The Children's Total Exposure to Persistent Pesticides and Other Persistent Organic Pollutants (CTEPP) Study

Sample Selection Procedures

Battelle
Columbus, OH 43201
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Standard Operating Procedure **CTEPP-SOP-1.10**

Title: Sample Selection Procedures

Source: Battelle

U.S. Environmental Protection Agency
Office of Research and Development
Human Exposure & Atmospheric Sciences Division
Exposure Measurements & Analysis Branch

STANDARD OPERATING PROCEDURE (SOP)
FOR SAMPLE SELECTION

Prepared by: _____ Date: _____

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1.0 Scope and Applicability

This standard operating procedure (SOP) describes the procedure for selecting CTEPP study samples (i.e, day care centers and children). An overview of the sampling design for the CTEPP study is presented in Figure A1. The target population is children ages 1½ to 5 in North Carolina (NC) and Ohio (OH). Selection of 256 children for the study, 128 in each state, of which 64 attend day care facilities and 64 stay at home, is expected.

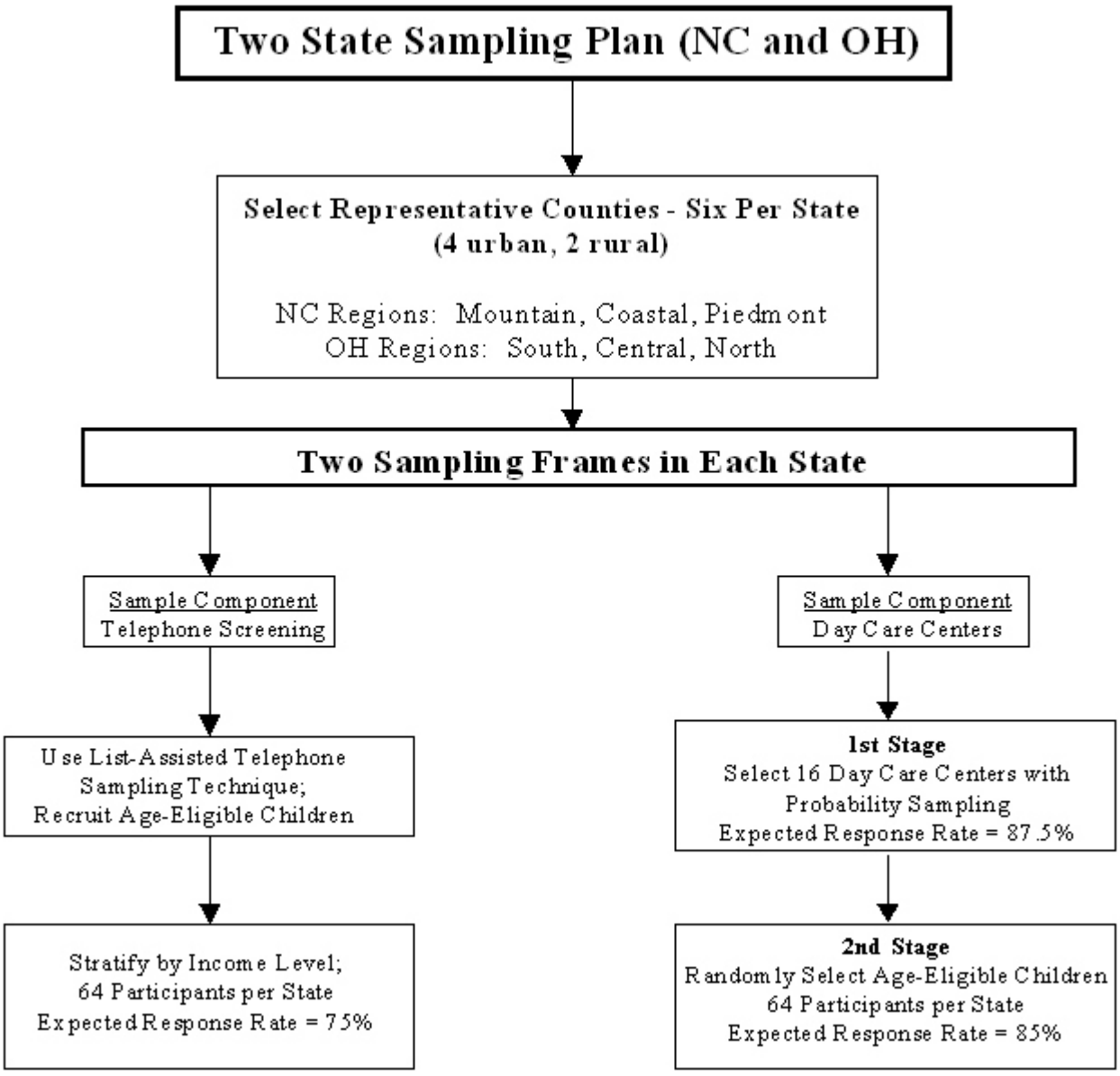
2.0 Summary of Method

As shown in Figure A1, the primary, county-level stratification is by region and urbanicity. Six sample counties in each of the two states are selected using stratified random sampling and reflect three distinct geographical areas in each state. Within each of the two states, the samples are further stratified according to urbanicity and family income. The urbanicity stratification is imposed at the first stage of selection by classifying counties as predominantly urban or predominantly rural. Income stratification is performed at subsequent stages of selection for the two sample components, which distinguishes between low-income and mid- to high-income households/day care centers.

In the day care sample component, all eligible day care centers in the six selected counties are identified. During the second-stage sampling frame, these centers are divided into two income strata. From these strata a random sample of targeted centers and a random sample of eligible children within each participating center are selected. In the telephone sample component, a random sample of telephone numbers is selected using list-assisted telephone sampling techniques in the six counties in each state. The anticipated sample size is 128 children in each state, with half (64) from the day care center sample (children who attend day care) and the other half (64) from the telephone sample (children who do not attend day care). This dual frame approach provides maximum coverage for the target population.

In summary, the sampling design allow a generation of the sample data to the selected counties in the two states so that valid statistical can be made. The design also simplifies the sampling frame construction and sample selection process. In addition, by concentrating recruitment efforts in a few selected counties, project resources can be efficiently used to maximize response rates (estimated 75% or higher).

Figure A1. Overview of the Sampling Plan for the CTEPP Study



3.0 Definition

A low-income group is defined using the Women, Infants, and Children (WIC) income guidelines for the period of 7/1/2000 to 6/30/2001. To be eligible on the basis of income, WIC applicants' income must fall below 185 percent of the U.S. Poverty Income Guidelines. For example, for a family of four, the WIC income guideline is $30,433.

Background Information about WIC:
WIC provides federal grants to states for supplemental foods, health care referrals, and nutrition education for low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, and to infants and children who are found to be at nutritional risk. Established as a pilot program in 1972 and made permanent in 1974, WIC is administered at the federal level by the Food and Nutrition

Service of the U.S. Department of Agriculture. Formerly known as the Special Supplemental Food Program for Women, Infants, and Children, WIC's name was changed under the Healthy Meals for Healthy Americans Act of 1994, in order to emphasize its role as a nutrition program. Most states WIC programs provide vouchers that participants use at authorized food stores. A wide variety of state and local organizations cooperate in providing the food and health care benefits, and 46,000 merchants nationwide accept WIC vouchers.

4.0 Cautions

The CTEPP study requires a large number of study measurements, generally costly and complex in nature. The measurements involve parents and day care centers for each subset of participating children. The study also requires a battery of measurement devices and monitors that are not only expensive, but also costly to transport to more than a few selected sites. The CTEPP study thus has unusually high costs per child.

These features of the study dictate that the sample be both highly clustered and confined to a few sites. They also limit the total sample size to remain within a reasonable budget. Given the complexity of the study measurements, obtaining a national sample is secondary to obtaining a cross-section of children in the target states.

A variety of errors can affect sample representativeness. There can be discrepancies between the survey population and the target population, that is, there can be coverage errors. There can be non-sampling errors and biases such as non-response. Additionally, there can be deviations from probability sampling.

The sampling design minimizes these potential errors. First, coverage errors are minimized with the dual frame design. Second, non-response errors are minimized by efforts to maximize response rates and by including all population subgroups represented in the respondent pool. Third, the sampling design uses probability sampling methods at every stage and for every component.

General Coverage Errors. The sampling design ensures coverage of non-telephone households via the day care component, and coverage of children not attending day care via the telephone sample. Two additional measures are used for minimizing both under-coverage errors and their potential biasing effects:

- The stratification of the telephone sample by income levels, and the targeting (over-sampling) of low-income households in this sample component.
- Post-stratification weight adjustments that force the sample distribution (participating households) to reflect the population distribution by income levels.

Coverage of Low-income Households. Ideally, for statistically power in data analysis, an equal distribution is needed between low- and mid- to high-income households/day care centers. In the general population, the low-income households represent only a small percentage of the whole. By oversampling low-income groups in both the day care and telephone samples, the result will yield adequate sample size that permit inferences about these groups (e.g., comparisons of low- and mid- to high-income households). The planned sample allocation of the 64 children in the telephone sample component in each state will include 24 children in the low-income stratum and 40 children in the mid- to high-income stratum. With this allocation, the low-income group constitutes 37.5% of the sample, although the low-income group represents a much smaller proportion of the population.

More extreme oversampling could induce extreme imbalance in sampling rates (and weights), and hence, could result in inefficient sampling design. However, balancing the sizes of the two groups (low and mid- to high-income households) leads to better statistical power for comparisons between these income groups. Similar compromises between conflicting statistical objectives were considered in the allocation of the sample to urban and rural strata.

Non-Response Errors. To minimize the non-response errors, recruitment procedures from earlier pilot studies are modified for enhancing response rates. Measures for increasing response rates are described in detail in CTEPP-SOP-1.11 and CTEPP-SOP-1.12.

Sampling Errors. The sampling design includes a number of features to enhance the statistical validity and accuracy of the study results:

- The use of probability sampling methods at every stage.
- Stratification by region, urbanicity, and income levels.
- Selection of sampling units with probability proportional to size (PPS) methods at the first two stages (counties and day care centers).
- Selection of lower-income children with disproportionate sampling.

These methods ensure that the study objectives are met with the greatest statistical efficiency and cost effectiveness.

5.0 Responsibilities

5.1 The sampling statistician is responsible for selecting the samples (counties, day care centers, and children) and documenting the sample selecting process. He also prepares the sample selection instructions for the survey sampling firm for the telephone sample list.

5.2 The Battelle Field Team Leader coordinates the sample selection tasks and is responsible for the procurement of the telephone sample list.

6.0 Apparatus and Materials

Not applicable.

7.0 Procedure

7.1 Selection of Counties

Within each state, six counties are selected for the study using stratified random sampling. Because of stratification, the sample represents different regions, urban and rural areas, and low-income and middle/high-income areas of the state.

The sample selection process targets counties with larger population sizes, and in particular, larger populations in the low-income groups, by selecting counties using probabilities proportional to size (PPS) within each stratum. The county population in the low-income segment is used as a measure of size.

The PPS sampling methods can be combined with an implicit stratification of the sampling frame, that is, the list of counties in the state, by size. The sample design uses systematic PPS sampling from the sorted frame to ensure that the sample counties vary across the range of income levels. In addition, with PPS methods, very large counties within a given stratum are selected with certainty.

Regional Stratification. NC is divided into three geographic regions: Piedmont, Mountain, and Coastal. Three counties from the Piedmont, two counties from the Eastern (Coastal) region, and one county from the Western (Mountain) region are included in the sample. Ohio is also divided into three geographic regions: South, Central, and North. Two counties from the North, three from the Central, and one from the South are included in the sample.

Urbanicity Stratification. To determine urbanicity, counties are classified as predominantly rural or urban based on whether the county contains part of a Metropolitan Statistical Area (MSA) as defined by the Office of Management and Budget (OMB Bulletin No. 99-04). Four predominantly urban counties and two predominantly rural counties in NC are included. Similarly in OH, four urban and two rural counties are included.

Selection Using PPS. The county population in the low-income segment is used as a measure of size, i.e., the county size measure is the number of low-income households in the county. Counties are sorted by size. The number of low-income households is obtained from the U.S. Census data. The use of systematic PPS sampling from the sorted frame ensures that the sample counties vary across the range of income levels. In summary, the steps of PPS sampling are:

- Classify counties into the strata
- Derive the number of counties to be selected in each stratum cell based on the cross-classification.
- Select target counties in each stratum cell using PPS.

Table A1 shows the distribution of the six sample counties across the three NC regions and OH regions, substratified by urban versus rural.

Table A1. Selected Counties by Region and Urbanicity Class

		Region			
State	**Urbanicity**	**Piedmont**	**Eastern**	**Mountain**	**Total**
NC	Urban	2	1	1	4
	Rural	1	1	0	2
Total		3	2	1	6
		Region			
State	**Urbanicity**	**North**	**Central**	**South**	**Total**
OH	Urban	1	2	1	4
	Rural	1	1	0	2
Total		2	3	1	6

Figure A2 shows the definition of the NC regions i.e., the group of counties included in each of the three regions. Figure A3 provides a similar mapping for Ohio. In addition, Table A2 presents the primary strata defined for NC in terms of regions and urbanicity. Table A3 presents the region-by-urbanicity strata for Ohio.

Figure A2. A Map of North Carolina Counties by Regions

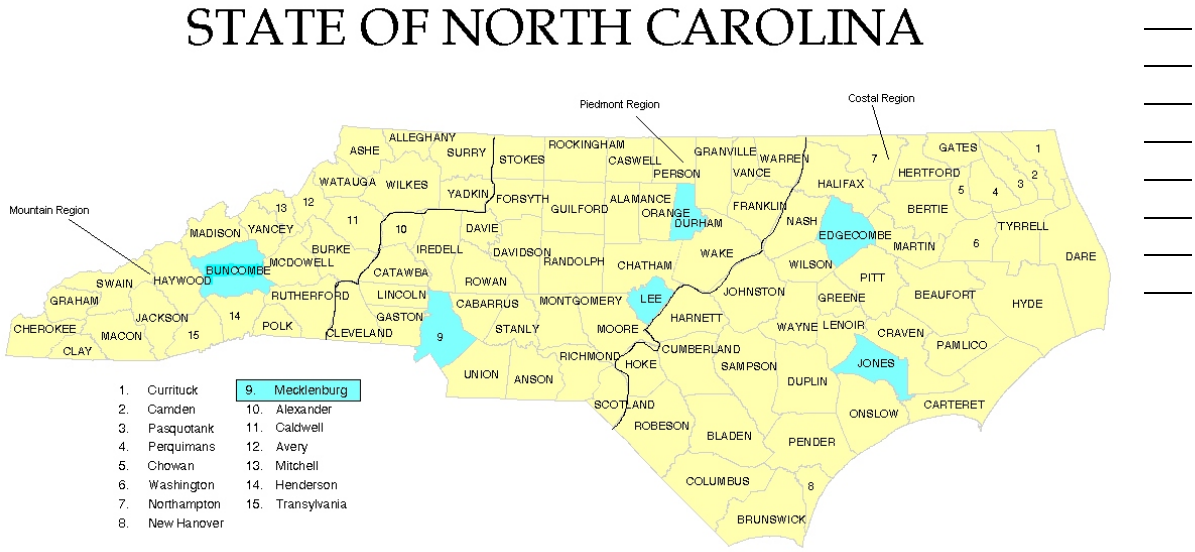


Figure A3. A Map of Ohio Counties by Regions

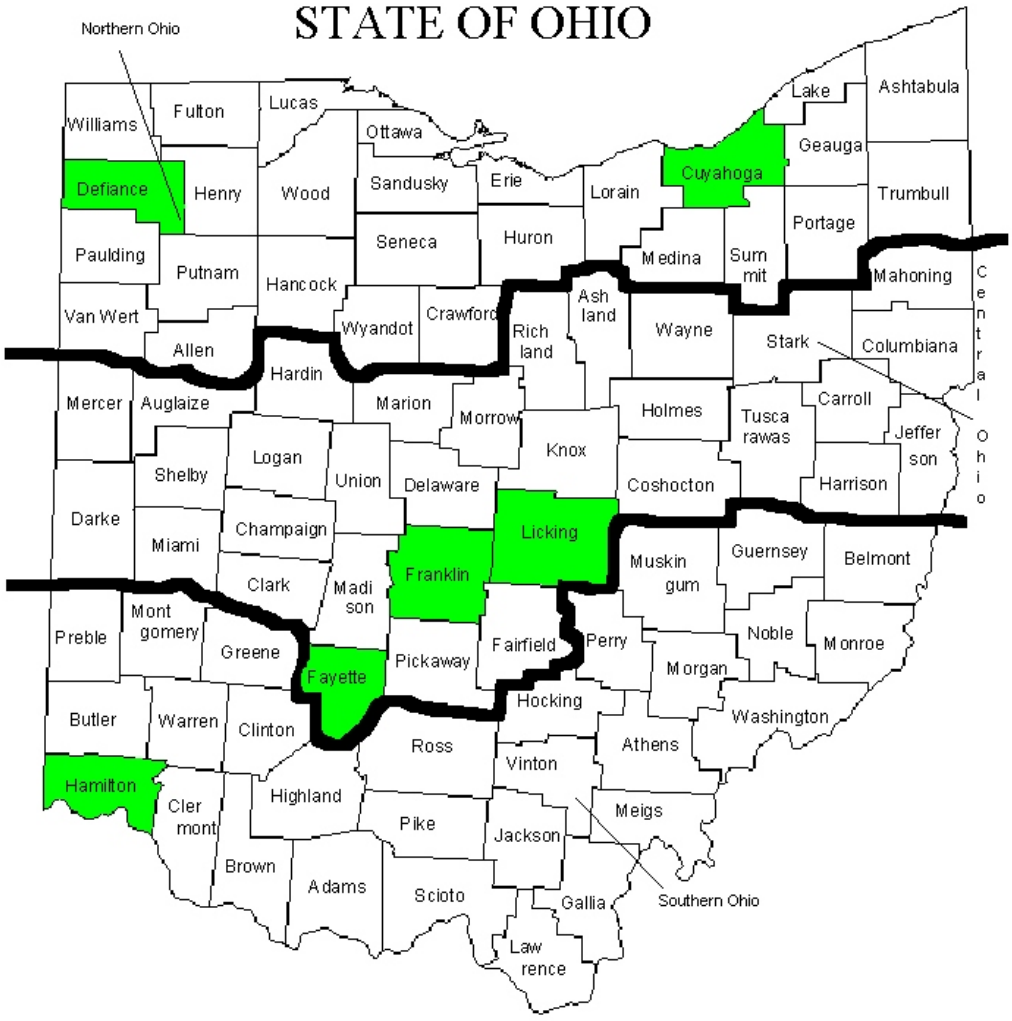


Table A2
Primary Strata for North Carolina Counties by Region and Urbanicity Class

Region: 1 = Coastal Plain, 2 = Piedmont, 3 = Mountain

Urbanicity Class: 1 = Urban, 2 = Rural

Region	Urban or Rural	County Name	State	Total Number of Households
2	1	ALAMANCE	NC	46,900
2	1	ALEXANDER	NC	11,800
3	2	ALLEGHANY	NC	4,100
2	2	ANSON	NC	8,900
3	2	ASHE	NC	9,800
3	2	AVERY	NC	6,000
1	2	BEAUFORT	NC	17,500
1	2	BERTIE	NC	7,600
1	2	BLADEN	NC	11,700
1	1	BRUNSWICK	NC	26,300
3	1	BUNCOMBE	NC	80,300
3	1	BURKE	NC	32,000
2	1	CABARRUS	NC	44,800
3	1	CALDWELL	NC	29,300
1	2	CAMDEN	NC	2,200
1	2	CARTERET	NC	24,600
2	2	CASWELL	NC	8,100
2	1	CATAWBA	NC	51,500
2	1	CHATHAM	NC	17,900
3	2	CHEROKEE	NC	9,200
1	2	CHOWAN	NC	5,600
3	2	CLAY	NC	3,600
2	2	CLEVELAND	NC	34,900
1	2	COLUMBUS	NC	20,000
1	2	CRAVEN	NC	31,500
1	1	CUMBERLAND	NC	95,200
1	1	CURRITUCK	NC	6,400
1	2	DARE	NC	11,400
2	1	DAVIDSON	NC	54,900
2	1	DAVIE	NC	12,400
1	2	DUPLIN	NC	16,300
2	1	DURHAM	NC	80,200
1	1	EDGECOMBE	NC	20,400
2	1	FORSYTH	NC	117,400
2	1	FRANKLIN	NC	16,900
2	1	GASTON	NC	68,800
1	2	GATES	NC	3,700
3	2	GRAHAM	NC	3,000
2	2	GRANVILLE	NC	14,400
1	2	GREENE	NC	6,300
2	1	GUILFORD	NC	154,200

Table A2
Primary Strata for North Carolina Counties by Region and Urbanicity Class

Region: 1 = Coastal Plain
2 = Piedmont
3 = Mountain

Urbanicity Class: 1 = Urban
2 = Rural

Region	Urban or Rural	County Name	State	Total Number of Households
1	2	HALIFAX	NC	21,700
1	2	HARNETT	NC	30,600
3	2	HAYWOOD	NC	21,000
3	2	HENDERSON	NC	33,600
1	2	HERTFORD	NC	8,600
1	2	HOKE	NC	10,000
1	2	HYDE	NC	2,100
2	2	IREDELL	NC	42,400
3	2	JACKSON	NC	10,900
1	1	JOHNSTON	NC	40,100
1	2	JONES	NC	3,500
2	2	LEE	NC	18,700
1	2	LENOIR	NC	23,200
2	1	LINCOLN	NC	21,900
3	2	MCDOWELL	NC	14,900
3	2	MACON	NC	11,800
3	1	MADISON	NC	7,300
1	2	MARTIN	NC	10,300
2	1	MECKLENBURG	NC	245,200
3	2	MITCHELL	NC	6,000
2	2	MONTGOMERY	NC	8,400
2	2	MOORE	NC	28,800
1	1	NASH	NC	33,700
1	1	NEW HANOVER	NC	60,300
1	2	NORTHAMPTON	NC	7,900
1	1	ONSLOW	NC	38,500
2	1	ORANGE	NC	44,600
1	2	PAMLICO	NC	5,100
1	2	PASQUOTANK	NC	12,700
1	2	PENDER	NC	14,800
1	2	PERQUIMANS	NC	4,200
2	2	PERSON	NC	12,800
1	1	PITT	NC	45,400
3	2	POLK	NC	7,100
2	1	RANDOLPH	NC	46,900
2	2	RICHMOND	NC	17,400
1	2	ROBESON	NC	40,100
2	2	ROCKINGHAM	NC	35,200
2	1	ROWAN	NC	48,500
3	2	RUTHERFORD	NC	23,800
1	2	SAMPSON	NC	19,500

Table A2
Primary Strata for North Carolina Counties by Region and Urbanicity Class

Region: 1 = Coastal Plain
2 = Piedmont
3 = Mountain

Urbanicity Class: 1 = Urban
2 = Rural

Region	Urban or Rural	County Name	State	Total Number of Households
1	2	SCOTLAND	NC	12,800
2	2	STANLY	NC	21,500
2	1	STOKES	NC	16,500
3	2	SURRY	NC	26,600
3	2	SWAIN	NC	4,700
3	2	TRANSYLVANIA	NC	11,200
1	2	TYRRELL	NC	1,500
2	1	UNION	NC	37,600
2	2	VANCE	NC	15,200
2	1	WAKE	NC	222,500
2	2	WARREN	NC	6,800
1	2	WASHINGTON	NC	5,300
3	2	WATAUGA	NC	15,300
1	1	WAYNE	NC	41,700
3	2	WILKES	NC	24,500
1	2	WILSON	NC	26,300
3	1	YADKIN	NC	14,000
3	2	YANCEY	NC	6,800
				2,878,300

Data gathered from U.S. Census Bureau, *State & County Quickfacts*: 1990 Census
Total Households Source provided by Survey Sampling Inc. (SSI)

Table A3
Primary Strata for Ohio Counties
by Region and Urbanicity Class

Region: 1 = North
2 = Central
3 = South

Urbanicity Class: 1 = Urban
2 = Rural

Region	Urban or Rural	County Name	State	Total Number of Households
3	2	ADAMS	OH	10,700
1	1	ALLEN	OH	38,400
2	2	ASHLAND	OH	18,900
1	1	ASHTABULA	OH	38,500
3	2	ATHENS	OH	21,200
2	1	AUGLAIZE	OH	17,400
3	1	BELMONT	OH	28,100
3	1	BROWN	OH	14,600
3	1	BUTLER	OH	119,500
2	1	CARROLL	OH	10,600
2	2	CHAMPAIGN	OH	14,300
2	1	CLARK	OH	55,700
3	1	CLERMONT	OH	61,700
3	2	CLINTON	OH	14,800
2	1	COLUMBIANA	OH	43,000
2	2	COSHOCTON	OH	14,000
1	1	CRAWFORD	OH	18,400
1	1	CUYAHOGA	OH	561,600
2	2	DARKE	OH	20,000
1	2	DEFIANCE	OH	14,500
2	1	DELAWARE	OH	30,500
1	2	ERIE	OH	30,100
2	1	FAIRFIELD	OH	43,800
2	2	FAYETTE	OH	10,800
2	1	FRANKLIN	OH	404,000
1	1	FULTON	OH	14,800
3	2	GALLIA	OH	12,400
1	1	GEAUGA	OH	28,900
3	1	GREENE	OH	49,600
3	2	GUERNSEY	OH	15,800
3	1	HAMILTON	OH	337,300
1	2	HANCOCK	OH	26,200
2	2	HARDIN	OH	11,500
2	2	HARRISON	OH	6,200
1	2	HENRY	OH	10,800
3	2	HIGHLAND	OH	15,000
3	2	HOCKING	OH	10,700
2	2	HOLMES	OH	10,900
1	2	HURON	OH	21,600
3	2	JACKSON	OH	12,200
2	1	JEFFERSON	OH	30,400
2	2	KNOX	OH	19,400
1	1	LAKE	OH	84,900
3	1	LAWRENCE	OH	24,400
2	1	LICKING	OH	52,000
2	2	LOGAN	OH	17,500
1	1	LORAIN	OH	101,100

Table A3
Primary Strata for Ohio Counties by Region and Urbanicity Class

Region: 1 = North, 2 = Central, 3 = South

Urbanicity Class: 1 = Urban, 2 = Rural

Region	Urban or Rural	County Name	State	Total Number of Households
1	1	LUCAS	OH	173,600
2	1	MADISON	OH	13,400
2	1	MAHONING	OH	100,400
2	2	MARION	OH	24,000
1	1	MEDINA	OH	49,300
3	2	MEIGS	OH	9,400
2	2	MERCER	OH	14,200
2	1	MIAMI	OH	36,800
3	2	MONROE	OH	5,700
3	1	MONTGOMERY	OH	222,600
3	2	MORGAN	OH	5,400
2	2	MORROW	OH	11,000
3	2	MUSKINGUM	OH	32,200
3	2	NOBLE	OH	4,400
1	2	OTTAWA	OH	15,600
1	2	PAULDING	OH	7,300
3	2	PERRY	OH	12,500
2	1	PICKAWAY	OH	16,800
3	2	PIKE	OH	10,300
1	1	PORTAGE	OH	53,600
3	2	PREBLE	OH	15,400
1	2	PUTNAM	OH	11,700
2	1	RICHLAND	OH	49,300
3	2	ROSS	OH	26,100
1	2	SANDUSKY	OH	23,100
3	2	SCIOTO	OH	31,400
1	2	SENECA	OH	21,900
2	2	SHELBY	OH	16,800
2	1	STARK	OH	144,000
1	1	SUMMIT	OH	210,900
1	1	TRUMBULL	OH	86,500
2	2	TUSCARAWAS	OH	34,200
2	2	UNION	OH	13,600
1	2	VAN WERT	OH	11,300
3	2	VINTON	OH	4,700
3	1	WARREN	OH	48,400
3	2	WASHINGTON	OH	24,800
2	2	WAYNE	OH	39,200
1	2	WILLIAMS	OH	14,500
1	1	WOOD	OH	42,800
1	2	WYANDOT	OH	8,500
				4,266,300

Data gathered from U.S. Census Bureau, *State & County Quickfacts*: 1990 Census
Total Households Source provided by Survey Sampling Inc. (SSI)

7.2 Sampling Design for the Two Sample Components

7.2.1 Day care Center Sample

The day care center sample is selected in two stages.

Stage 1. The aim in the first stage is to produce a sample consisting of the number of targeted day care centers. The first step is to examine the list of licensed centers in each state.

The state licensing agencies are the main sources of comprehensive lists of licensed day care centers in NC and OH because every eligible day care center must be licensed in its state. Contact the state licensing agencies to obtain the list of eligible centers. To further ensure the completeness of the lists, search the CD ROM national telephone database (Pro-CD, 1999-2000, infoUSA Inc.) and prepare a list of eligible day care centers in the target counties, using the SIC codes for child care services. In addition to searching the CD ROM national telephone database, search the Internet. Centers appearing on the CD ROM national telephone database and/or the Internet are cross-checked against the lists provided by state licensing agencies. Centers that appear on the CD ROM national telephone database and/or Internet, but do not appear on the list from state licensing agencies, are called to determine the eligibility status of the center. Additional eligible centers are added to the master list of eligible day care centers. To increase the representation of low-income children, Headstart centers are included in the sample.

Using PPS, the stratified sample of day care centers in each state are selected from the sorted list of eligible centers compiled over the six counties selected in the state. Within each state and income, the list is further sorted by county to ensure that the sample day care centers are evenly distributed across the target counties. Even with this implicit stratification by county, it is still possible that some of the smaller counties may be assigned 1 or 0 sample day care centers. This possibility, which does not jeopardize the representativeness of the sample, is stronger in counties with fewer children attending day care centers.

Stage 2. Next, select a random sample of age-eligible children from each participating center. The aim of the sampling approach is to yield at least 64 participating children from the estimated 14 participating day care centers in each of the two study states.

Higher sampling rates are used within the Headstart centers (i.e., low-income stratum). The sampling plan is to select 24 low-income children and 40 mid- to high-income children in each state. The planned allocation of participants is:

- 4 Headstart centers: 6 children per center (N=24)
- 10 regular day care centers: 4 children per center (N=40).

7.2.2 Telephone Sample Component

The telephone sample is selected using list-assisted techniques, which have several advantages over strict Random Digit Dialing (RDD) sampling. The advantage include lower costs, due to more productive calls, and smaller variances, due to less sample clustering. Sampling data files are provided by sampling vendors with the instructions from the sampling statistician.

By using available information on exchanges that are likely to have working residential numbers, list-assisted techniques show higher production and hit rates, and hence lower costs. Eligibility rates are also improved by using commercially available information on households likely to have young children, and on income groups, to target the stratified random sample of telephone numbers. Telephone screening is conducted to determine the eligibility of targeted numbers (e.g., to exclude households with children in day care).

The telephone sample design incorporates stratification by urban versus rural areas and by income levels. Urban versus rural stratification is performed at the county level. Stratification into two income groups is implemented by classifying each household in the telephone sampling frame as either low income or mid- to high-income. As with the day care sample, the low-income stratum is sampled at higher rates than the mid- to high-income stratum. The planned allocation of 64 children per state in the telephone sample includes 24 children in the low-income stratum and 40 children in the mid- to high-income stratum. With this allocation, the low-income group constitutes 37.5% of the sample, although the low-income group represents a much smaller proportion of the population.

The CTEPP telephone sampling design capitalizes on information available on telephone number exchanges to stratify the sampling frame of possible telephone numbers. This information is used in the construction of (1) blocks or clusters of telephone numbers known to contain higher concentrations of working residential numbers (WRNs), and (2) strata consisting of blocks with high and low densities of WRNs. As a result, high-density strata are oversampled to yield more effective stratified sampling designs.

Specifically, telephone numbers are grouped into 100-blocks with the same area code, prefix (3 digits), and first two digits of the suffix. Then, all possible combinations of the last two digits of the suffix are called. One example of a 100-block includes all numbers starting with the eight digits (410) 377-28 _ _, where the last two digits range from 00 to 99 (100 possible combinations). With this approach, unlisted numbers are likely to be included in the sample.

These list-assisted samples permit the exclusion of all telephone numbers that are non-working or non-residential and business numbers. This exclusion increases the efficiency of the telephone survey operations. Specifically, hundred-blocks with one or more listed household numbers are put into a high-density stratum, which is expected to contain a large proportion of households. This classification is aided by directory listings (telephone books). Hundred blocks with no listed household numbers are put into a low-density stratum, which is expected to contain a small proportion of households. Both strata are sampled to obtain a probability sample of all households with telephones, but the high-density stratum is oversampled, that is, the high-density stratum is sampled at a higher rate than the low-density stratum.

7.2.3 Expected Response Rate: Day Care Center Sample

The response rates in the day care component are the product of response rates obtained in the following two stages (i.e., A x B).

- (A) Day Care-level response.
- (B) Child-level response.

The goal is to obtain a final 75% response rate.

7.2.4 Expected Response Rate: Telephone Sample

For the telephone sample component, actual response rates are calculated by putting together two components: (a) computed directly for households completing screening, and (b) estimated for households not completing screening. The goal is to obtain a final 75% response rate. The following section provides a detailed description of the computation of response rates for the telephone sample component.
Telephone Screening Disposition Codes:

A. Agree to Participate/Eligible:
The subject agrees to participate in the study and completes the screening survey; the result of the screening indicates that the subject is eligible.

B. Ineligible Subjects:
The result of the screening survey indicates that the subject is ineligible.

C. Refused Screening:
The subject refuses to participate in the study even after the refusal conversion.

C1. Eligible Subjects/Refused:
Subjects provide eligibility information, but then refuse to participate further.
These are refused "eligible" subjects.

C2. Eligibility Unknown:
These are "instant hang-ups." The subject does not speak with the interviewer, so his/her eligibility cannot be determined.

D. Non-working Numbers:
These are disconnected or non-working numbers (e.g., a fax number).

E. Cannot be Reached/No Answer:
Some numbers may not reach a person throughout the entire recruitment period (always busy, answer machine, pager number, etc.). They are coded as "Cannot be Reached/No Answer."

_____A unique numeric code is assigned to each one of the above screening results.

_____

Steps to Calculate the Actual Response Rate:

The following are steps to calculate the actual response rate:

1. Eligible and Completed = A

2. Total Eligible = A + C1

3. Total Ineligible = B

4. Eligibility Unknown = C2 + E

5. Final Response Rate = 1/(2+((2/(2+3))x4))

8.0 Records

All sampling records and paper documents should be kept in the project files until the conclusion of the study. Electronic files should be stored in the sample folders and archived on a CD ROM disk after the project is completed. All records will be archived for three years after the completion of the study.

9.0 Quality Control and Quality Assurance

The results of sample selection and supporting data and documents should be reviewed and verified by the Battelle Field Team Leader, QA Officer, and Task Order Leader. The preparation of data files for sample selection should be checked by two different project staff for any keying errors.

10.0 Reference

10.1 Brewer, K.W.R (1963). "A model of systematic sampling with unequal probabilities," Australian Jour. Statistics, 5, 93-105.

10.2 Cochran, W. G. (1977). *Sampling Theory*. Wiley: New York.

10.3 Iachan, R. (1982). "Systematic sampling—A Critical review," International Statistical Review, 50, 293-303.

10.4 Iachan, R. (1989). "Issues in Environmental Survey Design," Jour. Official Statistics, 5, 323-335.