

# Salud America!

The Robert Wood Johnson Foundation Research  
Network to Prevent Obesity Among Latino Children

# Bridging the Gap

Research Informing Policies & Practices  
for Healthy Youth



## RESEARCH REVIEW

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## Reducing Consumption of Sugary Drinks Among Latino Children

### Abstract

The consumption of sugary drinks, also called sugar-sweetened beverages (SSBs), has increased markedly over the past several decades. Currently, SSBs, including soft drinks, sports drinks, energy drinks, fruit-flavored drinks, and other caloric but non-nutritious beverages, represent almost half of the added sugar consumed each day by the U.S. population. Latino youths' consumption of SSBs is higher than the overall average for the general population, especially among the earliest ages. In response, interventions to reduce SSB consumption have been proposed, including policies affecting beverages available and promoted in the school and early child care settings, regulatory and voluntary measures to limit marketing of SSBs to children, pricing issues, and promotion of water.

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Bridging the Gap is a national program dedicated to improving the understanding of how policies and environmental factors influence diet, physical activity and obesity among youth, as well as youth tobacco use.

This review of the literature examines available recent evidence on the impact of such policies and practices on the consumption of SSBs among youth and assesses the potential impact on obesity rates among Latino youth, especially among ages 0-5.

## Introduction

Americans obtain over 40 percent of their total sugar in the form of sugar-sweetened beverages (SSBs), including soda, sports and energy drinks, and fruit drinks that contain less than 100 percent juice. Young Americans—including young Latinos—drink far more of these beverages than they did a few decades ago.<sup>1</sup> Further, as young Americans' consumption of soda, fruit drinks, and other SSBs has increased, their consumption of white, unsweetened milk has decreased at the same time.<sup>2</sup> Cross sectional studies have shown that children's milk intakes are inversely associated with intakes of SSBs, including juice drinks and soda, as early as 2 years of age.<sup>3,4</sup> This trend is particularly concerning, as SSBs displace healthier beverages that naturally provide young children with essential nutrients and impact overall dietary quality.<sup>4</sup>

In efforts to reduce SSB consumption among children and adolescents, a variety of interventions have been proposed. These include: policies limiting the availability and promotion of SSBs in school and child care settings; regulatory and voluntary measures to limit the marketing of SSBs to children; and pricing incentives, (e.g., exempting healthier beverages such as bottled water from state sales taxes and/or subsidies for purchases of healthier beverages) and pricing disincentives (e.g., levying significant excise taxes on SSBs).

This research review examines:

- Current SSB consumption patterns in the general population, among youth, and among Latino children in particular, with a special emphasis on early childhood (i.e., ages 5 and younger).
- Evidence on the link between SSB consumption, obesity, and health.
- The extent of beverage company marketing efforts and any evidence of marketing specifically targeting Latinos.
- Availability and promotion of SSBs and other beverages in school and child care settings and policies that govern these practices.
- Evidence on the impact of pricing on SSB consumption and weight outcomes.
- Evidence around water consumption, accessibility, and affordability.

## Methodology

In 2012, *Salud America!* researchers developed a research review focusing on the SSB consumption among Latino youth and the impact of pricing on consumption and weight outcomes. Their initial literature search was conducted in PubMed, GoogleScholar, and Google using combinations of keywords that included “sugar sweetened beverages” AND “Latino,” “Hispanic,” “youth,” and “adolescents.” Further searching targeted economic aspects, by using terms such as “financial incentives” or “pricing” AND “sugar-sweetened beverages.” Additional documents

*Latinos' consumption of Sugar-sweetened beverages (SSBs) is higher than the overall average for the general population.*

related to current events and policies were found using the term “soda tax.” A further search was made using “pricing” AND “healthy beverages.”

The initial search resulted in approximately 35 peer-reviewed papers and other articles. Researchers also examined reports from the Institute of Medicine and the Economic Research Service of the U.S. Department of Agriculture. References in all articles reviewed led to a search for additional specific papers. Researchers also incorporated studies identified as part of a recent systematic review of research on food and beverage pricing conducted between January 2007 and March 2012, which included searches from the above databases and others.<sup>2</sup> This approach produced a comprehensive review of existing evidence on the impact of SSB taxes and prices on SSB consumption and obesity.

In 2015-16, researchers from *Bridging the Gap*, a research program dedicated to understanding how policies and environmental factors influence diet, physical activity and obesity among youth, expanded on the existing research review by searching specifically for any additional evidence published in English between January 2012 and May 2016, as well as any evidence from the past 10 years specific to SSB consumption in early childhood and around policies and regulations related to beverages in child care settings. Literature searches were conducted using a combination of the terms “beverages” (excluding alcoholic beverages) AND “Latino,” “Hispanic,” “Mexican American,” or “Puerto Rican.” Additional searches incorporated the terms “child,” “infant,” “toddler,” “child care,” “daycare,” “Head Start,” “preschool,” “kindergarten” or “Child and Adult Care Food Program.” After filtering the resulting list of papers through inclusion criteria, this yielded over 40 additional peer-reviewed journal articles and other papers that were considered relevant for incorporation into the research review. Additional references were identified and incorporated following the peer review process.

*SSBs displace healthier beverages that naturally provide young children with essential nutrients and impact overall dietary quality.*

## Key Research Results

- Nearly two-thirds (64%) of American youth ages 2-19, up to 10 percent of infants, and up to 38 percent of toddlers consume one or more SSBs on a given day.
- Minority youths, including Latinos, drink more SSBs than their non-Latino White peers; disparities in SSB consumption are seen as early as 6-11 months of age.
- Greater consumption of SSBs is associated with higher body weight among Latino and other children in early childhood.
- Individuals with lower socioeconomic status and U.S. immigrants with a higher degree of acculturation are more likely to consume more SSBs.
- The Latino population, including children as young as preschool age, is highly exposed to beverage company marketing efforts.
- Policies and regulations influence the availability and promotion of SSBs and other beverages in early child care settings.
- Increasing the prices of SSBs reduces overall SSB consumption, including among high risk populations such as young people and low-income populations;

more research is needed to understand the effect of pricing initiatives specifically on Latinos.

- Improving access to and affordability of water can play a role in promoting healthier beverage consumption.

## Studies Supporting Key Research Results

**Nearly two-thirds (64%) of American youth ages 2-19, up to 10 percent of infants and up to 38 percent of toddlers consume one or more SSBs on a given day.**

In the largest longitudinal study of infant feeding practices in the U.S., the Infant Feeding Practices Study II (IFPS II), prevalence of any SSB intake during infancy (between ages 1-12 months) was 25.9 percent in 2005-2007.<sup>5</sup> Research from the 2008 Feeding Infants and Toddlers Study (FITS), a cross-sectional survey describing infant feeding practices, nutrient intake, and food consumption patterns of U.S. infants and young children, showed that 0.6 percent of infants ages 4-5.9 months, 5 percent of infants 6-8.9 months, and 10.7 percent of infants 9-11.9 months consumed SSBs at least once in a day.<sup>6</sup> Prevalence of SSB consumption in a given day was 14.3 percent among toddlers 12-14.9 months, 29.4 percent among 15-17.9 months, 28.6 percent among 18-20.9 months, and 38.2 percent among 21-23.9 months in the FITS study.<sup>6</sup> This represented a significant decrease from 2002 SSB consumption among toddlers 12-14.9 and 18-20.9 months ( $p < 0.01$ ), but no significant change among toddlers 15-17.9 and 21-23.9 months. Among older toddlers participating in the 2008 FITS study, 44 percent of 2-year-olds and 48 percent of 3-year-olds consumed some type of SSB, with fruit-flavored drinks being the most popular.<sup>7</sup> SSB consumption has decreased in recent years among 2-5-year-olds; however, 4.5 percent of total calories still came from SSBs among this age group in 2009-2010.<sup>8</sup>

Early introduction of SSBs may influence young children's taste preferences for sweet foods and beverages later in life.<sup>9</sup> Any SSB intake during infancy (up to 12 months of age), for example, was associated with significantly increased likelihood of consuming SSBs at least once a day at age 6 in an analysis of longitudinal data from the 2005-2007 IFPS II and 2012 Follow-Up Study.<sup>10</sup>

One-third (33.1%) of youth ages 2-19 consumed one SSB on a given day in 2009-2010, while 31.2 percent reported consuming two or more servings on a given day, according to data from the National Health and Nutrition Examination Survey (NHANES).<sup>8</sup> Average daily caloric intake from SSBs among those ages 2-5 was 69 calories.<sup>8</sup>

A recent study using NHANES data, this time examining beverages sweetened both before and after purchase, found that SSBs accounted for 7.9 percent of total daily calories among children and adults ages 2 or older.<sup>11</sup> Recent simulation analyses based on 2005 School Nutrition Dietary Assessment data estimated that children would consume 205 fewer calories per day—roughly 10 percent of their daily total—by replacing their SSB and flavored milk consumption with unflavored low-fat milk at meals and water between meals.<sup>12</sup> Similarly, an analysis of children's dietary intakes from the 2003-2004 NHANES estimated that replacement of SSB

*Recent studies found that replacing SSB consumption with water or low-fat milk could result in consumption of 205-235 fewer calories per day for children.*

consumption with water would result in an average daily decrease of 235 calories consumed.<sup>13</sup>

**Minority youths, including Latinos, drink more SSBs than their non-Latino White peers; disparities in SSB consumption are seen as early as 6-11 months of age.**

By age 2, 74 percent of Latino children have consumed some SSBs, compared with 82 percent of African American children and 45 percent of non-Hispanic Whites, according to a study of 1,116 mother-child pairs participating in Project Viva.(REF) The same study showed that after adjusting for age, sex and energy intake, SSB consumption among African American and Latino 3-year-old children was more than three times greater and more than double, respectively, compared to white children.<sup>14</sup> These differences remained significant after controlling for maternal age, education, household income and maternal immigrant status.

One national study based on 2002 survey data found that Hispanic infants and toddlers in the U.S. were significantly more likely to be fed sweetened fruit-flavored drinks at 6-11 months (13.2% vs. 5.4%) and at 12-24 months (47.0% vs. 29.5%) compared to non-Hispanic infants and toddlers.<sup>15</sup> This study also noted that in several parts of Mexico sweetened drinks were routinely fed to infants to prevent or treat colic.

Another study of SSB and 100 percent fruit juice consumption among children in California found that Latino race/ethnicity was associated with 1.35 and 1.46 times higher odds of consuming any SSBs among children ages 2-5.<sup>16</sup>

Research based on national surveillance data shows that from 1988-1994 to 1999-2004, SSB consumption increased significantly more among Mexican American children ages 2-5 (and among children in older age groups) than it did among non-Hispanic white children and adolescents.<sup>17</sup> NHANES data from 2009-2010 show that Mexican American children ages 2-5 consume more daily calories from SSBs than their non-Hispanic white counterparts (but less than non-Hispanic black children).<sup>8</sup>

From 2003 to 2009, the consumption of 100 percent fruit juice per day increased among Latino children and decreased among White children, according to a study of children in California.<sup>16</sup> A 2016 study of 8,950 children demonstrated that drinking 100 percent fruit juice regularly at age 2 was associated with an increased odds (adjusted odds ratio, 1.30 [95% CI, 1.06-1.60]) of becoming overweight by age 4 compared with infrequently drinking or not drinking 100 percent fruit juice.<sup>18</sup>

Although not the focus of this research review, several studies indicate that these racial/ethnic disparities in SSB consumption continue among Latino children in older age groups, including Latino students in grades 4-6,<sup>19</sup> Latino children ages 6-11 and 12-19,<sup>8</sup> and Latino high-school student.<sup>20,21</sup>

**Greater consumption of SSBs is associated with higher body weight among Latino and other children in early childhood.**

*SSB consumption among Latino 3-year-old children was more than 2x that of non-Latino white children.*

Those who consume a greater amount of SSBs tend to have higher body weight than those who drink less.<sup>5</sup> A recent systematic review and meta-analysis of 32 studies, including prospective cohort studies and randomized controlled trials, associated SSB intake with risk of weight gain in children and adults.<sup>22</sup> Similarly, a meta-analysis of 88 studies found a clear association between soft drink consumption and weight.<sup>23</sup> By contrast, a recent systematic review of papers focused on regular soda consumption among children and adolescents and published between 2004 and 2014 did not find an association between regular soda consumption and weight among all age groups. Through an analysis of the NPD Group's 2006-2011 National Eating Trends survey, however, the same researchers found an association between more frequent soda consumption and obesity emerging between ages 6-8 and persisting through ages 9-12.<sup>24</sup> Recent studies have more clearly demonstrated the causal role of SSB consumption. For example, one recent prospective study of an intervention to reduce SSB consumption among adolescents found that BMI increase was smaller one year later in the intervention group than in the control group.<sup>25</sup>

Research indicates that calories from liquids are associated with higher overall total consumption because the body does not register liquid calories the same way it registers calories from solid food.<sup>26,27</sup> One study estimated that each additional 8-ounce serving of SSB consumed among children and adolescents ages 2-19 corresponded to an additional 106 calories in total energy intake, suggesting little to no compensation for the SSB calories.<sup>13</sup> However, one review had caveats related to the research design of some of the studies (although not necessarily the conclusions),<sup>28</sup> and another questioned the hypothesis that calorie-containing liquids are less satiating and that their sugar content affects body weight differently than solid foods.<sup>29</sup> Additionally, one study found greater ability among preschoolers to compensate for liquid calories consumed as long as one hour prior to sweet and savory snack foods.<sup>30</sup> Finally, some research has found that children and adults who drink SSBs specifically consume more sweet and salty snacks and eat more calories overall compared to those who do not.<sup>31</sup>

While detailed data on SSB intake at very young ages is generally lacking, research has shown an association of SSB intake and weight gain in early childhood. For example, a review of the literature (through September 2011) on the relationship between early weight gain, overweight, or obesity and genetic/biological, dietary, environmental, and behavioral factors concluded that SSB consumption was positively associated with adiposity or overweight in toddler and preschool age children.<sup>32</sup> A recent analysis of IFPS II data found that prevalence of obesity at age 6 was twice as high (17.0% vs. 8.6%) among children who had consumed SSBs between ages 1-12 months compared to those who did not drink SSBs in infancy.<sup>5</sup> After controlling for infants' gender, birth weight, age of solid food introduction, maternal race, maternal education, and other covariates, children who had consumed SSBs between ages 1-12 months had 1.71 times the odds of being obese as those who had not. Obesity prevalence was highest among children who consumed SSBs before 6 months and those who consumed SSBs at least three times per week between ages 10-12 months.<sup>5</sup>

One analysis of the Early Childhood Longitudinal Study Birth Cohort (ECLS-B) found that at ages 4 and 5, children drinking one or more servings of SSBs daily had

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higher odds of being overweight and obese compared to those not drinking SSBs. This association remained significant after adjusting for potential confounders (e.g., gender, race/ethnicity, SES, maternal BMI, TV viewing) at age 5 (AOR=1.43,  $p<0.01$ ) but not at age 4.<sup>33</sup> A separate analysis based on data from ECLS-B found through multivariate analyses that Latino race/ethnicity and drinking sugary beverages at kindergarten age at least once in the past week were both associated with 2.3 times the odds of severe obesity (BMI  $\geq$  99<sup>th</sup> percentile) in kindergarten.<sup>34</sup> Finally, an analysis of 1988-94 NHANES data showed a positive association between soft drink consumption and overweight among children, contributing a greater percentage of total calories among overweight versus normal weight 2-5-year-olds (3.1% vs. 2.4%).<sup>35</sup>

Specific to the young Latino population, a study involving low-income, Hispanic toddlers (ages 2-4) participating in the Los Angeles County Women, Infants, and Children (WIC) programs found that toddlers consuming no SSBs had 31 percent lower odds of being obese compared to those with high intakes ( $\geq 2$  servings/day) of SSBs.<sup>36</sup>

**Individuals with lower socioeconomic status and U.S. immigrants with a higher degree of acculturation are more likely to consume more SSBs.**

A study based on 2007-2008 NHANES data found that low-income children ages 2-11 (and those in older age groups) were significantly more likely than their high-income counterparts to consume regular soda and sports/energy drinks.<sup>37</sup> Low-income children were also significantly more likely to be heavy SSB consumers ( $>=500$  calories/day) and to obtain more calories from fruit drinks compared to high-income children.<sup>37</sup> Research has also pointed to an association between lower parental education and higher prevalence of SSB consumption among children ages 2-11.<sup>19,37,38</sup>

In a study in New York City, frequent soda consumption was more common among U.S.-born Puerto Ricans, Mexican/Mexican-Americans, and blacks, and individuals with less education and lower household incomes, mirroring disparities in obesity and other chronic diseases.<sup>39</sup> Although focused on adults, this study, unlike most, segmented by Hispanic origin (e.g., Puerto Rican, Dominican, Mexican/Mexican-American, and “other”), as well as for U.S. born and non-U.S. born. The authors concluded that economic resources, health literacy, and culture all play a role in soda consumption because the income-to-poverty ratio, educational attainment, and race/ethnicity/birthplace were all independent predictors of soda consumption.

While the level of Latinos’ acculturation—defined as a “process in which members of one cultural group adopt the beliefs and behaviors of another group”<sup>40</sup>—shows mixed results in terms of the effect on physical activity and the consumption of dietary fat and less healthful foods, the findings about added sugar consumption are consistent: Reviews of multiple studies concluded that more acculturated Latinos consume more added sugar<sup>41,42</sup> than less acculturated Latinos. Another study focused on Mexican Americans ages 12-19 in the NHANES 1999-2004 surveys found that second- and third-generation adolescents consumed more SSBs and had 2-4 times higher odds of being overweight or obese compared to first-generation adolescents.<sup>43</sup>

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The effect of acculturation on SSB consumption may change over time, at least for those of Mexican origin—but that is because Mexicans who are just coming to the United States may already consume more SSBs, given that Mexico’s per capita sugary drink consumption is the highest in the world.<sup>44</sup> One analysis shows that SSB consumption among Mexican adolescents more than doubled in less than a decade, from an average of 100 calories daily in 1999 to 225 calories daily in 2006.<sup>45</sup>

**The Latino population, including children as young as preschool age, is highly exposed to beverage company marketing efforts.**

The American Academy of Pediatrics (AAP) discourages TV watching among all children younger than 2.<sup>46</sup> In 2014, a randomized obesity prevention trial investigated racial/ethnic trends in infant feeding and activity behaviors and their relation to future obesity risk among 863 parents (50% Latino) of 2-month-old infants.<sup>47</sup> According to study investigators, parental adherence to the AAP’s TV-watching recommendation was low.<sup>48</sup> Nearly 50 percent of all parents reported active TV-watching among their infants, with over 90 percent reporting that infants had exposure to TV throughout the day.<sup>47</sup> For Latinos, 41 percent of infants took part in active TV watching for more than 25 minutes per day, with a mean daily TV exposure time of 228 minutes (or 3.8 hours). These findings indicate that by the age of 2 months, behaviors promoting sedentary behavior are already prevalent among Latino infants and their parents.<sup>47</sup>

Additional studies demonstrate that high rates of media exposures also exists among older Latino children (although this age group is not the focus on this review). Data show that Latino youth ages 8-18 have higher overall levels of total media exposure (including TV, music/audio, computer, video games, print, and movies) in a typical day than do their white counterparts – 13 hours for Latino youths compared with 8.36 hours for white youths.<sup>48</sup> A large portion of this increased media exposure comes from watching more TV. Latino youths watch an average of 5.21 hours of TV per day, as compared to the 3.36 hours watched by white youths. Further, Latino youths are more likely to have a TV in their bedroom than white youth (77% versus 64%).

Evidence has shown that TV advertising influences young children’s food preferences, short-term food consumption, and caloric intake.<sup>49-51</sup> Further, studies have documented an association between increased media exposure and childhood obesity in the Latino community.<sup>52,53</sup> In one study of sixth- and seventh-graders in Santa Barbara County, Calif., TV viewing and soft drink consumption were associated with obesity, and Latino students watched more TV each evening (2.4 hours per night) and drank more soft drinks (1.6 per day) than non-Hispanic White (1.3 hours and 1.1 drinks per day) or Asian (1.3 hours and 0.7 drinks per day) students.<sup>54</sup>

The Federal Trade Commission (FTC) estimated that in 2009, 48 major food and beverage companies spent a total of \$1.79 billion to market their products to children. While total spending was down by nearly 20 percent from 2006 to 2009, spending on new media (including online, mobile and viral marketing) rose by 50

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percent, to \$122.5 million, during this period.<sup>55</sup> In a comparison of 2006 and 2009 data, the FTC evaluated industry progress towards promoting healthier food choices to youths.<sup>55</sup> Findings were mixed; for example, drinks marketed to children and teens were slightly lower in calories in 2009 than in 2006, but still averaged more than 20 grams of added sugar per serving. One study found that between 2003 and 2009, exposure to televised beverage advertising for children ages 2-5 fell by more than 40 percent, and that fewer than two-thirds of the beverage ads seen by children were for products that were high in sugar.<sup>56</sup> A more recent analysis of 2009 TV advertising data showed that 52 percent of beverage ads seen by children ages 2-5 were for beverages high in sugar.<sup>56</sup> However, when examining ads shown specifically during children's programming (i.e., with 35% or greater child-audience share), 74 percent of beverage ads seen by 2-5-year-olds were for beverages high in sugar.<sup>56</sup>

In addition to having higher exposure to TV advertising, minority youths are also heavier consumers of new media than are White youths, with Hispanic youths spending more than twice as much time using new media than White youths.<sup>48</sup> In a recent study, Hispanic youth were 93 percent more likely to visit 20 top beverage company websites compared with all youth.<sup>57</sup> For example, Hispanic youth were about six times more likely to visit 7up.com and sprite.com compared to all youth.<sup>57</sup>

Given the growing purchasing power and heavy media consumption of the U.S. Hispanic population, marketers are investing significant resources to understand the Latino youth market so as to better appeal to this group.<sup>58</sup> One market research report, for example, summarizes its key finding as follows: "Both the number of Hispanics in the United States and their purchasing power are growing rapidly. With 51 million people in 2011, and purchasing power projected to reach more than \$1.48 trillion by 2015, Hispanics are a key consumer group for non-alcoholic beverage companies to court."<sup>59</sup>

SSB advertising on Spanish-language TV has been increasing. In 2013, seven companies spent \$83 million to advertise sugary drinks and energy shots on Spanish-language TV, an increase of 44 percent compared to 2010. By contrast, companies spent \$9 million to advertise diet drinks, 100 percent juice, and water.<sup>60</sup> According to one analysis of Nielsen data, Latino preschoolers, children, and teens saw 33, 49 and 99 percent more advertising, respectively, for sugary drinks and energy drinks on Spanish-language TV in 2010 than they did in 2008. In 2013, Latino preschoolers and children saw 23 and 32 percent more sugary drink ads, respectively, on Spanish-language TV than they did in 2010.<sup>60</sup> Furthermore, Hispanic preschoolers saw more ads for Coca-Cola Classic, Kool-Aid, 7UP, and Sunny D than did Hispanic older children and teens.<sup>60</sup> Various studies suggest that exposure to such targeted advertising (i.e., Spanish-language marketing) may be more effective in influencing Latino youths than exposure to non-targeted advertising.<sup>58,61</sup> For example, among bilingual Latinos, recall is greater for advertisements that are aired in Spanish compared to ads that are aired in English.<sup>61,62</sup> In addition to targeting Latinos via Spanish-language TV, SSB commercials and marketing initiatives often use soccer athletes, Latino music celebrities, and other culturally nuanced aspects that appeal to young Latinos.<sup>57</sup>

Outside of sugary drink marketing on traditional TV and new media, other forms of marketing exist in communities to build familiarity with and loyalty to brands. One observational study conducted in Austin, Los Angeles, New York City, and Philadelphia found that low-income Latino neighborhoods had up to nine times the density of outdoor advertising of sugary beverages, fast food, and other high-calorie/low-nutrient products compared to high-income white neighborhoods.<sup>63</sup> (REF) This difference persisted even in high-income Latino neighborhoods, where the density of such ads was still nearly three times higher than in high-income white neighborhoods.

Finally, food and beverage marketers have become an important source of funding for community organizations.<sup>64,65</sup> This is particularly true of soft drink companies and the Latino community. For example, in 2012, PepsiCo donated \$100,000 to the National Association for Hispanic Journalists and the Coca-Cola Company donated funding to the American Diabetes Association for education outreach specifically to the Latino community.<sup>66,67</sup> Local Latino events and causes are also frequently supported by sugary drink brands and are promoted on local Spanish-language TV.<sup>57</sup> The “do good for the community” attitude suggests that sponsorships and support for ethnic minority cultural institutions may have significant influencing powers.<sup>68</sup> Indeed, today many Latinos and African-Americans see marketing to their communities as evidence that companies value their business, which many people in these communities believe was not previously the case.<sup>58</sup>

### **Policies and regulations influence the availability and promotion of SSBs and other beverages in early child care settings.**

The National Household Education Survey reports that 60 percent of all U.S. children ages 5 and younger not yet enrolled in kindergarten were in some form of non-parental care at least once a week in.<sup>69</sup> Among these children, 56 percent were cared for in a center such as a day care center, Head Start program, preschool, prekindergarten, or other early childhood programs. Children in full-time child care programs obtain typically half to three-fourths of their daily energy in these settings.<sup>70</sup> The types of child care facilities and programs available in the U.S. vary considerably, including large and small child care centers, family day care homes, Head Start facilities, and others.<sup>71</sup> With the exception of the federal Health Start program, child care programs are regulated primarily at the state level, with states setting regulations and minimum enforcement standards for licensed programs. Some facilities, such as faith-based centers and smaller family day care homes, are exempt from licensure and regulations. Local regulations have been enacted in some municipalities, but not all states give municipalities this authority. Some facilities participate in the Child and Adult Care Food Program (CACFP), a federal program of the U.S. Department of Agriculture that provides site training and reimbursement for meals and snacks served to income-eligible children. Public and private nonprofit child care centers and for-profit centers receiving title XX funds for at least 25 percent of the children in care are eligible to participate in CACFP and participating providers must ensure that meals and snacks met current food-based meal pattern standards.<sup>72</sup> CACFP regulations pertain only to those foods and beverages for which providers seek reimbursement; therefore, they do not preclude providers from offering non-reimbursable items such as SSBs.<sup>71</sup> Finally, the Head Start program is a

*Local Latino events and causes are frequently supported by sugary drink brands and are promoted on local Spanish-language TV.*

federal program of the U.S. Department of Health and Human Services that provides health, education, and nutrition resources to low-income children.<sup>72</sup> Unlike the CACFP, the Head Start program has federal performance standards for nutrition and must have a registered dietitian review and evaluate centers' menus.<sup>71</sup>

Limited research has documented the types of beverages available and served to children in such child care settings. Studies have shown that some (but few) facilities do serve SSBs to children in this age group and that provision and promotion of water does not often meet recommended practices. For example, in a 2005-06 survey of 40 New York City child-care center directors (38 of which participated in the CACFP), three directors (8.1%) reported that fruit drinks with less than 100 percent juice were available. Half of the centers did not provide a source of drinking water, and only three provided drinking water to children at mealtimes.<sup>73</sup> By comparison, a national survey of 1,810 Head Start program directors found that nearly all (99%) reported never serving sugary drinks such as Kool-Aid, sports drinks, punches, or soda, and 95 percent reported never serving juice drinks with less than 100 percent juice.<sup>74</sup> An observational study conducted in 40 child care centers participating in the CACFP in Connecticut found that 16 percent and 68 percent of centers, respectively, did not have water available for students in the classroom or during physical activity.<sup>72</sup> Further, staff verbal promotion of water was observed in less than a quarter of the centers in both the classroom and physical activity components. In a 2008 statewide survey of 432 child care providers in California, provision of sweetened drinks (including soda or fruit drinks) to children ages 2-5 on the day preceding the survey varied by type of facility, with CACFP centers reporting the lowest frequency (2.9%) and non-CACFP homes reporting highest frequency (18.4%).<sup>75</sup> Lastly, in a survey of nearly 300 home child care providers (caring for up to six children ages 12 and younger) in Kansas, 93.5 percent of respondents reported that sugary drinks (e.g., fruit drinks, punches, sports drinks, soda) were served fewer than twice weekly and 70 percent and 96 percent reported that drinking water was readily available outside and inside, respectively.<sup>76</sup>

In 2007, a review of regulations in each of the 50 states and the District of Columbia was conducted to assess policies related to beverages and other obesity-related practices in child care.<sup>77</sup> Just seven states (14%) had policies limiting SSBs in both licensed child care centers and family child care homes. A number of these states' regulations stated that these beverages could only be served occasionally or on special occasions. Forty-one states (80%) had policies ensuring that water was available to all children in child care centers, while 34 states (67%) had policies requiring water be available to all children in family child care homes. Even when policies were in place, the authors note that regulations often lack specificity and may be difficult to interpret by child care providers.<sup>77</sup> In 2010, California passed Assembly Bill 2084, the Healthy Beverages in Childcare law, which among other things prohibited beverages with added sweetener (artificial or natural and including flavored milk), mandated that drinking water be available at all times, and limited 100 percent juice to no more than one age-appropriate serving per day.<sup>78</sup> These regulations exceeded federal CACFP beverage requirements and applied to all licensed child-care sites in the state, including non-CACFP sites. A study comparing beverage availability in California licensed child care facilities in 2008 and 2012 (before and after the new regulations took effect) surveyed approximately 1,400 sites

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and found that after the policy took effect, significantly more child care sites served water with meals and snacks (46.7% vs. 28.0%,  $p=0.008$ ) and made self-service water available to children both indoors (76.5% vs. 69.0%,  $p=0.001$ ) and outdoors (77.5% vs. 68.8%,  $p<0.001$ ).<sup>78</sup> Only 7.6 percent of sites reported providing SSBs in 2008 and 6.9 percent did so in 2012, representing a decrease but not a significant change. Compliance with the SSB and water provisions was higher among centers participating in the CACFP.<sup>78</sup>

In 2007, new regulations were set for early childhood centers in New York City, where the Board of Health has independent regulatory authority over child care centers. Among other obesity-related practices, the regulations restricted SSBs for all children and required water to be made available and accessible at all times.<sup>79</sup> In late 2009/early 2010, a study evaluating compliance with the regulations was conducted in 106 group child care centers (93% of which participated in CACFP and 73% of which participated in Head Start).<sup>80</sup> Researchers found that most centers (67%) complied with the SSB regulations (i.e., had no SSBs in center's kitchen facilities during two site visits and no SSBs served to any child with any meal or snack during two-day site visits). A little more than half (52.8%) of sites made water available to children (i.e., teachers consistently reported that water was available to children throughout the day and drinking water was visible in the classroom or in a nearby hallway).<sup>80</sup> Furthermore, this study demonstrated that compliance with the new regulations was associated with 86 percent lower odds of a child consuming SSBs with any meal or snack; compliance was not associated with the likelihood of a child consuming water during meals or snacks, however.<sup>80</sup>

The Healthy, Hunger-Free Kids Act of 2010 requires that child care facilities participating in the CACFP make drinking water available throughout the day (as of October 2011); however, it does not place any restrictions on SSBs. In January 2015 the USDA Food and Nutrition Service issued a proposed rule to amend the meal patterns for the CACFP to better align them with the Dietary Guidelines for Americans and Institute of Medicine recommendations. The proposed rule includes the following language: "States and sponsors should encourage facilities to serve water with snacks when no other beverage is being served, and in lieu of other high calorie, sweetened beverages (juice drinks, soda, sports drinks, etc.) that are served outside of meal times."<sup>81</sup> As the revised guidelines were in review, states and localities (where they are given the authority) were given authority to go beyond the nutrition requirements in the federal CACFP regulations and influence beverages available not only in centers participating in CACFP, but non-CACFP centers and day care homes as well. The revised CACFP rules were approved in April 2016. The new guidelines "will improve access to healthy beverages, including low-fat and fat-free milk and water, and encourage breastfeeding for the youngest program participants," according to the USDA.<sup>82</sup> The revised rules also: limit service of juice to once per day; prohibit flavored milk for children ages 2-5; recommend as a best practice that flavored milk contain no more than 22 grams of sugar per 8 fluid ounces for children ages 6 and older; and require potable drinking water to be offered to children throughout the day and available to children upon their request throughout the day.<sup>82,83</sup> The revised rules also include some non-mandatory best practices, which include "avoid serving non-creditable foods that are sources of added sugars, such as sweet toppings (e.g., honey, jam, syrup), mix-in ingredients sold with yogurt (e.g.,

honey, candy or cookie pieces), and sugar-sweetened beverages (e.g., fruit drinks or sodas). The implementation of the new rules began Oct. 1, 2017.<sup>83</sup>

Also, in February 2016, the Colorado State Board of Human Services Office of Early Childhood approved a new obesity prevention rule that took effect in child care centers within Colorado banning all centers on providing sugar-sweetened sodas, fruit drinks, energy and sports drinks and flavored milk.<sup>84</sup>

**Increasing the prices of SSBs reduces overall SSB consumption, including among high-risk populations such as young people and low-income populations; more research is needed to understand the effect of pricing initiatives specifically on Latinos.**

Research shows that soft drink consumption is responsive to changes in soft drink prices. One recent systematic review concluded that a 10 percent increase in soft drink prices would lead to a 7.9 percent reduction in soft drink consumption.<sup>85</sup> A second systematic review of studies published from January 2007 through March 2012 concluded that a 10 percent price increase for SSBs only would lead to an even larger—12.1 percent—reduction in SSB consumption, as some consumers would switch to diet, water and other lower-calorie options. Price increases on more narrowly defined categories of SSBs (e.g., regular carbonated soda) would lead to larger reductions in consumption in these categories.<sup>86</sup> A recent randomized controlled trial conducted in the Netherlands had study participants shop in a virtual 3-D supermarket and randomized participants to two groups – an experimental condition with a simulated 19 percent price increase for SSBs and a control group with regular prices.<sup>87</sup> Researchers examined the effect of the price conditions on the purchase of SSBs as well as four specific beverage categories and four specific snack categories. Statistically significantly lower SSB purchases were observed in the experimental condition (a decrease of .90 L per household per week), while no significant effects were observed for purchases in other beverage or snack food categories.

A recent meta-review on the effect of fiscal policy interventions intended to improve diet examined 11 systematic reviews representing 533 individual studies, including cross sectional and longitudinal studies, modeled studies, and randomized controlled trials.<sup>86</sup> SSBs were identified as one of the most effective targets for fiscal policy intervention, given that they are energy-dense and nutrient-poor, and that there are many healthier substitutes. While the evidence overall is convincing that increasing the price of SSBs reduces SSB consumption, there is currently a lack of evidence on the differential effects of increased SSB prices for various racial/ethnic groups, including Latinos. One recent paper linked soda consumption data from NHANES to soda price data from the Council for Community and Economic Research and estimated differential responsiveness to price changes for different populations. The authors concluded that the weakest negative associations between soda price and intake were found among minority (including Hispanic) children and adolescents.<sup>89</sup> More research is needed to determine how Latino purchasing and consumption behaviors are impacted by SSB price increases as compared to other populations.

Aside from a reduction in consumption, little is known about the effect on obesity of

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pricing increases of sugary drinks. One study used carbonated beverage prices to look at the impact of beverage prices on children's weight, using the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K) data. This study found that higher beverage prices were associated with lower BMI as children aged from kindergarten through eighth grade. In addition, estimates showed that the effects of beverage prices were greater for Hispanic and White children, compared with black children, and greater for near-poor children, compared with poor and non-poor children.<sup>90</sup> Other studies also have found greater impact in low-socioeconomic status and/or minority populations, at younger ages, and for individuals at a higher weight.<sup>86</sup>

Taxes specifically on SSBs have been proposed as one way to curb SSB consumption and possibly reduce obesity (in contrast to existing state sales taxes on beverages, which do not differentiate between sweetened and low- or no-calorie alternatives and are generally not comprehensively applied to all SSBs). A federal SSB tax was introduced in July 2014<sup>91</sup>, but to date, no such legislation has been passed at the state or federal level. SSB taxes have recently been adopted in Mexico, Philadelphia, and in Berkeley, Calif. Beginning in 2014, a peso-per-liter tax on SSBs (approximately 7 cents, or a 10% increase in price) went into effect throughout Mexico. Though not a domestic example, this case is expected to provide valuable information through its implementation and ongoing evaluation. According to a study by Mexico's National Institute of Public Health and the University of North Carolina, following the implementation of the tax, purchases of soda and other taxed beverages declined 6 percent on average, and reached 12 percent by December 2014.<sup>92</sup> Sales of bottled water and other untaxed drinks (e.g., 100% juice and milk) increased 13 percent and 7 percent, respectively.<sup>93</sup> Mexico's sugary drinks tax is projected to prevent 190,000 cases of diabetes, 20,000 heart attacks and strokes, and 19,000 deaths among Mexicans ages 35-94 over the next 10 years, in addition to saving \$1 billion in direct healthcare costs in that span, according to a 2016 study on the long-term health and economic effects of the tax.<sup>94</sup> In November 2014, Berkeley (10.8% Latino) became the first U.S. jurisdiction to pass a tax on SSBs (a penny per ounce), in spite of nearly \$2.5 million in industry spending to defeat this ballot initiative.<sup>95</sup> In June 2016, Philadelphia became the first major U.S. city to approve a tax on sodas and other sugary drinks. The 1.5-cent-per-ounce tax, expected to go into effect on Jan. 1, 2017, is expected to raise \$91 million annually and fund city projects including pre-kindergarten expansion, the creation of community schools and an investment in parks and recreation centers, according to news reports.<sup>96,97</sup> In November 2016, sugary drink taxes were also approved in Boulder, Colo., Cook County, Ill., and San Francisco, Oakland, and Albany, Calif.<sup>98,99</sup>

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In a recent analysis using average SSB prices collected from food stores nationwide, the anticipated change in price with a penny-per-ounce SSB tax was calculated for various beverages. Authors estimated that a penny-per-ounce SSB tax would represent a 16.9 percent tax on SSBs overall, a 20.9 percent tax on regular soda, a 13.3 percent tax on juice drinks, a 16.7 percent tax on sports drinks, and a 4.8 percent tax on energy drinks.<sup>100</sup> The authors projected that such a tax would result in a 20.3 percent decline in SSB consumption overall and that the drop in consumption of

regular soda, juice drinks, isotonic sports drinks, and energy drinks would be 24.5 percent, 16.0 percent, 20.0 percent, and 5.8 percent, respectively.

Independent of their impact on consumption, several experts have noted that earmarking SSB tax revenues for obesity-prevention and -reduction efforts would improve weight outcomes.<sup>101</sup> Revenue from Berkeley's SSB tax are allocated to the city's general fund; while not earmarked for obesity prevention and/or health promotion efforts, an appointed panel of experts in child nutrition, healthcare, and education, will make recommendations to the City Council on specific health programs to fund or establish to improve children's health across Berkeley.

In several studies that found little or no impact of existing, small sales taxes on weight outcomes, the authors noted that their estimates suggest that more sizable taxes would have significant effects on weight outcomes at the population level. Several studies have used the estimates from research on the effects of beverage taxes and prices on beverage consumption and weight outcomes to simulate the impact of larger beverage taxes. One such study projected that a penny-per-ounce tax (which is about a 20 percent increase in price if fully passed on to consumers) would translate to a 24 percent decrease in SSB consumption, a reduction in current consumption from 190-200 calories per day to 145-150 calories, with projected annual revenues of \$79 billion from 2010-2015.<sup>102</sup> A recent study, noting a lower price responsiveness among adolescents compared to children and adults, estimated that a penny-per-ounce soda tax or 20 percent increase in soda price would reduce overall soda intake by 16.2 percent for children, 10.4 percent for adolescents and 13.2 percent for adults.<sup>103</sup> Finally, a recent micro-simulation analysis estimating the impact of a penny-per-ounce SSB excise tax on childhood obesity prevalence concluded that by 2032, such a tax would reduce obesity by 1.6 percentage points among 6-12-year-olds and 2.4 percentage points among 13-18-year-olds.<sup>104</sup> The estimated reductions in obesity prevalence were higher among Hispanic children (-2.0%) and teens (-2.9%) in this study.

### **Improving access to and affordability of water can play a role in promoting healthier beverage consumption.**

Research based on national NHANES data (2005-06, 2007-08, and 2009-10) has shown that water intakes among U.S. children ages 4-13 are below recommended levels. Mexican-American children consumed less plain water than Non-Hispanic white children, on average, and children living in lower-income households were less likely to consume water as a beverage than those in high-income households.<sup>105</sup>

Studies have found that Hispanics are more likely to perceive tap water as unsafe and are less likely to drink tap water compared to Non-Hispanic whites.<sup>38,106-108</sup> Recent NHANES data showed that over half (56%) of Mexican-American children consumed water from bottled sources rather than tap, compared to only 35 percent of Non-Hispanic white children.<sup>105</sup> This raises questions around the accessibility of healthy alternatives to SSBs and whether this may play a role in the prevalence of SSB consumption. In their analysis of national 2010 YouthStyles data, Onufrak and colleagues found that negative perceptions of the school water fountains were associated with SSB intake among Hispanics.<sup>106</sup> A study of students in L.A. Schools

(60% Latino), middle-school students' perceived water to be warm, contain dirt/trash, or taste bad, and had greater odds of not drinking water.<sup>109</sup>

However, a 2016 study reviewing more than 1,227 elementary and middle schools in New York that banned sugary drinks and replaced vending machines with new water jets found students had a reduction in standardized BMI. Water jets were associated with a 0.9 percentage point reduction in the likelihood of being overweight for boys and a 0.6 percentage reduction among girls.<sup>110</sup>

While bottled water may be widely available in food stores throughout the country—one national study found plain bottled water in 97 percent of 5,922 food stores observed in communities throughout the U.S.<sup>111</sup>—price may be an issue for some families and individuals. As of January 1, 2014, 17 states and Washington, D.C. imposed sales taxes on bottled water sold in food stores, and 34 had sales taxes on bottled water sold in vending machines. In grocery stores, the average sales tax rate among states that do tax bottled water was 3.95 percent. In vending machines, the average sales tax rate among states that do tax bottled water was 5.04 percent.<sup>112</sup> In February of 2015, a bill was introduced in Maryland (HB 261/SB 574) that would eliminate the 6 percent sales tax from bottled water sold at grocery stores and convenience stores.<sup>113</sup>

Finally, a study that used Nielsen Homescan data to estimate the potential impact of a SSB tax on household beverage purchasing found that bottled water was the strongest substitute for caloric sweetened beverages after a tax-induced 20-percent price increase on caloric sweetened beverages.<sup>2</sup> Such substitution from sweetened beverages to bottled water (versus juice, milk, and other caloric beverages) would result in a net reduction in total daily calories. Hence, it is important to acknowledge the price and accessibility of healthier substitutes, such as water, when considering the overall impact of a tax on SSBs.

## Conclusions and Policy Implications

### CONCLUSIONS

- The large amount of added sugar consumed by Latino youths in the form of SSBs must be addressed, given the impact of this added sugar on obesity.
- Young people are exposed to a wide variety of SSB advertising and promotion, with exposure among Latinos disproportionately high, despite voluntary efforts by beverage companies to reduce marketing to children.
- Very few early childcare facilities report serving sugary drinks to children ages 0-5, but increased regulation can reduce serving of sugary drinks and increase promotion of water.
- A more sizable price increase on all SSBs could have a significant effect on consumption of SSBs and could improve weight<sup>12,30–33,36,38,49,67,77,92,112–115</sup> and health outcomes at the population level. Limited existing evidence suggests that the effects would likely be greater for Latinos.
- Latino children drink less plain water than their non-Latino white peers, suggesting the need for greater access to and affordability of water sources.

## POLICY IMPLICATIONS

- Early childcare centers should consider best practices from the revised Child and Adult Care Food Program (CACFP) guidelines, such as avoid serving sugar-sweetened beverages.<sup>83</sup>
- Beverage companies' voluntary efforts to reduce children's exposure to SSB marketing have had little impact. Stronger restrictions on SSB marketing to children are likely to be necessary to achieve significant reductions in exposure to SSB advertising and promotion.
- Research indicates that a specific tax covering all SSBs (not just soda) will have greater impact on SSB consumption and weight outcomes than a sales tax or an ad valorem excise tax. A tax that raises all SSB prices by 20 percent would reduce SSB consumption by 24 percent, with the net impact on weight less clear. Revenues from the tax could be directed toward obesity-prevention and other health-promotion efforts.
- Policies to lower the price of healthier beverages relative to SSBs, such as incentivizing the purchase of healthier beverages, are also likely to reduce SSB consumption and potentially improve weight outcomes.

## FUTURE RESEARCH NEEDS

Further research could focus on differences in SSB consumption and the effect on obesity and health among Latino subgroups, as most studies that tease out results by racial/ethnic group focus on Mexican Americans. More research is also needed on the beverages available and promoted in early child care settings and how new federal, state, and (where they have regulatory authority) local regulations impact this in both licensed and unlicensed child care settings.

Further research on the potential impact of SSB prices and taxes on Latinos, particularly youths, could be conducted. It will be important to evaluate the taxes implemented in Philadelphia, Cook County, Ill., and the California cities of Berkeley, San Francisco, Oakland, and Albany, and in Mexico, as well as any other policies that are passed into law, especially their impact on multicultural communities. Many cities and states have introduced legislation in recent years and a federal bill was introduced in mid-2014.

Research on removing existing sales taxes on bottled water and other low- or no-calorie alternatives, and on subsidizing these and other healthier alternatives, such as low-fat, low-sugar milk, unsweetened vitamin water and other beverages, could show whether positive pricing of alternatives affects SSB consumption. Similarly, research on other pricing incentives and disincentives that alter the relative prices of fruits, vegetables, snack foods, fast foods, and more in ways that promote healthier eating could show how such policies affect total caloric intake, diet quality, and obesity.

#### **ABOUT SALUD AMERICA!**

*Salud America!* The RWJF Research Network to Prevent Obesity Among Latino Children is a national program of the Robert Wood Johnson Foundation that develops multimedia communications to educate and motivate our national online network—kids and parents, teachers, academics, and community leaders—to take action to reduce Latino childhood obesity and build a culture of health. The network is directed by the Institute for Health Promotion Research at the University of Texas Health Science Center at San Antonio.

For more information, visit <http://www.communitycommons.org/salud-america>.

#### **ABOUT BRIDGING THE GAP**

*Bridging the Gap* is a research program dedicated to improving the understanding of how policies and environmental factors influence diet, physical activity and obesity among youth, as well as youth tobacco use. The program identifies and tracks information at the state, community and school levels; measures change over time; and shares findings that will help advance effective solutions for reversing the childhood obesity epidemic and preventing young people from smoking. Bridging the Gap is a joint project of the University of Illinois at Chicago's Institute for Health Research and Policy and the University of Michigan's Institute for Social Research.

For more information, visit [www.bridgingthegapresearch.org](http://www.bridgingthegapresearch.org).

#### **ABOUT THIS RESEARCH REVIEW**

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