

**Measuring the Purchases of Soft Drinks by
Students in U.S. Schools**

An Analysis for the American Beverage Association

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Executive Summary

This study provides an analysis of the sales of beverages in America's schools, including carbonated soft drinks (CSDs), juices, sports drinks, teas, milks, and waters. The study was commissioned by the American Beverage Association (ABA), the industry association for the nation's largest beverage companies and bottlers. The key objective was to calculate average per capita school purchases of beverages by students during the normal school day. The study also examined trends in the volume and product mix of beverages purchased at schools from 2002 through 2005.

Student "school day" purchases were computed from national industry shipments data for schools in 2004. The shipments data was obtained from the 13 largest bottlers in the country, who are responsible for about 90% of all U.S. soft drink shipments. Aggregated national shipment data for the 13 bottlers was adjusted to account for 100% of school sales and was then combined with national student population figures from the U.S. Census Bureau to estimate average per student beverage purchases in high schools, middle schools and elementary schools. In order to corroborate these national school purchase estimates, detailed shipments data was additionally collected for 15 benchmark school systems located in ten states across the country, from New Hampshire to California and combined with school enrollment data to determine average per student beverage purchases for these systems.

An important step in the analysis was to validate the shipments data received from the bottlers. A series of data checks were performed, including tests of how closely the reported school shipments data matched industry estimates of the relative Coke and Pepsi system percentages of national school sales. These data checks confirmed that the reported data was robust and reliable.

Given the study's focus on student school day purchases, two main adjustments to the reported shipments data were necessary:

- Upward adjustments were made because some school districts use third-party food service vendors that may sell beverages through school vending machines or other channels. These upward adjustments ranged from 5% to 30% of the bottler's reported school shipments.
- Downward adjustments were necessary to account for the fact that some shipments of beverages to schools are not student accessible. Shipments to faculty lounges, administration buildings, and stadiums were considered to be non-student accessible during the normal school day. Adjustments were based upon analysis of a detailed shipments database, surveys of school delivery personnel, information from an extensive vending machine location database, and interviews with industry experts. For high schools, 25% of CSDs, 15% of non-carbonated drinks, and 3% of milks were judged to not be student accessible during normal school hours.

Among the key findings of the study:

- Student school day purchases of traditional (“sugared”) CSDs in 2004 averaged at most 12.5 ounces per week for high school students, 3.0 ounces per week for middle school students, and 0.3 ounces per week for elementary school students. That is, the typical high school student purchased at most about one twelve-ounce can of traditional CSD per week at school. The typical elementary school student purchased at most only about one can of traditional sugared CSD per school year. Because of the conservative nature of the methodology, actual purchases could be lower than these estimates, particularly in elementary schools, because the analysis did not account for all beverage purchases by faculty members or parents from machines in student-accessible locations during or after the school day.
- The total number of ounces of beverages purchased at schools declined by 5.7% from 2002 to 2004. The biggest contributor to this overall decline was a sharp 24.3% decline in the purchases of traditional CSDs. During this same two-year span, the total number of ounces of diet CSDs purchased at school increased by 20.7%, waters increased by 22.8%, sports drinks increased by 69.5%, and 100% juices increased by 15.4%.
- There were major shifts in the product mix. At the high school level, traditional CSDs dropped from 57.2% of total shipments in 2002 to 44.9% of shipments in 2005. The fruit drink percentage of total shipments also fell, from 14.8% in 2002 to 12.5% in 2005. Virtually all other product categories saw their percentage of total shipments increase between 2002 and 2005. The largest increases were in sport drinks (6.8% in 2002 to 14.3% in 2005), waters (9.1% in 2002 to 12.7% in 2005), and diet CSDs (5.5% in 2002 to 7.6% in 2005.)
- For middle schools and elementary schools (combined), the same trends appear as for high schools, although the initial percentage of traditional CSDs in the product mix was lower. Traditional CSDs represented 47.5% of total shipments in 2002 and this declined steadily to 34.2% by 2005. Meanwhile the percentage of sports drinks more than doubled from 7.8% in 2002 to 16.3% in 2005, the percentage of waters jumped from 8.6% in 2002 to 12.7% in 2005, and the percentage of diet CSDs increased from 10.0% in 2002 to 13.0% in 2005.

The analysis of shipments data from the 15 benchmark school systems corroborated the reasonableness of the national estimates of average per student purchases.

- At the high school level, for example, the national estimate of 12.5 ounces of traditional CSD purchases per student per week in 2004 was slightly higher than the average purchase level of 9.2 ounces per week in the 15 benchmark systems.
- Traditional CSD purchases in high schools from these school systems ranged from a low of 2.9 ounces per week for a Connecticut school system and 5.2 ounces per week for a Florida school system, to 16.6 ounces per week for a New

Mexico school system. One school system showed higher per capita purchase levels than the national estimate, six showed roughly the same levels, and eight showed lower levels.

1. Research Objectives and Overview

This study provides an analysis of the sales of beverages in America's schools, including carbonated soft drinks, juices, sports drinks, teas, milks, and waters. The study was commissioned by the American Beverage Association (ABA), the industry association for the nation's largest beverage companies and bottlers. The specific objective was to compute per capita beverage purchases by students based upon actual shipments of beverages to schools by the bottling companies.

- Data for 2004 was collected and analyzed for the 13 largest bottlers in the country, including Coca-Cola Enterprises Inc., Coke Consolidated, Swire Coca-Cola, Coke United, Great Plains Coca-Cola, Coca-Cola Northern New England, Philadelphia Coke, Sacramento Coke, ABARTA, Pepsi Americas, Pepsi Bottling Group, Pepsi Bottling Ventures, and Dr Pepper/Seven Up Bottling Group.
- Together these bottlers are responsible for about 90% of all shipments of beverages to schools. An estimate for total school shipments was based upon a careful extrapolation of this data to account for the remaining 10% of school sales.
- The study also examined trends in beverage sales in schools and shifts in product mix over time. The largest bottlers, responsible for more than 70% of total U.S. beverage shipments, were able to provide historical data back to 2002 and also year-to-date data for 2005 to allow for an analysis of these trends.

This study attempted to account for the total amount of beverages purchased by school students in all U.S. schools, public and private, whether through vending machines, fountain sales, or through other sources at school. The study focused on beverages purchased by students in schools during the normal school day. The main results are presented as the number of ounces of product purchased per year and also per week (assuming a 36-week school year). The study did not attempt to determine the volume of beverages consumed in schools; it is known that students bring beverages into schools from home and from outside sources. It should be noted that this study reflects soft drink purchase data before the ABA announced new school sales guidelines for the industry in September 2005.

A number of adjustments were made to the raw shipments data. Upward adjustments were made to account for the fact that some beverages are shipped from bottlers to third-party food service vendors (like Sodexo School Services and Compass Chartwells) that then deliver the beverages to schools. Some of these shipments are not accounted for in the bottlers' school channel sales reports. Downward adjustments were made to account for the fact that not all beverages shipped to schools are student accessible. For example, some beverage sales are classified as "school sales," but are shipped to teacher lounges, administration buildings, and transportation facilities, while other products are shipped to football stadiums and sports complexes and are consumed on nights and weekends by

members of the community at large. All adjustments, both upward and downward, are fully documented in this report.

As noted, this study measures student purchases of beverages during the normal school day, normally 7 am to 4 pm. Although the study accounts for shipments to sports complexes and similar locations that are normally not accessible to students, it does not account for beverage purchases from school vending machines during evenings or weekends by community members who have access to schools. In fact, because federal guidelines require schools that participate in federal school lunch programs (about 80 percent of all schools) to turn off vending machines in cafeterias during lunch periods, there often are only limited times when students may purchase soft drinks during the normal school day. As a result, it is likely that this analysis somewhat overstates actual purchases of beverages by students during the normal school day, particularly for elementary schools where a sizable portion of the small number of CSD shipments are believed to have been purchased by teachers and other adults outside of school hours. Also note that there is some wastage of beverages—some product invariably gets thrown away. Because of the difficulty of estimating wastage, no adjustment was made for this factor, although actual student consumption of beverages purchased at school is probably lower because of this factor.

It was deemed important that the results of this study be validated by other research and confirmed by different methodologies. Three methods were used to check the reasonableness of the results in the study.

- First, a set of internal data consistency checks was performed. A key test was to compare the Coke bottlers' and Pepsi bottlers' reported school shipments with an independent national inventory of vending machine "brand presence" that reported Coke and Pepsi system percentages of total school beverage shares.
- Second, the results were compared against data from 15 "benchmark" school systems. Some bottlers provided detailed shipment data for 2004 for specific school systems where they had an exclusive contract and where there were no third-party food service vendors.¹ Actual student enrollment data for each of these school systems then allowed for the calculation of accurate per capita purchase levels by school type, and offered a useful measure of the reasonableness of the national beverage purchase data.
- And third, the results were compared with other studies done by federal government and private researchers who used end-user intake surveys and other techniques to determine beverage consumption levels in schools.

This report has four main sections. The first section describes the data upon which the study was based, the methodology used to process the data, and the key assumptions that underlie the analysis. The second section presents the main findings, including the 2004

¹ An exclusive contract meant that if a Pepsi bottler had the school system contract, then there was no Coke product in the school system, and vice versa.

national school purchase data, comparisons with the 15 benchmark school systems, and the 2002-05 trend analysis. The third section reviews other studies and surveys of beverage sales in schools. The last section presents conclusions. A set of tables provides detailed data results.

2. Data and Methodology

Industry Beverage Shipments Data

The objective of this analysis was to collect actual bottling company shipment data for 2004 “school channel” sales and calculate the number of ounces of carbonated soft drinks (CSDs) (traditional and diet) and non-carbonated beverages (NCBs) (juices, juice drinks, sports drinks, waters, teas, and milks) sold in America’s schools. The first step was to identify the U.S. major bottling groups and conduct conference calls with the companies’ data experts. Issues discussed during the conference calls conducted in the summer of 2005 included methods for dividing school channel sales data into elementary, middle, and high school categories, formulas for converting raw sales data (number of cases of bottles and cans, and gallons of fountain premix and postmix syrup) into ounces of finished product, and methods for harmonizing beverage type classifications (juices and juice drinks, sports drinks, etc.) that varied across companies. Some companies revised their data submissions four or five times to configure their data into a format and classification breakdown that could be harmonized with the data from the other bottlers.

The bottlers provided detailed sales data broken down by school category (elementary, middle, or high school), beverage type (traditional CSD, diet CSD, 100% juice, juice drink, sport drink, tea, water, and milk), and container type/volume (bottle, can, premix, or postmix fountain syrup). In some cases, the container size breakdown was very detailed—6 ounce, 350 ml, 500 ml, 8 ounce, 12 ounce, 14.4 ounce, 16 ounce, 20 ounce, 21 ounce, 24 ounce, 32 ounces, 1 liter, 2 liter, 1 gallon, 2.5 gallon, 5 gallon, etc., with accompanying case configuration details (24 cans/case, 12 bottles/case, etc.). Some companies reported this data broken down into more than 700 school type/product/package size/case configuration data rows.² This data was used to compute the number of finished ounces of consumable product delivered to each school category by beverage type.

Actual shipment data was obtained from the 13 largest bottling companies in the United States, responsible for about 90% of total industry shipments, including about 95% of Coca-Cola system shipments, about 82% of Pepsi system shipments, and virtually all Dr Pepper/Seven Up system shipments. Based upon a detailed analysis of the structure of the bottling industry, proprietary Coca-Cola and Pepsi bottler relative shipment estimates, and interviews with industry experts, missing bottler shipments were estimated as extrapolations from these reported shipments data. It was assumed that missing Coke

² For a few bottlers, middle school and elementary school beverage volumes were combined. In these cases, the average breakdown between middle school and elementary school shipments reported by bottlers who could provide this breakdown was used.

shipments had the same product breakdown as reported Coke shipments, and that missing Pepsi shipments had the same product breakdown as reported Pepsi shipments. School beverage shipments were adjusted upward by 1% of total school beverage volume to account for “self-supply” vending machines.³

Trend Data

In order to support trend analysis, the largest bottling groups, responsible for more than 70% of total beverage shipments in 2004, were also able to provide annual shipments data going back to 2002 and year-to-date shipments data through the first half of 2005. Total ounces of all beverages shipped to schools and ounces of each product type were collected. Data was collected using the same product breakdowns as for 2004, including shipments of traditional CSDs, diet CSDs, water, sports drinks, fruit drinks, 100% juice, teas, and milks. These individual bottling company percentages for each beverage type were then weighted according to the bottling groups’ 2004 relative shipments to compute a weighted average of overall product shares. It was necessary to combine the middle school and elementary school data in this trend analysis because of data limitations in some of the earlier years. Results thus show the high school trend and combined middle/elementary school trend over time.

Estimating Third-Party Shipments

One of the key issues in quantifying shipments of beverages to schools is accounting for the fact that some school districts choose third-party vendors to run their food services. Sometimes these companies purchase beverages from bottlers and sell them in schools. Among the major third-party vendors are Sodexo School Services, H.M.S. Host, Compass Chartwells, and ARAMARK. The estimation of these shipments is complicated by the fact that sometimes these vendors give full-service vending sub-contracts to the bottlers to deliver and stock beverages in school vending machines, while in other cases the bottlers deliver their products to the third-party vendor and that company then delivers the products to the school. In the former case, bottlers sometimes accurately record the shipment as going to a school, but frequently in the latter case, shipments to schools may not be recorded as a school shipment. To address this issue, each bottler was asked to estimate an upward adjustment to its reported school shipments to account for shipments through third parties. The upward adjustments ranged from 5% to 30%, with most bottlers’ shipments being adjusted upward by 5%.

Estimating Percentages of Beverage Shipments Accessible by Students

Another key research issue was determining the portion of school beverage shipments that is accessible by students. Shipments to schools include beverages delivered to faculty lounges, school administration buildings, and other facilities that are inaccessible

³ These could be instances where a school principal, janitor, or PTA member buys soft drinks, say, from a warehouse retailer, and stocks school-owned machines. Several industry experts reported that this practice was “negligible” and judged that it could not exceed 1% of total shipments to schools.

by students. Other examples are shipments made to sports complexes for games that are attended by the community at large during non-school hours, and “truckload” shipments to parent-teacher association, band, or club fundraising events, where cases of beverages are sold by students throughout the community. Given that the objective of this analysis was to determine the beverage volume purchased at school during the normal school day by school students, it was necessary to estimate these beverage shipments and subtract them from the shipment totals.

Four methods were relied upon to estimate beverage shipments that were “non-student accessible”:

- a computer database sort of hundreds of thousands of detailed “sales channel” records by one of the nation’s largest bottlers to identify clearly “non-student accessible” sites,
- a detailed field survey of more than 12,000 school beverage delivery personnel by another of the nation’s largest bottlers that categorized final locations of sales outlets (vending machine location, etc.) and indicated whether the beverages were student accessible or not,
- a survey conducted by a leading market research company of vending machine locations in more than 16,000 middle schools and high schools across the country, and
- interviews with beverage industry experts on school sales.

The database sort method, performed by one of the nation’s largest bottlers, looked at all school sales records. Each individual vending machine was typically identified as its own sales outlet, and the data search scanned the description field of the sales channel. Examples of description fields that were not considered to be student accessible during the normal school day included “teacher lounge,” “faculty lounge,” “administration building,” “board of education,” “transportation facility,” “football stadium,” “booster club,” “concessions,” and “parent/adult organization.” This method likely produced a very conservative estimate of non-student accessible beverages.⁴ This methodology determined that at least 15.2% of traditional CSD shipments to high schools, 14.1% of CSD shipments to middle schools, and 27.9% of CSD shipments to elementary schools were non-student accessible.

The detailed field survey of school beverage delivery personnel, conducted in 2004 by another large bottler, determined that 27.5% of the beverages it delivered to high schools were non-student accessible, that 49.5% of beverages delivered to middle schools were non-student accessible, and that 76% of beverages delivered to elementary schools were non-student accessible.

⁴ Any channel that was mislabeled or misspelled would by default have been considered student accessible. For example, shipments to “techers [sic] lounge” would have been considered student accessible, as would a shipment to “north lounge” or “field complex.”

The survey by the market research company, conducted in late 2003, determined that 13% of all vending machines in American high schools and 29% of all vending machines in American middle schools were in faculty areas.

In detailed discussions with industry experts, it was agreed that the database sort method placed a floor on non-student accessible shipments, as this was the most conservative estimation technique. Indeed, the vending machine location data for middle schools suggested that the percentage of vending machines in teachers' lounges alone could explain a higher percentage of soft drinks being non-student accessible than this database sort method.⁵ Because of the desire to prepare conservative estimates, it was decided that the assumed percentage of non-student accessible beverages would be roughly the average of the floor estimates provided by the database sort method of the one large bottler, and the field survey estimates provided by another large bottler, with small adjustments based upon experts' views and vending machine location data.⁶ Separate estimates were developed for "non-student accessible" shipments of CSDs, non-carbonated beverages, and milks using the same averaging methodology. Virtually all milks (97-98%) were considered to be student accessible by all reported methods. All student accessible estimates were applied equally to the shipments of all bottling groups. The assumed percentages of non-student accessible beverages are as follows:

	<u>Percent assumed to be non-student accessible</u>
High Schools	
Carbonated soft drinks	25%
Non-carbonated beverages	15%
Milks	3%
Middle Schools	
Carbonated soft drinks	35%
Non-carbonated beverages	15%
Milks	3%
Elementary Schools	
Carbonated soft drinks	70%
Non-carbonated beverages	30%
Milks	3%

⁵ For example, about 29% of all vending machines in middle schools are in faculty areas, whereas the database sort method determined that only 14.1% of shipments to middle schools were clearly non-student accessible.

⁶ The high school assumption that 25% of CSDs were non-student accessible was a judgment decision, based upon the 15% floor estimate from the database sort method, the 27.5% estimate from the field survey, and the data showing that 13% of vending machines in high schools are in faculty lounges. The experts were confident that on top of this 13% faculty share, "at least" 12% of high school shipments are for sports concessions, band sales, fund raisers, etc. The portion of the middle school CSDs determined to be non-student accessible was the average of the floor estimate from the database sort method (14.1%) and the field survey method (40%)—adjusted to 35% because of the data showing that 29% of vending machines in middle schools are in faculty areas and not likely to be student accessible.

Again, it should be noted that not all beverage purchases from student accessible machines would have been by students. These machines are also used by teachers and other adults, particularly after school hours. The data maintained by the bottlers did not provide a basis to separate student from adult purchases for these machines (in part because the time of product purchase was not recorded), but the likely occurrence of some adult purchases means that the percentages provided above understate the percentage of school beverage sales to adults.

School Population Data

In order to determine the average number of ounces of beverage purchased per capita by U.S. school students in 2004, student population data from the U.S. Census Bureau was relied upon. The U.S. Census provides detailed public and private school enrollment data by age.⁷ The most recent age breakdown of the school population is based upon the October 2003 Current Population Survey. In 2003 there were 24,084,500 students of ages 5-10 in grades K-5, 12,403,500 students of ages 11-13 in grades 6-8, and 16,337,000 14-18 year olds in grades 9-12. To update these age profiles for 2004, growth rates of the appropriate age groups from the national population estimates of October 2004 were applied to the October 2003 enrollment figures. These adjustments were as follows: -0.843% (elementary), -1.52% (middle), and +2.06% (high). The resulting October 2004 student enrollment estimates were: 23,881,408 (elementary), 12,215,157 (middle), and 16,673,974 (high).⁸ These estimates were then compared against the U.S. Department of Education's (DOE's) estimates of student enrollment by school breakdown, which were 38,541,000 for K-8 and 15,914,000 for 9-12. These Department of Education estimates have the advantage of providing the desired school level splits rather than age-based splits, but the disadvantage of being based upon more out of date 2001 population benchmarks, with annual projections thereafter. While the estimates from both the Census data and the DOE data were close, the Census estimates were judged to be more up to date and were therefore relied upon for this study.

Data Reliability, Robustness, and Limitations

This analysis relies upon multiple forms of triangulation to gauge the reasonableness of the data. This is important especially when certain judgments have to be made to account for shipments via third-party vendors, etc. One form of data benchmarking was to see if the reported school shipments of Coke system products and Pepsi system products approximately matched the two brands' reported national presence in schools. According to a detailed independent inventory of all vending machines in more than 16,000 schools in America, one of these major family brands had a market presence in schools of 1.25 times that of the other brand. It was reassuring to find that in this study this same family brand had total reported school shipments of 1.24 times the shipments of the other brand (total ounces shipped basis). Similar benchmarking of the reported school shipments of the various Coke bottlers against their reported Coke family shares, and of the reported

⁷ See Current Population Survey of October 2003, Table 1, released May 2005, available online at <http://www.census.gov/population/socdemo/school/cps2003/tab01-01.xls>.

⁸ See http://www.census.gov/popest/national/asrh/2004_nat_ni.html

school shipments of the various Pepsi bottlers against their reported Pepsi family shares also suggested that the data was correct. Such results give confidence that school shipments were reported accurately, that adjustments for third-party shipments were reasonable, and that the data processing was performed accurately.

As with any real world data analysis, there were certain challenges. All of the bottlers reported school channel sales, but there were discrepancies in how these school channels were defined. Some bottlers separated their schools channel sales into “primary” sales and “secondary” sales. Primary sales generally were kindergarten through 6th grade, and secondary sales were 7th through 12th grades. In an attempt to deliver data in the requested school categories of “elementary”, “middle”, and “high school”, some bottlers sorted their end-user name descriptor fields in their databases based on recognition of words such as “middle”, “junior”, and “intermediate,” in order to separate out a “middle school” category from their more general “secondary” category. Any middle schools that were not identified with one of these words in their name were counted in the “high school” category. This means that the data in this report may have a bias toward overstating high school volume and understating middle school volume. Also, bottlers reported that some of their reported “primary” school shipments really went to day care centers or nursery schools, where beverages would likely have been purchased almost exclusively by adults. This bias would tend to overstate beverages purchased by students in elementary schools.

Benchmark School Districts

In addition to their national shipments, some bottlers were able to report detailed school shipments data for “benchmark” school systems—systems where they had an exclusive contract in 2004 and where there were no third-party vendors that also might have shipped product into the school system. Bottlers representing all three major brands—Coke, Pepsi, and Dr Pepper—supplied data for multiple benchmark school districts. By examining this data and collecting the associated school district enrollment data, it was possible to accurately calculate per student beverage purchases and thus test the reasonableness of the U.S. national 2004 school beverage purchase estimates. Data were collected and analyzed using the same methodology described above for 15 school districts, including three county-wide Florida school systems, three districts in Texas, two school systems in California, a school district in a major New Mexico city, a large suburban Colorado school district, a major urban school system in Minnesota, a small suburban school district in Connecticut, a large urban school district in Michigan, and other school districts in New Hampshire and Oklahoma. Two school systems had fewer than 4,000 students, but all the others systems ranged in size from 14,000 students to more than 169,000 students. The total benchmark school population was more than three-quarters of a million students.

School population data, broken down by grade level or by high school/middle school/elementary school splits, was obtained from these school systems’ websites or from the school districts’ public relations officers. These district enrollment data were

then corroborated against a national school district database and no significant discrepancies were found.

3. Research Results

Student Beverage Purchase Levels in 2004

Tables 1 to 3 and Charts 1 to 3 present 2004 estimated per student beverage purchase levels based upon actual shipments data by the 13 largest bottlers in the United States, extrapolated to account for all industry shipments and adjusted for non-student accessibility. These estimates are expressed as ounces purchased per week (assuming a 36 week school year).

Total average beverage purchases were 28.3 ounces per week for high schools, 10.2 ounces per week for middle schools, and 1.3 ounces per week for elementary schools. For high schools, CSD purchases slightly exceeded purchases of other beverages (14.4 ounces vs. 13.9 ounces). For middle schools and elementary schools, non-CSD purchases exceeded CSD purchases by wide margins. For middle schools, non-CSD purchases (6.4 ounces) were nearly double the CSD purchases (3.7 ounces), while for elementary schools, non-CSD purchases (0.9 ounces) were more than double the CSD purchases (0.4 ounces.) For all three school categories, the largest volume non-CSDs were juice drinks, followed by sports drinks and waters.

Traditional CSD purchases ranged from a high of at most 12.5 ounces per week by high school students, to at most 3.0 ounces per week by middle school students, to at most 0.3 ounce per week by elementary school students. That is, the typical high school student purchased at school during the normal school day about one (12 ounce) can of traditional soda per week during the school year, while the typical elementary school student, conservatively speaking, purchased only about one can of traditional soda per school year. (Again, even these low levels of purchase are likely overstated because adult purchases from student-accessible vending machines are not accounted for.)

Chart 1

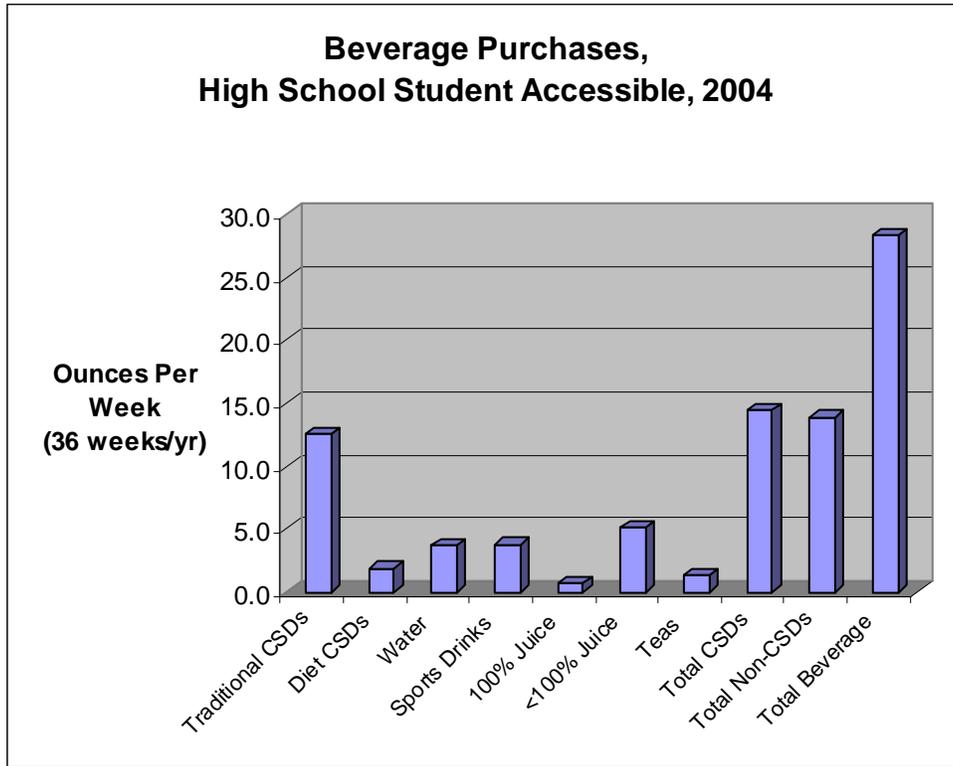


Chart 2

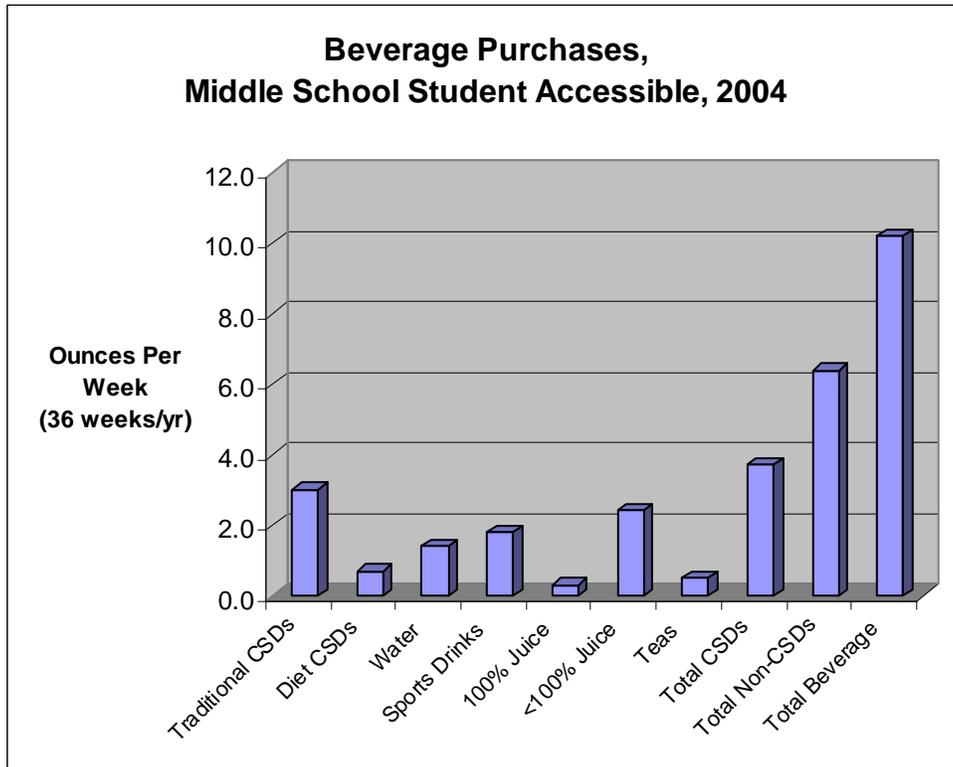
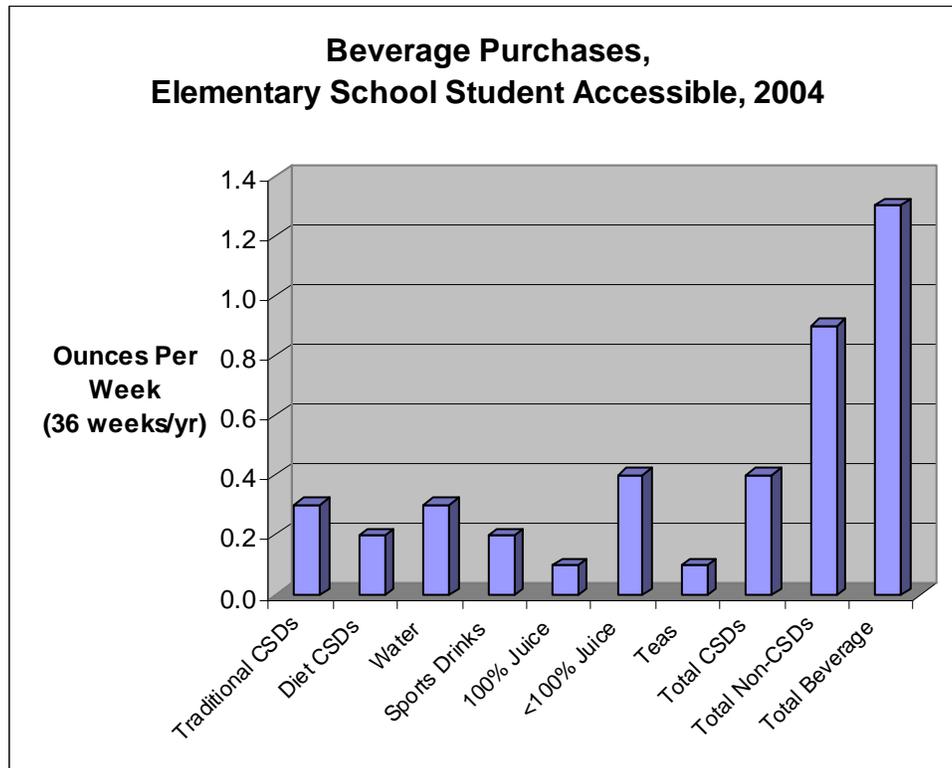


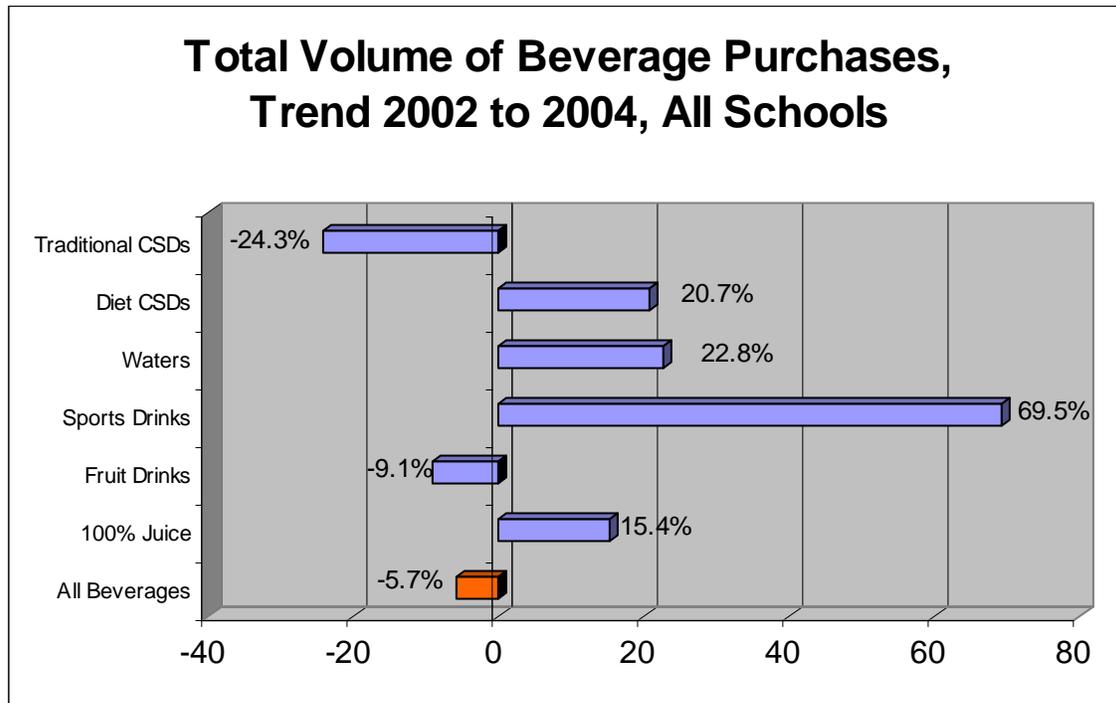
Chart 3



Trend Analysis

Chart 4 shows the trend changes in the total number of ounces of beverages purchased in schools between 2002 and 2004. In this two-year span, the total number of ounces of beverages purchased dropped by a noticeable 5.7%. This included a decline of 4.1% in beverages purchased in high schools and a decline of 9.7% in beverages purchased in middle/elementary schools (combined). The biggest cause of this decline between 2002 and 2004 was a sharp 24.3% drop in the total ounces of traditional CSDs purchased in schools. This included a 21.6% drop in traditional CSDs purchased in high schools and a 32.5% drop in traditional CSDs purchased in middle/elementary schools (combined). Partially offsetting this steep decline in purchases of traditional CSDs between 2002 and 2004 were increases in diet CSDs (20.7% increase), waters (22.8% increase), sports drinks (69.5% increase), and 100% juices (15.4% increase). Fruit drink purchases declined by 9.1% between 2002 and 2004. It should be noted that the decline in total ounces of beverages purchased in schools and the particularly sharp drop in purchases of traditional CSDs occurred before the ABA soft drink guidelines were announced in September 2005.

Chart 4



Tables 4 to 5 and Charts 5 to 6 show the changing percentages of different product categories within the overall product mix from 2002 to year-to-date 2005 (June). For high schools, traditional CSDs fell markedly from 57.2% of total shipments in 2002 to 44.9% of shipments in 2005. Fruit drinks also fell, from 14.8% in 2002 to 12.5% in 2005. Virtually all other products saw their percentages of total shipments increase between 2002 and 2005. The largest increases were in sport drinks (6.8% in 2002 to 14.3% in 2005), waters (9.1% in 2002 to 12.7% in 2005), and diet CSDs (5.5% in 2002 to 7.6% in 2005.)

For middle schools and elementary schools (combined), the same trends appear, although the initial product percentage of traditional CSDs was lower. Traditional CSDs accounted for 47.5% of total sales in 2002 and this declined steadily to 34.2% by 2005. The proportion of fruit drinks in the product mix also declined—from 19.8% in 2002 to 15.8% in 2005—similar to the high school pattern. Meanwhile sports drinks, waters, and diet CSDs posted the biggest gains. The percentage of sports drinks more than doubled from 7.8% in 2002 to 16.3% in 2005, waters jumped from 8.6% in 2002 to 12.7% in 2005, and diet CSDs increased from 10% in 2002 to 13% in 2005.

Chart 5

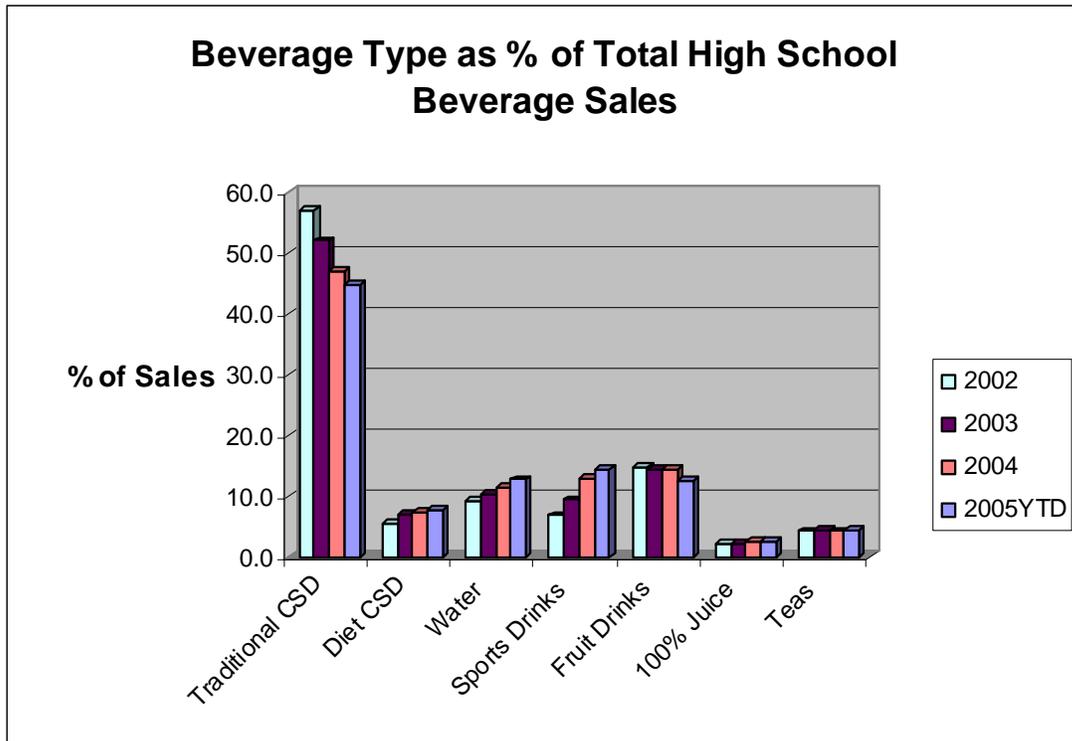
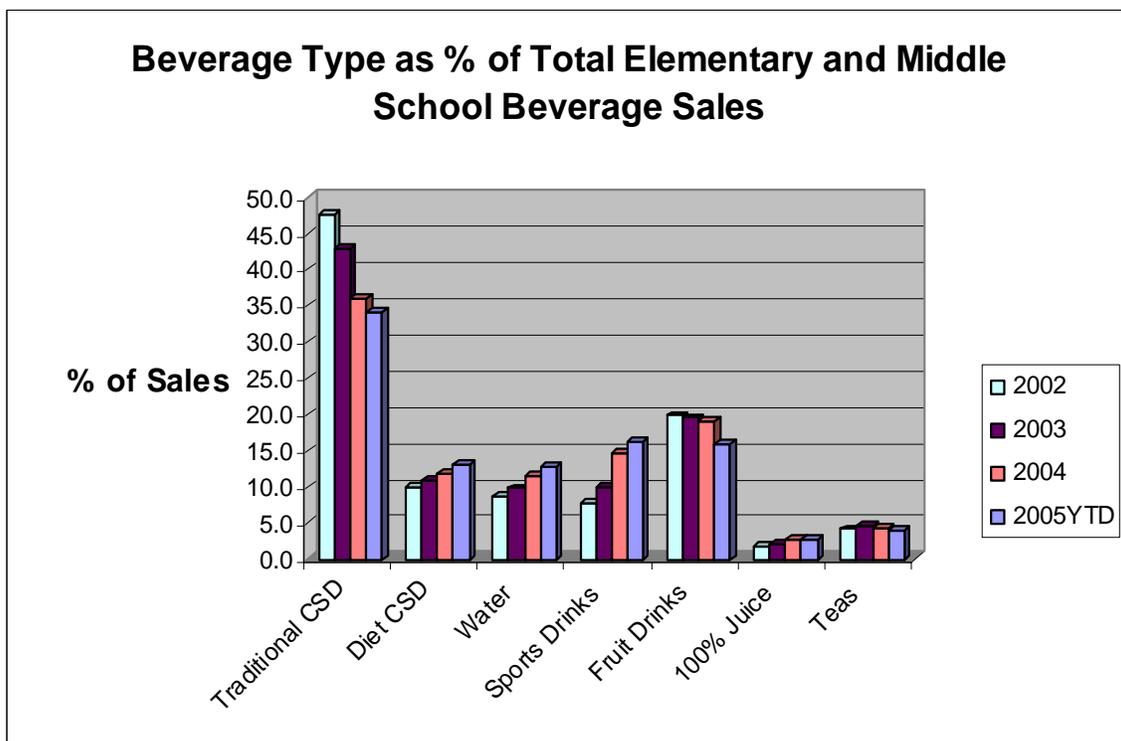


Chart 6



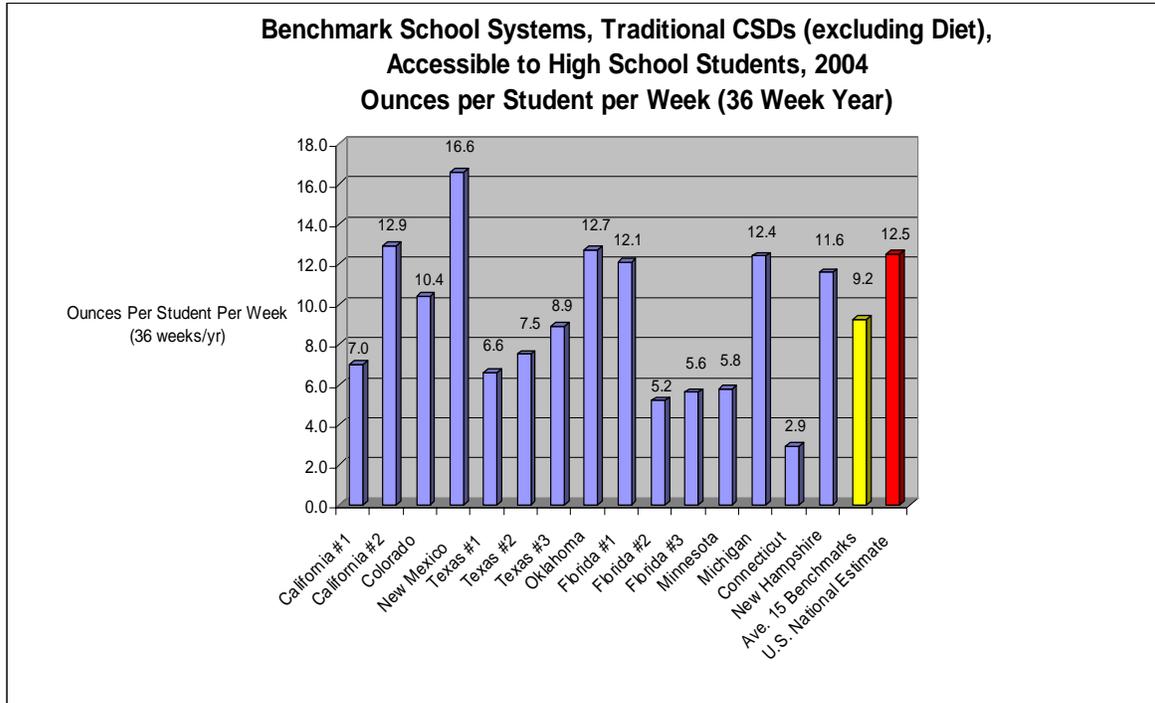
Even though these trend data are based upon weighted averages of the shipments of the major bottlers, the same broad product trends were reported by each individual bottler. Particularly in the high school category, the product shares were typically within a couple of percentage points of each other for all the major bottlers. The falling share of traditional CSDs in the total product mix was evident for all individual companies for both the high school category and for the combined middle/elementary school category. Also water and sports drinks showed a growing importance in the product mix over time for all bottlers that reported trend data.

Benchmark School Systems

Data from the 15 benchmark school districts is presented in Chart 7. Although there is some variance in the data across these school systems, most of the same general patterns that appeared in the national data also appear in these data—for example, high school purchases are markedly higher than middle school purchases, which in turn are markedly higher than elementary school purchases. Also traditional CSDs are generally (but not always) the largest single product category, but total CSD sales in many cases are lower than total non-CSD sales. Beverage purchases in southern states often are higher than in northern states, but this is not uniformly the case. One Florida school system, for example, had about half the traditional CSD per capita purchases as a New Hampshire school system.

- At the high school level, purchases of traditional CSDs ranged from a low of 2.9 ounces per student per week in one Connecticut school system, to a high of 16.6 ounces per student per week at a large New Mexico urban school system.
- The average high school student purchased 9.2 ounces of traditional CSDs in the 15 benchmark school systems in 2004—lower than the U.S. average of 12.5 ounces per student computed from the national shipments data.
- One of the 15 benchmark school systems showed purchases of traditional CSDs that were noticeably above the U.S. national estimate, six showed purchase levels roughly equal to the national estimate, and eight showed purchase levels noticeably below the national estimate.
- The data from these benchmark school systems thus give confidence that the national per student purchase estimates are reasonable.

Chart 7



4. Other Studies and Surveys of Beverage Purchases in Schools

It is useful to compare the results of this analysis with other studies of beverage shipments to schools and intake surveys of beverage consumption in schools. Some of these studies, however, estimate only total consumption per student, not beverage purchases in schools during the normal school day. Some studies also blend together data for middle school students and high school students.

Shipment Study Estimates

An Oregon study was conducted in February 2005 by a CPA firm for the Oregon Soft Drink Association (OSDA).⁹ All members of the OSDA that sold beverages to middle schools and high schools provided sales data. These data covered 97 schools districts (80% of middle, junior high, and high schools in the state). The results, based upon a student population of 233,930, are as follows:

⁹ Study done as part of an Oregon Department of Education Task Force to address nutrition in schools. Results are posted at <http://www/ode.state.or.us/search/results/?id=270>. Data were compiled by the CPA firm Shackelford, Hanson and Parr, LLP, 855 SW Yates, Suite 101, Bend, OR 97702.

Oregon Study Results (secondary schools only)
(purchases per student)

	Ounces/Week	Percent	Calories
Traditional CSDs	9.05	48%	112.5
Diet CSDs	1.49	8%	0
Juice drinks	3.48	18%	21.75
Water	2.36	12%	0
Isotonics	2.27	12%	14.19
Other	0.29	2%	1.81
TOTAL	18.93	100%	150.25

A study by Michael Ginevan for the National Soft Drink Association in September 2002 looked at sales by the three largest soft drink manufacturers to secondary schools and found that sales of traditional CSDs were 16.4 ounces per student per week.¹⁰ In another analysis, performed in September 2002 by the National Automatic Merchandising Association (NAMA), 53 members operating 2804 vending machines reported average per-student weekly purchases of carbonated beverages by high school students of 16.4 ounces.¹¹ This included both traditional CSDs and diet CSDs.

Intake Survey Estimates

One way to estimate beverage consumption by students is to directly query them via “intake” surveys. In these surveys, individuals typically enroll in a survey panel for a one or two week period and log everything that they drink or eat.¹² One major intake study of beverage consumption was performed by 13-17 year olds during 2004 by a company called Alpha (a pseudonym to protect confidentiality). The Alpha study was based upon a 2-week intake survey, and found that students at school consumed bottled water on 2.43 occasions per week (any size container), milk on 2.42 occasions per week, fruit juice on 2.25 occasions per week, CSDs on 2.13 occasions per week, sports drinks on 1.40 occasions per week, and fruit drinks on 1.25 occasions per week. Given that about 40% of CSDs in schools are sold in 12 ounce cans and 60% in 20 ounce bottles, the typical CSD container holds about 16.8 ounces. This suggests that the typical secondary student consumed about 35.8 ounces of CSDs a week at school (2.13 occasions per week times 16.8 ounces per container.) Importantly, however, the Alpha study found that about 37% of beverages consumed in school are brought in to the school from home or from outside school—often packed with a lunch by a parent—so the volume of CSDs purchased in school was 37% lower, or about 22 ounces per week. Of this amount of total CSDs consumed each school week, approximately 28% is typically diet soda (an average of middle school and high school shares as identified in this study). This suggests that

¹⁰ Copy of study provided by the American Beverage Association, July 2005.

¹¹ See May 13, 2004 National Automatic Merchandising Association (NAMA) press release citing 16.4 oz/week estimate, at: <http://www.vending.org/news/article.php?id=9>.

¹² Typically participants log their consumption in a handheld personal data assistant (with special software) that is loaned to the survey participant by the survey company.

consumption of traditional sugared CSDs—purchased at school and consumed at school—was about 15.8 ounces per student per week in 2004.

This Alpha study also found that of all occasions when students consume a beverage at school, 23% of the time they consume tap water, 20% of the time they consume traditional CSDs, 18% of the time they consume milk, 9% of the time they consume bottled water, 8% of the time they consume sport drinks, 8% of the time they consume other beverages, 7% of the time they consume fruit drinks, 3% of the time they consume diet CSDs, 2% of the time they consume fruit juice, 1% of the time they consume tea, and 1% of the time they consume coffee. This means that between tap water and bottled water, water is by far the most common drink consumed by students at school (consumed on about 32% of all occasions). That is, water is more than half again more likely to be consumed at school than traditional CSDs.

A 2005 study by Richard Forshee *et. al.* of the Center for Food and Nutrition Policy, published in *Risk Analysis*, examined beverage consumption data for students aged 13-18 from three large intake datasets: the federal government's National Health and Nutrition Examination Survey 1999-2000 (NHANES), the federal government's Continuing Survey of Food Intake by Individuals 1994-96, and 1998 (CSFII), and the National Family Opinion (NFO) WorldGroup Share of Intake Panel (SIP) study.¹³ Based upon the NHANES data, the study estimated that consumption of traditional sugared CSDs at school from all sources (including school vending machines and beverages brought from home) was 7.2 ounces per student per week—including 9.7 ounces per week for boys and 4.7 ounces per week for girls. Based upon the CSFII data, the study estimated traditional CSD purchases from school vending machines at 2.8 ounces per student per week. Based upon the NFO-SIP data, the study found school vending machine purchases of 2.5 ounces per student per week of traditional CSDs.

Summary of Other Studies

The estimates of traditional CSD purchases in schools in the present study are in the middle of the range of estimates from these other studies and intake surveys. This study found slightly lower high school purchases of traditional CSDs (12.5 ounces per student per week) than the Ginevan (16.4 ounces), NAMA (16.4 ounces), and Alpha intake (15.8 ounces) estimates. But it found higher purchases than the Oregon survey (9 ounces), and noticeably higher purchases than suggested by Forshee *et. al.*'s interpretation of the NHANES, CSFII, and NFO-SIP intake surveys (2.5 to 7.2 ounces).

¹³ See Richard Forshee, Maureen F. Storey, and Michael E. Ginevan, "A Risk Analysis Model of the Relationship between Beverage Consumption from School Vending Machines and Risk of Adolescent Overweight," *Risk Analysis*, Vol. 25, No. 5, 2005, pp. 1-15.

5. Conclusions

A set of data validation tests on the shipments data reported by the nation's 13 largest bottlers suggests that the data submitted for analysis were accurate. Similar patterns were observed in the data of all bottlers (trends, product breakdown, etc.), and their reported school shipments closely matched their reported presence in schools (from inventories of vending machines, etc.). This was a reassuring finding given that many bottlers from all major systems were independently reporting their sales data.

Purchases of traditional CSDs, particularly the estimate of 12.5 ounces purchased per week during the school year by the typical high school student, seem reasonable and are corroborated by several triangulation techniques. First, this purchase level is in line with estimates obtained from recent state and national studies—higher than some estimates and lower than others. The Alpha intake study and the Ginevan and NAMA estimates, (which clustered in the range of 15 to 16 ounces) are higher, while the Oregon estimate of 9 ounces is lower. Meanwhile the findings of Forshee *et. al.*, based upon two respected federal government intake surveys of traditional CSD consumption, the Continuing Survey of Food Intake by Individuals (CSFII), and the National Health and Nutrition Examination Survey (NHANES), as well as the NFO-SIP intake survey are much lower—in the range of 2 to 7 ounces.

Second, the national estimates appear to be corroborated by the “benchmark” data collected from multiple bottlers for 15 different school systems across ten states.

- This benchmark data covered more than three quarters of a million school students, and included large urban school districts, rural county-wide systems, and suburban school systems. Some school districts were in high-income states like California and Connecticut, and others were from states with below average income, like New Mexico.
- The fact that average consumption of traditional CSDs by high school students in the benchmark school systems was 9.2 ounces per student per week—below the 12.5 ounce national estimate—and the fact that 12 of the 15 benchmark systems showed purchase levels below the national estimate suggest that the national estimates are reasonable and not unduly low.

The trend data suggests that substantial changes are taking place in both the volume of soft drink sales in schools and in the product mix that bottlers are delivering to schools. The total ounces of all beverages purchased in schools declined by 5.7% from 2002 to 2004. The biggest decline was registered in the total ounces of traditional CSD purchases, which declined by 21.6% for high school students, 32.5% for middle/elementary school students, and by 24.3% overall. Meanwhile, between 2002 and 2004, there were increases in the total ounces of diet CSDs (20.7%), waters (22.8%), sports drinks (69.5%), and 100% juices (15.4%).

- The product mix is also changing. Between 2002 and year-to-date 2005, the percentage of traditional CSDs in the total product mix in all schools (high, middle, and elementary) has fallen by 12-14 percentage points—to well under 50% for all categories of schools.
- Replacing these traditional CSDs are sports drinks, waters, and diet CSDs. In particular, the percentage of sports drinks in the product mix has roughly doubled in the past three years.

Table 1: 2004 School Purchase Data – High Schools

Beverage Type	Total Ounces	Ounces per high school student per year	Ounces per student per week 36 weeks/year
Traditional CSDs (excluding Diet)	10,013,511,173	600.5	16.7
Traditional CSDs (excluding Diet) accessible to students	7,510,133,380	450.4	12.5
Diet CSDs	1,511,665,163	90.7	2.5
Diet CSDs accessible to students	1,133,748,872	68.0	1.9
Total CSDs	11,525,176,336	691.2	19.2
Total CSDs accessible to students	8,643,882,252	518.4	14.4
Water	2,586,095,217	155.1	4.3
Water accessible to students	2,198,180,934	131.8	3.7
Sports Drinks	2,677,305,977	160.6	4.5
Sports Drinks accessible to students	2,275,710,081	136.5	3.8
100% Juice	519,108,152	31.1	0.9
100% Juice accessible to students	441,241,929	26.5	0.7
<100% Juice	3,049,257,933	182.9	5.1
<100% Juice accessible to students	2,591,869,243	155.4	4.3
Teas	904,182,317	54.2	1.5
Teas accessible to students	768,554,969	46.1	1.3
Flavored Milk	13,182,139	0.8	0.0
Flavored Milk accessible to students	12,786,674	0.8	0.0
All other Non-CSD	78,357,434	4.7	0.1
All other Non-CSD accessible to students	66,603,819	4.0	0.1
Total Non-CSD	9,827,489,169	589.4	16.4
Total Non-CSD accessible to students	8,354,947,650	501.1	13.9
Total	21,352,665,504	1,280.6	35.6
Total accessible to students	16,998,829,902	1,019.5	28.3
High School Enrollment:	16,673,974		

Table 2: 2004 School Purchase Data – Middle Schools

Beverage Type	Total Ounces	Ounces per middle school student per year	Ounces per student per week 36 weeks/year
Traditional CSDs (excluding Diet)	2,024,955,498	165.8	4.6
Traditional CSDs (excluding Diet) accessible to students	1,316,221,074	107.8	3.0
Diet CSDs	503,389,207	41.2	1.1
Diet CSDs accessible to students	327,202,984	26.8	0.7
Total CSDs	2,528,344,704	207.0	5.7
Total CSDs accessible to students	1,643,424,058	134.5	3.7
Water	717,865,064	58.8	1.6
Water accessible to students	610,185,304	50.0	1.4
Sports Drinks	923,754,172	75.6	2.1
Sports Drinks accessible to students	785,191,046	64.3	1.8
100% Juice	142,616,147	11.7	0.3
100% Juice accessible to students	121,223,725	9.9	0.3
<100% Juice	1,222,425,432	100.1	2.8
<100% Juice accessible to students	1,039,061,617	85.1	2.4
Teas	265,542,579	21.7	0.6
Teas accessible to students	225,711,192	18.5	0.5
Flavored Milk	6,281,023	0.5	0.0
Flavored Milk accessible to students	6,092,593	0.5	0.0
All other Non-CSD	39,819,462	3.3	0.1
All other Non-CSD accessible to students	33,846,543	2.8	0.1
Total Non-CSD	3,318,303,880	271.7	7.5
Total Non-CSD accessible to students	2,821,312,021	231.0	6.4
Total	5,846,648,584	478.6	13.3
Total accessible to students	4,464,736,078	365.5	10.2
Middle School Enrollment:	12,215,157		

Table 3: 2004 School Purchase Data – Elementary Schools

Beverage Type	Total Ounces	Ounces per elementary school student per year	Ounces per student per week 36 weeks/year
Traditional CSDs (excluding Diet)	1,101,473,833	46.1	1.3
Traditional CSDs (excluding Diet) accessible to students	241,329,217	10.1	0.3
Diet CSDs	452,991,421	19.0	0.5
Diet CSDs accessible to students	135,897,426	5.7	0.2
Total CSDs	1,554,465,254	65.1	1.8
Total CSDs accessible to students	377,226,643	15.8	0.4
Water	324,311,879	13.6	0.4
Water accessible to students	227,018,316	9.5	0.3
Sports Drinks	249,489,867	10.4	0.3
Sports Drinks accessible to students	174,642,907	7.3	0.2
100% Juice	74,511,813	3.1	0.1
100% Juice accessible to students	52,158,269	2.2	0.1
<100% Juice	336,291,224	14.1	0.4
<100% Juice accessible to students	235,403,857	9.9	0.3
Teas	75,136,776	3.1	0.1
Teas accessible to students	52,595,744	2.2	0.1
Flavored Milk	2,873,496	0.1	0.0
Flavored Milk accessible to students	2,787,291	0.1	0.0
All other Non-CSD	10,652,623	0.4	0.0
All other Non-CSD accessible to students	7,456,836	0.3	0.0
Total Non-CSD	1,073,267,679	44.9	1.2
Total Non-CSD accessible to students	752,063,219	31.5	0.9
Total	2,627,732,934	110.0	3.1
Total accessible to students	1,129,289,862	47.3	1.3
Elementary School Enrollment:	23,881,408		

Table 4: School Beverage Purchase Trends, High School

Beverage Type	% of Product Mix in High School			
	2002	2003	2004	2005YTD
Traditional CSD	57.2	52.1	46.9	44.9
Diet CSD	5.5	6.9	7.3	7.6
Water	9.1	10.4	11.5	12.7
Sports Drinks	6.8	9.4	12.8	14.3
Fruit Drinks	14.8	14.3	14.3	12.5
100% Juice	2.2	2.2	2.6	2.5
Teas	4.2	4.4	4.2	4.3
Flavored Milk	0.1	0.1	0.1	0.1
All Other Non-CSD	0.2	0.2	0.2	1.0
Total	99.9	100.0	99.9	100.0

Table 5: School Beverage Purchase Trends, Middle and Elementary Schools

Beverage Type	% of Product Mix in Elementary and Middle School			
	2002	2003	2004	2005YTD
Traditional CSD	47.5	42.8	35.9	34.2
Diet CSD	10.0	11.0	11.7	13.0
Water	8.6	9.8	11.5	12.7
Sports Drinks	7.8	10.0	14.7	16.3
Fruit Drinks	19.8	19.5	18.9	15.8
100% Juice	1.9	2.0	2.6	2.8
Teas	4.2	4.6	4.3	4.0
Flavored Milk	0.1	0.2	0.1	0.1
All Other Non-CSD	0.1	0.1	0.3	1.0
Total	99.9	99.9	100.0	100.0

The Research Team

Dr. Robert Wescott, Principal Investigator, runs an economic consulting practice in Washington, DC that serves G-7 governments, major financial institutions and companies, and leading industry associations. He has 25 years of experience with macroeconomic, industry, and financial data and analysis. Previously Dr. Wescott served as Chief Economist at the Council of Economic Advisers and as Special Assistant to the President for Economic Policy at the White House. He also spent four years in the Research Department at the International Monetary Fund. Between 1982 and 1993 Wescott was Senior Vice President and Chief Economist at WEFA Group (Wharton Econometric Forecasting Associates), the Philadelphia-based economic forecasting and consulting firm, where he oversaw all data analysis, forecasting, economic modeling, consulting, and research activities for the U.S. Group. Wescott holds a Ph.D. in Economics from the University of Pennsylvania.

Karen Wise, Data Analyst and Systems Programmer, has 20 years experience as a data analyst and programmer. Since 2001, she has worked for Dr. Wescott on a range of projects for Washington DC-based industry associations, U.S. corporations, and financial institutions. These projects include the development of databases to aid in the analysis of CEO economic outlook surveys, and other surveys for Fortune 500 companies. For a number of years, she was a programmer/analyst for the Office of Administrative Computing at American University, has also done similar work for Arcadia University in Glenside, Pennsylvania, customizing data management software. She has experience with a wide range of applications including economic and industry databases, financial databases, scientific model building, and computer simulations. She has taught at the college level in the fields of mathematics and computer science. Ms. Wise holds a Master's degree in Applied Mathematics from Drexel University and a Bachelor's degree in Mathematics from Bucknell University, cum laude.

Nathan Brownback, Economic Researcher has been working for Dr. Wescott for two years. He specializes in economic and industry research as well as data collection, analysis, and presentation. Among recent projects have been: an analysis of energy prices and mining and exploration capacity data for a major energy company, an analysis of environmental data for a Washington, DC-based industry association, and a statistical analysis of survey data for a leading Washington DC-based business association. He holds a B.S. in Economics from American University, magna cum laude.