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Risk-Based School Food Screening For Health Education: Evidence From Palembang

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Abstract

School food-safety surveillance can provide locally relevant evidence for health education, yet chemical screening and educational practice are rarely integrated. This descriptive field-laboratory study screened risk-targeted snacks from 20 elementary schools in the service areas of Sako and 23 Ilir Community Health Centers, Palembang, Indonesia, during January-July 2026. Three different snacks per school were selected for different analytes, yielding 20 formaldehyde-targeted, 20 borax-targeted, and 20 Rhodamine B-targeted items. Qualitative rapid-test kits were applied after standardized sample preparation, and analyte-specific positive-screen proportions were calculated. Formaldehyde and borax were not detected in any targeted sample. One brightly colored corn ice-cream product screened positive for Rhodamine B, corresponding to 5.0% of the Rhodamine B-targeted group. The pooled operational yield across all 60 assay-specific items was 1.7%, but this should not be interpreted as analyte prevalence. The findings support continued risk-based surveillance, confirmatory testing after positive screens, and locally grounded school health education that teaches students, vendors, and school personnel to distinguish visual suspicion, screening evidence, and laboratory confirmation. Local food-safety data can therefore support critical food literacy without overstating surveillance findings.

Keywords: School Food Safety, Chemical Adulterants, Health Education, Critical Food Literacy, Rapid Screening

INTRODUCTION

School food environments are simultaneously nutritional, social, and educational settings. Children repeatedly encounter foods through canteens and nearby vendors, so routine purchasing becomes part of the informal curriculum through which they learn what foods are convenient, attractive, affordable, and trustworthy. Reviews of food environments around schools show that availability and proximity shape children's exposure to food options, while school nutrition policies can alter what is offered within the institutional setting (Chagas et al., 2022; Grigsby-duffy et al., 2022). In Indonesia, canteen conditions and governance vary considerably across schools, and the healthiness of school food environments depends on management, vendor practices, and institutional readiness rather than on student choice alone (Rachmadewi et al., 2021). Indonesian evidence after the COVID-19 disruption similarly emphasized that improving school canteens requires attention to the whole food environment (Hadi et al., 2022).

Food-safety education can strengthen this environment when it develops practical judgment rather than factual recall alone. Among elementary-school children, food-safety knowledge, attitudes, and practices are related but distinct, indicating that knowledge does not automatically translate into behavior (Kuo & Weng, 2021b). Exposure to formal food-safety instruction has been associated with better knowledge and selected practices, although family and contextual influences remain important (Kuo & Weng, 2021a). Longitudinal work has also shown that structured teaching can improve knowledge, risk perception, and perceived behavioral control over time (Barrett & Feng, 2021). Curriculum research further supports formal integration of food-safety competencies and repeated learning to strengthen retention (Limon, 2021, 2022).

Food literacy provides a useful educational frame because it connects functional knowledge with interactive and critical competencies. Primary-school interventions are more promising when they use active, context-sensitive, and curriculum-integrated learning (Omidvar et al., 2023). Intervention-mapping research with primary-school children likewise demonstrates the value of structured, participatory food and nutrition literacy activities (Ahmadpour et al., 2023). Controlled school programs have improved food-literacy outcomes through practical engagement, and culinary programs can strengthen children's food-related skills when learning is experiential (Elsborg et al., 2022; Labbé et al., 2023). Indonesian school-based nutrition education also indicates that structured teaching can influence psychosocial determinants and behavior, supporting the feasibility of school-based health learning in the national context (Indriasari et al., 2021).

Chemical food hazards offer a particularly relevant context for critical literacy because they cannot be reliably diagnosed by appearance. Formaldehyde may be misused as a preservative, yet interpretation is analytically complicated by food matrices and possible endogenous sources (Rahman et al., 2023). Borax has stimulated development of rapid field-compatible detection methods, including smartphone-assisted sensing, because accessible screening remains operationally useful (Banerjee & Das, 2024). Rhodamine B, an industrial dye investigated as an illicit food colorant, can be screened by low-cost methods but requires more selective analytical approaches when confirmation or quantification is needed (Knecht et al., 2024; Wardani et al., 2023). Reviews of rhodamine analysis similarly emphasize the growing range of chromatographic, spectrometric, and sensor-based methods (Du et al., 2024).

These educational and surveillance literatures are often separated: school interventions typically measure knowledge, attitudes, food choices, or hygiene behavior, whereas chemical-surveillance studies report whether hazardous substances are detected. The present study links them cautiously. Using risk-targeted sampling in 20 elementary schools within the Sako and 23 Ilir Community Health Center areas of Palembang, it screened 60 snack items for formaldehyde, borax, or Rhodamine B. The objectives were to characterize analyte-specific screening results, interpret positive and negative findings within the limits of targeted qualitative testing, and derive evidence-informed priorities for school health education. No educational intervention or learning outcome was evaluated; educational implications are therefore translational rather than causal.

RESEARCH METHODS

Study design and setting

A descriptive field-laboratory screening study was conducted from January to July 2026 in 20 elementary schools within the service areas of Sako Community Health Center and 23 Ilir Community Health Center, Palembang, South Sumatra, Indonesia. Fifteen schools were located in Sako and five in 23 Ilir. The unit of analysis was a food or beverage item purchased from a school vendor. The study was designed for pragmatic chemical surveillance rather than etiologic inference or evaluation of educational outcomes.

Sampling strategy and sample allocation

Quota sampling was combined with risk-targeted product selection. At each school, three different snacks were purchased: one selected for formaldehyde screening, one for borax screening, and one for Rhodamine B screening. The dataset therefore comprised 60 assay-specific items, with 20 samples in each analyte group. Formaldehyde-targeted products were selected from perishable foods with unusually prolonged apparent shelf life and from food categories commonly prioritized for screening because of potential preservative misuse.borax-targeted products emphasized unusually chewy or elastic foods;

Rhodamine B-targeted products emphasized intensely colored foods, sauces, sweets, and ices. Commercially packaged products with formal regulatory labels were excluded. Because selection was based on operational suspicion rather than probability sampling, positivity estimates describe only the tested risk-targeted groups and are not citywide prevalence estimates.

Sample preparation and qualitative testing

Each food item was purchased directly, stored separately, coded by service area, food type, and target analyte, and transported for testing. Solid foods were homogenized after approximately 25 g was mixed with about 50 mL distilled water; beverage samples were tested according to the kit volume requirements. Formaldehyde screening used the specified FO3 reagents, with a violet or purple reaction interpreted as positive. Borax screening used the designated reagent and curcumin paper, with brick-red or brown color interpreted as positive. Rhodamine B screening used two sequential reagents, with the kit-specified violet, purple, or pink reaction interpreted as positive. All outcomes were binary. These field tests were treated as screening tools rather than quantitative reference methods, consistent with current literature distinguishing rapid detection from laboratory confirmation (Fappiano et al., 2022). Portable sensing technologies offer similar trade-offs between speed, field usability, sensitivity, and analytical specificity (Roy & Yadav, 2022)

Quality control and statistical analysis

Quality control included use of reagents within validity dates, clean equipment and work surfaces, physical separation and labeling of samples, adherence to kit instructions, and immediate recording of results. A negative result was reported as “not detected by the rapid test,” not as proof of absolute absence. Data were checked, coded, entered, cleaned, and tabulated. For each analyte, the numerator was the number of positive screens and the denominator was the 20 samples assigned to that analyte. A pooled operational screening yield of positive tests divided by all 60 assay-specific items was reported only as a summary of testing activity, not as analyte prevalence. Figure 1 summarizes sampling allocation, Figure 2 presents analyte-specific positivity, and Figure 3 compares positive and negative counts for the three analytes.

Educational translation and ethics

Educational implications were derived through a simple evidence-to-learning sequence: state the observed result without extrapolation; identify the reasoning skill illustrated by the result; identify the relevant learner or actor; and propose a feasible educational application. This approach was informed by evidence that food-safety resources are stronger when aligned with curriculum and practical implementation constraints (Hann et al., 2023). The study tested food products and collected no personal identifiers or individual health data. School identifiers linked to analyte results were anonymized. Positive rapid-test findings were interpreted as signals warranting confirmation and follow-up, not as evidence of deliberate adulteration.

RESULTS AND DISCUSSION

Screening coverage and interpretation of the sampling design

The screening design yielded three balanced analyte groups across the same 20 schools: 20 formaldehyde-targeted, 20 borax-targeted, and 20 Rhodamine B-targeted products. The products differed intentionally because selection reflected the hazard most plausible for each item. Formaldehyde-targeted foods included tofu, rolled egg, fried chicken products, bread, noodles, and starch snacks; borax-targeted foods included sausage, cilok, meatballs, siomay, and pempek; Rhodamine B-targeted foods included colored ices, sweets, sauces, chips, agar products, and corn ice-cream (Table 1; Figure 1). This structure represents 60 risk-targeted screening opportunities rather than 60 random snacks from a single underlying food population.

The distinction is critical for interpretation. Surveillance sampling prioritizes products where limited testing resources are most likely to detect a problem, whereas prevalence studies require sampling strategies that support population inference. Street-vended foods are highly heterogeneous in ingredients, handling conditions, storage, and regulation, which makes targeted surveillance operationally attractive but inferentially limited (Rakha et al., 2022). Consequently, the analyte-specific proportions reported here describe only the tested groups. A negative result is reassuring for that screening episode, but it cannot demonstrate that an analyte is absent from all school foods or across time.

Table 1. Risk-targeted sampling structure by analyte

Target analyte	n	Sako	23 Ilir	Selection cues	Examples in the sampled foods
Formaldehyde	20	15	5	Unusually durable perishable foods; relatively firm texture	Rolled egg, tofu, fried chicken, bread, noodles, starch snacks
Borax	20	15	5	Unusually elastic, chewy, firm, or dense	Sausage, cilok, meatballs, siomay, pempek
Rhodamine B	20	15	5	Intense red/pink or conspicuous coloring	Colored ices, candy, sauces, chips, agar, corn ice-cream

Source: Primary data, 2026

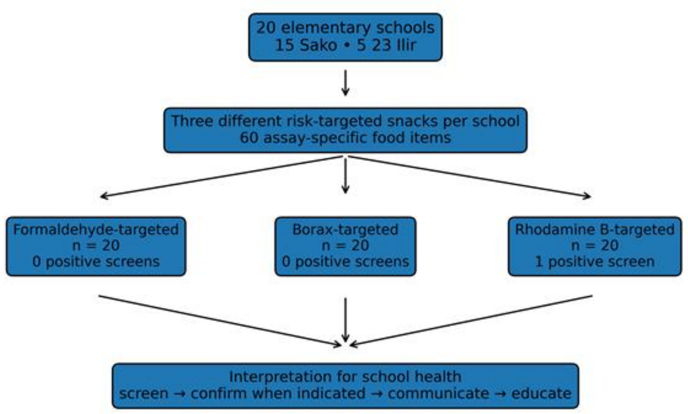

Figure 1. Risk-targeted sampling and screening workflow
Source: Primary data, 2026

Formaldehyde and borax were not detected in targeted samples

No formaldehyde-positive or borax-positive reaction was observed among the 20 samples selected for each analyte. The point estimate was therefore 0% for both groups. (Table 2; Figure 2).

For formaldehyde, the appropriate conclusion is that the rapid test did not detect the analyte in the sampled products under the study conditions. Contemporary reviews emphasize that formaldehyde analysis in food depends on source, matrix, concentration, and method, and that screening should be distinguished from more specific confirmation

(Rahman et al., 2023). For borax, the absence of positive reactions among chewy products indicates that the targeted screen did not identify evidence of misuse in those samples. However, the continuing development of sensitive fluorescence and smartphone-compatible borax detection illustrates why field screening is only one layer of analytical assurance (Banerjee & Das, 2024)

These predominantly negative findings remain educationally useful. Students can learn that “not detected in this test” differs from “proven absent everywhere,” a distinction that supports scientific reasoning rather than false reassurance. Such reasoning aligns with critical food literacy, which extends beyond factual knowledge toward evaluation of information and context (Omidvar et al., 2023). It also helps schools communicate surveillance results without either declaring complete safety or creating unnecessary concern.

Table 2. Analyte-specific rapid-test screening results

Screening group	n tested	Positive screens	Positive (%)
Formaldehyde, all schools	20	0	0
Borax, all schools	20	0	0
Rhodamine B, all schools	20	1	5

**The pooled yield summarizes the operational activity across different analyte-specific food items and is not an analyte prevalence estimate.*

Source: Primary data, 2026

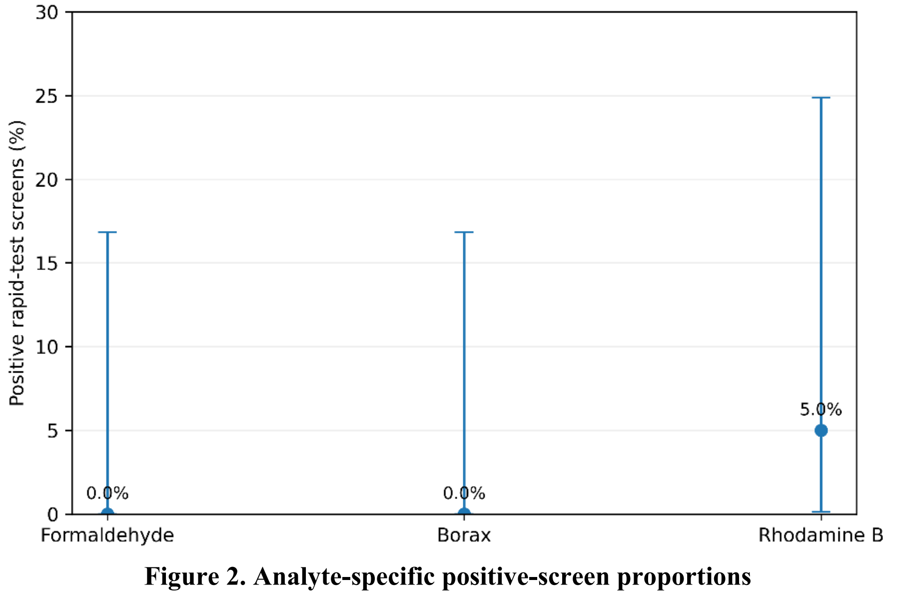

Figure 2. Analyte-specific positive-screen proportions

Source: Primary data, 2026

A Rhodamine B screening signal was identified

Rhodamine B was the only analyte producing a positive screening reaction. Nineteen of 20 Rhodamine B-targeted samples were negative and one was positive, corresponding to 5.0% positivity (Table 2; Figure 3). The positive reaction occurred in a conspicuously colored corn ice-cream product from the Sako service area. Within Sako, one of 15 targeted products screened positive (6.67%); none of the five products from 23 Ilir screened positive. With only one positive event, these area-level values should not be interpreted as evidence of a genuine difference between service areas.

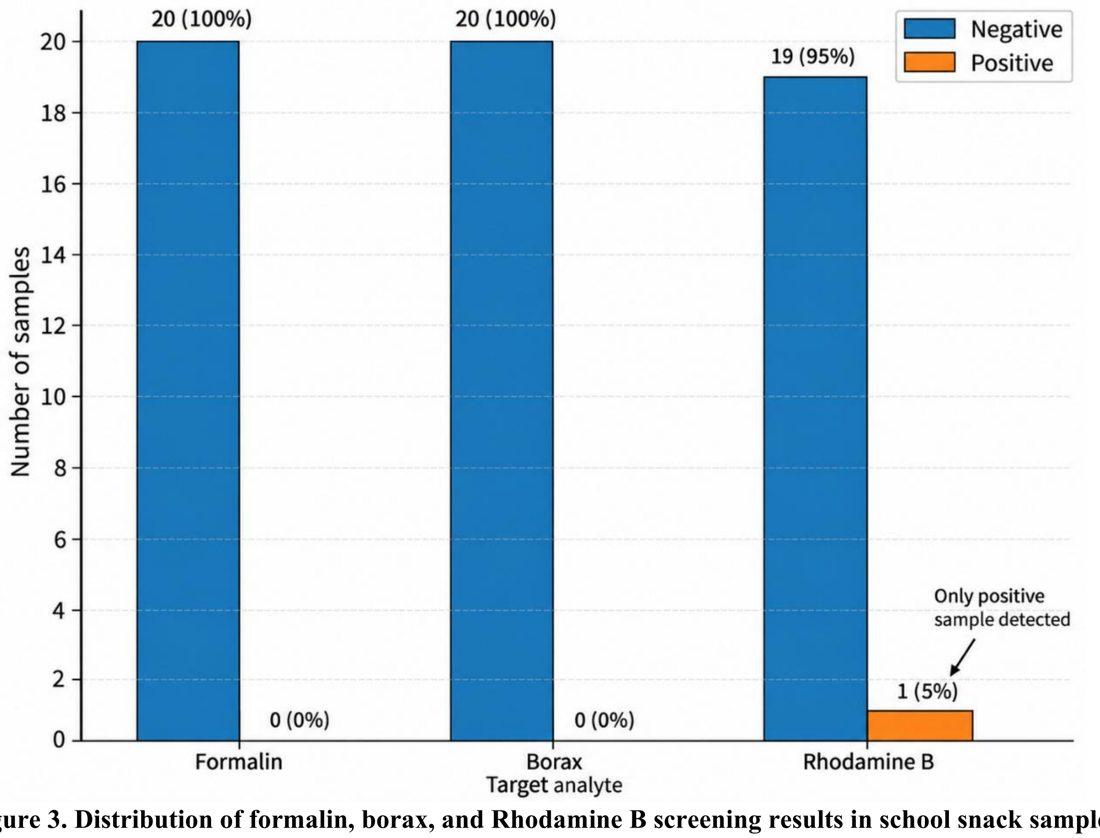

Figure 3. Distribution of formalin, borax, and Rhodamine B screening results in school snack samples (n = 20 per analyte)

Source: Primary data, 2026

The positive result is best treated as a surveillance signal requiring confirmation. Analytical studies show that Rhodamine B can be differentiated and detected in complex food matrices using more selective approaches (Knecht et al., 2024). Digital-image colorimetric methods have also been developed for food and beverage samples, demonstrating how field-oriented detection can be coupled with more controlled analytical procedures (Wardani et al., 2023). Broader reviews document chromatographic, spectrometric, Raman, and sensor-based techniques that can provide greater specificity or quantification when needed (Du et al., 2024). Therefore, this study does not establish the concentration of Rhodamine B or a toxicological exposure; it identifies a product that warrants follow-up.

The result also offers a strong educational example because visual intensity can prompt a question but cannot prove a prohibited dye. Teaching that "bright color means dangerous" would be inaccurate and could stigmatize foods containing permitted colorants. A better sequence is: appearance provides a cue, screening provides preliminary evidence, and confirmation provides greater certainty. Participatory food-literacy interventions can support this applied judgment (Ahmadpour et al., 2023).

Why 5.0% and 1.7% answer different questions

The analyte-specific Rhodamine B proportion is 1/20, or 5.0%, because only 20 samples were assigned to Rhodamine B testing. Pooling all 60 assay-specific items produces an operational screening yield of 1/60, or 1.67%, but that value combines three different groups selected for different tests. It is therefore not the prevalence of Rhodamine B and is not a coherent estimate of "any hazardous additive," because each product was not tested for every analyte. Table 2 retains 1.67% only as an operational summary.

This denominator discipline prevents the Rhodamine B signal from appearing artificially rare and makes the analysis faithful to the design. The same logic applies to zero results: small denominators leave substantial uncertainty even when no positives are observed. For education, the statistical concept can be simplified as "we can state what was found in the tested snacks, not what is guaranteed everywhere." Food-safety curricula can influence risk perception as well as knowledge, so careful framing is important for building vigilance without alarmism (Barrett & Feng, 2021).

From surveillance evidence to critical food-safety literacy

The main educational contribution is the translation of local chemical-surveillance findings into competencies relevant to school life. Food-safety education often emphasizes hygiene, temperature control, and cross-contamination. Chemical hazards require additional reasoning: students should understand that appearance is not a chemical test, that suspicious products should be reported rather than publicly accused, and that institutions share responsibility for food safety.

Evidence among schoolchildren shows that knowledge, attitude, and practice do not move in lockstep (Kuo & Weng, 2021b). Food-safety instruction can improve knowledge and selected practices, but contextual influences still shape behavior (Kuo & Weng, 2021a). Accordingly, simply teaching the names formaldehyde, borax, and Rhodamine B would be insufficient. A stronger approach would combine functional knowledge with reporting self-efficacy, source checking, appropriate trust in health authorities, and recognition of uncertainty. Structured curriculum development and repeated learning can support retention of these competencies (Limon, 2021, 2022).

Local data make this learning more authentic. Students can work with anonymized scenarios based on the three analyte patterns, interpret simplified screening results, decide what information is missing, and discuss when confirmatory testing is appropriate. Controlled school interventions indicate that experiential food learning can improve broader food-literacy capacities (Elsborg et al., 2022). Culinary and practical programs also demonstrate that children can develop applied food competencies when lessons are age-appropriate and active (Labbé et al., 2023). The present study does not establish that these activities will improve outcomes in Palembang, but it provides locally grounded material for testing such an intervention.

Vendor, school, and health-center responsibilities

Educational translation should not shift responsibility for chemical food safety onto children. Vendors, school managers, health personnel, and regulators control many upstream determinants. School-kitchen studies show that food-handler knowledge, attitudes, and practices can remain uneven even within institutional services (da Vitória et al., 2021). Reviews of food handlers and street vendors likewise support continuing training and monitoring while showing that practice is shaped by contextual (Desye et al., 2023; Rifat et al., 2022). Evidence from public food establishments reinforces the role of organizational conditions (Tadele et al., 2022), while an integrative review cautions that knowledge alone does not consistently translate into safe practice (Aljasir, 2023).

For vendors, education should pair prohibited-additive messages with feasible alternatives: lawful colorants and texturizers, safe storage, reputable ingredient sourcing, and clear access to health-center advice. For school managers, priorities include approved vendor arrangements, participation in food-safety briefings, transparent follow-up after abnormal screens, and routine access for inspection. School food-environment reviews show that institutional policies can influence what children encounter and that implementation determines whether intended changes reach practice(Durao et al., 2024).

The two community health centers provide a practical platform for a recurring cycle of risk mapping, targeted screening, confidential feedback and education, and re-screening. School food-environment evidence indicates that sustained institutional routines matter when translating policy into practice (Grigsby-duffy et al., 2022). Repeated surveillance could therefore supply current classroom examples while informing vendor support and school management, turning testing into a local learning system.

Educational translation of each analyte pattern

Table 3 translates the three analyte patterns into distinct educational messages. The formaldehyde result is suitable for teaching the limits of non-detection and the importance of lawful preservation and storage. The borax result can be used to show that texture is a reason to investigate, not evidence that a chemical is present. The Rhodamine B signal can support a more advanced sequence in which students distinguish visual suspicion, preliminary screening, and confirmatory testing. Risk-targeted sampling can also be introduced to older pupils as an example of how health services allocate limited resources according to plausible risk.

These applications should be guided reasoning tasks rather than exercises in identifying “unsafe vendors.” Teachers can present anonymized sample cards, ask what conclusions are justified, then reveal the screening result and its limitations. Students can practice reporting concerns, comparing labeled and unlabeled products, and explaining why vivid color or chewy texture cannot establish chemical content. This active approach is consistent with participatory food-literacy interventions (Ahmadpour et al., 2023) and with curriculum-focused work emphasizing feasible, teacher-aligned food-safety materials (Hann et al., 2023).

The educational message should remain proportional to the evidence: local data can make lessons concrete without implying that most school snacks are contaminated or that a particular school is unsafe.

Table 3. Evidence-informed translation of surveillance findings into school health education

Local surveillance finding	**Scientific reasoning to teach**	**Primary learners/actors**	**Illustrative educational application**
Formaldehyde not detected in targeted foods	Non-detection in a small screening sample is not universal proof of absence	Students, teachers, health staff	Compare “not detected in this test” with “never present”; discuss sampling and safe preservation
Borax not detected in targeted chewy foods	Texture may guide investigation but cannot identify a chemical by itself	Students, vendors	Use texture as a hypothesis cue; teach lawful formulation and the limits of sensory judgment
One Rhodamine B screening signal	A screening signal warrants confirmation; vivid color is not proof of a prohibited dye	Students, vendors, school managers, health staff	Trace safe colorant sourcing; practice reporting; explain confirmatory laboratory pathways
Risk-targeted sampling across schools	Surveillance allocates limited testing resources according to plausible risk	Older students, school managers	Classify product cues, propose sampling priorities, and distinguish surveillance from prevalence surveys

Note: These educational applications were not tested as study outcomes; they are evidence-informed implications for curriculum and school-health practice.

Source: Primary data, 2026

Analytical hierarchy, educational implications, and limitations

Rapid tests are defensible for field triage when their purpose is explicit. They are not substitutes for validated quantitative methods when the question concerns concentration, exposure, or definitive identification. Reviews of formaldehyde sensing describe analytical options with different trade-offs in sensitivity, selectivity, cost, and field usability (Fappiano et al., 2022). Electronic-nose technologies illustrate the broader movement toward faster screening of food adulteration, but also the need to match analytical tools to the decision being made (Roy & Yadav, 2022). This hierarchy can itself become a science-education lesson: observation generates a question, screening tests it provisionally, and confirmation strengthens certainty.

Several limitations define the study's scope. Sampling was quota-based and risk-targeted, so the proportions cannot be generalized to all school snacks in Palembang. Each item was assigned to one analyte group, preventing estimation of the proportion of individual foods containing any of the three hazards. No confirmatory chromatographic or spectrometric analysis was reported for the Rhodamine B-positive screen. The study also did not examine microbiological hazards, pesticide residues, excessive permitted additives, or nutritional quality. Finally, no student, teacher, vendor, or policy outcome was measured, so the educational framework remains evidence-informed rather than evaluated.

Future research should combine repeated sampling, accredited confirmation, and direct evaluation of a locally grounded school module. Outcomes should include critical food-safety literacy, reporting self-efficacy, vendor practice, and repeated screening. Curriculum alignment and teacher feasibility are important (Hann et al., 2023), while Indonesian evidence supports structured school-based education (Indriasari et al., 2021).

CONCLUSION

This risk-targeted survey found no formaldehyde or borax screening positives and one Rhodamine B screening signal among the foods selected for that analyte. The result should prompt confirmation and targeted follow-up rather than a claim of widespread contamination, because the design used quota-based selection and qualitative rapid tests. The study's educational value lies in converting local surveillance into critical food-safety literacy: appearance can justify a question, screening can guide investigation, and confirmation is required for stronger certainty. A proportionate school-health response should combine vendor guidance, school procurement and monitoring, age-appropriate student learning, clear reporting pathways, and collaboration with community health centers. Future work should use broader repeated sampling, accredited confirmatory methods, and direct evaluation of whether locally grounded teaching improves student reasoning, reporting confidence, vendor practice, and school food-safety governance.

REFERENCES

Ahmadpour, M., Omidvar, N., Shakibazadeh, E., Doustmohammadian, A., & Rahimiforoushani, A. (2023). Development and evaluation of an intervention to improve food and nutrition literacy among Iranian Kurdish primary school children: An application of intervention mapping approach. Frontiers in Public Health, 10. https://doi.org/10.3389/fpubh.2022.1059677

Aljasir, S. F. (2023). Food safety knowledge and practices among food handlers and consumers in Gulf countries: An integrative review. Global Public Health, 18(1), 2287584. https://doi.org/10.1080/17441692.2023.2287584

Banerjee, S., & Das, P. (2024). Sensitive detection of borax in real food samples by red emissive carbon nanoparticle displaying multiformat compatibility including faraway smartphone based sensing. Sensors and Actuators B: Chemical, 401, 135002. https://doi.org/10.1016/j.snb.2023.135002

Barrett, T., & Feng, Y. (2021). Evaluation of food safety curriculum effectiveness: A longitudinal study of high-school-aged youths' knowledge retention, risk-perception, and perceived behavioral control. Food Control, 121, 107587. https://doi.org/10.1016/j.foodcont.2020.107587

Da Vitória, A. G., de Souza Couto Oliveira, J., de Almeida Pereira, L. C., de Faria, C. P., & de São José, J. F. B. (2021). Food safety knowledge, attitudes and practices of food handlers: A cross-sectional study in school kitchens in Espírito Santo, Brazil. BMC Public Health, 21, 349. https://doi.org/10.1186/s12889-021-10282-1

Desye, B., Tesfaye, A. H., Daba, C., & Berihun, G. (2023). Food safety knowledge, attitude, and practice of street food vendors and associated factors in low- and middle-income countries: A systematic review and meta-analysis. PLoS ONE, 18(7), e0287996. https://doi.org/10.1371/journal.pone.0287996

Du, R. Z., Zhang, Y., Bian, Y., Yang, C. Y., Feng, X. S., & He, Z. W. (2024). Rhodamine and related substances in food: Recent updates on pretreatment and analysis methods. Food Chemistry, 459, 140384. https://doi.org/10.1016/j.foodchem.2024.140384

Durão, S., Wilkinson, M., Davids, E. L., Gerritsen, A., & Kredo, T. (2024). Effects of policies or interventions that influence the school food environment on children's health and nonhealth outcomes: A systematic review. Nutrition Reviews, 82(3), 332–360. https://doi.org/10.1093/nutrit/nuad059

Elsborg, P., Thorsen, A. V., Ravn-Haren, G., Bonde, A. H., Andersen, S. G., Vermund, M. C., Klinker, C. D., & Stjernqvist, N. W. (2022). Improved food literacy among schoolchildren as an effect of a food camp intervention: Results of a controlled effectiveness trial. Appetite, 169, 105845. https://doi.org/10.1016/j.appet.2021.105845

Fappiano, L., Carriera, F., Iannone, A., Notardonato, I., & Avino, P. (2022). A review on recent sensing methods for determining formaldehyde in agri-food chain: A comparison with the conventional analytical approaches. Foods, 11(9), 1351. https://doi.org/10.3390/foods11091351

França, F. C. O., Andrade, I. S., Zandonadi, R. P., Sávio, K. E., & Akutsu, R. C. C. A. (2022). Food environment around schools: A systematic scope review. Nutrients, 14(23), 5090. https://doi.org/10.3390/nu14235090

Grigsby-Duffy, L., Brooks, R., Boelsen-Robinson, T., Blake, M. R., Backholer, K., Palermo, C., & Peeters, A. (2022). The impact of primary school nutrition policy on the school food environment: A systematic review. Health Promotion International, 37(5), daac084. https://doi.org/10.1093/heapro/daac084

Hadi, H., Triastanti, R. K., Anggraeni, D., Nurwanti, E., Lewis, E. C., Colon-Ramos, U., Kang, Y., Yamaguchi, M., & Gittelsohn, J. (2022). The role of the school food environment in improving the healthiness of school canteens and readiness to reopen post COVID-19 pandemic: A study conducted in Indonesia. Journal of Public Health Research, 11(1), 2287. https://doi.org/10.4081/jphr.2021.2287

Hann, M., Hayes, C. V., Lacroix-Hugues, V., Touboul Lundgren, P., McNulty, C., Syeda, R., Eley, C., Teixeira, P., Gennimata, D., Truninger, M., Knøchel, S., Münter, L., Allison, R., Fehér, Á., Izsó, T., Kunszabó, A., Kasza, G., & Demirjian, A. (2023). Evidence-based health interventions for the educational sector: Application and lessons learned from developing European food hygiene and safety teaching resources. Food Control, 143, 109219. https://doi.org/10.1016/j.foodcont.2022.109219

Indriasari, R., Nadjamuddin, U., Arsyad, D. S., & Iswarawanti, D. N. (2021). School-based nutrition education improves breakfast-related personal influences and behavior of Indonesian adolescents: A cluster randomized controlled study. Nutrition Research and Practice, 15(5), 639–654. https://doi.org/10.4162/nrp.2021.15.5.639

Knecht, G. T., Froelich, N., & Campiglia, A. D. (2024). Screening method for the analysis of Rhodamine B in chili powder. Food Chemistry, 447, 138936. https://doi.org/10.1016/j.foodchem.2024.138936

Kuo, S. C., & Weng, Y. M. (2021a). Effects of food safety education on knowledge, attitude, and practice of schoolchildren in southern Taiwan: A propensity score-matched observational study. Food Control, 124, 107360. https://doi.org/10.1016/j.foodcont.2020.107360

Kuo, S. C., & Weng, Y. M. (2021b). Food safety knowledge, attitude, and practice among elementary schoolchildren in southern Taiwan. Food Control, 122, 107818. https://doi.org/10.1016/j.foodcont.2020.107818

Labbé, C., Ward Chiasson, S., Dupuis, J. B., & Johnson, C. (2023). Effectiveness of a school-based culinary programme on 9- and 10-year-old children's food literacy and vegetable, fruit, and breakfast consumption. Nutrients, 15(6), 1520. https://doi.org/10.3390/nu15061520

Limon, M. R. (2021). Validation of a researcher-developed food safety curriculum guide for junior high school students using Delphi technique. Food Control, 125, 108011. https://doi.org/10.1016/j.foodcont.2021.108011

Omidvar, N., Doustmohammadian, A., Shakibazadeh, E., Clark, C. C. T., Kasaii, M. S., & Hajigholam-Saryazdi, M. (2023). Effects of school-based interventions on food and nutrition literacy (FNLIT) in primary-school-age children: A systematic review. British Journal of Nutrition, 129(12), 2102–2121. https://doi.org/10.1017/S0007114522002811

Rachmadewi, A., Soekarjo, D., Maehara, M., Alwi, B., Mulati, E., & Rah, J. H. (2021). School canteens in selected areas in Indonesia: A situation analysis. Food and Nutrition Bulletin, 42(2), 225–246. https://doi.org/10.1177/03795721211008021

Rahman, M. B., Hussain, M., Kabiraz, M. P., Nordin, N., Siddiqui, S. A., Bhowmik, S., & Begum, M. (2023). An update on formaldehyde adulteration in food: Sources, detection, mechanisms, and risk assessment. Food Chemistry, 427, 136761. https://doi.org/10.1016/j.foodchem.2023.136761

Rakha, A., Fatima, M., Bano, Y., Khan, M. A., Chaudhary, N., & Aadil, R. M. (2022). Safety and quality perspective of street vended foods in developing countries. Food Control, 138, 109001. https://doi.org/10.1016/j.foodcont.2022.109001

Rifat, M. A., Talukdar, I. H., Lamichhane, N., Atarodi, V., & Alam, S. S. (2022). Food safety knowledge and practices among food handlers in Bangladesh: A systematic review. Food Control, 142, 109262. https://doi.org/10.1016/j.foodcont.2022.109262

Roy, M., & Yadav, B. K. (2022). Electronic nose for detection of food adulteration: A review. Journal of Food Science and Technology, 59(3), 846–858. https://doi.org/10.1007/s13197-021-05057-w

Tadele, M. M., Dagnaw, A., & Alamirew, D. (2022). Food handling practice and associated factors among food handlers in public food establishments of Ethiopia: a systematic review and meta-analysis. BMJ Open, 12.https://doi.org/10.1136/bmjopen-2021-051310

Wardani, N., Alahmad, W., Tabani, H., & Varanusupakul, P. (2023). Emulsification liquid-liquid microextraction coupled with droplet digital image colorimetric detection for determination of rhodamine B in food and beverage samples. *Advances in Sample Preparation*. https://doi.org/10.1016/j.sampre.2023.100091