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Intervenciones ambientales en escuelas y sus alrededores para reducir el consumo de bebidas azucaradas en niños y adolescentes: una revisión sistemática de la literatura

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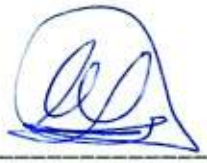

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RESUMEN

El consumo frecuente de bebidas azucaradas (SSBs) está asociado con el incremento en varios indicadores adversos de la salud. Se ha observado un consumo cada vez más elevado de estas bebidas. Se realizó esta revisión sistemática para evaluar el efecto de intervenciones ambientales en escuelas y sus alrededores orientadas a los niveles de consumo de bebidas azucaradas, obesidad y otros indicadores de salud relacionados con la dieta. Se realizaron búsquedas en las bases de datos en línea PubMed, Embase (Ovid®), LILACS, SciELO y CENTRAL, así como literatura gris, desde el inicio de la base de datos hasta enero 2018. Se incluyeron tanto ensayos controlados como no controlados que aplicaron intervenciones ambientales o combinadas en escuelas. Se calificó el riesgo de sesgo de los trabajos seleccionados. Dos autores revisaron los 3,209 estudios después de remover duplicados. Diecisiete estudios cumplieron con los criterios de inclusión: y se excluyeron 53 estudios. Se encontraron estudios con intervenciones ambientales y combinadas. La mayoría de los estudios incluidos reportaron un resultado positivo y significativo en la reducción del consumo de SSBs. Las intervenciones con los resultados positivos más consistentes fueron aquellas enfocadas en las políticas, normas o legislaciones de alimentación y nutrición. Sin embargo, 16 de los 17 estudios incluidos presentaron un riesgo de sesgo alto o incierto debido a las limitaciones en su diseño, métodos e informes, limitando así las conclusiones que se podrían obtener. Por esta razón, es necesario obtener evidencia más clara basada en métodos estandarizados y así lograr mejor calidad.

INTRODUCCIÓN

Durante los últimos 30 años, se ha incrementado marcadamente el consumo de bebidas azucaradas (SSBs) en todo el mundo (1), incluyendo México (2). En el 2012, el consumo de bebidas representó el 17.5% (325 kcal) del consumo total diario de energía por persona en niños de 1–19 años (2). Del consumo total de bebidas en el 2012 se estimó que las bebidas azucaradas representaron el 7% del consumo total de energía tanto en niños como en adolescentes y adultos (2, 3).

El consumo frecuente de bebidas azucaradas está asociado con el incremento en varios indicadores de salud adversos, incluyendo la obesidad (4, 5), el síndrome metabólico y la diabetes tipo 2 (6), las enfermedades cardiovasculares (4, 7), y las caries dentales (8, 9).

En la literatura se encontraron varías definiciones de bebidas azucaradas, las cuales hacían referencia a bebidas carbonatadas o no carbonatadas con azúcar, jugos de frutas endulzados, bebidas deportivas y energizantes, así como tés y cafés endulzados (3, 10-14). Todas descartaban a las bebidas alcohólicas y a los jugos naturales de frutas como bebidas azucaradas (Tabla 1), pero al referirse a leche, las definiciones entran en debate. Avery y Von Philipsborn no consideran la leche endulzada como una bebida azucarada (3, 11), mientras que Vargas García, Sánchez-Pimienta y Colchero sí la consideran como tal (10, 12, 13).

El concepto definido por Colchero fue el utilizado para la implementación del impuesto a bebidas azucaradas en enero del 2014 en México, en el cual el gobierno implementó un impuesto de 1 peso mexicano por litro a todas las bebidas no alcohólicas con azúcar añadido (10). El impuesto se aplica a las gaseosas, aguas saborizadas, tés, leche endulzada y bebidas energizantes con azúcar; y excluye bebidas con edulcorantes artificiales y jugos 100% naturales (10). Tomando en cuenta esto, dicho concepto será el utilizado en esta revisión, ya que las bebidas mencionadas son consideradas como bebidas azucaradas bajo la ley mexicana.

Tabla 1. Tabla de comparación según diferentes autores de distintas definiciones de SSBs.

	Autor y referencia					
	Avery y col. (11)	**Vargas García y col. (12)**	**Sánchez-Pimienta y col. (13)**	**von Philipsborn y col. (3)**	**Colchero y col. (10)**	**Singh y col. (14)**
Bebidas carbonatadas c/ azúcar	✓	✓	✓	✓	✓	✓
Bebidas no carbonatadas c/ azúcar	✓	✓	–	–	✓	✓
Jugos de frutas naturales	–	×	×	–	×	×
Jugos de frutas endulzados	✓	✓	✓	✓	✓	✓
Bebidas lácteas	–	–	–	×	–	×
Leche endulzada	×	✓	✓	×	✓	–
Bebidas alcohólicas	–	×	×	×	×	–
Aguas frescas	–	–	–	–	–	✓
Bebidas deportivas y energizantes	–	✓	✓	✓	✓	✓
Té endulzado	–	✓	✓	✓	✓	✓
Café endulzado	–	✓	✓	✓	–	–

✓ Si, × No, – No aplica

Las estimaciones del consumo de SSBs de Singh y colaboradores (14) fueron utilizadas para estimar las cargas de las enfermedades a nivel nacional, regional y global provocada por el consumo de bebidas azucaradas (15). Mundialmente, el modelo estimó 184,000 muertes/año (95% intervalo de incertidumbre (II), 161,000–208,000) atribuibles al consumo de bebidas azucaradas: 133,000 (95%II, 126,000–139,000) por diabetes mellitus, 45,000 (95%II, 26,000–61,000) por enfermedad cardiovascular, y 6,450 (95%II, 4,300–8,600) debidas a cánceres. El 5% de muertes relacionadas al consumo de bebidas azucaradas ocurrieron en países de bajos ingresos; 70.9% en aquellos de ingresos medios, y el 24.1% en países de ingresos altos (15). Entre las naciones más grandes (población >1 millón), la tasa de mortalidad asociada al consumo de bebidas azucaradas alcanzó su mayor nivel en México (405 muertes por millón de adultos; 95%II, 345–462) así como lo fue el número de Años de Vida Ajustado por Discapacidad (AVAD) por millón de adultos atribuidos al consumo de bebidas azucaradas (3960; 95%II, 1,516–13,990).

En México, casi 1 de cada 6 casos de diabetes tipo 2 relacionados a AVAD se atribuyeron al consumo de bebidas azucaradas (15.8%; 95%II, 7.0%–27.5%) (15).

Planteamiento del problema

En el 2016 la diabetes tipo 2 y la cardiopatía isquémica fueron las dos principales causas de muerte y discapacidad en México. La alta glucosa plasmática en ayuno, el índice de masa corporal elevado, el uso de drogas y alcohol, la presión sistólica elevada y los riesgos por la dieta fueron los principales factores de riesgo responsables por muerte y discapacidad (en ese orden) (16).

Según la Encuesta Nacional de Salud y Nutrición de Medio Camino (ENSANUT) 2016, para la población mexicana en edad escolar (5 a 11 años) la prevalencia combinada de sobrepeso u obesidad, utilizando los criterios de la Organización Mundial de la Salud, fue de 33.2% (17.9 y 15.3%, respectivamente) (17). Estas prevalencias representan alrededor de 15,803,940 escolares en el ámbito nacional. Los adolescentes (12 – 19 años) presentaron un 36.3% de sobrepeso u obesidad, lo que en el ámbito nacional representa a 18,492,890 adolescentes (17).

De igual manera, en la ENSANUT 2016, se reportó que del total de la población, el 39.1% consume bebidas azucaradas diariamente, el 33.2% varias veces a la semana, el 18.7% de una a tres veces al mes, y el 9% menos de una vez o nunca (17). También se encontró que, si bien a una gran mayoría de las personas le gustan las bebidas azucaradas (82%) y estas se consumen habitualmente, la población mexicana sabe que el consumo de bebidas azucaradas en exceso no es saludable (92% lo reportó) y conoce las consecuencias negativas de un alto consumo, pero sin embargo no dejan de consumirlas (17).

En noviembre del 2016, la Secretaría de Salud de México declaró una emergencia epidemiológica para todas las Entidades Federativas de México ante la magnitud y trascendencia de los casos de sobrepeso y obesidad (18). Asimismo, también fue declarada como emergencia epidemiológica la diabetes mellitus debido a la magnitud y trascendencia de los casos (19). Aunque México ha tenido una Estrategia Nacional para la Prevención y el Control del Sobrepeso, la Obesidad y la Diabetes desde 2013 (20), una reciente auditoría por la Auditoría Superior de la

Federación en el análisis de la Cuenta Pública 2015 concluyó que el plan es deficiente porque no se definió de manera clara su implementación, evaluación y supervisión (21). Ha habido algunos logros como resultado de este plan, incluyendo la introducción de un impuesto del 10% en bebidas endulzadas con azúcar (introducido en enero 2014) el cual llevó a la reducción del consumo de bebidas azucaradas (10, 22, 23).

En el 2014 en México, se establecieron Lineamientos Generales para el expendio y distribución de alimentos y bebidas preparados y procesados en las escuelas del Sistema Educativo Nacional. En estos lineamientos se establecieron los alimentos y bebidas permitidos y no permitidos en escuelas primarias según los distintos días de la semana, así como la prohibición de vendedores informales afuera de las escuelas (24). Las regulaciones restringen la presencia de bebidas azucaradas y otros productos no saludables.

El "Poder del Consumidor", la cual es una asociación civil sin fines de lucro, junto con un comité de expertos, llevaron a cabo una investigación (en una muestra pequeña de escuelas) que midió la implementación de dicha regulación, la cual dio como resultado la falta de implementación, así como la falta de interés y compromiso del gobierno mexicano en reconocer a los entornos escolares como un elemento esencial para el combate a la epidemia nacional de sobrepeso y obesidad en los niños y adolescentes (25). Aún queda mucho trabajo por hacer para combatir la obesidad y la diabetes en México.

Claramente, se requieren intervenciones efectivas para reducir el consumo de bebidas azucaradas en México. Entre los posibles abordajes, las intervenciones ambientales y políticas pueden estar entre las estrategias más efectivas para crear beneficios para toda la población (26, 27). En contraste con las intervenciones conductuales, es probable que su impacto sea más prolongado y que reduzca desigualdades socioeconómicas en la obesidad (27, 28). Con base en parámetros adecuados y tiempos para intervención, un análisis de la Encuesta Nacional de Salud y Nutrición (ENSANUT) del 2012 mostró que la contribución de las bebidas azucaradas al consumo de energía era mayor durante el refrigerio de media mañana comparado al desayuno, y que el porcentaje de energía proveniente de bebidas azucaradas era mayor en el trabajo y en la escuela comparado con comer en casa (29). Esto sugiere que, para niños y adolescentes, las escuelas son un escenario importante para intervenciones en México.

Las revisiones sistemáticas de la literatura son muy útiles para clarificar lo que ya se sabe con relación a un tópico, para estimular la aplicación del conocimiento existente a la política y práctica, y para identificar hacia dónde se deben enfocar los esfuerzos en investigación primaria. A la fecha, tenemos conocimiento de sólo dos revisiones sistemáticas existentes en relación con intervenciones para reducir el consumo de bebidas azucaradas (11, 12). La primera se limitó sólo a niños e incluyó estudios con un grupo control, y su búsqueda se limitó a artículos publicados en inglés (11). La segunda se enfocó en técnicas de cambio de comportamiento más que en intervenciones ambientales (12). Otra revisión sistemática relevante a intervenciones ambientales está en progreso (3) y es probable que arroje hallazgos importantes. Sin embargo, cuenta con un margen de estudio muy amplio, por lo que es probable que tome un tiempo considerable en terminarse y estar a disposición de la comunidad científica. Dado su amplio margen, también es probable que resulte difícil discernir los mensajes más relevantes para México, si es que los hay.

OBJETIVOS

Objetivo general

Evaluar el efecto de intervenciones ambientales en escuelas y sus alrededores orientadas a bebidas azucaradas en los niveles de consumo, obesidad y otros indicadores de salud relacionados con la dieta.

Objetivos específicos

1. Identificar las intervenciones que podrían implementarse en México.
2. Identificar la necesidad de investigación adicional con relación a intervenciones para bebidas azucaradas en México.

MÉTODOS

Se utilizó el Manual de Cochrane para revisiones sistemáticas para realizar la revisión y las directrices PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) por sus siglas en inglés para reportar (30, 31). El protocolo de la revisión sistemática se aceptó y registró en PROSPERO (International Prospective Register of Systematic Reviews) (CRD42018093528) (32).

Criterios de Inclusión

Tipos de participantes: Se incluyeron estudios con niños y adolescentes como participantes, basándonos en los diferentes grados de escuela (jardín de niños, primarias, secundarias y preparatorias), independientemente de su peso y estado de salud.

Tipos de intervenciones: Se incluyeron en la revisión aquellas intervenciones que se enfocaron a entornos alimentarios y en las que las personas llevan una elección de bebidas. Entornos alimentarios se definen como: "el entorno colectivo físico, económico, político y sociocultural; las oportunidades y condiciones que influyen en la elección de comida y bebida por las personas y el estatus nutricional" (27). También se incluyeron intervenciones conductuales, siempre y cuando éstas fueran combinadas con intervenciones ambientales. Se incluyeron sólo aquellas intervenciones enfocadas dentro y alrededor de escuelas, pues estos son los ambientes donde los niños y adolescentes tienden a consumir alimentos de manera discrecional (productos con elevada cantidad de grasas saturadas y/o azúcar agregada, y bebidas azucaradas) (29).

Tipos de comparaciones: La comparación fue no intervención, intervenciones mínimas o intervenciones alternativas.

Tipos de resultados: Se incluyeron estudios que reportaron por lo menos uno de los siguientes resultados primarios:

- Consumo de bebidas azucaradas
- Compra de bebidas azucaradas
- Medidas antropométricas relacionadas con la dieta
- Resultados de salud relacionados con la dieta

Resultados secundarios:

- Cambios en entornos físicos y en políticas públicas
- Cambios en las desigualdades en salud
- Medidas de viabilidad económica y financiera

Tipos de estudios: Se consideraron los siguientes tipos de estudios: ensayos controlados aleatorios, ensayos controlados no aleatorios, estudios controlados de tipo *antes y después*, estudios en series de tiempo interrumpido y estudios de medidas repetidas.

Se incluyeron artículos publicados en cualquier lengua desde la fecha origen de la base de datos hasta enero del 2018. Se incluyó literatura publicada y no publicada (literatura "gris").

Estrategia de Búsqueda

La estrategia incluyó la búsqueda en las siguientes bases de datos: PubMed, Embase (Ovid®), LILACS, SciELO, y en el Registro Cochrane Central de Ensayos Controlados (CENTRAL por sus siglas en inglés). También se analizaron las listas de referencias de los estudios incluidos y las revisiones sistemáticas ya publicadas en busca de artículos pertinentes. En lo referente a la literatura gris se realizó una búsqueda en Google utilizando las mismas palabras clave.

Los términos de búsqueda incluyeron Encabezados de Temas Médicos (MeSH por sus siglas en inglés) y palabras clave en el título, el resumen y el texto. Se utilizó el marco PICOS por sus siglas en inglés (Participantes, Intervención, Comparación, Resultados y Tipo de estudio) y otras revisiones sistemáticas sobre el tópico de "bebidas azucaradas" para identificar términos de búsqueda relevantes. Se incluyeron términos de búsqueda relacionados con SSBs, tipo de intervención, resultado y tipo de estudio. La estrategia de búsqueda utilizada en PubMed se incluyó en el Anexo 1. Uno de los autores de la revisión realizó las búsquedas (MSR) y los resultados se descargaron en Endnote™ desktop version X8.2 reference management software (Clarivate Analytics, Philadelphia, United States of America). Los duplicados se eliminaron en dos etapas: primero identificando y eliminando duplicados por medio de la opción en Endnote™, de autor, año y título; y segundo, de manera manual, por medio de la opción de año y título.

Selección de Estudios

La selección de estudios para la revisión se llevó a cabo en dos etapas. En la primera etapa, se revisaron los títulos y resúmenes de los artículos, y fue asegurado que cumplieran con los criterios de inclusión. En esta fase dos autores (MSR y MMH) realizaron dos pruebas piloto de manera independiente con un total de 100 artículos cada una y se compararon los porcentajes de concordancia. Se discutieron las razones del desacuerdo. En la segunda prueba piloto se logró un acuerdo del 95%, después del cual uno de los autores revisó los títulos y resúmenes restantes. Solo los artículos que claramente no cumplían con los criterios de inclusión fueron excluidos en esta etapa. Se obtuvieron los textos completos de todos los documentos potencialmente relevantes para llevar a cabo un examen más detallado. En la segunda etapa, dos autores (MSR y MMH) leyeron los textos completos de los artículos de manera independiente para determinar que cumplieran con todos los criterios de inclusión. Las diferencias o desacuerdos se resolvieron mediante discusión. Los artículos excluidos después de la revisión por un segundo revisor, y las discusiones entre los revisores se detallaron en una tabla, junto con el motivo de su exclusión (Anexo 2).

Extracción de Datos

Dos autores realizaron dos pruebas piloto de la extracción de datos de manera independiente. Se resolvieron las diferencias mediante discusión. Después se llevó a cabo la extracción de los artículos restantes por un autor (MSR) y se realizó la verificación por el otro autor (MMH). Se resolvieron las diferencias mediante discusión. Se contactó con dos autores de los artículos revisados, por la presencia de información faltante, de los cuales uno no respondió y el otro respondió brindándonos la información necesaria para el trabajo.

Los siguientes datos se extrajeron en dos tablas de Microsoft® Word versión 16.16: autor y año de publicación; país, duración de la intervención y recopilación de datos: participantes, entorno de intervención, detalles de la intervención y comparaciones; diseño del estudio, medidas primarias y secundarias reportadas; resultados, posibles conflictos de interés y necesidad de más investigación.

Evaluación del Riesgo de Sesgo de los Estudios Incluidos

Dos autores (MSR y MMH) evaluaron de manera independiente la calidad metodológica de cada estudio incluido utilizando los criterios de la herramienta Effective Practice and Organization of Care (EPOC)-adapted Cochrane Collaboration "Risk of bias" (33) y las diferencias se resolvieron mediante discusión. Para los estudios con un grupo de control separado, fue eliminada la pregunta "Baseline characteristics (of providers) similar" porque no aplicaba a los tipos de intervención incluidos en esta revisión.

Análisis

Los hallazgos de los estudios incluidos y su riesgo de sesgo se sintetizaron usando tablas y un resumen narrativo. Aunque no se especificó previamente en el protocolo, se hizo una clasificación cualitativa en la cual se muestra si el resultado fue positivo o negativo; es decir, si hubo un aumento o una disminución y, además, si dicho resultado fue estadísticamente significativo. Para ayudar a la interpretación de los resultados, se agruparon tipos de intervenciones similares; por ejemplo, políticas, legislaciones o normas alimentarias. La evaluación de la calidad de los estudios se utilizó para interpretar los resultados de los estudios y formular conclusiones. No fue posible realizar el metaanálisis porque los estudios incluidos fueron heterogéneos en cuanto a los tipos de intervención estudiadas y los resultados medidos. Tampoco se evaluó cuantitativamente el sesgo de publicación al no haber hecho el metaanálisis; además, no hay métodos claros disponibles para evaluar cuantitativamente dicho sesgo (34).

RESULTADOS

Resultados de la búsqueda

La búsqueda en bases de datos arrojó un total de 5,394 registros (Figura 1). La búsqueda en Google, lista de referencias de los artículos potenciales y en revisiones sistemáticas consultadas dio como resultado 36 artículos. Después de la eliminación de duplicados y la revisión de títulos y resúmenes, se evaluaron 78 textos completos de artículos para su elegibilidad, y 53 se excluyeron por varias razones (Anexo 1). Un total de 17 estudios de 25 artículos (35-59) cumplieron los criterios de inclusión para la revisión (Tabla 2).

De los estudios incluidos uno era un ensayo controlado aleatorio (56), cinco eran estudios controlados aleatorios en grupos (37, 39, 44, 46, 47), cinco eran estudios controlados de tipo antes y después (41, 43, 48, 52, 58), uno era un estudio controlado (49), uno era un estudio de tiempo interrumpido (35) y cuatro eran de tipo antes y después (42, 51, 54, 57). La mayoría de los estudios incluidos datan del año 2000 en adelante, a excepción del estudio por Teufel y colaboradores (54), publicado en 1998.

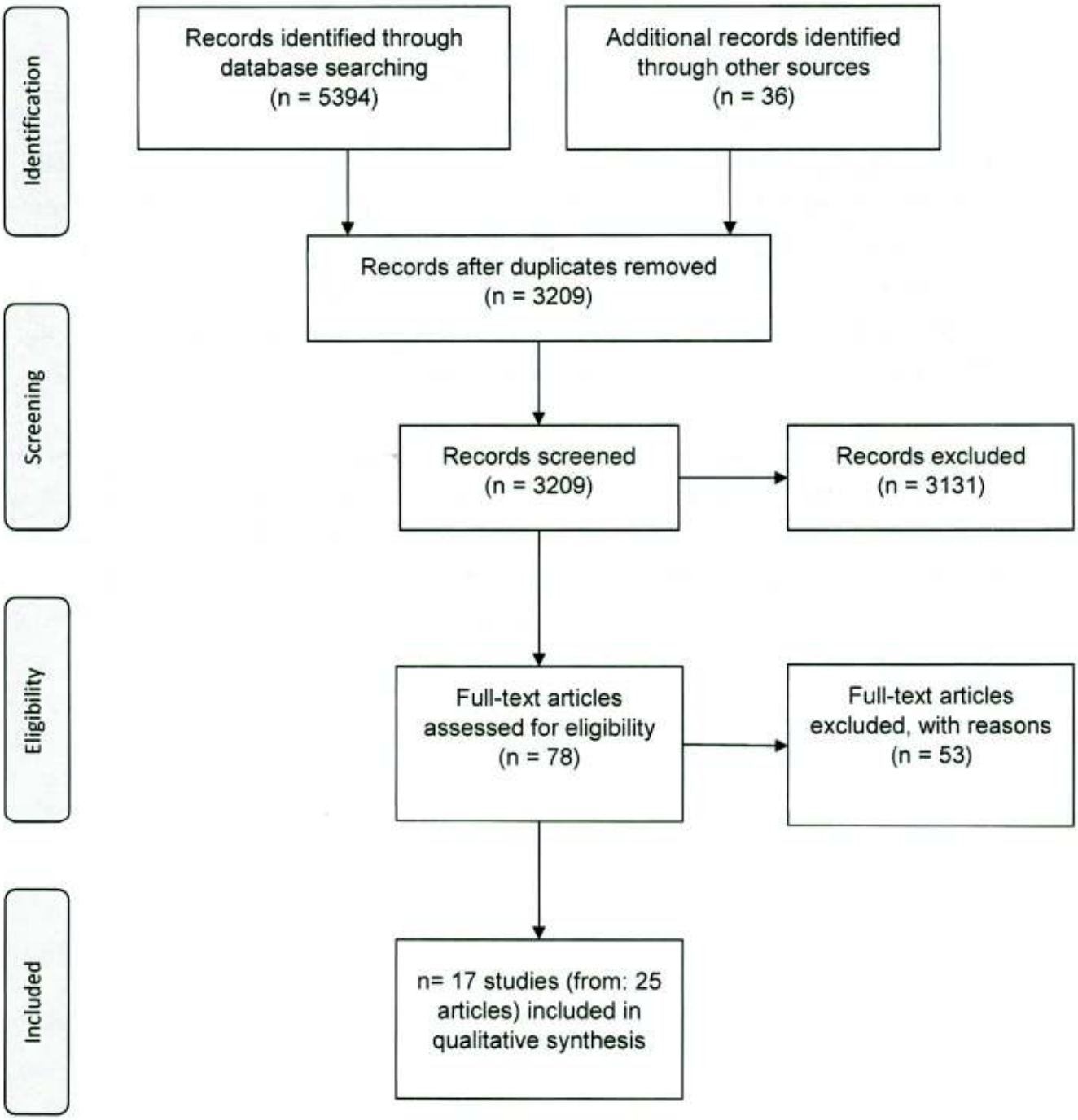

Figura 1. Diagrama de flujo de los estudios incluidos y excluidos

Tabla 2. Características de los estudios incluidos en la revisión.

Author and year (reference/s)*	Country of study	Participants	Design†	Intervention	Comparison‡	Outcomes reported
Bae 2012 (35)	Korea	Adolescents – middle school and high school students	ITS	Environmental	•	SSBs consumption
Bauhoff 2013 (58)	United States	Adolescents – Students in 7th, 9th and 12th grade.	CBA	Environmental	•	BMI z-score Prevalence (%) of overweight/obesity SSBs consumption
Beets 2016 (37)	United States	Children – 20 Afterschool Programs (ASPs) serving over 1,700 children of elementary school age	cRCT	Environmental	No intervention	Portions of SSBs served
Carriedo 2013 (39)	Mexico	Children – 4th and 5th grade	cRCT	Combined	No intervention	SSBs consumption Water consumption
Cradock 2011 (41)	United States	Adolescents – 9th through 12th grade in public high school	CBA	Environmental	National data	SSBs consumption
Cullen 2008 (42)	United States	Adolescents – 6th through 8th grade students	BA	Enviromental	No intervention	SSBs consumption
Ermetici 2016 (43)	Italy	Adolescents – 11-15 years	CBA	Combined	No intervention	BMI z-score WHtR SSBs consumption
Foster 2008 (44)	United States	Children and adolescents – 4th through 6th grade students	cRCT	Combined	No intervention	Incidence and prevalence of overweight and obesity
Haerens 2007 (46)	Belgium	Adolescents – students in 7th and 8th grades	cRCT	Combined	No intervention	BMI z-score
Kocken 2012 (47)	Netherlands	Adolescents – Students in grades 7 to 12, age 12-18 years	cRCT	Environmental	No intervention	Volume of SSBs purchased
Loughridge 2005 (48)	England	Adolescents – students of secondary schools	CBA	Combined	No intervention	Volume of SSBs purchased Water consumption

Author and year (reference/s)*	Country of study	Participants	Design†	Intervention	Comparison‡	Outcomes reported
Muckelbauer 2009 (49)	Germany	Children – 2nd and 3rd grades	CT	Combined	No intervention	BMI z-scores Prevalence of overweight Incidence of overweight SSBs consumption Water consumption
Nanney 2014 (51)	United States	Adolescents – students from 6th, 9th and 12th grade	BA	Environmental	•	BMI percentiles SSBs consumption
Patel 2011 (52)	United States	Adolescents – 7th grade students in two Los Angeles Unified School District (LAUSD) middle schools	CBA	Combined	No intervention	SSBs consumption Water consumption
Teufel 1998 (54)	United States	Adolescents – students in grades 9-12	BA	Combined	•	SSBs consumption BMI value
Wolfenden 2017 (56)	Australia	Children – 70 primary schools with a canteen serving over 3500 children	RCT	Environmental	No intervention	SSBs purchases
Woodward-Lopez 2010 (57)	United States	Children and adolescents – 13 schools serving over 3500 students	BA	Enviromental	•	SSBs consumption Water consumption

*Some studies had more than one publication – only the reference to the primary study is included here.
†Study design: BA = Before and after study, CBA = Controlled before-after study, cRCT = Cluster-randomized controlled trial, CT= Controlled trial, ITS = interrupted time-series, RCT = Randomized controlled trial.
‡Comparison: N/A (•)

Características de los estudios incluidos

Las intervenciones de los distintos estudios se clasificaron en ambientales (n=9) o combinadas (n=8); es decir, donde se utilizaron tanto ambientales como conductuales (Tablas 2 y 3). La población intervenida fueron niños en edad escolar en 4 estudios, adolescentes en 11 estudios, y tanto niños como adolescentes en 2 estudios. Las características sociodemográficas de los participantes no se incluyeron en la mayoría de los artículos.

En la Tabla 3, se muestra a detalle la intervención aplicada por los estudios incluidos; si solamente se utilizaron componentes ambientales o combinados, así como si cada uno de ellos contaba con algún tipo de comparación. Ocho estudios reportaron haber utilizado una intervención de tipo combinada (39, 43, 44, 46, 48, 49, 52, 54); es decir, también utilizaron un componente educativo.

Siete de los estudios evaluados utilizaron intervenciones ambientales, en los cuales se probó el efecto de políticas, estándares o legislaciones alimentarias y nutricionales (35, 41, 42, 44, 51, 57, 58) (Tabla 3 y Anexo 3–parte A). Foster y colaboradores (44) también utilizaron un componente de comportamiento (50 horas de educación alimentaria y nutricional por año). El nivel de implementación de las políticas varió desde basado individualmente en la escuela (44, 51), al distrito escolar y a todo el país (35). Otro estudio introdujo tres estrategias para promover la venta de alimentos bajos en calorías en las máquinas expendedoras de las preparatorias (47). Las tres estrategias incluyeron: incrementar la disponibilidad de alimentos y bebidas saludables, proporcionar información de los productos a la venta y reducir el precio de las opciones más saludables (47). Un estudio hizo cambios ambientales con el fin de promover hábitos saludables, reemplazando las máquinas expendedoras existentes por máquinas con un contenido más saludable de productos, entre otras estrategias (43). Cuatro estudios instalaron fuentes de agua potable en las escuelas, entregaron botellas reusables y educaron a los estudiantes sobre los beneficios de consumir agua (39, 48, 49, 52). Otro estudio utilizó varias estrategias para cambiar la disponibilidad y acceso a bebidas azucaradas y agua purificada combinado con educación y apoyo de los padres (46). Las estrategias utilizadas incluyeron reducir el costo del agua embotellada en comparación con las bebidas azucaradas y la instalación de fuentes de agua.

Dos estudios utilizaron estrategias de apoyo y desarrollo de capacidades para mejorar la implementación de estándares y políticas (37, 56). Uno de estos aplicó una estrategia enfocada a los programas después de las escuelas, la cual consistió en mejorar la alimentación realizando menús más saludables, como servir fruta y verduras todos los días, aumentar la disponibilidad de agua y eliminar las SSBs y los alimentos y bebidas artificialmente saborizados (37). El otro estudio, realizado en Australia, tuvo una intervención multi-estratégica para aumentar la implementación de una política de comedores saludables a nivel estatal, la cual consistía en un sistema de semáforo para clasificar los alimentos y las bebidas disponibles en las escuelas (56). Por último, un estudio se enfocó en cuatro intervenciones estratégicas para identificar factores de riesgo en la prevención de la diabetes, incluyendo la modificación de los alimentos disponibles para los estudiantes (54).

Para los estudios que incluyeron un grupo control, la comparación fue no intervención (Tabla 2). Las medidas de seguimiento en los estudios incluidos generalmente se llevaron a cabo inmediatamente después del final de periodo en el cual se aplicó la intervención (Anexo 3). Para uno de estos estudios, solo están disponibles los resultados de mitad de proyecto (54). En el caso en donde las intervenciones fueron la implementación de políticas, las medidas de seguimiento se recogieron generalmente en el año posterior a la implementación. Una variedad de medidas de resultado se utilizó en los estudios incluidos (Tabla 2). Once de los 17 estudios midieron el consumo de SSBs como una medida de resultado (35, 39, 41-43, 49, 51, 52, 54, 57, 58), aunque variaron considerablemente en la unidad de medida (Tabla 2 y Anexo 3–parte B).

Tabla 3. Intervenciones aplicadas y su comparación.

Author and year (reference)	Intervention		Comparison*
	Environmental component	Educational component	
Bae 2012 (35)	Korean Government nutrition policies implemented for the improvement of adolescents' dietary behaviors during 2005 and 2009		•
Bauhoff 2013 (58)	The Los Angeles Unified School District beverage and food standards for all of its schools		•
Beets 2016 (37)	The Strategies To Enhance Practice for Healthy Eating (STEPs-HE) intervention focused on capacity building with ASPs to develop a snack budget and menus that met the healthy eating standards		No intervention
Carriedo 2013 (39)	More availability of filtered water in various locations around the school and every child received a reusable plastic bottle to promote water consumption	Promotional strategies, key messages were communicated through different materials in the school and in the media to promote water	No intervention
Cradock 2011 (41)	Implementation of the Boston Public Schools Snack and Beverage Policy		National data obtained from the 2003-2004 and 2005-2006 NHANES
Cullen 2008 (42)	Implementation of a local policy based on removing non-healthy snacks from vending machines and implementation of the Texas Public Schools Nutrition Policy to promote a healthy school environment for students.		No intervention

Author and year (reference)	Intervention		Comparison*
	Environmental component	Educational component	
Ermetici 2016 (43)	Two- year program with environmental changes such as all traditional vending machines were replaced with machines containing healthy foods and beverages	16 health-promoting group lessons by expert nutritionists over two-school-years	No intervention
Foster 2008 (44)	School Nutrition Policy Initiative (SNPI), including school self-assessment and implementation of a nutrition policy aimed at meeting nutritional standards based on the Dietary Guidelines for Americans	50 hours of food and nutrition education per student per school year	No intervention
Haerens 2007 (46)	Environmental component was aimed at changing the availability and accessibility of soft drinks and promoting the drinking of water by offering it free or at a lower price than soft drinks	Children received information about the improved health consequences of drinking water rather than soft drinks +/- parental support component	No intervention
Kocken 2012 (47)	3 strategies for promoting the sale of lower-calorie food and beverage products from vending machines in high schools		No intervention
Loughridge 2005 (48)	Water cooler sited within the cafeteria	+/- Students were educated about the health benefits of drinking water (also received promotional pencils and water bottles)	No intervention
Muckelbauer 2009 (49)	One or two water fountains were installed in each school and each child received a water bottle	Consisted of four 45-min classroom lessons to promote water consumption based on the theory of planned behavior	No intervention
Nanney 2014 (51)	Eight evidence-supported policies were identified and summed to create a recommended policy score.		•

Author and year (reference)	Intervention		Comparison*
	Environmental component	Educational component	
Patel 2011 (52)	The provision of cold, filtered tap water (5-gallon) in the school cafeteria and distribution of reusable water bottles to all school staff and students	Education regarding the health and environmental benefits of drinking tap water (included posting nutritional information for beverages available in the school cafeteria or store) plus school-wide promotional activities	No intervention
Teufel 1998 (54)	Construction of a wellness facility designed specifically for teens; modification of the food supply available to teens; and the establishment of supportive social networks. All designed to target the identified risk factors	Diabetes education integrated within the existing school curriculum	•
Wolfenden 2017 (56)	Multi-strategic intervention to increase implementation of the state-wide healthy canteen policy, including allocation of a support officer to assist with policy implementation, engagement of school principals and parent committees, consensus processes with canteen managers, training, provision of tools and resources, academic detailing, performance feedback, recognition and marketing initiatives		No intervention
Woodward-Lopez 2010 (57)	Legislation in California, Senate Bill 12 (SB 12), which applied nutrition standards to competitive foods sold in schools and a second law, SB 965, limited the competitive beverages that could be offered during the school day		•

* Comparison: N/A (•); NHANES – National Health and Nutrition Examination Survey.

Riesgo de sesgo

De los estudios incluidos (n=17), 14 fueron clasificados con un alto riesgo de sesgo (Tablas 4 y 5), dos estudios con un riesgo no claro (37, 44) y solamente un estudio con riesgo bajo (56). En la tabla de riesgo de sesgo en estudios controlados (Tabla 4) se muestra la calificación para cada uno de los puntos evaluados. Los primero tres ítems, adecuada generación de secuencias (*adequate sequence generation),* la ocultación de la asignación *(allocation concealment)* y el cegamiento *(blinding*) son muy importantes, ya que son los que proporcionan certeza de que el estudio fue controlado correctamente. Sin embargo, en la mayoría de los estudios la calificación de dichos ítems es *riesgo alto* o *riesgo no claro*, lo que indica que la calidad de los estudios no es muy buena. Una excepción es el estudio de Wolfenden y colaboradores (56), el cual tiene como calificación total riesgo bajo (en todos los ítems tuvo riesgo bajo), lo que indica que el estudio fue elaborado correctamente. En cuanto a los estudios de tipo no controlados (por ejemplo, estudios de tipo antes y después o estudios en series de tiempo interrumpido) (Tabla 5) la calificación total fue *riesgo alto*.

Tabla 4. Riesgo de sesgo en estudios controlados.

Item	Bauhoff 2014	Beets 2016	Carriedo 2013	Cradock 2011	Ermetici 2016	Foster 2008	Haerens 2007	Kocken 2012	Loughridge 2005	Mucklbauer 2009	Patel 2011	Wolfenden 2017
Adequate sequence generation	+	-	?	+	+	?	?	?	+	+	+	-
Allocation concealment	+	?	?	+	+	?	?	?	+	+	+	-
Blinding	+	+	+	+	+	+	+	+	+	+	+	-
Incomplete outcome data addressed	?	-	+	?	-	-	?	+	?	+	?	-
Free of selective reporting	?	-	?	?	?	?	?	?	?	?	?	-
Free of other bias	-	-	+	+	-	-	-	-	-	-	-	-
Baseline measures similar	-	-	?	+	-	-	-	+	+	-	-	-
Free of contamination	-	-	-	-	+	-	-	?	-	-	-	-
Overall assessment	**High risk**	**Unclear risk**	**High risk**	**High risk**	**High risk**	**Unclear risk**	**High risk**	**High risk**	**High risk**	**High risk**	**High risk**	**Low risk**

Quality rating: High risk (+), Low risk (-), Unclear risk (?)

Tabla 5. Riesgo de sesgo en estudios no controlados.

Item	Bae 2012	Cullen 2008	Nanney 2014	Teufel 1998	Woodward-Lopez 2010
Intervention independent of other changes	+	?	?	?	+
Analysed appropriately	-	+	-	+	+
Shape of intervention effect pre-specified	?	?	?	?	?
Unlikely to affect data collection	-	?	-	+	?
Blinding	+	+	+	+	+
Incomplete outcome data addressed	-	+	+	+	?
Free of selective outcome reporting	?	?	?	?	?
Free of other bias	-	-	-	+	+
Overall assessment	**High risk**	**High risk**	**High risk**	**High risk**	**High risk**

Quality rating: High risk (+), Low risk (-), Unclear risk (?)

Eficacia

En la Tabla 6, se muestra el efecto que tuvieron las distintas intervenciones de cada estudio en los resultados primarios de interés para esta revisión. La mayoría de los estudios reportaron un cambio positivo y significativo en la reducción del consumo de SSBs. Sin embargo, el riesgo de sesgo de dichos estudios fue alto. El único estudio que tuvo un bajo riesgo de sesgo (56) no reportó en sus resultados el consumo de SSBs, sino la compra de SSBs, que fue negativo y no significativo. Por lo tanto, no es posible establecer conclusiones claras sobre el efecto de las intervenciones incluidas en esta revisión sistemática.

De los estudios que reportaron medidas del IMC, ya sean puntajes-Z, percentiles o valor absoluto, todos tuvieron un resultado positivo; sin embargo, la mayoría fueron no significativos. En la columna de "Otros" se agregaron los resultados complementarios a nuestros resultados primarios, por ejemplo, el consumo de agua pura, medidas antropométricas diferentes al IMC, entro otros. Estos se clasificaron como "otros" ya que no eran concisos; es decir, los estudios reportaron diferentes resultados, pero los cuales fueron relevantes para nuestra revisión, (Anexo 3–parte B).

Tabla 6. Resultados del efecto de las intervenciones ambientales en escuelas y sus alrededores sobre el consumo de SSBs y las medidas antropométricas relacionadas con la dieta.

Author and year (reference)	Quality*	Sample	Population	SSBs consumption†	BMI z-score†	Incidence or prevalence of overweight and obesity†	SSBs purchases†	Other†
Food and nutrition policies, standards or legislation								
Bae (2012) (35)	+	65,000 plus	Adolescents	(+) SS				
Bauhoff (2013) (58)	+	25,000	Adolescents	(+) SS	(+) NS	(+) NS		
Cradock (2011) (41)	+	2033	Adolescents	(+) SS				
Cullen (2008) (42)	+	Not specified	Adolescents	(+) SS				
Foster (2008) (44)	?	1349	Children and adolescents			(+) SS		
Nanney (2014) (51)	+	18,881	Adolescents	(+) SS	(+) NS‡			
Woodward-Lopez (2010) (57)	+	13 schools serving over 3500 students	Children and adolescents	(+) SS				(+) SS
Water provision interventions								
Carriedo (2013) (39)	+	341	Children	(+) SS				(+) SS
Loughridge (2005) (48)	+	2965	Adolescents				(-) NS	(+) SS
Muckelbauer (2009) (49)	+	3190	Children	( ) NS	(+) NS	(+) SS¶ (-) NS# (+) SS††		

Author and year (reference)	Quality*	Sample	Population	SSBs consumption†	BMI z-score†	Incidence or prevalence of overweight and obesity†	SSBs purchases†	Other†
Patel (2011) (52)	+	793	Adolescents	(+) NS				
Vending machines intervention								
Kocken (2012) (47)	+	Not specified	Adolescents				(+) SS	
Mix of interventions								
Ermetici (2016) (43)	+	487	Adolescents	(+) SS	(+) SS			(+) SS
Haerens (2007) (46)	+	2991	Adolescents		(+) SS§			
Teufel (1998) (54)	+	Number targeted not specified	Adolescents	(+) SS	(+) NS‡‡			
Capacity building								
Beets (2016) (37)	?	20 ASPs serving 1700 children	Children					(+) SS
Wolfenden (2017) (56)	-	70 schools serving over 3500 children	Children				(-) NS	

* Quality rating: High risk (+), Low risk (-), Unclear risk (?)
† (+) = positive effect; (-) negative effect; ( ) unclear or no effect; SS= statistically significant (P<0.05); NS= not significant.
‡ BMI percentiles
§ in girls
¶ incidence of overweight
# incidence of obesity
†† prevalence of overweight
‡‡ BMI value

DISCUSIÓN

En esta revisión se incluyeron 17 estudios, de los cuales nueve aplicaron intervenciones ambientales y los ocho restantes una intervención combinada; es decir, ambiental y conductual. La mayoría de los estudios reportaron un impacto positivo en el consumo de SSBs. Sin embargo, estos resultados deben interpretarse con precaución, ya que solo uno de los 17 estudios tuvo bajo riesgo de sesgo y no logró un impacto positivo en el consumo de SSBs (56).

Los siete estudios que utilizaron una política, legislación o un estándar como intervención ambiental (35, 41, 44, 51, 57, 58), reportaron resultados positivos y estadísticamente significativos en la disminución del consumo de SSBs, a excepción de uno, que reportó incidencia o prevalencia de sobrepeso y obesidad, pero de igual manera un impacto positivo y significativo (44). Este resultado es alentador, pero debe interpretarse con cautela debido a que todos los estudios excepto uno (44) tuvieron un alto riesgo de sesgo, y a que solo tres de los estudios tuvieron un grupo control (41, 44, 58). El diseño de estudio más sólido fue utilizado por Foster y colaboradores (44), que fue un ensayo controlado aleatorio en grupos. Se podría haber mejorado mediante el cegamiento (*blinding*) de sus evaluadores de resultados, y proporcionando detalles más claros de la ocultación de la asignación (*allocation concealment*), la generación de secuencias (*sequence generation*) y los resultados preespecificados (*pre-specified outcomes*) (Tabla 4). Sin embargo, a pesar de las limitaciones metodológicas, fue el único estudio grupal de intervenciones que mostró un impacto positivo y estadísticamente significativo en la incidencia de sobrepeso u obesidad (44).

Micha y colaboradores (60), en su revisión sistemática sobre el impacto de las políticas del entorno alimentario escolar en los hábitos dietarios, la adiposidad y el riesgo metabólico en niños, encontraron resultados similares a esta revisión. Observaron que las normas competitivas de alimentos y bebidas redujeron el consumo habitual de SSBs en 0.18 porciones/día (IC95% -0.31, -0.05). En la discusión menciona que sus resultados respaldan la importancia de las escuelas como un entorno para mejorar los hábitos alimentarios de los niños, ya sea dentro o fuera del establecimiento. También mencionan que sus hallazgos sugieren la eficacia de una gama de políticas enfocadas al ambiente alimentario, incluidas las normas de alimentos y bebidas, y de comidas escolares, así como la provisión directa de alimentos saludables a los alumnos (60).

Los estudios que utilizaron como intervención la provisión de agua potable en las escuelas, tuvieron resultados variados (39, 48, 49, 52). Todo ellos utilizaron un tipo de intervención combinada (ambiental y conductual), y aunque brindaron educación a los alumnos de las escuelas en cuanto al consumo de agua, solamente en un estudio se observó un impacto positivo y significativo en el consumo de SSBs (39). En los otros estudios se observaron resultados variados en valores de IMC, incidencia y prevalencia de sobrepeso y obesidad, así como en la compra de SSBs. De igual manera, el riesgo de sesgo de dichos estudios es muy alto, a pesar de que todos utilizaron un grupo control.

Solamente un estudio utilizó una intervención enfocada totalmente a las máquinas expendedoras en las escuelas (47), en donde se observó un resultado positivo en la compra de bebidas azucaradas. De igual manera su riesgo de sesgo fue alto, aunque utilizó un diseño de estudio considerado "fuerte" (ensayo controlado aleatorio en grupos).

En los tres estudios que utilizaron intervenciones mezcladas (43, 46, 54) se observó un impacto positivo en el consumo de SSBs, así como en las medidas antropométricas reportadas. Para uno de estos (46), que también utilizó el diseño de estudio más sólido, el impacto en el puntaje-Z del IMC solo se observó en las niñas (no en los niños). Nuevamente, todos tenían un alto riesgo de sesgo, aunque muchos de estos podrían haberse superado fácilmente en el diseño y a través de un mejor reporte de sus métodos, especialmente para los dos estudios que utilizaron un grupo de control (43, 46).

Dos estudios tuvieron como intervención la creación de capacidad para mejorar la aplicación de estándares o políticas en las escuelas (37, 56). Ambos fueron ensayos controlados aleatorios. Uno de ellos (37), se enfocó en los programas después de la escuela, en donde se desarrollaron menús que cumplieran con los estándares de nutrición (fruta y verdura todos los días, agua potable siempre disponible y eliminar las SSBs y los alimentos artificialmente saborizados). Este estudio solo reportó las diferentes porciones de SSBs servidas antes y después de la intervención. El consumo de SSBs se midió, pero no se reportó. Su nivel de sesgo no fue claro, y podría haberse mejorado mediante el cegamiento de los evaluadores de resultado y el ocultamiento de la asignación (*allocation concealment*).

El otro estudio fue el de Wolfenden y colaboradores (56), realizado entre 2013 y 2015. Fue el único estudio de los 17 incluidos que tuvo un riesgo de sesgo bajo y en el cual se utilizó un diseño de los más fuertes (ensayo controlado aleatorio). Este estudio solamente reportó la compra de SSBs, la cual tuvo un resultado negativo y no estadísticamente significativo. Este resultado puede deberse a que el país donde se realizó es Australia, y ya existía mucho avance en la implementación de la política relevante. El estudio aplicó una intervención multi-estratégica para incrementar la implementación de una política enfocada a las cafeterías de las escuelas. La intervención se aplicó en un periodo de 12 a 14 meses. La política contaba con una estrategia lanzada por el gobierno de Nueva Gales del Sur en el 2005 (así se había implementado durante 8 años), la cual tenía como objetivo prevenir la obesidad infantil. La estrategia utilizó un sistema de semáforo para clasificar los alimentos y las bebidas ofrecidas en las escuelas en función de sus propiedades nutricionales, coherente con las pautas dietéticas australianas para niños y adolescentes. La política exigía que todas las escuelas públicas retiraran las comidas y bebidas no saludables – aquellas clasificadas como "rojas" – de la venta regular en los comedores escolares. Además, se alentó a las escuelas a "llenar el menú" con elementos clasificados como "verdes" y no dejar que los elementos clasificados como "ámbar" dominen el menú. En el 2007, la estrategia fue respaldada por una prohibición de la venta de SSBs.

A pesar de la alta prevalencia de sobrepeso y obesidad que existe en los países latinoamericanos, solo se encontró un estudio con base en Latinoamérica, en específico en México, que intervino en la mejora de este problema a nivel escolar (39). Desafortunadamente, la intervención se limitó a la provisión de agua y no se enfocó en la eliminación o reducción del consumo de SSBs, lo cual es un problema importante en México (15, 17). Además, el estudio podría haberse mejorado sustancialmente al reportar mejor la generación de secuencias (*reporting of sequence generation*), el ocultamiento de la asignación (*allocation concealment*) y las medidas de resultado preespecificadas; así como mediante el uso del cegamiento de los evaluadores de resultado y logrando una mayor tasa de respuesta (39) (Tabla 4).

En México existe el "*Acuerdo mediante el cual se establecen los lineamientos generales para el expendio y distribución de alimentos y bebidas preparados y procesados en las escuelas del Sistema Educativo Nacional*", el cual establece que todos los alimentos y bebidas disponibles en las escuelas deben ser acordes a una alimentación correcta, con higiene, seguridad, los nutrimentos necesarios y el aporte energético de acuerdo a la edad y condición de vida de los estudiantes (24). El Acuerdo, elaborado por la Secretaría de Educación Pública y la Secretaría

de Salud, se aplica a todas las escuelas primarias y secundarias y prohíbe la venta de refrescos en cualquier día de la semana. Sin embargo, su nivel de implementación se desconoce. Se necesita probar su eficacia en la reducción del consumo y/o compra de bebidas azucaradas, así como comprobar, por parte de las instituciones gubernamentales, que todas las escuelas lo apliquen de manera adecuada. Si este no es el caso, se requiere brindar capacitación al personal escolar sobre dichos lineamientos, la vigilancia de su implementación y la aplicación de sanciones cuando sea necesario.

Claramente, existe la necesidad de realizar más investigación sobre las intervenciones dirigidas a reducir el consumo de SSBs, también en México. Estos estudios deben ser de alta calidad e incluir el uso de la asignación aleatoria al grupo de intervención o control, la generación adecuada de secuencias, el ocultamiento de la asignación, el cegamiento de los evaluadores de resultados, la disponibilidad de un protocolo preespecificado y los informes de acuerdo con las directrices CONSORT (33, 61).

Dados los resultados generalmente positivos logrados por estudios que probaron políticas, estándares o legislaciones, sería interesante diseñar un ensayo controlado aleatorio del impacto de la implementación total del Acuerdo mexicano (24). Los elementos de la intervención de Woldenfen y colaboradores en Australia (56) para desarrollar la capacidad en las escuelas, junto con el apoyo de la Secretaria de Educación Pública y la Secretaria de Salud para monitorear y hacer cumplir la implementación del Acuerdo, podrían probarse para ver si estas acciones impactan realmente en el consumo de SSBs y en el sobrepeso y la obesidad.

Una fortaleza de esta revisión es que los métodos utilizados se basaron en el Manual Cochrane de revisiones sistemáticas de intervenciones, y que este reporte cumple con las directrices PRISMA (30, 31). Las limitaciones de la revisión incluyen la falta de investigación de alta calidad que mida el impacto de intervenciones ambientales en escuelas y sus alrededores dirigido a bebidas azucaradas en los niveles de consumo, obesidad y otros indicadores de salud relacionados con la dieta. Además, la mayor parte de los estudios incluidos recolectaron los datos de seguimiento (*follow-up*) inmediatamente después de aplicar la intervención, lo que no proporciona la certeza de que el efecto de la intervención siguió por más tiempo. Otra limitante fue que se encontraron intervenciones y medidas de resultado muy variadas, por lo cual no fue posible la elaboración de un metaanálisis.

CONCLUSIONES

Las intervenciones ambientales pueden ser una de las estrategias más efectivas para lograr un impacto positivo en la población, ya que su objetivo es modificar el entorno de las personas. Algunos ejemplos de éstas son las mencionadas en esta revisión, como las políticas, legislaciones, impuestos, etiquetado nutricional, disponibilidad de alimentos, etc.

En esta revisión bibliográfica, se observó que la utilización de dichas intervenciones es cada vez más común, ya sean por si solas o en combinación con otros tipos de intervenciones. Fue más común observar intervenciones enfocadas a la disminución del consumo de SSBs, ya que se ha visto un aumento en el número de estudios con este tipo de intervenciones en los últimos años.

Las características de los estudios incluidos en esta revisión sistemática muestran una variedad de intervenciones ambientales, así como de regiones en las cuales se aplicaron. El impacto de dichas intervenciones fue, en la mayoría de los casos, positivo; sin embargo, no siempre fue estadísticamente significativo. El tipo de intervención con los resultados positivos más consistentes fue donde el enfoque se centró en las políticas, normas o legislaciones de alimentación y nutrición. Sin embargo, la mayoría de los estudios tuvieron un alto riesgo de sesgo debido a las limitaciones en su diseño, métodos e informes; limitando así las conclusiones que se pueden obtener.

RECOMENDACIONES

Se requiere mejor evidencia basada en métodos estandarizados para tener estudios de mejor calidad. De igual manera, es indispensable que se realicen trabajos de campo enfocados a intervenciones ambientales para la reducción de SSBs en países de Latinoamérica, incluyendo México.

A su vez, es importante fomentar la elaboración de revisiones sistemáticas dentro de la Universidad de Sonora, ya que en este tipo de trabajo se revisa toda la evidencia existente de un tema con el fin de cumplir los objetivos de ésta. Además, pueden resaltar dónde se necesita más investigación, asegurando así que los recursos de investigación estén enfocados donde más se necesita. Adicionalmente, las revisiones sistemáticas son relativamente baratas de realizar, con el tiempo y los recursos humanos siendo los principales insumos.

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ANEXOS

Anexo 1. Estrategia de búsqueda en PubMed

#63	Search (#62 NOT #61)
#63	Search (#62 NOT #61)
#62	Search (#29 AND #36 AND #39 AND #53)
#61	Search (#56 or #57 or #58 or #59 or #60)
#60	Search case reports [publication type]
#59	Search Editorial [publication type]
#58	Search animal experimentation [MeSH Terms]
#57	Search veterinary medicine [MeSH Terms]
#56	Search (#54 NOT #55)
#55	Search humans[MeSH Terms]
#54	Search animals[MeSH Terms]
#53	Search (#42 or #43 or #44 or #45 or #46 or #47 or #48 or #49 or #52)
#52	Search (#50 AND #51)
#51	Search (body[Title/Abstract] OR visceral[Title/Abstract] OR skin[Title/Abstract] OR abdominal[Title/Abstract])
#50	Search (fat[Title/Abstract] OR fatness[Title/Abstract])
#49	Search (weight*[Title/Abstract] OR bodyfat[Title/Abstract] OR obes*[Title/Abstract] OR overweight*[Title/Abstract] OR adiposity[Title/Abstract] OR BMI[Title/Abstract] OR zBMI[Title/Abstract] OR body mass index[Title/Abstract] OR skinfold thickness[Title/Abstract] OR caries[Title/Abstract] OR dental decay[Title/Abstract] OR dental erosion[Title/Abstract])
#48	Search food preferences [MeSH Terms]
#47	Search energy intake [MeSH Terms]
#46	Search nutritional status [MeSH Terms]
#45	Search body weight changes [MeSH Terms]
#44	Search overweight[MeSH Terms]
#43	Search drinking[MeSH Terms]
#42	Search (#40 AND #41)

#41	Search (water[Title/Abstract] OR soda[Title/Abstract] OR lemonade[Title/Abstract] OR SSB[Title/Abstract] OR SSBs[Title/Abstract] OR sugar-sweetened-beverage*[Title/Abstract])
#40	Search (consumption[Title/Abstract] OR intake[Title/Abstract])
#39	Search (#37 or #38)
#38	Search (random*[Title/Abstract] OR RCT*[Title/Abstract] OR controlled trial*[Title/Abstract] OR controlled stud*[Title/Abstract] OR controlled design[Title/Abstract] OR interrupted time series[Title/Abstract] OR before-and-after[Title/Abstract] OR pretest posttest[Title/Abstract] OR pretest-posttest[Title/Abstract] OR multicenter-study[Title/Abstract] OR clinical-trial[Title/Abstract])
#37	Search clinical studies as topic [MeSH Terms]
#36	Search #30 or #31 or #32 or #33 or #34 or #35
#35	Search (intervention*[Title/Abstract] OR policy[Title/Abstract] OR policies[Title/Abstract] OR prevention[Title/Abstract] OR preventive[Title/Abstract] OR school*[Title/Abstract] OR lifestyle*[Title/Abstract] OR regulation[Title/Abstract] OR legislation[Title/Abstract] OR law[Title/Abstract] OR procurement[Title/Abstract] OR incentive[Title/Abstract] OR guideline[Title/Abstract])
#34	Search food dispensers, automatic [MeSH Terms]
#33	Search serving size [MeSH Terms]
#32	Search portion size [MeSH Terms]
#31	Search consumer health information [MeSH Terms]
#30	Search nutrition policy [MeSH Terms]
#29	Search (#1 or #3 or #4 or #5 or #6 or #7 or #10 or #15 or #19 or #22 or #25 or #26 or #27 or #28)
#28	Search (agua-fresca[Title/Abstract] OR aguas-frescas[Title/Abstract])
#27	Search refresco [Title/Abstract]
#26	Search dietary sucrose [MeSH Terms]
#25	Search (#23 AND #24)
#24	Search (fountain*[Title/Abstract] OR cooler*[Title/Abstract] OR dispenser*[Title/Abstract] OR chiller*[Title/Abstract] OR bottled[Title/Abstract] OR vending[Title/Abstract] OR filter*[Title/Abstract])
#23	Search (water[Title/Abstract] OR soda[Title/Abstract])
#22	Search (#20 AND #21)
#21	Search (consumption[Title/Abstract] OR intake[Title/Abstract] OR sales[Title/Abstract] OR drink*[Title/Abstract] OR beverage*[Title/Abstract] OR sugar*[Title/Abstract] OR sweet*[Title/Abstract])
#20	Search soda [Title/Abstract]

#19	Search (#16 AND #18)
#18	Search (flavour*[Title/Abstract] OR flavor*[Title/Abstract] OR sugar*[Title/Abstract] OR sweet*[Title/Abstract])
#16	Search (tea[Title/Abstract] OR coffee[Title/Abstract] OR milk[Title/Abstract] OR dairy[Title/Abstract] OR water[Title/Abstract] OR soda[Title/Abstract])
#15	Search (#13 AND #14)
#14	Search (drink*[Title/Abstract] OR beverage*[Title/Abstract] OR soda[Title/Abstract] OR milk[Title/Abstract])
#13	Search (sugar[Title/Abstract] OR sugar-sweetened[Title/Abstract] OR sugarsweetened[Title/Abstract] OR sugary[Title/Abstract] OR carbonated[Title/Abstract] OR caffein*[Title/Abstract] OR fizzy[Title/Abstract] OR diet*[Title/Abstract] OR cal[Title/Abstract] OR calorie[Title/Abstract] OR caloric[Title/Abstract] OR energy[Title/Abstract] OR soft[Title/Abstract] OR sport*[Title/Abstract] OR sweet*[Title/Abstract] OR fructose*[Title/Abstract] OR sucrose*[Title/Abstract] OR corn syrup[Title/Abstract] OR HFCS[Title/Abstract])
#10	Search ((SSB[Title/Abstract] OR SSBs[Title/Abstract] OR cola[Title/Abstract] OR lemonade*[Title/Abstract] OR drinking water).[Title/Abstract])
#7	Search ((SSB[Other Term] OR SSBs[Other Term] OR sugar-sweetened beverage[Other Term] OR sugar-sweetened beverages[Other Term] OR lemonade[Other Term] OR lemonades[Other Term] OR softdrink[Other Term] OR soft-drink[Other Term] OR softdrinks[Other Term] OR soft-drinks)[Other Term]))
#6	Search (SSB[Other Term] OR SSBs[Other Term] OR sugar-sweetened beverage[Other Term] OR sugar-sweetened beverages[Other Term] OR lemonade[Other Term] OR lemonades[Other Term] OR softdrink[Other Term] OR "soft drink"[Other Term] OR softdrinks[Other Term] OR "soft drinks")[Other Term])
#5	Search Energy Drinks [MeSH Terms]
#4	Search Carbonated Water [MeSH Terms]
#3	Search drinking water [MeSH Terms]
#1	Search carbonated beverages [MeSH Terms]
#62	Search (#29 AND #36 AND #39 AND #53)
#61	Search (#56 or #57 or #58 or #59 or #60)
#60	Search case reports [publication type]
#59	Search Editorial [publication type]
#58	Search animal experimentation [MeSH Terms]
#57	Search veterinary medicine [MeSH Terms]
#56	Search (#54 NOT #55)
#55	Search humans[MeSH Terms]

#54	Search animals[MeSH Terms]
#53	Search (#42 or #43 or #44 or #45 or #46 or #47 or #48 or #49 or #52)
#52	Search (#50 AND #51)
#51	Search (body[Title/Abstract] OR visceral[Title/Abstract] OR skin[Title/Abstract] OR abdominal[Title/Abstract])
#50	Search (fat[Title/Abstract] OR fatness[Title/Abstract])
#49	Search (weight*[Title/Abstract] OR bodyfat[Title/Abstract] OR obes*[Title/Abstract] OR overweight*[Title/Abstract] OR adiposity[Title/Abstract] OR BMI[Title/Abstract] OR zBMI[Title/Abstract] OR body mass index[Title/Abstract] OR skinfold thickness[Title/Abstract] OR caries[Title/Abstract] OR dental decay[Title/Abstract] OR dental erosion[Title/Abstract])
#48	Search food preferences [MeSH Terms]
#47	Search energy intake [MeSH Terms]
#46	Search nutritional status [MeSH Terms]
#45	Search body weight changes [MeSH Terms]
#44	Search overweight[MeSH Terms]
#43	Search drinking[MeSH Terms]
#42	Search (#40 AND #41)
#41	Search (water[Title/Abstract] OR soda[Title/Abstract] OR lemonade[Title/Abstract] OR SSB[Title/Abstract] OR SSBs[Title/Abstract] OR sugar-sweetened-beverage*[Title/Abstract])
#40	Search (consumption[Title/Abstract] OR intake[Title/Abstract])
#39	Search (#37 or #38)
#38	Search (random*[Title/Abstract] OR RCT*[Title/Abstract] OR controlled trial*[Title/Abstract] OR controlled stud*[Title/Abstract] OR controlled design[Title/Abstract] OR interrupted time series[Title/Abstract] OR before-and-after[Title/Abstract] OR pretest posttest[Title/Abstract] OR pretest-posttest[Title/Abstract] OR multicenter-study[Title/Abstract] OR clinical-trial[Title/Abstract])
#37	Search clinical studies as topic [MeSH Terms]
#36	Search #30 or #31 or #32 or #33 or #34 or #35
#35	Search (intervention*[Title/Abstract] OR policy[Title/Abstract] OR policies[Title/Abstract] OR prevention[Title/Abstract] OR preventive[Title/Abstract] OR school*[Title/Abstract] OR lifestyle*[Title/Abstract] OR regulation[Title/Abstract] OR legislation[Title/Abstract] OR law[Title/Abstract] OR procurement[Title/Abstract] OR incentive[Title/Abstract] OR guideline[Title/Abstract])
#34	Search food dispensers, automatic [MeSH Terms]
#33	Search serving size [MeSH Terms]

#32	Search portion size [MeSH Terms]
#31	Search consumer health information [MeSH Terms]
#30	Search nutrition policy [MeSH Terms]
#29	Search (#1 or #3 or #4 or #5 or #6 or #7 or #10 or #15 or #19 or #22 or #25 or #26 or #27 or #28)
#28	Search (agua-fresca[Title/Abstract] OR aguas-frescas[Title/Abstract])
#27	Search refresco [Title/Abstract]
#26	Search dietary sucrose [MeSH Terms]
#25	Search (#23 AND #24)
#24	Search (fountain*[Title/Abstract] OR cooler*[Title/Abstract] OR dispenser*[Title/Abstract] OR chiller*[Title/Abstract] OR bottled[Title/Abstract] OR vending[Title/Abstract] OR filter*[Title/Abstract])
#23	Search (water[Title/Abstract] OR soda[Title/Abstract])
#22	Search (#20 AND #21)
#21	Search (consumption[Title/Abstract] OR intake[Title/Abstract] OR sales[Title/Abstract] OR drink*[Title/Abstract] OR beverage*[Title/Abstract] OR sugar*[Title/Abstract] OR sweet*[Title/Abstract])
#20	Search soda [Title/Abstract]
#19	Search (#16 AND #18)
#18	Search (flavour*[Title/Abstract] OR flavor*[Title/Abstract] OR sugar*[Title/Abstract] OR sweet*[Title/Abstract])
#16	Search (tea[Title/Abstract] OR coffee[Title/Abstract] OR milk[Title/Abstract] OR dairy[Title/Abstract] OR water[Title/Abstract] OR soda[Title/Abstract])
#15	Search (#13 AND #14)
#14	Search (drink*[Title/Abstract] OR beverage*[Title/Abstract] OR soda[Title/Abstract] OR milk[Title/Abstract])
#13	Search (sugar[Title/Abstract] OR sugar-sweetened[Title/Abstract] OR sugarsweetened[Title/Abstract] OR sugary[Title/Abstract] OR carbonated[Title/Abstract] OR caffein*[Title/Abstract] OR fizzy[Title/Abstract] OR diet*[Title/Abstract] OR cal[Title/Abstract] OR calorie[Title/Abstract] OR caloric[Title/Abstract] OR energy[Title/Abstract] OR soft[Title/Abstract] OR sport*[Title/Abstract] OR sweet*[Title/Abstract] OR fructose*[Title/Abstract] OR sucrose*[Title/Abstract] OR corn syrup[Title/Abstract] OR HFCS[Title/Abstract])
#10	Search ((SSB[Title/Abstract] OR SSBs[Title/Abstract] OR cola[Title/Abstract] OR lemonade*[Title/Abstract] OR drinking water).[Title/Abstract])
#7	Search ((SSB[Other Term] OR SSBs[Other Term] OR sugar-sweetened beverage[Other Term] OR sugar-sweetened beverages[Other Term] OR lemonade[Other Term] OR lemonades[Other Term] OR softdrink[Other Term] OR soft-drink[Other Term] OR softdrinks[Other Term] OR soft-drinks)[Other Term]))

#6	Search (SSB[Other Term] OR SSBs[Other Term] OR sugar-sweetened beverage[Other Term] OR sugar-sweetened beverages[Other Term] OR lemonade[Other Term] OR lemonades[Other Term] OR softdrink[Other Term] OR "soft drink"[Other Term] OR softdrinks[Other Term] OR "soft drinks")[Other Term])
#5	Search Energy Drinks [MeSH Terms]
#4	Search Carbonated Water [MeSH Terms]
#3	Search drinking water [MeSH Terms]
#1	Search carbonated beverages [MeSH Terms]

Anexo 2. Tabla de motivos de exclusión de estudios.

Study	Reason
Abdel Rahman A, Jomaa L, Kahale LA, Adair P, Pine C. Effectiveness of behavioral interventions to reduce the intake of sugar-sweetened beverages in children and adolescents: a systematic review and meta-analysis. Nutrition reviews. 2018;76(2):88-107.	Study type
Adab P, Barrett T, Bhopal R, Cade JE, Canaway A, Cheng KK, et al. The West Midlands ActiVe lifestyle and healthy Eating in School children (WAVES) study: a cluster randomised controlled trial testing the clinical effectiveness and cost-effectiveness of a multifaceted obesity prevention intervention programme targeted at children aged 6-7 years. Health technology assessment (Winchester, England). 2018;22(8):1-608.	Study type
Adab P, Pallan MJ, Lancashire ER, Hemming K, Frew E, Griffin T, et al. A cluster-randomised controlled trial to assess the effectiveness and cost-effectiveness of a childhood obesity prevention programme delivered through schools, targeting 6-7 year old children: the WAVES study protocol. BMC public health. 2015;15:488.	Intervention
Afshin A, Del Gobbo L, Silva J, Michaelson M, Mozaffarian D. The effect of food pricing on dietary behaviors and adiposity: A systematic review and meta-analysis. Circulation Conference: American Heart Association's Epidemiology and Prevention/Nutrition, Physical Activity, and Metabolism. 2014;129(SUPPL. 1).	Study type
Andersen R, Biltoft-Jensen A, Christensen T, Andersen EW, Ege M, Thorsen AV, et al. Dietary effects of introducing school meals based on the New Nordic Diet - a randomised controlled trial in Danish children. The OPUS School Meal Study. The British journal of nutrition. 2014;111(11):1967-76.	Outcomes
Barbosa FNM, Casotti CA, Nery AA. Health Risk Behavior of Adolescent Scholars. Texto & Contexto - Enfermagem. 2016;25(4):e2620015.	Intervention
Barrientos-Pérez M, Flores-Huerta S. ¿Es la obesidad un problema médico individual y social? Políticas públicas que se requieren para su prevención. Boletín médico del Hospital Infantil de México. 2008;65(6):639-51.	Intervention
Blum JE, Davee AM, Beaudoin CM, Jenkins PL, Kaley LA, Wigand DA. Reduced availability of sugar-sweetened beverages and diet soda has a limited impact on beverage consumption patterns in Maine high school youth. Journal of nutrition education and behavior. 2008;40(6):341-7.	Study type
Bogart LM, Elliott MN, Uyeda K, Hawes-Dawson J, Klein DJ, Schuster MA. Preliminary healthy eating outcomes of SNaX, a pilot community-based intervention for adolescents. The Journal of adolescent health: official publication of the Society for Adolescent Medicine. 2011;48(2):196-202.	Intervention
Bonvecchio-Arenas A, Theodore FL, Hernandez-Cordero S, Campirano-Nunez F, Islas AL, Safdie M, et al. The school as an opportunity for obesity prevention: An experience from the Mexican school system. [Spanish]. Revista Espanola de Nutricion Comunitaria. 2010;16(1):13-6.	Intervention

Study	Reason
Chen HJ, Wang Y. Influence of school beverage environment on the association of beverage consumption with physical education participation among US adolescents. American journal of public health. 2013;103(11):e63-70.	Study type
Cohen JF, Richardson S, Parker E, Catalano PJ, Rimm EB. Impact of the new U.S. Department of Agriculture school meal standards on food selection, consumption, and waste. American journal of preventive medicine. 2014;46(4):388-94.	Outcomes
Collins CE, Dewar DL, Schumacher TL, Finn T, Morgan PJ, Lubans DR. 12 month changes in dietary intake of adolescent girls attending schools in low-income communities following the NEAT Girls cluster randomized controlled trial. Appetite. 2014;73:147-55.	Intervention
Costa FFd, Assis MAAd, González-Chica D, Bernardo C, Barros MVGd, Nahas MV. Effect of school-based intervention on diet in high school students. Revista Brasileira de Cineantropometria & Desempenho Humano. 2014;16(suppl 1):36-45.	Intervention
de Barros MV, Nahas MV, Hallal PC, de Farias Junior JC, Florindo AA, Honda de Barros SS. Effectiveness of a school-based intervention on physical activity for high school students in Brazil: the Saude na Boa project. J Phys Act Health. 2009;6(2):163-9.	Outcomes
Dick M, Lee A, Bright M, Turner K, Edwards R, Dawson J, et al. Evaluation of implementation of a healthy food and drink supply strategy throughout the whole school environment in Queensland state schools, Australia. European journal of clinical nutrition. 2012;66(10):1124-9.	Outcomes
Dishchekenian VRM, Escrivão MAMS, Palma D, Ancona-Lopez F, Araújo EACd, Taddei JAdAC. Padrões alimentares de adolescentes obesos e diferentes repercussões metabólicas. Revista de Nutrição. 2011;24(1):17-29.	Study type
Dreyhaupt J, Koch B, Wirt T, Schreiber A, Brandstetter S, Kesztyus D, et al. Evaluation of a health promotion program in children: study protocol and design of the cluster-randomized Baden-Wurttemberg primary school study. BMC public health. 2012;12(157).	Intervention
Fernandes PS, Bernardo CdO, Campos RMMB, Vasconcelos FdAGd. Avaliação do efeito da educação nutricional na prevalência de sobrepeso/obesidade e no consumo alimentar de escolares do ensino fundamental. Jornal de pediatria. 2009;85(4):315-21.	Intervention
Flores-Huerta S, Klünder-Klünder M, Medina-Bravo P. La escuela primaria como ámbito de oportunidad para prevenir el sobrepeso y la obesidad en los niños. Boletín médico del Hospital Infantil de México. 2008;65(6):626-38.	Study type
Gomes FdS, Silva GAe, Castro IRRd. Aquisição domiciliar de refrigerantes e de biscoitos reduz o efeito de uma intervenção de promoção de frutas e hortaliças. Cadernos de saude publica. 2017;33(3):e00023316.	Intervention

Study	Reason
Gómez-Miranda LM, Jiménez-Cruz A, Bacardí-Gascón M. Estudios aleatorizados sobre el efecto del consumo de bebidas azucaradas sobre la adiposidad en adolescentes y adultos: revisión sistemática. Nutricion hospitalaria. 2013;28(6):1792-6.	Study type
Greece J. Behavioral impact of school-based helthy eating intervention for at-risk children. : Boston University; 2011.	Not enough information to evaluate. No abstract and full text could not be found.
Gutiérrez Ruvalcaba CL, Vásquez-Garibay E, Romero-Velarde E, Troyo-Sanromán R, Cabrera-Pivaral C, Ramírez Magaña O. Consumo de refrescos y riesgo de obesidad en adolescentes de Guadalajara, México. Boletín médico del Hospital Infantil de México. 2009;66(6):522-8.	Study type
Habib-Mourad C, Ghandour LA, Moore HJ, Nabhani-Zeidan M, Adetayo K, Hwalla N, et al. Promoting healthy eating and physical activity among school children: findings from Health-E-PALS, the first pilot intervention from Lebanon. BMC public health. 2014;14:940.	Intervention
Hurley KL, Griffin TL, Lancashire ER, Cade JE, Pallan MJ, Adab P. Sugar sweetened beverages are the dominant source of sugar intake: results from 5-6 year old children from the WAVES study, UK. Obesity facts.Conference: european obesity summit(EOS):1st joint congress of EASO and IFSO-EC. Gothenburg sweden. Conference start:. 20160601. Conference end: 4. Conference publication: (var.pagings) Vol.9.	Study type
Jimenez-Aguilar A, Morales-Ruan MDC, Lopez-Olmedo N, Theodore F, Moreno-Saracho J, Tolentino-Mayo L, et al. The fight against overweight and obesity in school children: Public policy in Mexico. Journal of public health policy. 2017;38(4):407-28.	Outcomes
Jiménez-Cruz A, Gómez-Miranda LM, Bacardí-Gascón M. Estudios aleatorizados sobre el efecto del consumo de bebidas azucaradas sobre la adiposidad en menores de 16 años: revisión sistemática. Nutricion hospitalaria. 2013;28(6):1797-801.	Study type
Johnson DB, Bruemmer B, Lund AE, Evens CC, Mar CM. Impact of school district sugar-sweetened beverage policies on student beverage exposure and consumption in middle schools. The Journal of adolescent health : official publication of the Society for Adolescent Medicine. 2009;45(3 Suppl):S30-7.	Study type
Lima J, Augusto C, Gaspar J, Brandão TRS, Rocha A. O açúcar que comes quando bebes: impacto de uma estratégia de consciencialização. Acta Portuguesa de Nutrição. 2016;0(4):18-22.	Participants and intervention
Marisela Vazquez Duran M, Castillo Martinez L, Orea Tejada A, Tellez Olvera DA, Delgado Perez LG, Marquez Zepeda B, et al. Effect of decreasing the consumption of sweetened caloric and non-caloric beverages on weight, body composition and blood pressure in young adults. European Journal of Preventive Cardiology.20(1 SUPPL. 1):S120.	Participants and intervention

Study	Reason
McDarby F, O'Hora D, O'Shea D, Byrne M. Taking the sweetness out of the 'Share a Coke' marketing campaign: the influence of personalized labelling on elementary school children's bottled drink choices. Pediatric obesity. 2016(pagination).	Outcomes
McGoldrick K. Sweetened beverage consumption of Peel adolescent: nutritional correlates and influence of the school and neighbourhood food environments.: University of Waterloo; 2006.	Not enough information to evaluate. No abstract and full text could not be found.
Morales-Ruan MDC, Aguilar AJ, Shamah-Levy T, Olmedo NL, Theodore F, Mayo MLT, et al. Public policy in Mexico for the fight against overweight and obesity in school children. Annals of Nutrition and Metabolism. 2017;71 (Supplement 2):787.	Outcomes
Muzaffar H, Nickols-Richardson SM. PAWS (Peer-education About Weight Steadiness) club: Rationale and design for a randomized controlled study. FASEB journal.30(no pagination):CONFERENCE START: 2016 Apr 2 CONFERENCE END: Apr 6.	Intervention
Nahas MV, Barros MVGd, Goldfine BD, Lopes AdS, Hallal PC, Farias Júnior JCd, et al. Physical activity and eating habits in public high schools from different regions in Brazil: the Saude na Boa project. Revista Brasileira de Epidemiologia. 2009;12(2):270-7.	Intervention
Nahas MV, de Barros MV, de Assis MA, Hallal PC, Florindo AA, Konrad L. Methods and participant characteristics of a randomized intervention to promote physical activity and healthy eating among brazilian high school students: the Saude na Boa project. J Phys Act Health. 2009;6(2):153-62.	Outcomes
Pérez López IJ, Delgado Fernández M. Un juego de cartas durante los recreos escolares mejora los hábitos alimentarios en adolescentes. Nutricion hospitalaria. 2012;27(6):2055-65.	Intervention
Perez-Morales ME, Bacardi-Gascon M, Jimenez-Cruz A, Armendariz-Anguiano A. Randomized controlled school based interventions to prevent childhood obesity: Systematic review from 2006 to 2009. [Spanish]. Archivos latinoamericanos de nutricion. 2009;59(3):253-9.	Study type
Pérez-Morales ME, Bacardí-Gascón M, Jiménez-Cruz A, Armendáriz-Anguiano A. Intervenciones aleatorias controladas basadas en las escuelas para prevenir la obesidad infantil: revisión sistemática de 2006 a 2009. Archivos latinoamericanos de nutricion. 2009;59(3):253-9.	Study type
Petrescu DC, Hollands GJ, Couturier DL, Ng YL, Marteau TM. Public Acceptability in the UK and USA of Nudging to Reduce Obesity: The Example of Reducing Sugar-Sweetened Beverages Consumption. PloS one. 2016;11(6):e0155995.	Intervention
Ritchie LD, Sharma S, Gildengorin G, Yoshida S, Braff-Guajardo E, Crawford P. Policy improves what beverages are served to young children in child care. Journal of the Academy of Nutrition and Dietetics. 2015;115(5):724-30.	Outcomes

Study	Reason
Rivera JA, Muñoz-Hernández O, Rosas-Peralta M, Aguilar-Salinas CA, Popkin BM, Willett WC. Consumo de bebidas para una vida saludable: recomendaciones para la población mexicana. Salud publica de Mexico. 2008;50(2):173-95.	Study type
Sichieri R, Paula Trotte A, de Souza RA, Veiga GV. School randomised trial on prevention of excessive weight gain by discouraging students from drinking sodas. Public health nutrition. 2009;12(2):197-202.	Intervention
Sichieri R, Souza RAd. Estratégias para prevenção da obesidade em crianças e adolescentes. Cadernos de saude publica. 2008;24(suppl 2):s209-s23.	Study type
Silva DAS, Pelegrini A, Lopes AdS, Wanderley Júnior RdS, Barros SSH, Barros MVGd. Changes in health-related behaviors and their effect on dissatisfaction with body weight in youths. Revista Brasileira de Cineantropometria & Desempenho Humano. 2014;16(suppl 1):79-90.	Outcomes
Souza RAGd, Mediano MFF, Souza AdM, Sichieri R. Reducao do uso de acucar em escolas publicas: ensaio randomizado por conglomerados. Revista de saude publica. 2013;47(4):666-74.	Intervention
Terry-McElrath YM, O'Malley PM, Johnston LD. School soft drink availability and consumption among U.S. secondary students. American journal of preventive medicine. 2013;44(6):573-82.	Intervention
van de Gaar VM, Jansen W, van Grieken A, Borsboom G, Kremers S, Raat H. Effects of an intervention aimed at reducing the intake of sugar-sweetened beverages in primary school children: a controlled trial. The international journal of behavioral nutrition and physical activity. 2014;11:98.	Intervention
Vargas ICdS, Sichieri R, Sandre-Pereira G, Veiga GVd. Avaliação de programa de prevenção de obesidade em adolescentes de escolas públicas. Revista de saude publica. 2011;45(1):59-68.	Intervention
Vio del R F, Zacarías H I, Lera L, Benavides MC, Gutiérrez AM. PrevenciÓn De La Obesidad En Escuelas BÁsicas De PeÑalolÉn: Componente AlimentaciÓn Y NutriciÓn. Revista chilena de nutrición. 2011;38(3):268-76.	Intervention
Wordell D, Daratha K, Mandal B, Bindler R, Butkus SN. Changes in a middle school food environment affect food behavior and food choices. Journal of the Academy of Nutrition and Dietetics. 2012;112(1):137-41.	Intervention
Yildirim M, Singh AS, te Velde SJ, van Stralen MM, MacKinnon DP, Brug J, et al. Mediators of longitudinal changes in measures of adiposity in teenagers using parallel process latent growth modeling. Obesity (Silver Spring, Md). 2013;21(11):2387-95.	Intervention

Anexo 3. Características de los estudios incluidos en la revisión.

Parte A

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
Bae et al (2012)	Korea	Intervention: 2005-2009 Data collection: Oct-Nov 2005 Sept-Oct 2006, 2007, 2008 & 2009	Around 65,000 students from the 1st grade of middle school up to the 2nd grade of high school in 2005. Around 80,000 students every year from the 1st grade of middle school up to the 3rd grade of high school in 2006, 2007, 2008, and 2009.	This research used the Korea Youth Risk Behavior Web-based Survey (KYRBWS) original data from 2005 to 2009 to evaluate the effect of various nutrition policies implemented in schools.	Intervention: through literature review, the authors included the policies implemented for the improvement of adolescents' dietary behaviors during 2005 and 2009. These included: 1. Recommendation of ban on carbonated-beverages in school and youth-training facilities (Mar 2006), 2. Amendment of School Meal Act (Jul 2006), 3. Dissemination of standardized obesity prevention program (Sep 2006), 4. Ban on carbonated-beverages in school and youth-training facilities (Feb 2007), 5. Pilot project for Nutritional labeling on school meal (Sep 2007), 6. Enforcement of mandatory Nutritional labeling on school meal (Mar 2008), and 7. Enactment of special law on children's safe eating habit management (Mar 2009). For this review the most relevant policies are 1 and 4.	Policies were included whose purposes were to improve adolescents' dietary behavior and were performed after 2005 by the Ministry of Health and Welfare or the Ministry of Education, Science and Technology (MEST), or their affiliated organizations. Policies that stopped at the planning stage, or were performed after September 2009, (in 2009, 5th KYRBWS was started) were excluded from the analysis. The authors report that: "In March 2006, a ban on carbonated-beverages in the schools was recommended and fully enforced in February 2007. For this reason, it was reported that, according to an investigation led by MEST, the ban rate rose from 52.5% in May 2006, to 84.2% in October 2006, to 99.8% in August 2007. This policy was

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
						implemented because ingestion of carbonated-beverages can be the reason for children-adolescence weight gain and obesity."
Bauhoff (2013)	United States	Intervention: January 2004 onwards, July 2004 Baseline: March – June 2003 (physical measures) March – June 2004 (soda consumption) Follow-up: March – June 2005 (physical measures) March – June 2006 (soda consumption)	Students in 7th (age 12-13), 9th (age 14-15) and 12th grade. N > 120,000 for the physical measures; N > 25,000 for consumption measures	Los Angeles Unified School District. Physical measures come from the California FITNESS-GRAM Physical Fitness Test (PFT), which is administered annually to students in public schools grades 5, 7 and 9 – data from Spring 2003 and Spring 2005. The California Healthy Kids Survey (CHKS) collects self-reported consumption of fried foods, soda, milk, juice, fruit and vegetables during the past 24 h – data from Spring 2004 and Spring 2006.	Intervention: The Los Angeles Unified School District introduced beverage and food standards for all of its schools in January and July 2004, respectively. The policy limits beverages to unsweetened soft drinks and juice blends with at least 50% juice. It allows only low-fat milk, and imposes serving size restrictions on electrolyte drinks; added sweeteners are also limited for these types of beverages. The food standard limits calories from fats (35% from total fat and 10% from saturated fat), restricts added sugar to 35% by weight and introduces size restrictions for snacks, baked goods and entrées. Comparisons: 1. Other school districts in California 2. All school districts in California	Foods and beverages sold in schools are either part of the national breakfast and lunch programs, or "competitive foods" such as snack foods and drinks sold à la carte in cafeterias, vending machines and school stores. Overall, the nutrition standards are comparable to federal regulations for the breakfast and lunch programs and to recent guidelines for competitive foods by the Institute of Medicine (2007). Since the district standards apply to all foods and beverages sold in schools, they are important complements to the national regulations that solely target the federally reimbursed school meals.
Beets et al (2016)	United States	Intervention: August 2013 – February 2014	20 Afterschool Programs (ASPs) serving over 1,700	South Carolina, USA. To be included ASPs needed to operate in a school, community or	Intervention: The Strategies To Enhance Practice for Healthy Eating (STEPs-HE) intervention	Intervention: Trainings, conducted by research staff, occurred at the beginning of the school

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
		Data collection: Baseline: Spring 2013 (March–April) Mid-point: Fall (September–November 2013) Post-intervention: Spring 2014 (March–April).	children of elementary school age (6–12 yrs) Percentage of population in poverty: 17.5% control, 13.3% intervention Race/Ethnicity - African American: 44.7% control, 29.7% intervention	faith setting; for a minimum of 2 hours; and had to provide a snack, homework assistance / completion time, enrichment, and opportunities for physical activity.	focused on capacity building with ASPs to develop a snack budget and menus that met the healthy eating standards and identifying low-cost outlets to purchase snacks. The standards specify that a fruit or vegetable be served daily; water offered at the table and be accessible at all times; and sugar-sweetened beverages/foods and artificially flavored foods be eliminated. N= 10 ASPs Comparison: No intervention - asked to continue with current ASP practices and received no technical assistance or support from the intervention staff. N = 10 ASPs	year (August 2013) and lasted approximately 3 hours with the site leaders. Additionally, 4 booster sessions per intervention ASP, that include site leaders and staff, were provided. The intervention begins by focusing on the program leader as the primary target of the process of integrating the Healthy Eating Standards into routine practice. The resources/strategies provided are adapted based on the specific needs of the ASP.
Carriedo et al (2013)	Mexico	Intervention: March to June 2010 Data collection: before and after the intervention	341 children from 4th and 5th grade (9-10 years)	4 elementary public schools in the south of Mexico City with school breakfast programs funded by the Mexican government (Sistema Nacional para el Desarrollo Integral de la Familia)	Intervention: More availability of filtered water in various locations around the school (better placed than the drinking taps). Every child received a reusable plastic bottle (750 ml) to promote water consumption and meters to measure the color of their urine (so that they could ensure they were drinking sufficient water. Promotional strategies, key messages were communicated through different materials (video, posters) in the school and in the media to	

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
					promote water consumption at school and home. Teachers and parents were also targeted with some intervention components. Duration of intervention: 3 months. N= 171 children, 2 schools Comparison: no intervention N=161 children, 2 schools	
Cradock et al (2011)	United States	Intervention: Policy approved June 2004 and initiated with the fall 2004 school year. Data collection: Baseline: February-April 2004 Post-intervention: February-April 2006	Public high school students who participated in the Boston Youth Survey in February through April 2004 and 2006 (N= 2033). Complete data were available for 895 (83%) of 1,079 students in 2004 and 1,138 (92%) of 1,233 students in 2006. In 2004 and 2006, respectively, 3.5% and 2.8% of respondents were missing data on consumption of sugar-sweetened beverages.	Boston's public high schools (9th through 12th grade). The Boston Public Schools system, established in 1647, consists of 135 schools, enrolling more than 55,000 students (fiscal year 2010). The student body is diverse: 37% of students are black, 39% are Hispanic, 13% are white, and 9% are Asian, and approximately 74% of students are eligiblefor free or reduced-price meals.	Intervention: Boston Public Schools Snack and Beverage Policy. The beverage guidelines specifically precluded the sale of soft drinks, fruit drinks (i.e., non–100% vegetable or fruit juice beverages), and sports drinks anywhere in school buildings or on school campuses and had specifications that limited other beverage serving sizes. Comparison: National data obtained from the 2003-2004 and 2005-2006 National Health and Nutrition Examination Survey (NHANES).	The Boston Public Schools Snack and Beverage Policy and subsequent detailed implementation guidelines required that beverages sold in schools or on school grounds adhere to the Massachusetts à la Carte Food and Beverage Standards to Promote a Healthier School Environment published by Massachusetts Action for Healthy Kids.

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
			Comparison: data from the 2003-2004 (N=1196) and 2005-2006 (N=1233) National Health and Nutrition Examination Survey (NHANES)			
Cullen et al (2008)	United States	Intervention: 1. Before 2002-2003 school year 2. Fall 2004 Data collection: Baseline: 2001-2002 school year Post-intervention: 2005-2006 school year	6th through 8th grade students from three middle schools in a school district in southeast Texas. There were 2671 self-reported food records for year 1 (no intervention), 5273 for year 2 (after intervention 1) and 10234 for year 3 (after intervention 2). Students could have completed more than 1 lunch food record during each school year. Demographics changed between ears 1/2 and year 3. The percentage of students eligible for free or reduced-price	Middle schools in district in southeast Texas	Interventions: 1. Local policy, implemented before 2002-2003 school year The food service director removed snack chips, candy, and many desserts from all district middle school snack bars and removed vending machines from the cafeterias. 2. Texas Public School Nutrition Policy, implemented in Fall 2004 An unfunded mandate to promote a healthy school environment for Texas students. The guidelines apply to all school food sources, including vending machines. For middle schools, the policy restricts the portion sizes of high-fat and sugar snacks (limits vary by food group), sweetened beverages (≤12 oz), and the fat content of all foods served (≤28 grams of fat per serving no more	

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
			meals increased from 26% to 38%, 50% to 66%, and 68% to75% in the 3 schools. The percentage of Hispanic students increased slightly (35% to 45%; 62% to 71%, 87% to 89%), whereas the percentage of White students decreased slightly (11% to 9%, 29% to 17%, 61% to 48%).		than 2 times per week). It also sets limits on the frequency of serving high-fat vegetables such as french fries (3 oz per serving no more than 3 times per week). Comparison: No intervention, 2001–2002 school year	
Ermetici et al (2016) Briganti et al (2014) Romanelli et al (2013)	Italy	From 2009 to 2011 (two school years) Data collection: Baseline: 2009 Post-intervention for primary outcome: 2011 Follow-up data also collected in intervention group in 2014	487 adolescents (11-15 years) Mostly Caucasian – less than 5% of ethnic minorities including Asians, Arabs, and South Americans. Parental educational levels included mainly middle-school and high-school certificates.	6 state middle schools in townships in an urban area around Milan	<u>Intervention:</u> Two- year program Environmental changes – all traditional vending machines were replaced with machines containing healthy foods and beverages, including fresh fruit and vegetables, dried fruit, fruit juices, smoothies without added sugar, and drinkable yogurt, all from local farms, keeping prices as low as possible. The schools were asked to create more opportunities for exercise during breaks and pupils were given an additional 1 hour of breaks per week for physical activity. A re-usable BPA-free water bottle	Expert nutritionist team carefully evaluated the products to be included in the vending machines. An agreement was reached with the vending machine supplier to keep prices as low as possible and to dedicate part of the proceeds to childhood health promotion initiatives. No other food and drink sources were available inside the schools, except for tap water. Students were free to bring food or drinks from home.

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
		but not reported.			was supplied to encourage water consumption. Education – 16 health-promoting group lessons by expert nutritionists over two-school-years were included in the curriculum. Educational posters were posted in schools. Automated text messages promoting a healthy diet and daily exercise were sent to the students and their parents three times a week throughout the two school years including school vacations. N= 3 schools, 262 adolescents <u>Comparison:</u> No intervention. N= 3 schools, 225 adolescents	
Foster et al (2008)	United States	Intervention: 2 school years Data collection: Before and after the intervention in Spring semester (January to May)	1349 students in grades 4 through 6 53.7% female Age (mean ± SD) of 11.2 ± 1.0 years 40.7% were overweight or obese	10 schools in the School District of Philadelphia that had at least 50% of children eligible for federally subsidized, free, or reduced-price meals.	Intervention: School Nutrition Policy Initiative (SNPI) included the following components: (1) school self-assessment – schools assessed their environment and developed an action plan that proposed various strategies, such as limiting the use of food as reward, punishment, or for fundraising; promoting active recess; and serving breakfast in classrooms to increase the number of students eating a healthy breakfast; (2) nutrition education - 50 hours of food and	The SNPI was developed and delivered by The Food Trust, a community-based organization, and was funded by the US Department of Agriculture Food Stamp Nutrition Education Program. Self-assessment teams included administrators, teachers, nurses, coaches, and parents. All of the school staff in the intervention schools were offered ~10 hours per year

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
			Black children composed nearly half of the sample		nutrition education per student per school year; (3) nutrition policy - all the foods sold and served were changed to meet the following nutritional standards: all of the beverages were limited to 100% juice (recommended 6-oz serving size), water (no portion limits), and low-fat milk (recommended 8-oz serving size). Snack standards allowed ≤7 g of total fat, 2g of saturated fat, 360 mg of sodium, and 15 g of sugar per serving; (4) social marketing; and (5) parent outreach. Comparison: No intervention	of training in nutrition education. At these trainings, staff received curricula and supporting materials such as *Planet Health* and *Know Your Body*, as well as nutrition and physical activity theme packets designed to integrate classroom lessons, cafeteria promotions, and parent outreach.
Haerens et al (2007) Haerens et al (2006)	Belgium	Intervention: October 2003 - June 2004 Data collection: Baseline: September 2003 Post-intervention: June 2004	2991 students in 7th and 8th grades Age (years), mean ± SD 13.1 ± 0.81	15 schools in West-Flanders Intervention with parental support (n= 5, 1226 pupils), intervention alone (n= 5, 1006 pupils) and a control condition (n= 5, 759 pupils).	Intervention: Physical activity and healthy food intervention, including environmental and computer-tailored feedback components. Environmental component was aimed at changing the availability and accessibility of soft drinks. Promote the drinking of water as opposed to soft drinks, by offering it free by means of drinking fountains or at a lower price than soft drinks in shops or vending machines. The educational intervention consisted in that children received information about the improved health consequences of drinking water rather than soft	The healthy food intervention was designed for implementation by the school staff itself. Therefore a working group was composed of the principal, the physical education teacher(s) and other involved teachers. The working group received background information and guidelines on how to address the intervention topics. They received an intervention manual and educational material. Every three months a 1-h meeting with the working group and the research team was held

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
					drinks. To facilitate fruit consumption, fruit was sold once a week at school at low cost or provided free to all 7th and 8th graders. It was also suggested to offer fruit as a dessert of the school lunch. Children received information about the improved health consequences of eating fruit as opposed to snacks and drinking water rather than soft drinks. The computer-tailored feedback component focused on fruit and fat intake and physical activity. Parental support: information 3 times per year. In addition, all parents received a free CD-ROM with the adult computer-tailored intervention for fat intake and physical activity to complete at home. They were asked to discuss the results with their children. Comparison: no intervention.	to evaluate the implementation and to plan further actions.
Kocken et al (2012)	Netherlands	Intervention: January – June 2007	Students in grades 7 to 12, age 12-18 years, approximately 800 students per school	40 schools in 4 areas of the Netherlands, though only 28 continued to the end (13 experimental schools and 15 control schools.)	Intervention: The experimental schools introduced the 3 intervention methods consecutively in 6-week phases; finally combining all 3 strategies in phase 3. 1) Energy-dense extra foods and drinks were replaced by lower-calorie foods and drinks. Products were grouped into food groups	Responsibility for changing the product range in the vending machines, and also for the labeling and price reductions indicated by the research team, lay with the relevant school staff, canteen staff, or catering companies. The experiment was prepared in collaboration with many

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
					(extra foods, beverages, and basic foods), and the 3 categories (favorable product, moderately unfavorable product, and unfavorable product). Under these recommendations, 75% of the products offered in a vending machine should be favorable or moderately unfavorable; no fewer than 25% should be favorable. 2) Information labels were attached to the products in the vending machines to indicate the product category and to give information about the product. 3) The prices of favorable and moderately unfavorable products were reduced by about 10%. Comparison: no intervention	stakeholders involved in the schools' food supply, that is, students, school boards and teachers, school canteen staff members, school catering companies, and government authorities. The project staff supported the changes and helped ensure that the schools stayed on track during the intervention stage. An independent specialist in the field of school facilities and foods was contracted to advise schools and vendors on a range of healthy foods for the machines. Health-promotion officers from community health organizations encouraged the schools in their regions to participate in the project, and also helped the schools with the changes to the machines. The project organization ran a help desk which was on stand-by for questions and troubleshooting.
Loughridge et al (2005)	England	Intervention: February 2003	2965 students of secondary schools	Three secondary schools from the most deprived areas within	Intervention W + P: W - Water cooler sited within the cafeteria.	The intervention took place during one month (February 2003).

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
		Data collection: Baseline: January 2003 Post-intervention: February – April 2003	% Students entitled to free school meals: W + P = 35.6 P = 21.2 C = 21.3	North Tyneside, a part of the Tyne and Wear Health Action Zone. All three schools were well separated geographically.	P - Students were educated about the health benefits of drinking water and how to access it. Students also received promotional pencils and water bottles. 1 school, N=903 students Intervention W: Water cooler sited within the cafeteria. 1 school, N=1190 students Control C: No intervention 1 school, N=872 students.	P – promotion was performed by appropriately displaying purposefully designed posters and by verbally informing the children at school assemblies about the drinking water facilities within their school. A basketball sports personality attended the assemblies to help with the promotion. The specifically designed water promotion lessons were conducted with all age groups (11–18 years). The lesson plan involved class discussion about the perceptions of water drinking in school, individual completion of a 'water drinking habit' worksheet, feedback and discussion.
Muckelbauer et al (2009)	Germany	Intervention: August 2006–June 2007 Data collection: Baseline: August 2006 Post-intervention: June 2007	3,190 children attending the second and third grades (2,950 at follow-up), mean age ± SD: 8.3 ± 0.7 years, 50.2% male, 44.3% with migrational background.	32 elementary schools in socially deprived neighborhoods of two German cities, Dortmund and Essen.	<u>Intervention:</u> Combined environmental and educational intervention promoting water consumption - Environmental component – 1 water fountain was installed in each school, or 2 for schools with > 150 participants. The fountains provided cooled, filtered, plain or optionally carbonated water. Each child received a water bottle (500	The lessons were performed by the classroom teachers. At the beginning of the study, teachers received a booklet with the prepared curriculum and necessary materials to implement the lessons in the formal school curriculum. The lessons were developed by using the results of

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
					mL), and teachers were encouraged to organize filling of the water bottles each morning for all children in the corresponding classes. The educational intervention consisted of four 45-min classroom lessons to promote water consumption based on the theory of planned behavior. N = 17 schools <u>Comparison:</u> No intervention. N = 15 schools	empirical teaching research and were intended to improve the constructs of intention, attitudes, and perceived behavioral control, on the basis of the theory of planned behavior. Three months after the beginning of the study, teachers introduced a motivation unit (i.e., booster sessions) that used a goal-setting strategy to reach a sustained increase in water consumption by giving quantitative targets and feedback. In month 5 after the baseline assessment, each participant received a new water bottle with an improved handling design.
Nanney et al (2014)	United States	Intervention: change in number of policies from 2002 - 2006 Data collection: Baseline: 2004 Post-intervention: 2007	18,881 students from 6th, 9th and 12th grade who completed the 2004 and/or 2007 Minnesota Student Survey. Participants came from 37 schools that participated in both the 2002 and 2006 Center for Disease Control and Prevention	The School Obesity-related Policy Evaluation study (ScOPE) uses policy data from the Minnesota Student Survey and Profiles study. The cohort of 37 schools is more rural and white and has lower eligibility for free and reduced school meal participation than all	Principals in each school completed a survey that assessed school nutrition and physical activity policies and practices. Eight evidence-supported policies were identified and summed to create a recommended policy score. Policies included: 1) PE required in any of grades 6th-12th(yes/no); 2) intramural sports opportunities available (yes/no); availability of healthy items 3) fruits/vegetables and	

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
			School Health Profiles (Profiles) study. The school-level student population was mostly white. Across schools, eligibility for the free and reduced price meal program was generally less than 40%.	Minnesota schools in 2002 and 2006.	4) 100% fruit juice; and less healthy items 5) salty snacks, 6) chocolate candy, 7) other candy and 8) soda or sports drinks in vending machines/school stores.	
Patel (2011)	United States	Intervention: 5 weeks during March to June of 2008 Data collection: Baseline: pre-intervention Follow-up: 2 months post-intervention	793 7th grade students in two Los Angeles Unified School District (LAUSD) middle schools. Mean age, y (SD): I - 12.8 (0.75) C - 12.9 (0.46) 55% female 59% Hispanic 63% of students qualified for free and reduced-price National School Lunch Program meals (a proxy for household income).	In the LAUSD, the second largest US school district, water is typically available at no cost through school drinking fountains, and bottled water is sold through school vending in most middle and high schools. In 2002, the LAUSD school board passed the Motion to Promote Healthy Beverage Sales. Since then, beverages with less added sugar have been made available in schools.	Intervention components: were the provision of cold, filtered tap water (5-gallon) in the school cafeteria; distribution of reusable water bottles to all school staff and students; implementation of school-wide promotional activities; and education regarding the health and environmental benefits of drinking tap water (included posting nutritional information for beverages available in the school cafeteria or store). We monitored student cafeteria water consumption at the intervention school throughout the 5-week intervention period and tested alternative strategies to increase water consumption. During intervention week 4, we placed paper cups next to water	A water treatment company installed a carbon coconut shell and 5-micrometer sediment filter on a cafeteria faucet to improve the taste and appearance of the dispensed tap water. Cafeteria staff filled dispensers with filtered tap water, refrigerated them, and placed them in the cafeteria courtyard during mealtimes. Cafeteria staff sanitized water dispensers weekly according to a protocol developed by cafeteria staff and research team members.

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
					dispensers for students who did not have their water bottles. 1 school, 363 students <u>Comparison:</u> No intervention 1 school, 430 students	
Teufel et al (1998)	United States	Intervention: September 1993 to December 1995 Data collection: Baseline: September to December 1993 Mid-project results: September to December 1995	Students in grades 9-12 Year 1 – 119 55% female Mean age: 17.2 ± 4.0 years Year 3 – 173 48% female Mean age: 17.9 ± 1.7 years	Two high schools in Zuni (a Zuni Indian Reservation), New Mexico: Zuni High School (ZHS), with an enrollment between 300 and 350, and Twin Buttes High School (TBHS), with an enrollment between 70 and 90. Non-insulin dependent diabetes mellitus (NIDDM) is a serious problem among the Zunis, affecting one in three adults over age 35, with the age of diagnosis between 25 and 35 years	Intervention: The Zuni Diabetes Prevention Program (Program) is a community-based primary prevention project designed to reduce the prevalence of diabetes risk factors among high-school-age youths. Four intervention strategies were developed to target the identified risk factors (obesity and pattern of fat distribution, insulin resistance as indicated by hyperinsulinemia, low physical activity levels, high consumption of sugared beverages and low consumption of high-fiber foods): 1) The establishment of supportive social networks, 2) construction of a wellness facility designed specifically for teens, 3) diabetes education integrated within the existing school curriculum, and 4) modification of the food supply available to teens.	Program design and implementation are a joint effort between the Department of Family and Community Medicine at the University of Arizona (UA) and the Zuni Public School District (ZPSD). The Program office and wellness facility are located in ZHS; as a result, intervention activities are more frequent at this location. The wellness facility offers recreational activities and has a range of exercise equipment.

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
					The Program has worked to change both the snacks and meals available to students in the high schools. At the onset of the Program, no sugar-free beverage selections were available in the school vending machines. In years 1 and 2, sugar-free selections were added to the machines. In years 3 through 4, only sugar-free selections were available. No snack vending machines exist in the high schools. The wellness center sells snacks, including frozen fruit bars, fresh fruit (e.g., oranges, lemons, grapes, and plums), and large dill pickles. Intervention strategies target students in grades 9-12 at the two high schools.	
Wolfenden et al (2017)	Australia	Intervention: October 2013 to November 2014 Data collection: Baseline: April to September 2013	70 primary schools with a canteen: Intervention (I): 35 randomized, 27 at follow-up Control (C): 35 randomized, 30 at follow-up Mean (SD) number of	The Hunter region of New South Wales (NSW)	Context: In 2005, the NSW Government launched a Healthy School Canteen Strategy to help prevent childhood obesity. The strategy used a traffic light system to classify foods and beverages sold by schools as 'red', 'amber' or 'green' based on their nutritional properties and is consistent with the Australian Dietary Guidelines for Children and Adolescents. The	1) Policy implementation support: provided directly to canteens by support officers with qualifications in nutrition and dietetics and experience in supporting schools. Support officers contacted canteen managers every 2 months (via email, telephone or in person) throughout the intervention and used a continuous

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
		Follow-up: March to April 2015	students at each school: I: 256 (147) C: 253 (173) In a sample of approximately 20% of schools, all purchases were independently recorded by two observers.		strategy was adopted as policy in NSW and all government schools were mandated to remove items classified as 'red' from regular sale at school canteens. Furthermore, schools were encouraged to 'fill the menu' with items classified as 'green' and not let items classified as 'amber' dominate the menu. In 2007, the strategy was also supported by a ban on the sale of sugar sweetened drinks. <u>Intervention:</u> The multi-strategic intervention to increase implementation of the state-wide healthy canteen policy and was delivered over a period of 12–14 months: 1) Policy implementation support: Each school was allocated a support officer for the duration of the intervention to support the canteen manager with the implementation of the healthy canteen policy. 2) Executive support: School principals were asked to communicate support for policy implementation and maintenance to teachers, parents, students and canteen managers during staff meetings, in newsletters and assemblies.	quality improvement framework of repeated goal setting, action planning, self-monitoring and problem-solving with canteen managers. 2) Executive support: Support officers also sought meetings with the executive of parent representative groups to garner their support for and input on policy implementation. 4) Training: Training combined didactic and interactive components including opportunities for self-assessment, role play and facilitator provided feedback. Training was facilitated by a support officer. Schools were also offered a small reimbursement to cover the costs associated with canteen manager attendance at training.

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
					3) Consensus processes: Consensus processes with the canteen managers and canteen staff were conducted to reach an agreement regarding a policy implementation strategy and to develop local canteen action plans. 4) Training: The canteen manager, canteen staff and parent representatives were invited to attend a 1-day (5-hr) training workshop, designed to provide education and skill development in nutrition and food classification based on the healthy canteen policy criteria, canteen stock selection, financial management, food pricing and promotion and change management. 5) Tools and resources: Canteen managers were provided with a 'Canteen Resource Kit' containing various printed and electronic instructional materials, including electronic menu and pricing templates, and a poster-sized checklist that prompted canteen managers to regularly review their canteen practices relating to the policy. Canteen managers also received kitchen equipment to the value of AUD$100.	

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
					6) Academic detailing: School canteen visits were conducted 1 and 3 months post-canteen manager training to enable support officers to observe the operational canteen environment, provide feedback and assist with problem-solving barriers to policy implementation. 7) Recognition: Throughout the intervention, the schools with canteen menus assessed as compliant (>50% 'green' items and 0% 'red' or 'banned') with the healthy canteen policy were sent a congratulatory letter and phone call from the research team and were publicly acknowledged via marketing strategies. 8) Performance monitoring and feedback: Quarterly menu reviews were conducted, and the results were used to compile written feedback reports to the canteen manager and school principal. Verbal discussion of the reports occurred during academic detailing visits or via telephone support calls. 9) Marketing strategies: Quarterly project newsletters communicated key messages, provided information and case studies of successful	

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
					implementation approaches to common barriers. N=35 schools <u>Control group:</u> No contact was made, and no resources provided to control schools during the intervention period by the research team. N=35 schools	
Woodward-Lopez et al (2010) **Note:** three different studies are reported in the paper but only the the Healthy Eating, Active Communities study (HEAC) reported our key outcomes – thus all information reported for participants and results is based on	United States	Intervention: July 2007 onwards Data collection: Pre-legislation: March to June 2005 Post-legislation_ March to June 2008	HEAC: 6 elementary schools, 6 middle schools, 6 high schools and 1 K-12 school. Individual dietary intake and purchases data – 7th and 9th grade students: 3527 students Pre-legislation (Spring 2006); 3828 students post-legislation (Spring 2008)	HEAC: 6 California communities. HEAC schools were located in low-income areas with ethnically diverse student populations that were 65% Latino overall.	Legislation in California, Senate Bill 12 (SB 12), which applied nutrition standards to competitive foods sold in K–12 schools, which took effect in July 2007. The law imposed the following limits on foods in secondary schools: Individually sold snacks must contain no more than: • 35% of calories from fat (with some exceptions, such as legumes, nuts, and eggs); • 10% of calories from saturated fat (excluding eggs and cheese); • 35% sugar by weight (excluding fruits and vegetables); and • a total of 250 calories. Individually sold entrées must contain no more than 36% of calories from fat and 400 calories per entrées. At elementary schools, the only competitive foods allowed are	Note: the HEAC study was part of a larger evaluation of a place-based initiative to prevent obesity through environmental and policy changes in multiple sectors (school, after-school programs, health care, media environments, and neighborhoods) of the same community (implemented 2005-2009). The schools received technical assistance for various aspects of the project, including implementation of the nutrition standards.

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
the HEAC study.					individually sold portions of nuts, nut butters, seeds, eggs, cheese packaged for individual sale, fruit, vegetables that have not been deep-fried, legumes, and dairy or whole-grain foods that meet the nutrient limits described previously and contain no more than 175 calories. A second law, SB 965, limited the competitive beverages that could be offered during the school day. The limits went into full effect in July 2007 for elementary and middle schools; at high schools, 50% of beverages had to comply by July 2007, and 100% of beverages had to comply by July 2009. The law limits competitive beverages to the following: • fruit-based and vegetable-based drinks that are at least 50% fruit juice without added sweeteners; • drinking water without added sweeteners; • milk products and nondairy milks that have no more than 2% fat and 28 g of total sugars per 8 oz; and • electrolyte replacement beverages with no caffeine	

Author	Country	Timing of intervention and data collection	Participants	Setting	Intervention	Further details of intervention (who applied it etc)
					and no more than 42 g of added sweetener per 20 oz (not allowed at elementary schools).	

HEAC- the Healthy Eating, Active Communities study
K-12- schools with the (SB 12) standard.

Anexo 3. Características de los estudios incluidos en la revisión.

Parte B.

Author	Study design	Outcomes reported	Results	Conflicts of interest	Comments, need for further research
Bae et al (2012)	ITS	Carbonated-beverages consumption (%) Milk consumption (%)	The carbonated-beverages consumption rate (percentage of students who drank carbonated beverage one or more times during the past 7 days before survey) decreased 11.1% from 77.6% in 2005 to 66.5% in 2009, and there was a change within an 11.1% range. A significant linear decrease was observed, both before and after adjustment (for school grade, gender, and residing region); a significant convex-shaped tendency was observed, as well. Looking at each year, there were significant decreases in every year, except for between 2008 and 2009 ($p<0.05$). For each characteristic in all stratum (gender, type of school, and region), the same tendencies were observed. The milk consumption rate (percentage of students who drank milk two or more times per day during the past 7 days before survey) slightly rose 0.7% from 13.4% in 2005 to 14.1% in 2009, and there was a change within a 2.1% range. Linear tendency that was not significant before adjustment showed significant linear-increase after the adjustment according to gender, grade, and region, and convex-shape trends	The authors declared that they have no conflicts of interest with the material presented in this paper.	The authors concluded that: "Among government nutrition policies conducted from 2005 to 2009, those on environmental improvement, especially in school, were more effective than those on individual behavior. Therefore, the development and implement of policies on school environmental improvement are needed in Korea." The authors note that they couldn't control for the effect of various external factors that might have effects on a change in dietary behavior, such as family, economy, and structure of food provisions. They also mentioned that the causes for the worsening of the adolescents' dietary behavior could be due to the deterioration in the economic environment (i.e. the global economic crisis that occurred after the second half of 2008), in general, or aggravated social inequality (Korea's social inequality increased between 2005 and 2009).

Author	Study design	Outcomes reported	Results	Conflicts of interest	Comments, need for further research
			were observed both before and after adjustment. Looking at each year, a significant increase was observed between 2005 and 2006, and a significant decrease between 2008 and 2009 ($p<0.05$).		
Bauhoff (2013)	Controlled before-after study	BMI z-score % overweight/obese % obese % consumed More than 0, 1, 2, 3 or 4 servings of soda during the past 24 hours.	The cohort results are generally negative (i.e. showed a reduction in BMI z-score or prevalence of overweight/obesity) but not statistically significant, suggesting that: • BMI z-score decreased by 0.05 (females) and increased by 0.009 (males) SD units; • Overweight/obesity rates decreased by 0.5 (females) to 0.8 (males) percentage points; • Obesity rates decreased by 1.2 (females) to 1.7 (males) percentage points. For males, consumption of any soda showed a large decrease of 8.2 (cohort analysis) and 12.8 percentage points (cross-sectional analysis) ($p< 0.05$). For females, consumption of more than 3 servings of soda showed a large decrease of 4.5 (cohort analysis) and 6.1 percentage points (cross-sectional analysis) ($p< 0.05$).	None identified.	The results suggest that the policy was relatively ineffective at reducing BMI and overweight and obesity prevalences within 8–15 months of implementation. However, the policy appears to have reduced the self-reported consumption of soda and fried foods. The policy's impact on physical outcomes appears to be mitigated by substitution toward foods that are still (or newly) available in the schools or at home. A limitation of the data is that the CHKS does not distinguish between total and in-school consumption. It also only covers a limited set of beverages and foods, omitting items that are prevalent in schools, such as desserts, baked goods, juice drinks with less than 100% juice and electrolytes.
Beets et al (2016)	Cluster-randomized controlled trial ASPs were matched post-baseline data	Difference in beverage served in intervention afterschool programs at	By post-assessment, intervention ASPs decreased serving sugar-sweetened beverges to 0.1 ± 0.7 (mean $\pm$ SD) vs 1.8 ± 2.4 days/wk compared to controls, $P=0.005$.	The authors declare no conflicts of interest. The research was funded by the	Not all intervention ASPs were complying with standards post-intervention and there were inconsistencies between policies and practices. Given this, the authors concluded that, additional

Author	Study design	Outcomes reported	Results	Conflicts of interest	Comments, need for further research
	collection on enrollment size and number of days per week fruit and vegetables were served	baseline and post-assessment Consumption of SSBs was measured but data not reported.	Cost of snacks increased by $0.02/snack in the intervention ASPs ($0.36 to $0.38) compared to a $0.01/snack decrease in the control ($0.39 to $0.38).	National Institutes of Health, USA.	effort is required to assist ASP leaders in formalizing healthy eating practices so that any person within the ASP organization can continue the practice and that each individual is fully aware of what the standards call for programs to do and that this is carried out daily.
Carriedo et al (2013)	Cluster-randomized controlled trial	Consumption of plain water and SSBs	-In school hours: water consumption increased in the IG (171 ml) and decreased in the CG (140 ml), p<0.05. SSBs consumption decreased in both groups (IG: 35 ml, CG: 94 ml) -Outside of school hours: there was no change in water consumption in the IG (600 to 603ml), while the CG reported a reduction (642 to 510 ml). Consumption of SSBs decreased in both groups (IG 258ml and CG 158ml). There was no significant differences between groups. -In the IG, 30.5% of the children reported that they never brought a bottle of water to the school before the intervention, a percentage that decreased to 10.6% (p <0.001) after the intervention. In the CG there was a small increase from 27 to 29%.	The authors declare no conflict of interest.	The authors identified barriers that could affect the impact of the intervention. These included a lack of collaboration of personnel in the reception, placement and replacement of the bottles of water. Other barriers were changes in the teachers and directors during the intervention, suspension of classes, constant no attendance of teachers, holidays and celebratory days in which SSBs were provided. Future research should use a longer intervention time and evaluate the impact at least 6 months post-intervention.
Cradock et al (2011)	Controlled before-after study	Servings per day of: SSBs consumed	Intervention: Multiple regression analyses showed that mean consumption of SSBs declined by −0.30 (95%CI	This work was supported by cooperative agreement nos.	NHANES and Boston Youth Survey estimates of consumption of sugar-sweetened beverages are not directly comparable because of

Author	Study design	Outcomes reported	Results	Conflicts of interest	Comments, need for further research
		(SSBs included soda and other sugar-sweetened drinks such as fruit punch and lemonade. One serving was defined as 1 "can" or a similar 12-oz serving.)	−0.43 to −0.17) servings per day between 2004 and 2006, p<0.001 from 1.71 to 1.38 serves per day. Comparison: NHANES data showed a small but nonsignificant decline in daily per capita consumption of sugar-sweetened beverages nationally between 2003-2004 and 2005-2006 (−0.08 servings/day; 95% CI −0.27, 0.11; P = .41).	U48/DP000064 and 1U48DP001946 (including the Nutrition and Obesity Policy Research and Evaluation Network) from the Centers for Disease Control and Prevention; a Steps to a Healthier US grant to the Boston Public Health Commission; and the Robert Wood Johnson Foundation (nos. 260639, 61468, and 6628	differences in wording and data collection methods. Nutrition education and health promotion activities focused on consumption of sugar-sweetened beverages separate from the policy change in Boston may play a role in the observed decline in overall consumption of sugar-sweetened beverages. Additionally, accessible alternatives for water in Boston may not be comparable to those in other communities.
Cullen et al (2008)	Before-after study	Sweet beverage consumption (including soft drink) at lunch (mean (SD) oz per student per day) Soft drink consumption at lunch (oz per student per day)	Sweet beverage consumption (including soft drink) decreased significantly from 5.43 oz (SD 3.13) in year 1 to 1.49 oz (SD 0.20) in year 3, i.e. after implementation of interventions 1+2. There was no significant difference for intervention 1, with a reduction to 3.54 oz (SD 1.68) in year 2. Soft drink consumption decreased significantly from 4.76 oz (SD 3.05) in year 1 to 0.11 oz (SD 0.11) in year 3, i.e. after implementation of interventions 1+2. There was also a significant difference for intervention 1, with a reduction to 2.65 oz (SD 1.26) in year 2.	This project was funded in part by the US Department of Agriculture, Agriculture Research Service Economic Research Service (agreement 43–3AEM-2-80121) and USDA-ARS (agreements 143-3AEL-2-80121 and 58-6250-6001), and by the National Cancer Institute (grant CA88511).	Dietary changes that occur in school may not reflect dietary changes over a 24-hour period. This is an important area for further research. Capturing 24-hour dietary intake would have helped to answer this concern. Future research on changes in school food environments should include 24-hour food recalls.

Author	Study design	Outcomes reported	Results	Conflicts of interest	Comments, need for further research
Ermetici et al (2016) Briganti et al (2014) Romanelli et al (2013)	Controlled before-after study	Change in: BMI z-score Waist-to-height ratio (WHtR) Weekly consumption of SSBs between baseline and post-intervention	-Intervention was associated with a significant difference in BMI z-score (regression coefficient ± SE) between the intervention and control groups (-0.18±0.03, 95%CI -0.27 to -0.09, P<0.01) and a significant difference in WHtR (20.04±0.002, 95%CI -0.04 to -0.03, P<0.001) after adjusting for baseline covariates. -There was a significant group difference for SSB and high-energy snack consumption. Difference in change between intervention and control groups after two school years was: -1.12 (95%CI -1.52 to -0.72) times/week in normal weight adolescents and -0.81 (95%CI -1.48 to -0.14) times/week in overweight/obese adolescents	The authors declare no conflict of interest. This study was partially sustained by IRCCS Policlinico San Donato Ricerca Corrente Fund.	The authors note: "Although our health promotion intervention addressed all adolescents independently of their weight, a more pronounced difference in BMI z-score was observed in subjects with overweight or obesity." "The educational program is relatively inexpensive and easy to implement. We calculated an approximate cost of the intervention of 46 euros (50 dollars) per pupil for the educational materials for two school years. Alternative healthier vending machines did not cost more than the previous ones." Limitations – lack of randomization, small sample size.
Foster et al (2008)	Cluster-randomized controlled trial	Incidence of overweight and obesity (primary outcome) Prevalence of overweight and obesity	-Significantly fewer children in the intervention schools (7.5%) than in the control schools (14.9%) became overweight after 2 years (unadjusted means). After controlling for gender, race/ethnicity, and age, the predicted odds of incidence of overweight or obesity were ~15% lower for the intervention group (odds ratio [OR]: OR: 0.85; 95% CI: 0.74 to 0.99; P< 0.05). -After controlling for gender, race/ethnicity, age, and baseline prevalence, there was no statistically significant difference between the intervention and	The study was supported by grants from the Centers for Disease Control and Prevention and the US Department of Agriculture/Food and Nutrition Service through the Pennsylvania Nutrition Education Program as part of Food Stamp Nutrition Education.	The intervention showed no evidence of an adverse impact with respect to a worsening body image or changes in the incidence, remission, and prevalence of underweight. The 7.5% increase over 2 years suggests that stronger or additional interventions are needed. These may include environments that are within schools (eg, physical education classes or more aggressive nutrition policies) or more proximal to schools (eg, local corner stores or after-school feeding programs).

Author	Study design	Outcomes reported	Results	Conflicts of interest	Comments, need for further research
			control schools in the prevalence of overweight or obesity (P<0.07).		
Haerens et al (2007) Haerens et al (2006)	Clustered randomized controlled trial	BMI z-score	In boys, no significant positive intervention effects were found. In girls, involvement and support of the parents was necessary to see effects. In girls, after 2 years of intervention, there was a significant lower increase in BMI (F= 12.52, p< 0.05) and BMI z-score (F= 8.61, p< 0.05) in the intervention with parental support group when compared with the control group. In addition, there was a significantly lower increase in BMI z -score (F=2.68, p<0.05) and a trend for a significantly lower increase in BMI (F=3.42, p<0.08) in the intervention with parental support group when compared with the intervention-alone group.	The work was supported by the Policy Research Centre Sport, Physical Activity, and Health funded by the Flemish Government.	The intervention had positive effects on fat-related outcomes in girls, but only when parental support was included. Further studies are necessary to determine which components of the intervention are crucial in yielding significant effects. Designing interventions that are effective in boys is a challenge for the future.
Kocken et al (2012)	Cluster-randomized controlled trial – no baseline measure	Mean sales volume - Mean Proportions (%) and Standard Deviations (SD) of Products Sold per Product Group and Category	–The mean proportion of favorable beverages (<100 Kcal products) was significantly higher only in the last phase (when the prices of these products were reduced): 42.2% (14.4) in the experimental school, against 26.6% (15.0) in the control schools, p < .05. In phases 1 and 2, there was a trend effect between the experimental and control groups for the differences in the mean proportions of favorable beverages sold (p < 0.10). The mean proportions of favorable beverages were 1.5 times higher in the experimental schools than in the control schools.	Funded by the Netherlands Organization for Health Research and Development (ZonMw), Research Grant 6320.0007.	Although we encountered positive attitudes in the school boards, attitudes were less collaborative in schools involving commercial catering firms. Interviews with these firms identified 2 related barriers to collaboration: the firms' doubt that students would welcome changes to the product range, and their fear that changes would reduce income. One difficulty was the limited extent to which the implementation of intervention strategies was completed, which may explain the lack of distinct effects of labeling and price reduction relative to those produced by changing the product

Author	Study design	Outcomes reported	Results	Conflicts of interest	Comments, need for further research
			The additional effect of labeling and price reduction was analyzed using repeated-measures analysis. No significant extra effect could be shown. None of the tests for the effect of condition by time were significant.		range. Although full implementation of the intervention was achieved in only 23% of the experimental schools, the implementation of the strategies (measured on a scale indicating the completeness with which a school had introduced them) was acceptable in 69% of the total number of experimental schools. The authors recommend that further research is conducted on the range of foods preferred for school vending machines, and on ways consumer information can be provided and price variations can be applied. More research is also needed on how each of the 3 strategies—that is, changing the product range, labeling products, and reducing prices—has an added effect on the consumption of healthy foods.
Loughridge et al (2005)	Controlled before-after study (pilot)	Change in: Volume of soft drinks purchased (mL per student per day Water consumption (mL per student per day)	The volume of soft drinks purchased per student per day remained fairly static in all three schools over this time. The average volume of water drunk by students in school 'W + P' was greater (P = 0.05) than that drunk in school 'W' and control school 'C'.	The study was supported by Van den Bergh Foods Ltd to conduct this project as winner of the CNG/PG Tips Research Grant 2002/2003.	This study should be repeated using a more intensive intervention promoting water drinking in school involving a whole school approach. It should be followed up by measuring water consumption for at least a year after the initial intervention to allow for seasonal influences. There are a number of other reasons why the sale of soft drinks remained fairly static throughout the project. These include preference for fizzy drinks, water coolers not sited in prime positions, loss of or damaged initial

Author	Study design	Outcomes reported	Results	Conflicts of interest	Comments, need for further research
					free water bottle and cups not provided by catering staff. Another limitation of the project was that it was not possible to record accurately the actual number of students using the cafeterias and an assumption was made that all students had access. Results were therefore based on school roll figures.
Muckelbauer et al (2009) x 2	Controlled trial (2 cities were randomized to intervention or control)	BMI SD scores Overweight incidence rate Overweight prevalence (primary outcome) Beverage consumption (glasses per day - defined as 200 mL): • Water Soft drinks/juices	- BMI SDS changes (±SD) from baseline to the follow-up assessment were 0.005 ± 0.289 in the IG and 0.007 ± 0.295 in the CG. The estimated group difference (IG-CG) in BMI SDS changes of -0.004 (95% CI: 0.045 to 0.036) was not significant (P = .829), with adjustment for BMI SDS at baseline. -The incidence rate of overweight during the follow-up period of 250 days was significantly lower in the IG (3.8%) than in the CG (6.0%). No significant difference in the incidence of obesity. -The prevalence of overweight at the follow-up assessment was 23.5% in the IG and 27.8% in the CG. Odds ratio 0.69 (95%CI 0.48-0.98) after adjustment for significant confounders. -Water consumption after the intervention was 1.1 (95% CI: 0.7-1.4) glasses per day greater in the IG than in the CG; P < 0.001, with adjustment for baseline	The authors declared no conflict of interest. Supported by grant 05HS026 from the German Federal Ministry of Food, Agriculture, and Consumer Protection. Intervention materials (water fountains, bottles, and lesson booklets) were provided by the Association of the German Gas and Water Industries. Ms Muckelbauer and Mr Libuda received research funding from grant 05HS026 from the German Federal Ministry of Food, Agriculture, and	The authors note that: The reduction in consumption of sugar-containing beverages did not reach significance, probably because our prevention program did not actively discourage drinking of those beverages but only promoted water consumption. The measured water flow of the fountains indicated lasting use of the fountains during the entire period, although the extent varied. The introduction of new water bottles yielded newly increased use, which demonstrates that the bottles worked as an incentive for the children. In contrast, the booster sessions as motivation units did not seem to be effective, perhaps partly because teachers showed low levels of compliance in presenting these units regularly. The collaboration of teachers is essential for sustainable modification of the school environment. Our process evaluation suggested good and lasting compliance for the majority of teachers. Compliance was better

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			consumption and migrational background. -No intervention effect on juice consumption was found. Difference between IG and CG was -0.1 (95% CI: -0.2 to 0.1) glasses per day; P = 0.50. No intervention effect on soft drink consumption was observed (P = .41).	Consumer Protection.	with respect to implementing the daily use of the water fountains than presenting the educational lessons.
Nanney et al (2014)	Before-after study	Mean school-level change in self-reported BMI percentile with each additional policy Change in mean daily glasses of sugary drinks (include soda and sports drinks) with each additional policy	−0.13 (95%CI −1.04 to 0.78), (p=0.078) for each additional policy. −0.08 (95%CI −0.15 to−0.00), (p=0.04) for each additional policy.	The authors declared that they have no conflicts of interest	This study addresses a limitation of previous school policy evaluation literature that has had a focus on the singling out of one or two policies, especially nutrition related policies without considering the overall policy environment. Also, all data were self-reported and could be subject to misclassification. We did not adjust for time varying confounders, which could bias our associations. Future studies should attempt to replicate and extend these findings to include a broader set of policies in a larger cohort of schools.
Patel (2011)	Controlled before-after study	Adjusted odds ratio (Intervention vs comparison) of: Drinking any soda Drinking any sports drink Drinking any water at school 2 months post-intervention.	OR 0.89 (95%CI 0.66-1.20), P=0.46 OR 1.31 (95%CI 0.97-1.75), P=0.08 OR 1.76 (95%CI 1.20-1.57), P=0.003)	This study was supported by the National Center for Minority Health and Health Disparities at the National Institutes of Health (no. R24MD001648); Centers for Disease Control and Prevention (no. U48/DP000056);	Reusable water bottles did not prove to be such an effective strategy - over the length of the program student use of reusable water bottles declined (at 2 months post-intervention, less than 10% of intervention school students reported using them). Perhaps reusable water bottles may be a more appropriate strategy for encouraging water consumption among students in schools that provide storage for bottles so that

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		Students were asked about the day before the survey		the Robert Wood Johnson Clinical Scholars Program; the University of California, Los Angeles; and RAND.	they are less likely to be lost, damaged, or forgotten at home. For schools that lack such storage, providing water coolers with paper cups or free bottled water with meals may be more effective tactics to encourage water consumption. Although we hypothesized that this pilot study would decrease intervention students' consumption of SSBs, we did not observe such an effect. This may have been secondary to low baseline student consumption of SSBs due to preexisting LAUSD policies that have limited the availability of SSBs on school campuses.
Teufel et al (1998)	Before-after study	Sugar-sweetened beverage consumption BMI value	A comparison of the percent of sugared beverages consumed by Zuni youth in year 1 vs year 3 reveals a significant ($P<0.05$) change in consumption patterns. In year 1, more than 80% of the beverages consumed by most students (>60%) were identified as having high sugar content. In year 3, high-sugar beverages contributed less than 50% to total beverage intake. A comparison of Zuni adolescents participating in assessment activities in year 1 vs year 3 illustrates that BMIs decreased in both females and males. However, the year 1 and year 3 differences were not significant.	This research is fully funded by NIH/NIDDK Grant No. DK47091-04.	Modification of the foods served in the school cafeteria has been limited. Food service personnel purchase low-fat, low-sugar foods when available, but there have not been consistent changes in meal planning and cooking techniques. During year 2, the Center installed water coolers, replaced sugared soft drinks with sugar-free selections, and began selling low sugar snacks. These dietary interventions have been constant throughout years 2, 3, and 4. The intervention strategies have met with varying challenges. Contributory factors include: (1) difficulty in employing qualified staff for a short-term program, (2) partnership continuity limited by frequent turnover in ZPSD faculty

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					and administration, and (3) continual support of activities and local Program personnel limited by the physical separation of the Program directors (UA faculty) from the intervention site. Despite efforts to define administrative roles, actions of both the UA and the ZPSD have encumbered progress of the Program. Generally, conflict was due to a lack of understanding of the Respective institution's administrative structures and procedures and in a difference of institutional priorities.
Wolfenden et al (2017)	RCT	• Proportion of items purchased that are SSBs Proportion of drinks purchased that are SSBs	Intervention: 4.56% (n=166/3642) Control: 3.71% (n=134/3614) (p=0.75) Intervention:17.15% (n=166/968) Control group 18.66% (n=134/718) (p=0.49). *Data/analyses provided by authors.	All authors have completed the Unified Competing Interest form at www.icmje.org/coidisclosure.pdf (available on request from the corresponding author) and declare that (1) LW, NN, LJ, JW, CW, CB, RW, RS, LC, MF and SY report grant from Australian Research Council Linkage Project Scheme (LP130101008) during the conduct of the study; (2) no financial	Primary outcomes: Relative to control, at follow-up, intervention schools were significantly more likely to have menus without 'red' or 'banned' items (RR = 21.11; 95% CI 3.30 to 147.28; p ≤ 0.01) and to have at least 50% of menu items classified as 'green' (RR = 3.06; 95% CI 1.64 to 5.68; p ≤ 0.01). Secondary outcomes: At follow-up, student purchases from intervention school canteens were significantly lower in total fat (difference = −1.51 g; 95% CI−2.84 to −0.18; p = 0.028) compared to controls, but not in energy (difference = −132.32 kJ; 95% CI −280.99 to 16.34; p = 0.080) or sodium (difference = −46.81 mg; 95% CI −96.97 to 3.35; p = 0.067). Canteen revenue did not differ significantly between groups.

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				relationships with any organization that might have an interest in the submitted work in the previous 3 years; and (3) no other relationships or activities that could appear to have influenced the submitted work.	
Woodward-Lopez et al (2010)	Before-after study	% change in consumption the day prior to the survey at home and at school (self-reported): • Soda • Sports drinks • Water Self-reported purchases	Soda • ≈7% decrease in consumption at school, P<0.01 • ≈1% increase in consumption at home, not significant Sports drinks • ≈4% decrease in consumption at school, not significant • ≈0.3% increase in consumption at home, not significant Water • ≈9% increase in consumption at school, P<0.01 • ≈6% increase in consumption at home, P<0.01 HEAC survey data indicate that after implementation of nutrition standards, fewer students reported purchasing foods from on-campus competitive food and beverage venues (vending machines, snack bars and stores, and school fundraisers; data not shown). Each of these venues was reportedly utilized by 15% to 35% of students	The California Endowment (awards 20042960 & 20042808) through a subcontract with Samuels and Associates, the Robert Wood Johnson Foundation (award 57926), and a Team Nutrition grant from the US Department of Agriculture through a subcontract with the California Department of Education Nutrition Services Division (award CN077297).	Given that these interventions were only part of a larger community-wide obesity prevention program operating in the same area from 2005-2009 (HEAC), it is difficult to attribute changes in consumption and purchase only to the legislation.

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			the day prior to the survey in 2006; at most venues these proportions dropped by 5 to 10 percentage points in 2008.		

RCT - randomized controlled trial
ITS - interrupted time-series study