

## Chapter Four

# Health-Related Behaviors

This chapter presents information on health-related behaviors of WIC participants and nonparticipants. Topics covered for infants and children include breastfeeding and other infant feeding practices and exposure to second-hand smoke. For pregnant and postpartum women, topics include physical activity, alcohol consumption, tobacco use, and exposure to second-hand smoke.

### **Breastfeeding and Other Infant Feeding Practices**

NHANES-III included, for infants and children under the age of 6 years, a detailed set of questions on infant feeding practices. The questions asked about initiation and duration of breastfeeding, use of formula and cow's milk, use of baby bottles, and introduction of solid foods. This section summarizes these data for infants and 1-4-year-old children.

#### **Breastfeeding**

Official WIC policy has always encouraged breastfeeding, while at the same time providing access to infant formula for nonbreastfeeding infants. The focus on breastfeeding promotion increased during the late 1980s and early 1990s, largely in response to a national survey that showed that rates of breastfeeding were declining as the WIC program was expanding. During the NHANES-III data collection period (1988-94), several important changes in WIC breastfeeding policies were implemented (USDA, FNS, 2003b). For example, in 1989, P.L. 101-147 required that USDA develop standards for breastfeeding promotion and support and targeted \$8 million for State-level efforts in this area. In 1992, P.L. 102-342

required that USDA establish a national breastfeeding promotion program. That same year, USDA instituted an enhanced food package for women who exclusively breastfeed. The enhanced package has additional amounts of juice, cheese, and legumes, and also includes carrots and canned tuna. Finally, in 1994, P.L. 103-448 increased the amount of money each State was required to devote to breastfeeding promotion and required that all States collect data on the incidence and duration of breastfeeding among WIC participants.

More recently, P.L. 105-336 authorized the use of State administrative funds for the purchase or rental of breast pumps. USDA has also implemented several breastfeeding promotion demonstration projects and has disseminated findings and recommendations to State and local WIC agencies.

Clearly, the NHANES-III data were collected during a time when WIC breastfeeding promotion strategies were evolving and do not reflect current program policies and procedures in this area. For this reason, NHANES-III breastfeeding data for WIC participants must be interpreted with caution. This is especially true for data on WIC children, some of whom were infants before 1988 and who may or may not have participated in WIC as infants or had mothers who participated in WIC during pregnancy. (NHANES-III does not include information on prior WIC participation).

It is also important to note that research on the determinants of breastfeeding has demonstrated that women who are minority, less educated, lower-income, and younger are less likely to

breastfed than other women (U.S. DHHS, 2000a). These demographic characteristics also describe WIC participants.

**Initiation and Duration of Breastfeeding**

At the time NHANES-III data were collected, 54 percent of all infants and 1-4-year-old children had been breastfed for some period of time (table D-58). Among those ever breastfed, 41 percent had been breastfed for at least 6 months (tables D-59) and 16 percent had been breastfed for at least a year (table D-60).

WIC infants were significantly less likely to have ever been breastfed than either income-eligible or higher-income nonparticipant infants (39% vs. 51% and 71%) (figure 19 and table D-58). In addition, WIC children were significantly less likely than higher-income children to have ever been breastfed (41% vs. 67%).

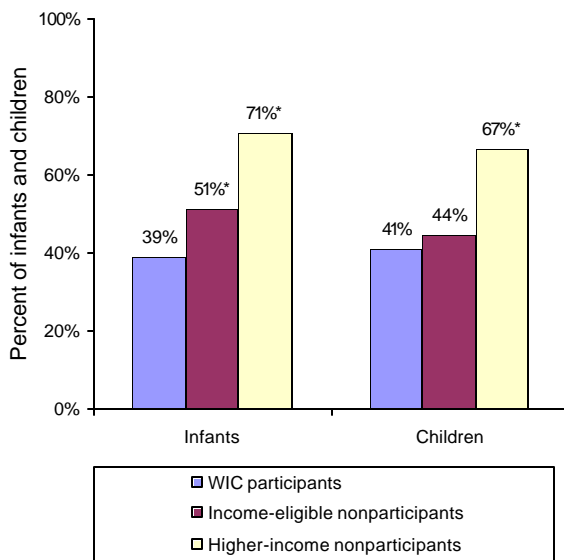
Among infants who had ever been breastfed, there was no significant difference between WIC participants and income-eligible nonparticipants in the percentage who had been breastfed

for 6 months or more (31% vs. 39%) (figure 20 and table D-59). However, in comparison with higher-income infants, WIC infants were significantly less likely to have been breastfed for this length of time (31% vs. 42%).

Among children who were breastfed as infants, there were no differences between WIC participants and nonparticipants, overall, in the percentage breastfed for 6 months or more (figure 20 and table D-59), the percentage breastfed for a year or more (table D-60), or in the mean duration of breastfeeding (table D-61).<sup>1</sup> Among 4-year-olds, however, WIC participants were significantly less likely than either group of nonparticipants to have been breastfed for a year or longer (table D-60) (the point estimate for WIC children is statistically unreliable). In addition, the mean duration of breastfeeding was significantly shorter for 4-year-old WIC children

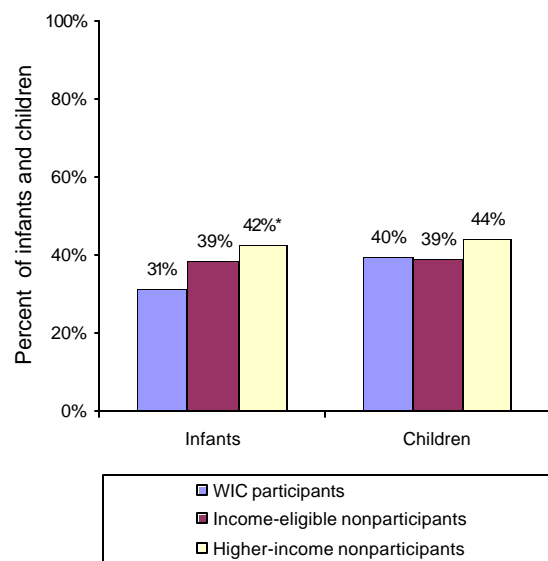
<sup>1</sup>Mean duration of breastfeeding was not tabulated for infants because some infants were still breastfeeding.

**Figure 19 - Percent of infants and children ever breastfed**



\*Statistically significant difference from WIC participants at the .05 level or better.  
Source: NHANES-III, 1988-94.

**Figure 20 - Percent of infants and children breastfed at least 6 months, among those ever breastfed**



\*Statistically significant difference from WIC participants at the .05 level or better.  
Source: NHANES-III, 1988-94.

than for comparably aged children in the higher-income group (table D-61) (the point estimate for WIC children is statistically unreliable).

### Use of Supplemental Formula Among Breastfed Infants

Among infants and children who were ever breastfed, 17 percent never received supplemental formula (table D-62). For infants and 1-4-year-old children who received both breastmilk and formula, formula was first fed on a daily basis at about 12 weeks of age, on average (table D-63).

Overall, breastfed WIC infants were significantly more likely to receive supplemental formula than breastfed infants in either of the nonparticipant groups. Only 9 percent of breastfed WIC infants had never received formula, compared with 19 percent of income-eligible breastfed infants and 22 percent of higher-income breastfed infants (table D-62). In addition, breastfed WIC infants were fed formula on a daily basis at a significantly younger age than higher-income breastfed infants (6.6 weeks vs. 9.1 weeks) (table D-63).

Among 1-4-year-old children who had been breastfed, there were no significant differences, overall, between WIC participants and either group of nonparticipants in the percentage who never received supplemental formula (table D-62) or in the age at which formula was first fed on a daily basis (table D-63). However, among 4-year-olds who were breastfed as infants, WIC participants were significantly more likely than either group of nonparticipants to have received supplemental formula (table D-62) (the point estimate for WIC children is statistically unreliable).

### Use of Cow's Milk Before 12 Months of Age

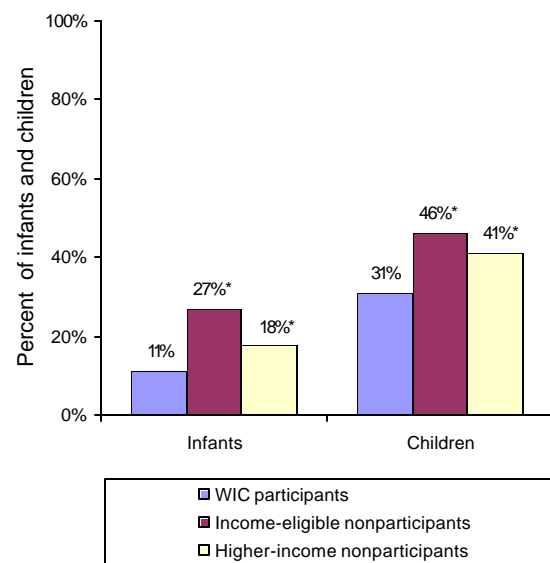
WIC infant feeding guidelines, as well as guidelines issued by the American Academy of Pediatrics (AAP), recommend that cow's milk

not be introduced until 12 months of age (USDA, FNS, 2003c and AAP, 2003). The rationale for this recommendation is that, relative to infants' special nutritional needs, cow's milk is low in iron and other essential nutrients and high in protein, sodium, and potassium. In addition, the type of protein and fat found in cow's milk may be difficult for infants to digest and absorb.

At the time the NHANES-III data were collected, many parents and caregivers did not adhere to this recommendation. Overall, 17 percent of infants 2-11 months of age were being fed cow's milk on a daily basis (table D-64). Among children 1-4 years of age, 41 percent had been fed cow's milk on a daily basis before their first birthday.

Early introduction of cow's milk was significantly less common among WIC participants than either group of nonparticipants. This was true for both infants and children. Eleven percent of WIC infants were receiving cow's milk on a daily basis, compared with 27 percent of income-eligible infants and 18 percent of higher-income infants (figure 21). Similarly, 31 percent of WIC

**Figure 21 - Percent of infants and children fed cow's milk before 12 months of age**



\*Statistically significant difference from WIC participants at the .05 level or better.  
Source: NHANES-III, 1988-94.

children reportedly received cow's milk on a daily basis before 12 months of age, compared with 46 percent of income-eligible children and 41 percent of higher-income children.

Among infants 7 months of age and older, the mean age at which cow's milk was first fed on a daily basis was 32.1 weeks or 7.6 months (table D-65). (This estimate may be biased by the large percentage of infants who had not yet been fed cow's milk.) Among children, the mean age at which cow's milk was first fed on a daily basis was 47.9 weeks or 11.4 months.

Overall, there were no significant differences between WIC participants and either group of nonparticipants in the mean age at which cow's milk was first fed on a daily basis. Among 1-year-olds, however, WIC participants were significantly older than income-eligible nonparticipants when they were first fed cow's milk on a daily basis (47.8 weeks (11.4 months) vs. 44.2 weeks (10.5 months)) (table D-65).

#### **Use of a Baby Bottle**

It is recommended that infants be fed beverages from cups rather than bottles as soon as they are able to sit erectly on their own. Infants can generally drink from a cup, with assistance, by 4-6 months and can hold a cup on their own by 10-12 months (USDA, FNS, 2003c and AAP, 2003). A major reason for discouraging prolonged use of baby bottles is that it increases the risk of "baby-bottle-carries," a syndrome in which infant teeth are excessively decayed (USDA, FNS, 2003c and AAP, 2003). In extreme cases, underlying permanent teeth may also be affected. Another concern is that infants who consume too much formula or other beverages from a bottle may crowd out other essential nutrients found in solid foods.

The vast majority of infants and children (96%) used a baby bottle at some point in time (table D-66). Among infants, WIC participants were

significantly more likely than either group of nonparticipants to have used a baby bottle (the point estimate for WIC infants is statistically unreliable). The higher rate of breastfeeding among nonparticipant infants may contribute to this pattern.

At the time data were collected, 95 percent of all infants were using baby bottles (table D-67). Again, WIC infants were significantly more likely than either group of nonparticipant infants to be using bottles (the point estimate for WIC infants is statistically unreliable). This pattern was also observed when data were tabulated separately for infants who were between 7 and 11 months of age (99% vs. 92% for both groups of nonparticipants) (data not shown).

At about a year of age, there was a noteworthy decline in use of baby bottles. Overall, 61 percent of 1-year-olds were still using a bottle. This percentage decreased to 23 percent for 2-year-olds and to 9 percent and 4 percent for 3- and 4-year-olds, respectively. This general pattern was noted for all three groups of children. However, the rate of decline was significantly slower for WIC children than for higher-income children. At each year of age, the proportion of children using a baby bottle was significantly greater for WIC participants than for higher-income nonparticipants (table D-67).

Among children who were no longer using a baby bottle, there were no significant differences between WIC participants and either group of nonparticipants in the percentage of children who stopped using a bottle before 1 year of age (table D-68) or in the mean age at which baby bottles were discontinued (table D-69).

#### **Introduction of Solid Foods**

Recommended infant feeding practices suggest that solid foods be introduced as children become physically and physiologically able to handle these foods. Signs of readiness include

the ability to sit erectly in a supported position (for example, in a high chair), to draw in the lower lip when being fed with a spoon, to swallow food rather than reflexively push it out with the tongue, and to express satiety (USDA, FNS, 2003c and AAP, 2003). These developmental milestones usually occur between 4 and 6 months of age. Consequently, infants should generally not receive solid foods until they are at least 4 months old.

Overall, almost a quarter (23%) of infants and children were fed solid foods before 4 months of age (table D-70). WIC infants and children were no more or less likely than nonparticipant infants and children to be fed solid foods at an early age. According to parent and caregiver reports, 20 percent of WIC infants and children received solid foods before 4 months of age, compared with 24 percent of income-eligible nonparticipants and 23 percent of higher-income nonparticipants.

Among infants, the mean age at which solid foods were first fed on a daily basis was 4.1 months (table D-71). (This estimate may be biased by the large percentage of infants who were not yet eating solids.) There were no differences between WIC infants and either group of nonparticipant infants in the mean age at which solids were introduced. Children 1-4 years of age were reportedly first fed solid foods on a daily basis at 5.9 months. On average, WIC children were significantly older than higher-income children (6.3 months vs. 5.5 months) when they began to eat solid foods on a daily basis.

### **Physical Activity Among Pregnant and Postpartum Women**

Increasing leisure-time physical activity among adults is one of the *Healthy People 2010* goals in the area of physical activity (U.S. DHHS, 2000a). Specific goals call for decreasing the percentage of adults who engage in no leisure-

time activity and increasing the percentage of adults who participate in moderate and vigorous physical activity.

*Healthy People 2010* does not include specific physical activity goals for pregnant and postpartum women. The guidelines of the American College of Obstetrics and Gynecologists (ACOG), however, say that there are no data to indicate that pregnant women should limit exercise during pregnancy. ACOG recommends that pregnant women “engage in 30 minutes or more of moderate exercise on most, if not all, days of the week” (ACOG, 2001).

As discussed below, NHANES-III data lack sufficient information about levels of exertion to evaluate compliance with *Healthy People 2010* goals for vigorous and moderate activity or ACOG recommendations for moderate activity.<sup>2</sup> However, the available data provide some information about the extent to which women participated in leisure-time physical activities during and after pregnancy.

NHANES-III asked adult respondents (17 years and older) whether they participated in a number of different physical activities during the preceding month and, if so, how often they engaged in the activity. The specific activities included in the query were walking a mile or more without stopping, jogging or running, riding a bike or an exercise bike, swimming, aerobics or aerobic dance, other types of dancing, calisthenics, gardening or yard work, and weight lifting. Respondents were also asked to identify any other type of physical activity they engaged in during the preceding month. The reported prevalence of many activities was too low to support detailed analyses. However, data were analyzed separately for walking.

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<sup>2</sup>*Healthy People 2010* used data from the National Health Interview Survey (NHIS), rather than NHANES-III, to establish baselines for goals related to physical activity among adults, and will use NHIS data to monitor trends in this area over time (U.S. DHHS, 2000b).

## Walking

Overall, 51 percent of pregnant and postpartum women reported walking a mile or more without stopping at least once during the preceding month (table D-72). There were no significant differences between WIC participants and either group of nonparticipants on this measure. Forty-nine percent of WIC women walked a mile or more without stopping, compared with 48 percent of income-eligible women and 54 percent of higher-income women.

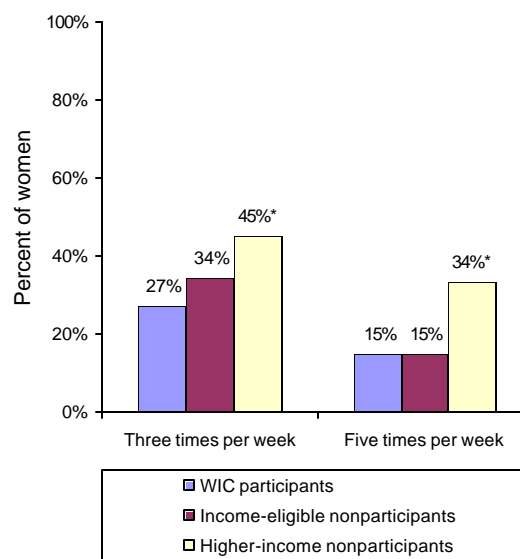
## Weekly Frequency of Physical Activity

As noted in the introduction to this section, NHANES-III data cannot be used to examine compliance with *Healthy People 2010* goals for frequency of vigorous and moderate activity or with ACOG guidelines for frequency of moderate activity. This is because NHANES-III lacks information on the intensity and duration of bouts of physical activity.<sup>3</sup>

As an alternative, available data on the reported frequency of physical activity were used to assess the proportion of women who engaged in physical activity three or more times per week and the proportion who engaged in physical activity five or more times per week. All reported activities were included in these tabulations.

The data indicate that pregnant and postpartum women enrolled in WIC were about as physically active as income-eligible nonparticipants, but were significantly less physically active than higher-income nonparticipants (figure 22 and table D-72). Twenty-seven percent of WIC women engaged in some physical activity at

**Figure 22 - Percent of pregnant and postpartum women engaging in physical activity**



\*Statistically significant difference from WIC participants at the .05 level or better.  
Source: NHANES-III, 1988-94.

least three times per week, and 15 percent engaged in physical activity at least five times per week. This compares with 34 percent and 15 percent of income-eligible nonparticipants, respectively, and 45 percent and 34 percent of higher-income nonparticipants, respectively. Both of the differences between WIC women and higher-income women were statistically significant.

## Alcohol and Tobacco Consumption

Women are advised to avoid alcoholic beverages and tobacco during pregnancy. Alcohol consumption during pregnancy is associated with adverse effects on fetal growth, ranging from subtle developmental problems to fetal alcohol syndrome. Smoking during pregnancy is associated with increased risk of premature membrane rupture and a modest increase in risk of preterm delivery and low birthweight (U.S. DHHS, 2001). Consequently, *Healthy People 2010* set targets for pregnant women of nearly 100 percent abstinence from alcohol and cigarettes during pregnancy (U.S. DHHS, 2000a).

<sup>3</sup>NHANES-III physical activity data include intensity codes that were assigned to all queried activities and to all additional ("other") activities reported by respondents. However, because all queried activities received the same intensity rating, these data could not be used to identify individuals who engaged in specific activities at greater and lesser levels of intensity.

NHANES-III did not ask sampled women about alcohol and tobacco consumption during pregnancy. Rather, respondents were asked if they ever smoked or consumed alcohol and if they smoked or consumed alcohol in the recent past (past 5 days for cigarettes, past year for alcohol). These data provide some information on the percentage of WIC women and nonparticipant women who may need education about the dangers of alcohol and tobacco consumption during pregnancy. (The next chapter presents information about the percentage of infants and children born to women who smoked during pregnancy.) Data are not tabulated separately for pregnant women and postpartum women because of limited samples.

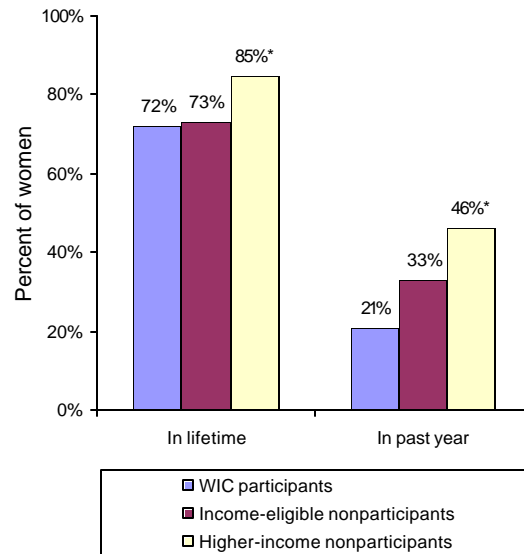
### Alcohol Consumption

Respondents were asked whether they had consumed at least 12 alcoholic beverages, not counting small sips, over their lifetime and during the past 12 months. Overall, 78 percent of pregnant and postpartum women reported consuming at least 12 alcoholic drinks during their lifetime (table D-73). The percentage consuming that number of alcoholic drinks during the past year was notably lower, at 37 percent.

Patterns of alcohol consumption among pregnant and postpartum women were comparable for WIC participants and income-eligible nonparticipants (figure 23). However, in comparison with higher-income nonparticipants, WIC participants were significantly less likely to have consumed 12 or more alcoholic drinks in their lifetime (72% vs. 85%) or to have consumed this amount of alcohol during the past year (21% vs. 46%).

Among women who consumed alcohol during the past year, the mean number of drinks consumed on an average drinking day was significantly *greater* for WIC participants than for higher-income nonparticipants (point esti-

**Figure 23 - Percent of pregnant and postpartum women who consumed 12 or more alcoholic beverages, in their lifetime and in the past year**



\*Statistically significant difference from WIC participants at the .05 level or better.  
Source: NHANES-III, 1988-94.

mates for both groups of women are statistically unreliable) (table D-73).

### Tobacco Consumption

Overall, 38 percent of pregnant and postpartum women reported that they were or had been smokers (table D-74). This includes all women who reported having smoked at least 100 cigarettes (5 packs) in their lifetime. More than one in five (22%) pregnant and postpartum women reported having smoked in the past 5 days. The mean number of cigarettes smoked by current smokers in the past 5 days was 52.6, or about 2.6 packs. There were no significant differences between WIC participants and either group of nonparticipants on any of these measures.

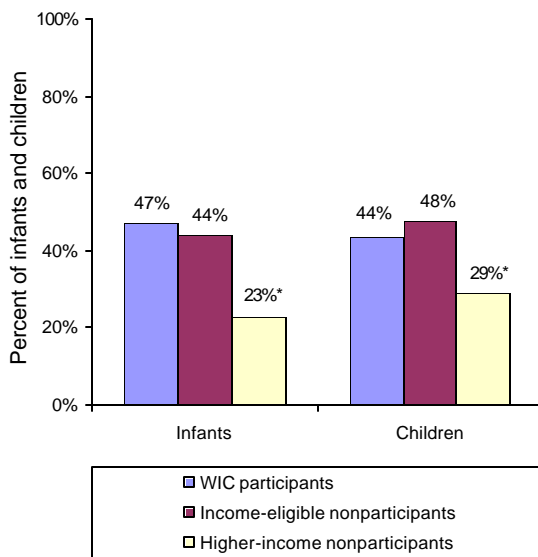
There was a significant difference, however, between WIC women and higher-income women in the reported mean age at which smoking was initiated. Specifically, WIC women

started smoking at a younger age than higher-income women (the point estimate for WIC women is statistically unreliable) (table D-74).

### Exposure to Second-Hand Smoke

NHANES-III collected information on the number of smokers living in each household and the number of cigarettes smoked by those individuals. These data reveal that exposure to second-hand smoke was comparable for non-smoking WIC participants and nonsmoking, income-eligible nonparticipants. However, non-smoking WIC participants were significantly more likely than nonsmoking, higher-income nonparticipants to be exposed to second-hand smoke produced by other household members (figure 24 and D-75). This was true for all three categories of WIC participants (women, infants, and children). Data for women are not presented in figure 24 because the point estimate for higher-income women is statistically unreliable.

**Figure 24 - Percent of infants and children exposed to cigarette smoke at home**



\*Statistically significant difference from WIC participants at the .05 level or better.

Note: Women are not shown because the point estimate is statistically unreliable for higher-income women.

Source: NHANES-III, 1988-94.

The exposure of infants and young children to second-hand smoke is of special concern.

Among infants, WIC participants were twice as likely as higher-income nonparticipants to be exposed to smoke in the home (47% vs. 23%).

The trend was similar for children, although the disparity between the two groups was smaller (44% vs. 29%).

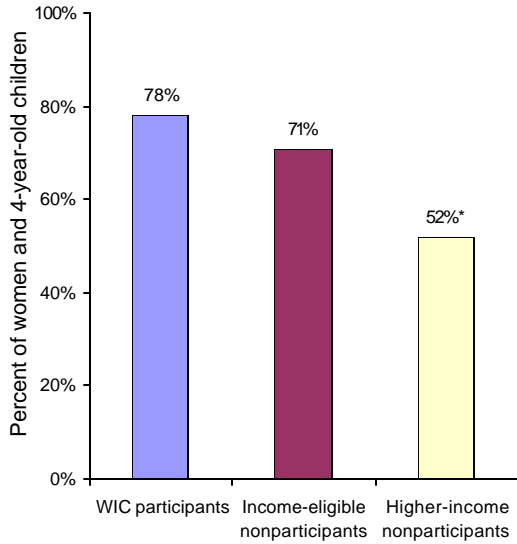
Although a significantly greater percentage of nonsmoking WIC participants than nonsmoking, higher-income nonparticipants were exposed to second-hand smoke in their homes, the average “dose” for those exposed was comparable across groups. That is, for all groups of non-smokers, the mean number of cigarettes smoked by smokers in the household was approximately the same: 15-16 cigarettes per day (table D-76).

NHANES-III measured serum cotinine in all respondents 4 years of age and older. Cotinine is a breakdown product of nicotine, and is used as a biological marker for tobacco use and exposure to environmental tobacco smoke. Overall, 62 percent of nonsmoking women and 4-year-old children had high serum cotinine levels (table D-77). The prevalence of this problem was notably greater for 4-year-old children than for pregnant and postpartum women (76% vs. 52%) (statistical significance of age-based difference not tested).

There were no differences between WIC participants and income-eligible nonparticipants in the prevalence of high serum cotinine levels. In comparison with higher-income nonparticipants, however, the prevalence of high serum cotinine was significantly greater for WIC participants (figure 25 and table D-77). This is consistent with the previous finding that non-smoking WIC participants were more likely than nonsmoking, higher-income nonparticipants to reside with one or more smokers. Overall, 78 percent of WIC participants had high a high serum cotinine, compared with 52 percent of



**Figure 25 - Percent of nonsmoking women and 4-year-old children with high serum cotinine levels**



\*Statistically significant difference from WIC participants at the .05 level or better.

Note: Data are not shown separately for women and 4-year-old children because the point estimate is statistically unreliable for 4-year-old WIC participants.

Source: NHANES-III, 1988-94.

higher-income nonparticipants. This pattern was noted separately for both women and 4-year-olds. Data are not reported separately in figure 25 because the point estimate for 4-year-old WIC participants is statistically unreliable.