

Method for Evaluating Food Packaging Waste in Schools: Waste Audit for Sustainable Transitions and Evaluations (WASTE)

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Introduction

School meals offer an unparalleled opportunity to improve student food security and nutrition outcomes and to minimize food and packaging waste to facilitate both human and environmental health.

Nationally the nutritional quality of school meals has improved, but student participation in the lunch program is declining and high levels of waste persist.

Studies suggest students prefer fresh, unpackaged school meals and that freshly prepared meals may increase school meal participation.

Additionally, US public schools generate ~14,500 tons of municipal solid waste each day with 42% being food packaging waste generated by school foodservice.

Methods

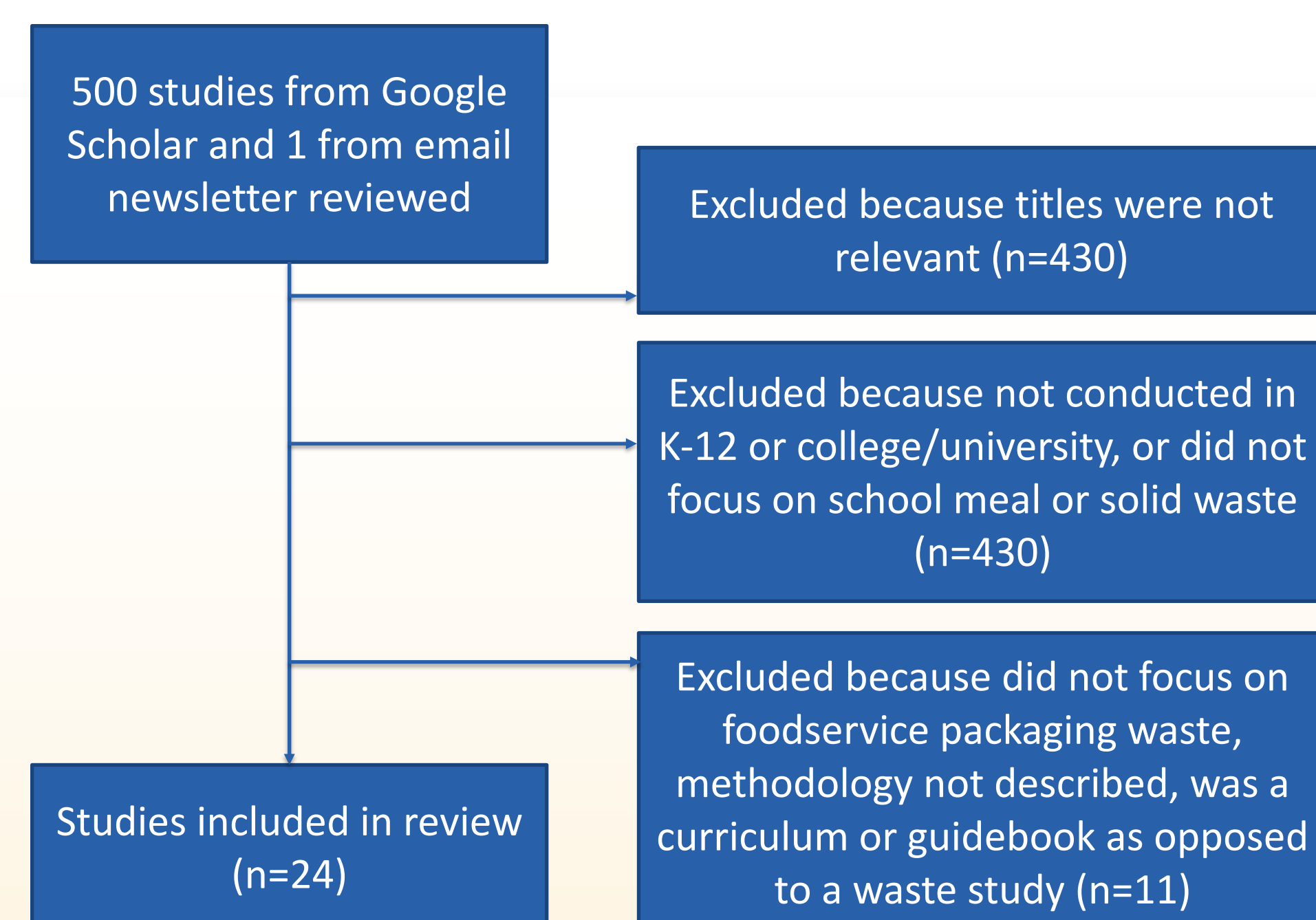
We conducted a systematic literature review using Google Scholar to inform the development of a new method to evaluate food packaging waste (Figure 1).

Search terms included (1) “solid”, “waste”, “school”, and “cafeteria”, and (2) “food packaging”, “waste”, and “school”.

Peer-reviewed journal articles and grey literature describing research on food packaging waste, using qualitative and/or quantitative methodologies, were included in our review.

Studies conducted in the K-12 school or college/university environments—either the entire school or school foodservice venues—were eligible.

Figure 1. Studies included in the systematic review.



Systematic Review

Evaluation of 24 studies showed large variation in the settings, participants, designs, and methodologies (Table 1). Methodologies included objective methods such as waste audits, models, and secondary data as well as subjective methods of qualitative observations, questionnaires, interviews, and focus groups.

Table 1. Methodologies used in the reviewed studies (n = 24) to evaluate school foodservice packaging waste.

Method	Description	Outcome	Components
waste audit	objective measurement of type and amount of waste generated	mass and/or volume of waste generated by waste type(s)	landfill, recycling, compost, and/or other more granular categories
secondary data	external, pre-compiled data	holistic perspective on direct and indirect influences of waste generation and disposal	waste hauler reports; curbside recycling participation; socioeconomic information
model	compile data to project conditions in the near- or far-term	mass and/or volume of waste generated; cost(s) of disposable food packaging, operations, and/or food packaging waste	landfill, recycling, compost, and/or other more granular categories; monetary costs
observations	observe (real-time or through photographs) meal prep and serving operations as well as disposal practices for their associated food packaging waste types and amounts	when different types of food packaging waste are generated and how they are disposed of; capture and demonstrate practices and interventions	kitchen/prep, serving, disposal; photographs taken; double-blind analysis
questionnaires, interviews, or focus group	study participants' perceptions of barriers to/facilitators of reducing waste; collected individually or in a group setting	data from many people on specific topics (e.g., barriers and facilitators to waste reduction; knowledge, behaviors, and attitudes of waste reduction practices)	knowledge; behavior; attitude

Source: Heiges J. et al. Evaluating Food Packaging Waste in Schools: A Systematic Literature Review. *Int. J. Environ. Res. Public Health*. 2022; 19(9):5607. <https://doi.org/10.3390/ijerph19095607>

A New Instrument

Informed by the review, we developed a new instrument—**Waste Audit for Sustainable Transitions and Evaluations (WASTE)**—to collect data on aggregate weight and volume of food packaging waste in K-12 school cafeteria settings, and was designed to be used alongside plate-waste data collection methods.

The instrument guides researchers to capture photos of a typical meal, waste bin receptacles, waste bin signage, and to document available waste receptacles.

Food packaging is categorized into solid waste types (e.g. beverage container, food container, wrapper), how it was provided (e.g. automatically, on request, self-serve), and the material type (e.g. compostable plastic or fiber, plastic, lined paper).

Scan this code to see the publication; the instrument can be downloaded from the supplementary materials.



Field Testing

Field testing of the WASTE instrument occurred during one 4th/5th grade on-site lunch meal service (n~137 students) in the cafeteria of an elementary school in a large urban district in February 2020.

Meals served as individually portioned and wrapped food items generated an aggregate of 4.7 pounds or 93.8 gallons—this equated to **15.5 grams or 0.7 gallons of food packaging waste per student for one lunch.**

For a single elementary school with an enrolment of 550 students, this would be a total of **3,392 pounds or 67,746 gallons of food packaging waste for an entire school year** if all students were to consume the school lunches.

Conclusion

We developed a credible food packaging waste audit instrument to standardize the collection and analysis of food packaging waste in US school foodservice programs.

Standardization is important as food packaging trends change (e.g., movement to reusable foodware and the adoption of compostable or biodegradable material) and more research to assess school foodservice waste is conducted.