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1 **10. CONSUMER PRODUCTS**

2
3 **10.1 BACKGROUND**

4 Consumer products may contain toxic or potentially toxic chemical constituents to which
5 children may be exposed as a result of their use. For example, household cleaners can contain
6 ammonia, alcohols, acids and organic solvents which may have health concerns. Potential
7 pathways of exposure to consumer products or chemicals released from consumer products
8 during use include ingestion, inhalation, and dermal contact.

9 This chapter presents information on the amount of product used, frequency of use, and
10 duration of use for various consumer products typically found in households. There are limited
11 data available on consumer product use for the general population and especially for children.
12 Children can be in environments where adults use household consumer products such as
13 cleaners, solvents, and paints. As such, children can be passively exposed to chemicals in these
14 products. Table 10-1 provides a list of household consumer products that are commonly found
15 in some U.S. households (U.S. EPA, 1987). It should be noted that these are 1987 data and
16 current consumer use of some products listed may have changed (e.g., aerosol product use has
17 declined). The studies presented in the following sections represent readily available surveys for
18 which data were collected on the frequency and duration of use and amount of use of cleaning
19 products, painting products, household solvent products, cosmetic and other personal care
20 products, household equipment, pesticides, and tobacco. The reader is referred to the *Exposure*
21 *Factors Handbook* (U.S. EPA, 1997) for a more detailed presentation for use of consumer
22 products for the general population.

23
24 **10.2 CONSUMER PRODUCTS USE STUDIES**

25 *National Human Activity Pattern Survey (NHAPS).* The U.S. EPA collected
26 information for the general population on the duration and frequency of selected activities and
27 the time spent in selected microenvironments via 24-hour diaries. Over 9000 individuals from
28 all age groups in 48 contiguous states participated in NHAPS. The survey was conducted
29 between October 1992 and September 1994. Individuals were interviewed to categorize their
30 24-hour routines (diaries) and/or answer follow-up exposure questions that were related to
31 exposure events. Demographic data, including socioeconomic (gender, age, race, education,

1 etc.), geographic (census region, state, etc.), and temporal (day of week, month, season) data
2 were included in the study (Tsang and Klepeis, 1996). Data were collected for a maximum of 82
3 possible microenvironments and 91 different activities.

4 As part of the survey, data were also collected on duration and frequency of use of
5 selected consumer products. Because the age categories used by the study authors do not
6 coincide with the standardized age categories used in this Handbook, the source data from
7 NHAPS were re-analyzed by EPA to generate data for the standardized age categories. These
8 data are presented in Tables 10-2 through 10-6 for age groups less than 1 year, 1 year, 2 years, 3
9 to <6 years, 6 to <11 years, 11 to <16 years, and 16 to <21 years. Data for subsets of the first
10 year of life (e.g., 1 to 2 months, 3 to 5 months, etc.) are not available. Distribution data are
11 presented for selected percentiles (where possible). Other data are presented in ranges of time
12 spent in an activity (e.g., working with or near a product being used) or ranges for the number of
13 times an activity involving a consumer product was performed. Total N denotes the number of
14 respondents for that specific activity category.

15 As discussed in previous chapters of this Handbook that used NHAPS as a data source,
16 the primary advantage of NHAPS is that the data were collected for a large number of
17 individuals and the survey was designed to be representative of the U.S. general population.
18 However, due to the wording of questions in the survey, precise data are not available for
19 consumers who spent more than 60, 120, 180, or 240 minutes (depending on the activity) using
20 some consumer products. This prevents accurate characterization of the high range of the
21 distribution and may also introduce error into the calculation of the mean.

22 23 **10.3 RECOMMENDATIONS**

24 Due to the large range and variation among consumer products and their exposure
25 pathways, it is not feasible to specify recommended exposure values as had been done in other
26 chapters of this handbook. The user is referred to the contents/references of this chapter and
27 Chapter 16 of the *Exposure Factors Handbook* to derive appropriate exposure factors.

1 **10.4 REFERENCES FOR CHAPTER 10**
2
3

4 Tsang, A.M.; Klepeis, N.E. (1996) Results tables from a detailed analysis of the National Human Activity Pattern
5 Survey (NHAPS) response. Draft Report prepared for the U.S. Environmental Protection Agency by
6 Lockheed Martin, Contract No. 68-W6-001, Delivery Order No. 13.
7

8 U.S. EPA (1987). Methods for assessing exposure to chemical substances - Volume 7 - Methods for assessing
9 consumer exposure to chemical substances. Washington, DC: Office of Toxic Substances. EPA/560/5-
10 85/007.
11

12 U.S. EPA (1997). Exposure Factors Handbook, National Center for Environmental Assessment, Office of Research
13 and Development, Washington, DC. EPA/600/P-95/002FC.

Table 10-1. Consumer Products Commonly Found in Some U.S. Households^a

Consumer Product Category	Consumer Product
Cosmetics Hygiene Products	Adhesive bandages Bath additives (liquid) Bath additives (powder) Cologne/perfume/aftershave Contact lens solutions Deodorant/antiperspirant (aerosol) Deodorant/antiperspirant (wax and liquid) Depilatories Facial makeup Fingernail cosmetics Hair coloring/tinting products Hair conditioning products Hairsprays (aerosol) Lip products Mouthwash/breath freshener Sanitary napkins and pads Shampoo Shaving creams (aerosols) Skin creams (non-drug) Skin oils (non-drug) Soap (toilet bar) Sunscreen/suntan products Talc/body powder (non-drug) Toothpaste Waterless skin cleaners
Household Furnishings	Carpeting Draperies/curtains Rugs (area) Shower curtains Vinyl upholstery, furniture
Garment Conditioning Products	Anti-static spray (aerosol) Leather treatment (liquid and wax) Shoe polish Spray starch (aerosol) Suede cleaner/polish (liquid and aerosol) Textile water-proofing (aerosol)
Household Maintenance Products	Adhesive (general) (liquid) Bleach (household) (liquid) Bleach (see laundry) Candles Cat box litter Charcoal briquets Charcoal lighter fluid Drain cleaner (liquid and powder) Dishwasher detergent (powder) Dishwashing liquid Fabric dye (DIY) ^b Fabric rinse/softener (liquid)

Table 10-1. Consumer Products Commonly Found in Some U.S. Households^a (continued)

Consumer Product Category	Consumer Product
Household Maintenance Products (continued)	Fabric rinse/softener (powder) Fertilizer (garden) (liquid) Fertilizer (garden) (powder) Fire extinguishers (aerosol) Floor polish/wax (liquid) Food packaging and packaged food Furniture polish (liquid) Furniture polish (aerosol) General cleaner/disinfectant (liquid) General cleaner (powder) General cleaner/disinfectant (aerosol and pump) General spot/stain remover (liquid) General spot/stain remover (aerosol and pump) Herbicide (garden-patio) (Liquid and aerosol) Insecticide (home and garden) (powder) Insecticide (home and garden) (aerosol and pump) Insect repellent (liquid and aerosol) Laundry detergent/bleach (liquid) Laundry detergent (powder) Laundry pre-wash/soak (powder) Laundry pre-wash/soak (liquid) Laundry pre-wash/soak (aerosol and pump) Lubricant oil (liquid) Lubricant (aerosol) Matches Metal polish Oven cleaner (aerosol) Pesticide (home) (solid) Pesticide (pet dip) (liquid) Pesticide (pet) (powder) Pesticide (pet) (aerosol) Pesticide (pet) (collar) Petroleum fuels (home) (liquid and aerosol) Rug cleaner/shampoo (liquid and aerosol) Rug deodorizer/freshener (powder) Room deodorizer (solid) Room deodorizer (aerosol) Scouring pad Toilet bowl cleaner Toilet bowl deodorant (solid) Water-treating chemicals (swimming pools)
Home Building/Improvement Products (DIY) ^b	Adhesives, specialty (liquid) Ceiling tile Caulks/sealers/fillers Dry wall/wall board Flooring (vinyl) House Paint (interior) (liquid) House Paint and Stain (exterior) (liquid) Insulation (solid) Insulation (foam)

Table 10-1. Consumer Products Commonly Found in Some U.S. Households^a (continued)

Consumer Product Category	Consumer Product
Home Building/Improvement Products (DIY) ^b (Continued)	Paint/varnish removers Paint thinner/brush cleaners Patching/ceiling plaster Roofing Refinishing products (polyurethane, varnishes, etc.) Spray paints (home) (aerosol) Wall paneling Wall paper Wall paper glue
Automobile-related Products	Antifreeze Car polish/wax Fuel/lubricant additives Gasoline/diesel fuel Interior upholstery/components, synthetic Motor oil Radiator flush/cleaner Automotive touch-up paint (aerosol) Windshield washer solvents
Personal Materials	Clothes/shoes Diapers/vinyl pants Jewelry Printed material (colorprint, newsprint, photographs) Sheets/towels Toys (intended to be placed in mouths)

^a A subjective listing based on consumer use profiles.

^b DIY = Do It Yourself.

Source: U.S. EPA, 1987.

Table 10-2. Number of Minutes Spent in Activities Working with or Near Household Cleaning Agents Such as Scouring Powders or Ammonia (minutes/day)

Age	N ^a	Min	Percentiles ^b											Max	
			1	2	5	10	25	50	75	90	95	98	99		
Time spent in Activities Working with or Near Household Cleaning Agents Such as Scouring Powders or Ammonia (minutes/day)															
0 to <1	2	0	-	-	-	-	-	-	-	-	-	-	-	-	10
1 to <2	6	5	-	-	-	-	-	-	-	-	-	-	-	-	121
2 to <3	5	10	-	-	-	-	-	-	-	-	-	-	-	-	30
3 to <6	11	0	0	0	0	0	3	5	20	20	25	28	29	30	
6 to <11	21	1	1	1	2	2	3	5	10	20	20	26	28	30	
11 to <16	34	0	0	0	1	1	2	5	15	37	60	60	60	60	
16 to <21	41	0	0	0	0	0	3	7	15	30	60	132	156	180	

^a N = doer sample size

^b Percentiles are the percentage of doers below or equal to a given number of minutes; percentiles were not calculated where N < 10.

Source: EPA Analysis of source data used by Tsang and Klepeis (1996) (NHAPS database)

Table 10-3. Number of Minutes Spent Using Any Microwave Oven (minutes/day)

Age	N ^a	Min	Percentiles ^b											Max	
			1	2	5	10	25	50	75	90	95	98	99		
Time spent using any microwave oven (minutes/day)															
0 to <1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 to <2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 to <3	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 to <6	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1
6 to <11	54	0	0	0	0	1	1	2	5	10	15	20	25	30	
11 to <16	110	0	0	0	0	1	2	3	5	11	18.3	30	30	60	
16 to <21	137	0	0	0	0	1	2	3	5	10	15	34	80	121	

^a N = doer sample size

^b Percentiles are the percentage of doers below or equal to a given number of minutes; percentiles were not calculated where N < 10.

Source: EPA Analysis of source data used by Tsang and Klepeis (1996) (NHAPS database)

Table 10-4. Number of Respondents Using a Humidifier at Home

Age (years)	Total N	Frequency				
		Almost Every Day	3-5 Times a Week	1-2 Times a Week	1-2 Times a Month	DK
0 to <1	14	4	2	2	6	0
1 to <2	25	6	5	1	13	0
2 to <3	30	10	5	1	14	0
3 to <6	63	16	6	8	31	2
6 to <11	64	15	8	6	33	2
11 to <16	69	16	5	4	43	1
16 to <21	51	17	9	5	20	0

Note: DK= Don't Know; Refused = Respondent Refused to Answer; N = Number of Respondents

Source: EPA Analysis of source data used by Tsang and Klepeis (1996) (NHAPS database)

Table 10-5. Number of Respondents Indicating that Pesticides Were Applied by a Professional at Home to Eradicate Insects, Rodents, or Other Pests at Specified Frequencies

Age (years)	Total N	Frequency					
		None	1 to 2	3 to 5	6 to 9	10+	DK
0 to <1	15	9	4	1	1	0	0
1 to <2	23	13	5	3	1	1	0
2 to <3	32	9	15	5	3	0	0
3 to <6	80	51	22	5	2	0	0
6 to <11	106	59	22	7	17	1	0
11 to <16	115	68	35	4	6	0	2
16 to <21	87	40	36	2	5	1	3

Note: * = Missing Data; DK= Don't know; Refused = Respondent Refused to Answer; N = Number of Respondents

Source: EPA Analysis of source data used by Tsang and Klepeis (1996) (NHAPS database)

Table 10-6. Number of Respondents Reporting Pesticides Applied by the Consumer at Home To Eradicate Insects, Rodents, or Other Pests at Specified Frequencies

Age (years)	Total N	Frequency					
		None	1 to 2	3 to 5	6 to 9	10+	DK
0 to <1	15	4	8	2	0	1	0
1 to <2	23	11	10	1	0	1	0
2 to <3	32	18	9	2	2	1	0
3 to <6	80	26	35	18	1	0	0
6 to <11	106	37	49	14	1	4	1
11 to <16	115	37	50	18	4	6	0
16 to <21	87	36	33	9	4	4	1

Note: * = Missing Data; DK= Don't know; Refused = Respondent Refused to Answer; N = Number of Respondents

Source: EPA Analysis of source data used by Tsang and Klepeis (1996) (NHAPS database)