.1 (3.3)	10.9 (3.3)	0.0 (-)
Female	105	116493	0.0 (-)	99.7 (0.3)	0.3 (0.3)	0.0 (-)
Race:						
White	162	198489	0.0 (-)	94.0 (1.9)	6.0 (1.9)	0.0 (-)
Non-White	38	28057	0.0 (-)	98.1 (1.4)	1.9 (1.4)	0.0 (-)
Census Region:						
Northeast	31	49135	0.0 (-)	97.6 (1.8)	2.4 (1.8)	0.0 (-)
North Central	54	58866	0.0 (-)	89.7 (4.3)	10.2 (4.3)	0.0 (-)
South	76	75372	0.0 (-)	95.1 (2.7)	4.9 (2.7)	0.0 (-)
West	39	41173	0.0 (-)	96.5 (2.4)	3.5 (2.4)	0.0 (-)
Entire Nation	200**	226546	0.0 (-)	94.5 (1.7)	5.5 (1.7)	0.0 (-)

* PPM denotes part per million.
** These specimens represent only a subsample of the specimens actually collected this year.
(-) Standard error cannot be calculated since estimated percentage is zero.

APPENDIX B

STATISTICAL APPROACH TO THE ESTIMATION OF POPULATION TIME TRENDS

B.1 STATISTICAL MODELS

The analysis of time trends and their differences across subpopulations require the use of statistical models. The model for any given characteristic of the residue level distribution expresses the functional form of the relationship between the characteristic of interest and the "predictor variables" thought to affect it: time (fiscal year), age, race, sex and geographic region (census region). The model provides the mathematical framework needed to investigate and interpret observed relationships in the collected data. The assumed model includes unknown coefficients (parameters) whose values are estimated from the observed data by using linear regression techniques. The results of the regression analysis provide:

(1) A mathematical equation that expresses the best relationship (of the assumed model form) for predicting residue levels as a function of time and the geographic and demographic characteristics associated with the given subpopulation.

(2) Estimates of the unknown coefficients and the magnitudes of the possible errors associated with these coefficient estimates. This information is used to assess whether or not a given factor (e.g., time, census region) has a statistically significant influence on the population residue levels and indicates the possible range of its influence.

Due to the multi-stage sampling design used to collect the NHATS data, the regression analyses required special adjustments (e.g., implemented in the computer program SURREGR (1)) to address the correlation structure inherent in the collected data. This allowed proper estimates to be made for the standard errors of the coefficients, thus providing for valid assessments to be made of the influence of each factor on the observed residue levels.

B.2 APPROACH TO THE TIME TREND MODELING

Two types of trend models were used in the statistical analyses. The first type involved the estimation of a single time trend to represent the entire nation with respect to the population residue distribution characteristic of interest. The second type involved the investigation of differences in trends across the geographic and demographic subpopulations. In the following sections the approach to modeling is discussed separately for each type.

B.2.1 National Time Trends

For each compound analyzed, national time trends were estimated for several different characteristics of the population residue level distribution. For β-BHC and HCB these included:

- Percentage of population having a detectable level of the compound
- Percentage of population have a quantifiable level of the compound
- Population average residue amount
- Population median

Since the collected data for PCBs were categorical in nature, different characteristics were addressed in the PCB trends. These were:

- Percentage of the population having detectable levels of PCBs
- Percentage of the population having PCB levels exceeding 1 ppm, and
- Percentage of the population having PCB levels exceeding 3 ppm.

The model used for each compound and population characteristic had the form:

$$Y = B_0 + B_1(FY-\overline{FY}) + B_2(FY-\overline{FY})^2 + E, \qquad (B.1)$$

where:

Y represents the observed value of the residue level characteristic of interest for a specimen collected during the given fiscal year (FY)

$(FY-\overline{FY})$ denotes the linear part of the time trend centered at the midpoint of the study period

$(FY-\overline{FY})^2$ represents the quadratic part of the time trend centered at the midpoint of the study period

B_0, B_1 and B_2 are unknown coefficients that are estimated from the observed data, and

E denotes the total contribution of all other factors affecting the residue level other than those included in the model.

The definition of the response variable Y depends on the population characteristic being addressed. The definitions for Y are summarized here.

Population Average Residue Amount:

Y = the specimens's observed residue level

Population Median:

Y = Logarithm (base 10) of the observed residue level

Note

The analysis for the median was performed by estimating the average level for the distribution of logarithms (base 10) of the original data and then transforming the result into an estimate of the median for the original distribution (7).

Population Percentage Having Detectable Levels:

Y = 0, if the observed residue level is below the level of detection for the analytical measurement process (See Table B.1)

Y = 1, if the observed value is above the level of detection

Population Percentage having quantifiable levels:

Y = 0, if the observed residue level is below the level of quantification for the analytical measurement process (see Table B.1)

Y = 1, if the observed value is above the level of quantification

TABLE B.1. APPROXIMATE LEVELS OF DETECTION AND LEVELS OF QUANTIFICATION FOR THE COMPOUNDS β-BHC, HCB, AND PCBs

Definition of Value	β-BHC	HCB	PCBs
Level of Detection* (ppm)	.02	.0033	1.0
Level of Quantification** (ppm)	.07	.01	--

* These values correspond to concentration levels that yield signal-to-noise ratios of approximately three. This implies that the probability of declaring detection of a chemical in a sample that has none is less than 1 percent.

** These values correspond to concentration levels that yield signal-to-noise ratios of approximately ten. This implies that the percent relative error in estimating concentrations at or greater than this value is 10 percent or less.

Each of the models for the different characteristics and compounds was fit to the observed data using the computer software called SURREGR (1). The estimated values for the coefficients and their associated statistical significance levels are given in Tables B.2 through B.4.

TABLE B.2 SUMMARY OF MODEL COEFFICIENT ESTIMATES FOR NATIONAL TIME TRENDS FOR β-BHC

Residue Distribution Characteristic	Model Component				
	Intercept Estimate	Fiscal Year-Linear Estimate	Fiscal Year-Linear Sig. Level	Fiscal Year-Quadratic Estimate	Fiscal Year-Quadratic Sig. Level
Percent Detected	98.5887	0.0795	0.238	0.0053	0.564
Percent Quantifiable	94.9633	-1.1513	0.000	-0.1215	0.006
Average Amount	0.2445	-0.0250	0.000	0.0018	0.017
Average Log-Amount*	-0.8535	-0.0416	0.000	0.0015	0.119

*Used in the analysis of population median.

TABLE B.3 SUMMARY OF MODEL COEFFICIENT ESTIMATES FOR NATIONAL TIME TRENDS FOR HCB

Residue Distribution Characteristic	Model Component				
	Intercept Estimate	Fiscal Year-Linear Estimate	Fiscal Year-Linear Sig. Level	Fiscal Year-Quadratic Estimate	Fiscal Year-Quadratic Sig. Level
Percent Detected	99.023	0.3248	0.0032	-0.0285	0.2898
Percent Quantifiable	92.101	0.4453	0.1260	0.0896	0.2827
Average Amount	0.0589	3.6E-05	0.9664	-7.6E-04	0.0021
Average Log-Amount*	-1.3980	0.0042	0.4070	-0.0043	0.0021

*Used in the analysis of population median.

TABLE B.4 SUMMARY OF MODEL COEFFICIENT ESTIMATES FOR NATIONAL TIME TRENDS FOR PCBs

Residue Distribution Characteristic	Model Component				
	Intercept Estimate	Fiscal Year-Linear Estimate	Fiscal Year-Linear Sig. Level	Fiscal Year-Quadratic Estimate	Fiscal Year-Quadratic Sig. Level
Percent Detected	0.9711	0.0156	0.0000	-0.0018	0.0000
Percent GT 1 PPM	0.2822	-0.0391	0.0000	0.0012	0.2031
Percent GT 3 PPM	0.0739	-0.0022	0.0725	-0.0020	0.0000

B.2.2 Investigation of Time Trend Differences Across Subpopulations

The investigation of time trend differences across subpopulations was limited to two population characteristics for β-BHC and HCB:

- Percentage of the population having detectable levels of the compound, and
- Population median.

For PCBs three characteristics were addressed:

- Percentage of the population having detectable levels of PCBs
- Percentage of the population having PCB levels exceeding 1 ppm, and
- Percentage of the population having PCB levels exceeding 3 ppm.

A complex statistical model was used for each compound to express the residue characteristic as a function of time and the subpopulations of interest. The form of the model is given by:

$$Y = B_0 + B_1(FY-\overline{FY}) + B_2(FY-\overline{FY})^2 + AGE + SEX + RACE + CR + (FY-\overline{FY})*(AGE+RACE+SEX+CR) + (FY-\overline{FY})^2*(AGE+RACE+SEX+CR), \quad (B.2)$$

where:

Y represents the residue distribution characteristic of interest

AGE, RACE, SEX and CR denote the main effects due to the different demographic and geographic subpopulations

$(FY-\overline{FY})*(AGE+RACE+SEX+CR)$ denotes the interactions of the linear part of the time trend with the different subpopulations, and

$(FY-\overline{FY})^2*(AGE+RACE+SEX+CR)$ denotes the interactions of the quadratic part of the time trend with the subpopulations.

The statistical significance of an interaction involving fiscal year indicates that the time trends are different for the associated subpopulations. Significance of a main effect indicates a difference in absolute levels across the subpopulations associated with that main effect.

The regression techniques used in statistical model fitting require the assumption that the distribution of specimen residue levels is normally distributed. This assumption, however, is more closely satisfied for the logarithms (base 10) of the residue level data since the actual residue distribution is skewed. For this reason the comparison of subpopulation trends for the median levels of β-BHC and HCB were based on the log-transformed data. The statistical model (Equation B.2) was used to obtain trend estimates based on the log-transformed data. These trends were then transformed back into trend estimates for the median of the distribution of actual residue levels.

The results of fitting the observed data to the given model are presented in Tables B.5 through B.7. These tables present the significance levels for the effects of each model corresponding to the different compounds and response variables.

The time trend estimates and plots for the various geographic and demographic subpopulations were generated by using predicted values from a reduced model derived from Equation B.2. The reduced model included only the statistically significant model effects in Equation B.2 that were associated with fiscal year and the geographic or demographic factor being compared in the trend plot. For each response variable and compound the estimated coefficients for the reduced models are presented in Tables B.8 - B.10.

TABLE B.5. SIGNIFICANCE LEVELS FOR THE MODEL EFFECTS ASSOCIATED WITH THE COMPARISON OF β-BHC TRENDS ACROSS SUBPOPULATIONS

Effect	Significance Levels: Percent Detected Model	Significance Levels: Average Log* Amount Model
Age Group	.0016	NT**
Race Group	.4551	.0676
Sex	.2084	.0416
Census Region	.2612	.0000
Fiscal Year-Linear	NT***	NT***
Fiscal Year by Age Group Interaction	.1077	.0002
Fiscal Year by Race Group Interaction	.2341	.3626
Fiscal Year by Sex Interaction	.6562	.0523
Fiscal Year by Census Region Interaction	.3727	.3628
Fiscal Year-Quadratic	NT***	NT***
Fiscal Year-Quadratic by Age Group Interaction	.1033	.0000
Fiscal Year Quadratic by Race Group Interaction	.2751	.3798
Fiscal Year Quadratic by Sex Interaction	.9476	.7526
Fiscal Year Quadratic by Census Region Interaction	.3880	.8512

* Used in the analysis of trends for the median.
** The effect is not testable due to the significance of a related interaction effect.
*** Not testable due to the parameterization used to define the model.

TABLE B.6. SIGNIFICANCE LEVELS FOR THE MODEL EFFECTS ASSOCIATED WITH THE COMPARISON OF HCB TRENDS ACROSS SUBPOPULATIONS

Effect	Significance Levels: Percent Detected Model	Significance Levels: Average Log* Amount Model
Age Group	.0973	NT**
Race Group	.1181	.8135
Sex	.9108	.0006
Census Region	.0988	.0000
Fiscal Year-Linear	NT***	NT***
Fiscal Year by Age Group Interaction	.0806	.0010
Fiscal Year by Race Group Interaction	.1132	.1058
Fiscal Year by Sex Interaction	.2360	.5545
Fiscal Year by Census Region Interaction	.2555	.1250
Fiscal Year-Quadratic	NT***	NT***
Fiscal Year-Quadratic by Age Group Interaction	.3413	.0264
Fiscal Year Quadratic by Race Group Interaction	.0918	.6854
Fiscal Year Quadratic by Sex Interaction	.5965	.7747
Fiscal Year Quadratic by Census Region Interaction	.9113	.5852

* Used in the analysis of trends for the median.
** The effect is not testable due to the significance of a related interaction effect.
*** Not testable due to the parameterization used to define the model.

TABLE B.7. SIGNIFICANCE LEVELS FOR THE MODEL EFFECTS ASSOCIATED WITH THE COMPARISON OF PCB TRENDS ACROSS SUBPOPULATIONS

Effect	Significance Levels		
	Percent Detected Model	Percent GT 1 PPM Model	Percent GT 3 PPM Model
Age Group	NT*	NT*	.0000
Race Group	.4140	.0001	.0010
Sex	.7548	.0002	.0080
Census Region	.8013	.0021	.0029
Fiscal Year-Linear	NT**	NT**	NT**
Fiscal Year by Age Group Interaction	.0346	.0018	.2220
Fiscal Year by Race Group Interaction	.1324	.5278	.3324
Fiscal Year by Sex Interaction	.5806	.2554	.5858
Fiscal Year by Census Region Interaction	.7610	.3210	.6052
Fiscal Year-Quadratic	NT**	NT**	NT**
Fiscal Year-Quadratic by Age Group Interaction	.3028	.0046	.0003
Fiscal Year Quadratic by Race Group Interaction	.1884	.0730	.1252
Fiscal Year Quadratic by Sex Interaction	.5244	.6472	.3227
Fiscal Year Quadratic by Census Region Interaction	.6265	.3521	.0537

* The effect of is not testable due to the significance of a related interaction effect.

** Not testable due to the parameterization used to define the model.

TABLE B.8. ESTIMATED COEFFICIENTS FOR THE STATISTICAL MODEL USED TO COMPARE TIME TRENDS FOR B-BHC

	Intercept	Age Groups 1 (0-14)	Age Groups 2 (15-44)	Race Group 1 (White)	Sex Group 1 (Male)	Census Regions Northeast	Census Regions North Central	Census Regions South	Fiscal Year Linear	Fiscal Year Quadratic	FY (Linear) by Age Group 1	FY (Linear) by Age Group 2	FY (Quadratic) by Age Group 1	FY (Quadratic) by Age Group 2
Percent Detected														
Age Group Comparisons	99.2119	-1.5197	-.4598						.0751	.0046				
Race Group Comparisons	98.3844			.2310					.0802	.0053				
Sex Group Comparisons	98.9060				-.6461				.0793	.0053				
Census Regions Comparisons	97.8524					1.3503	.3631	1.0024	.0814	.0054				
Average Log-Amount*														
Age Group Comparisons	-0.5735	-0.6306	-.2454						-.0291	7.0E-05	-.0179	-.0197	.0060	-6.3E-04
Race Group Comparisons	-0.7819			-.0810					-.0419	.0015				
Sex Group Comparisons	-0.8288				-.0503				-.0416	.0015				
Census Region Comparisons	-0.9273					.0140	-.0154	.2420	-.0420	.0015				

* Used in the estimation of trends for the median.

TABLE B.9. ESTIMATED COEFFICIENTS FOR THE STATISTICAL MODEL USED TO COMPARE TIME TRENDS FOR HCB

	Intercept	Age Groups 1 (0-14)	Age Groups 2 (15-44)	Race Group 1 (White)	Sex Group 1 (Male)	Census Regions Northeast	Census Regions North Central	Census Regions South	Fiscal Year Linear	Fiscal Year Quadratic	FY (Linear) by Age Group 1	FY (Linear) by Age Group 2	FY (Quadratic) by Age Group 1	FY (Quadratic) by Age Group 2
Percent Detected														
Age Group Comparisons	98.9046	-.8071	.8265						.3151	-.0303				
Race Group Comparisons	98.5277			.5656					.3271	-.0287				
Sex Group Comparisons	98.9827				.0817				.3248	-.0285				
Census Regions Comparisons	99.9502					-1.233	-1.4810	-.7151	.3207	-.0293				
Average Log-Amount*														
Age Group Comparisons	-1.3223	-.2072	-.0432						.0169	-.0070	-.0177	-.0197	.0070	.0017
Race Group Comparisons	-1.4453			.0539					.0044	-.0044				
Sex Group Comparisons	-1.4235				.0516				.0041	-.0043				
Census Region Comparisons	-1.1658				-.2417	-0.2790	-0.2790	-.3127	.0038	-.0044				

*Used in the estimation of trends for the median.

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TABLE B.10. ESTIMATED COEFFICIENTS FOR THE STATISTICAL MODEL USED TO COMPARE TIME TRENDS FOR PCBs

	Intercept	Age Groups 1 (0-14)	Age Groups 2 (15-44)	Race Group 1 (White)	Sex Group 1 (Male)	Census Regions Northeast	Census Regions North Central	Census Regions South	Fiscal Year Linear	Fiscal Year Quadratic	FY (Linear) by Age Group 1	FY (Linear) by Age Group 2	FY (Quadratic) by Age Group 1	FY (Quadratic) by Age Group 2	FY (Quadratic) by Census Region 1	FY (Quadratic) by Census Region 2	FY (Quadratic) by Census Region 3
Percent Detected																	
Age Group Comparisons	.9930	-.0750	-.0022						.0141	-0.0023	.0084	-.0025	.0013	5.7E-04			
Race Group Comparisons	.9433			.0315					.0157	-0.0018							
Sex Group Comparisons	.9700				.0023				.0156	-0.0018							
Census Region Comparisons	.9776					-.0107	-.0038	-.0093	.0156	-0.0018							
Percent GT 1 PPM																	
Age Group Comparisons	.4064	-.3378	-.0707						-.0437	-3.9E-04	.0192	-.0035	.0052	5.0E-04			
Race Group Comparisons	.3278			-.0317					-.0392	0.0012							
Sex Group Comparisons	.2444				.0774				-.0390	0.0012							
Census Region Comparisons	.2465					.1123	.0080	.0789	-.0389	0.0012							
Percent GT 3 PPM																	
Age Group Comparisons	.1200	-.1056	-.0415						-.0023	-.0034			.0032	.0013			
Race Group Comparisons	.1028			-.0329					-.0023	-.0020							
Sex Group Comparisons	.0663				.0195				-.0022	-.0020							
Census Region Comparisons	.0523					.0693	.0010	.0150	-.0021	-.0016					-.0019	3.3E-04	-1.1E-04

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16. Abstract (Limit: 200 words)
The National Human Adipose Tissue Survey (NHATS) is an on-going annual progr collect and chemically analyze adipose tissue specimens from a representative na sample of autopsied cadavers and surgical patients. The objective of the p is to estimate baseline levels and time trends for the presence of toxic che in the adipose tissue of the U.S. population. This report presents the resul a statistical analysis conducted on three specific chemicals: Beta-benzene hexach (β-BHC), hexachlorobenzene (HCB), and polychlorinated biphenyls (PCBs). The r are based on NHATS data collected between 1970 and 1983.

The results include baseline estimates of the percentages of the population detectable levels of these compounds in their adipose tissue as well as est of the mean and median levels. Estimates are given separately for various demog groups and geographic regions of the country as well as national estimates.

Results of the analysis indicate that nearly 100 percent of the population detectable levels of these compounds in their adipose tissue. However, the levels of these compounds are either decreasing or remaining nearly constant.

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