Evaluating Behaviour Centered Design for Hygiene Promotion in Schools

Fazil Hasan, Jay Vasani, Anisha Arya, Vijay Nagpurkar, Ganesh Korwar, Prashant B. Patel

Abstract: *This study presents a behaviour-centered conceptual model for school hygiene programming that treats WASH interventions as constrained decisions linking context, implementation fidelity, and sustained practice. Current choices are often made with incomplete data and fragmented governance, and prevailing program logics frequently emphasize infrastructure or messaging without a clear, testable mapping from context to expected service outcomes. The proposed framework defines term-level constructs for resources and governance capacity, behavioural opportunity and motivation, and delivery fidelity, and operationalizes them through a compact coding rubric and explicit mechanisms that connect constraints to observable performance. Evaluability is embedded through prespecified propositions and a validation blueprint based on grouped and external holdouts, leakage controls, and bootstrap uncertainty reporting, with decision rules requiring Increase >=20 pp in observed handwashing with soap versus baseline, behaviour persistence rate >=70%, and fidelity score >=0.80 with a 95% CI pass. The resulting model and protocol are intended to support structured comparison against logistic regression, causal forest, and infrastructure-only or messaging-only baselines, enabling school administrators and implementers to select feasible hygiene promotion packages under resource and capacity constraints.*

Keywords: School Hygiene Behaviour, Behaviour Centred Design, Implementation

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Fidelity, Grouped Holdout Evaluation, Coding Rubric, WASH Decision Support, Behaviour Persistence

Introduction

School hygiene programs often fail when decisions privilege infrastructure or messaging over the behaviours that sustain daily practice. Evidence from multi-country WASH behaviour-change work indicates that community-engaged, psychosocially informed approaches can shift handwashing at scale; midline outcomes reported a 15 percentage point increase in proper handwashing within intervention areas (Zisa et al., 2022). Fig. (1) situates the decision problem in schools by making explicit the assets, actors, and cues that shape routine use.

Research design transparency is pursued through an explicitly conceptual approach: prior WASH behaviour-change evidence motivates a compact model that maps school context to programming decisions, then to observable service outcomes (Zisa et al., 2022). The approach specifies constructs for a coding rubric and pre-specifies evaluable propositions to be checked in a programmatic cohort using grouped and external holdouts, leakage controls, and bootstrap uncertainty. Comparisons against logistic regression, causal forest, and conventional program logics are planned. The framework is not an engineering blueprint.

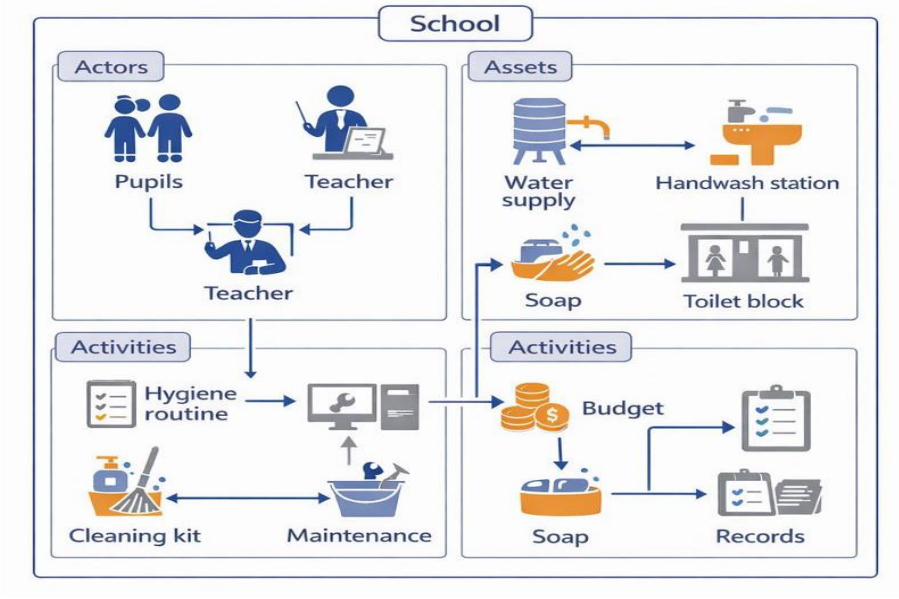

Figure 1. *School WASH field decision context*

Background and Related Foundations

Program decision support for school-based interventions increasingly depends on transparent evidence-rating schemes that separate program components, target populations, and the strength of empirical support. The AEB systematic review series exemplifies this approach by applying standardized rating criteria, cataloguing intervention features, and incorporating cost information to guide selection across K-12 settings (Ghose et al., 2024). Notably, the introductory synthesis emphasizes methodology and scope rather than reporting pooled effectiveness, clarifying what the ratings can and cannot justify (Ghose et al., 2024).

Behaviour-centered hygiene programming in schools also turns on staff behaviour and retention, which are shaped by distinct motivational logics. Evidence from rural teachers indicates that hygiene factors (e.g., policy and pay conditions) and motivation factors (e.g., advancement and achievement) both reduce turnover intention, with motivation exerting the stronger association in a structural equation model (Jiang et al., 2023). The same distinction cautions against treating implementation gaps as purely infrastructural; contextual and occupational incentives may dominate (Jiang et al., 2023).

Behaviour Centred Design and School WASH Baselines

Baseline hygiene behaviour in schools is often modest and context-dependent, which constrains what Behaviour Centred Design can plausibly shift. In Ethiopia, 34.1% of grade 5-8 students were classified with good hygiene, with higher odds associated with female sex (AOR 2.68), urban residence (1.86), separate toilets (2.11), and school clubs (1.75) (Beya et al., 2022). In India, knowledge and practice were similarly incomplete, with 49.07% good knowledge and 59.26% moderate practice (Chutia, 2023). Limited autonomy remains a key assumption boundary (Pico et al., 2022).

Baselines in school hygiene programming are set by facility availability and gender-linked constraints, with affordability bounding feasible options. Syntheses in Ghana link inadequate sanitation and privacy to schoolgirls participation (Jane & Pienaah, 2023). A two-school assessment in Pakistan reported uneven conditions and pathogenic bacteria in water samples (Raza et al., 2023). Period product scarcity is also salient: 70.7% reported inability to afford products and 68.0% menstruation-related absences (Kuhlmann et al., 2023). Evidence corpus

integrity depends on explicit selection rules; Fig. (2) records inclusion, exclusion, and provenance for the programmatic cohort.

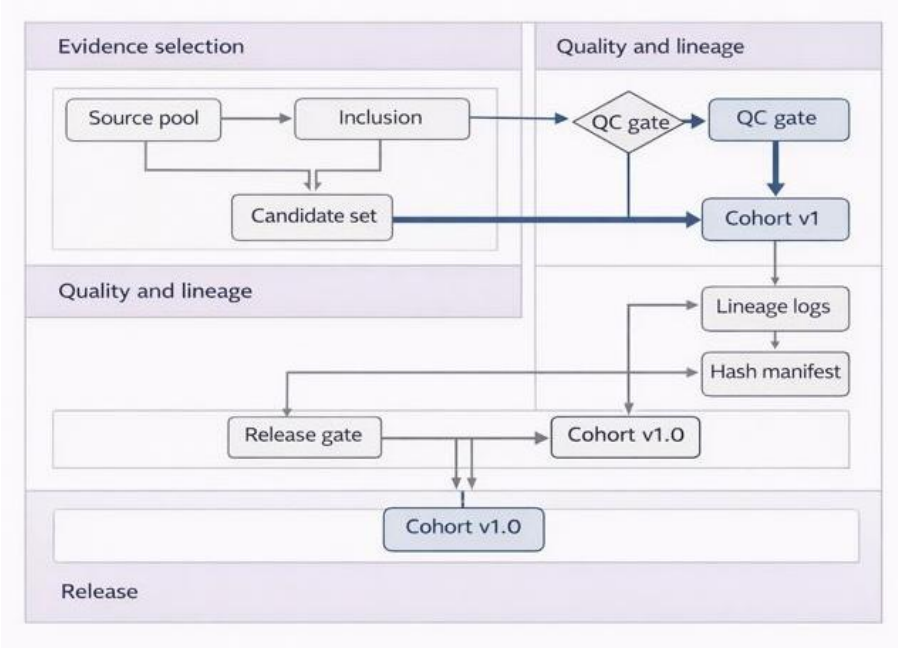

Figure 2. *Cohort evidence selection and lineage*

Programmatic Cohort Evidence for Hygiene Promotion Decisions

Program decisions for school hygiene promotion benefit from cohort-like evidence that links exposure to measurable behaviour change under routine conditions. Longitudinal school evaluations using pre/post questionnaires illustrate how brief education sessions can shift reported handwashing practices relative to standard instruction (Trandafir & Lotrean, 2025). Similar multi-topic school courses have recorded short-term gains in handwashing and related habits, while also revealing uneven learning across domains (Yamgai et al., 2022). Pre/post testing of hygiene knowledge offers a pragmatic, low-burden signal when direct observation is infeasible (Tunggeng et al., 2025).

Interpretation of such program evidence depends on implementation and compliance measurement, because fidelity failures can mimic intervention ineffectiveness. Descriptive and qualitative assessments commonly document delivery extent, stakeholder engagement, and context-specific bottlenecks, offering plausible explanations for heterogeneous outcomes (PANCHACOLA,

2023; Rany et al., 2022). Evidence corpus integrity is treated as a design constraint: the present study draws on diverse school program evaluations, but the literature search strategy and inclusion/exclusion rules are not reported here, limiting claims to illustrative patterns rather than population-wide estimates.

Conceptual Framework

This study frames behaviour-centered school hygiene programming as a decision problem in which contextual constraints shape the feasible mix of enabling conditions and behaviour-change actions, with performance indexed by observed_handwashing_with_soap_rate, behaviour_persistence_rate, and fidelity_score. Core constructs are defined at the school term as the unit of analysis: resources and governance capacity, delivery fidelity, and behavioural opportunity and motivation. The causal logic links constraints to intervention choices and, in turn, to sustained practice rather than short-lived uptake. Mechanism clarity prevents rubric drift.

To support baseline comparison, the framework is positioned to be operationalized alongside logistic regression and causal forest models, and against program logics dominated by standard health education messaging or infrastructure-only improvements. Evaluability is embedded through pre-specified acceptance criteria and a cohort validation plan using grouped holdouts and external holdouts, BCa bootstrap intervals with 2000 stratified resamples, and 10 seeds. Evidence-corpus selection rules and detailed competing mechanisms are not reported here; mis-coding and transfer failure remain salient risks.

Key Constructs and Definitions for Fidelity Score and Persistence

Core constructs are defined to support conceptual precision in coding school hygiene programs and their outcomes. Table (1) specifies operational measures and coding cues for Observed Handwashing, Behaviour Persistence, Implementation Fidelity, and Service Reliability, aligning observational and follow-up indicators with explicit annotator prompts. Fig. (3) maps these definitions onto a single scoring rubric so that fidelity dimensions are applied consistently across reviewers, drawing on validated implementation questionnaires in school settings (Vennegoor et al., 2022).

Implementation fidelity is quantified as a normalized rubric score, where each component is scaled to its observed maximum and averaged across K elements; Equation (1) formalizes this fidelity score as a unit-free index. Behaviour

persistence is treated as weighted adherence across follow-up times, allowing later observations to carry different influence; Equation (2) defines the persistence rate as a weighted mean. These operationalizations follow experimental fidelity measurement practice (Wang et al., 2022) and psychometric scale-construction principles, including internal-consistency considerations, by analogy to school measurement work (Kalubi et al., 2023; March et al., 2022).

$$Fidelity = \frac{1}{K}\sum_{k=1}^{K}\frac{x_k}{x_k^{max}} \tag{1}$$

$$Persistence = \frac{\sum_{t=1}^{T} w_t \; b_t}{\sum_{t=1}^{T} w_t} \tag{2}$$

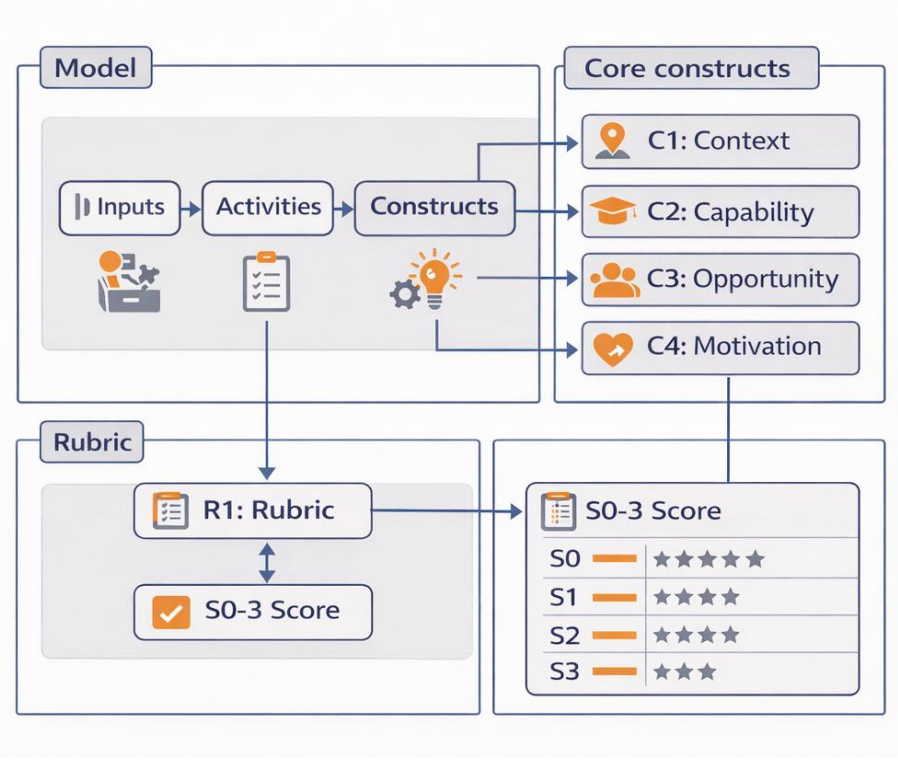

Figure 3. *Construct definitions and rubric map*

Table 1. Construct definitions and measures

Construct	*Operational Measure*	*Coding Cue*
Observed Handwashing	Soap use rate	Direct observation
Behaviour Persistence	Follow-up adherence	Post-term check
Implementation Fidelity	Rubric score	Two annotators
Service Reliability	WASH uptime proxy	Range check ladder

Boundary Conditions Across Geography, Affordability, and Service Level

Geographic transfer, affordability, and service level jointly bound what the conceptual model can claim about school hygiene programming. Table (2) lists boundary conditions and applicability limits that restrict inference to programmatic cohorts and public aggregate inputs, precluding health impact or individual-level claims. Resource norms and service capacity can make otherwise plausible targets infeasible, so decision guidance is interpreted relative to local constraints rather than aspirational benchmarks (Kouévi et al., 2024). Socioeconomic context is treated as a structural boundary shaping expected hygiene trajectories (Paula et al., 2022).

Several failure modes follow from these boundary conditions. Education-linked gradients may shift both behaviour and reporting, meaning that the same intervention package can present different apparent effects across settings (Perpelea et al., 2024). Transfer evidence also weakens when grouped holdouts cannot be defined or when group identifiers are absent, limiting claims of stability beyond observed entities. Coding remains conditional on two annotators with adjudication; if low inter-rater reliability persists, additional adjudication is required. Stress tests model resource bounds, not unmodeled shocks.

Table 2. Boundary conditions and scope limits

Boundary	*Applies When*	*Fails When*	*Implication*
Cohort validation only	Programmatic cohort	Clinical outcomes needed	No health impact claims

Public aggregate inputs	No individual data	Individual linkage required	No patient inference
Grouped holdouts design	Entities have group IDs	Groups undefined	Weak transfer evidence
Coding rubric limits	Two annotators; adjudication	Low IRR persists	Increase adjudication
Stress test realism	Resource bounds modeled	Unmodeled shocks	Limit deployment advice

Mechanisms Linking Governance and Cost Constraints to Outcomes

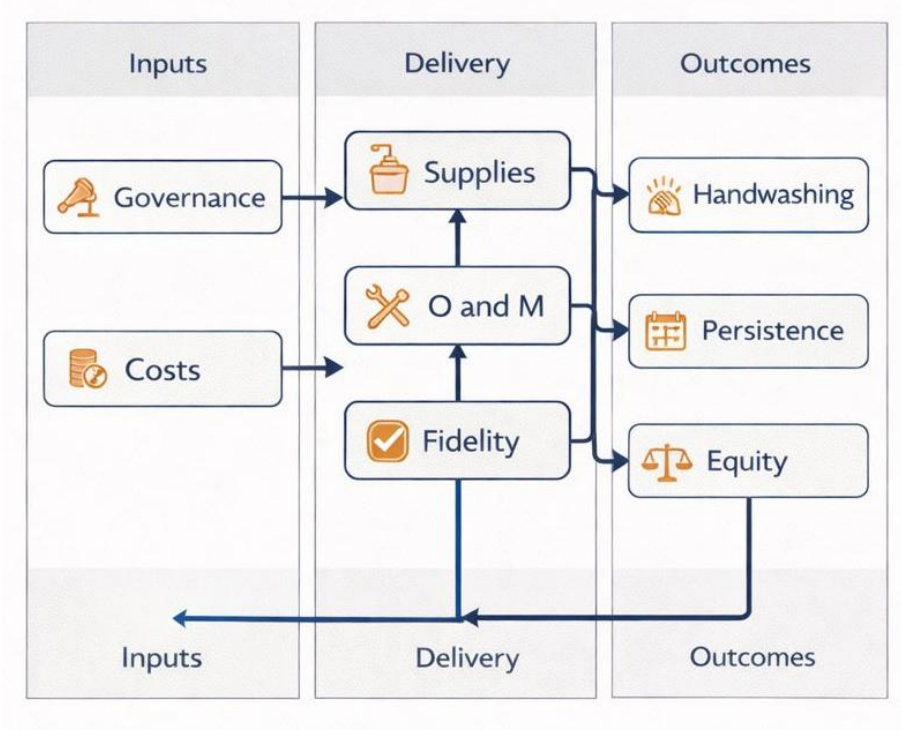

Figure 4. *Mechanism paths from constraints to outcomes*

Governance capacity and budget ceilings shape outcomes by first altering implementation determinants, then constraining fidelity and practice opportunities. The causal logic and mechanisms follow an organizational readiness view in which leadership engagement, communication, and perceived priority condition whether program components are delivered as intended (McLoughlin et al., 2022). Household and community determinants such as knowledge, income, and local support enter the chain by mediating uptake and reinforcement (Irawati et al., 2022). Fig. (4) renders these pathways explicit.

Mechanism hypotheses are framed so governance and cost constraints alter intermediate determinants that can be observed, rather than remaining abstract program descriptors. Table (3) maps five mechanisms to expected increases in soap availability, hygiene knowledge, club participation, delivered activities, and proper handwashing. Messaging theory motivates the efficacy pathway by emphasizing perceived efficacy as a driver of action (Muche et al., 2023), and intervention design frameworks support aligning school delivery roles with these mediators (Bilal et al., 2023).

Table 3. Mechanisms and observable links

Mechanism	***Observable***	***Expected Direction***	***Measurement Cue***
Infrastructure Access	Soap available	Increase	Facility checklist (Raza et al., 2023)
Knowledge Gain	Handwashing knowledge	Increase	KAP survey (Chutia, 2023)
Social Norms	School hygiene clubs	Increase	Participation count (Beya et al., 2022)
Implementation Fidelity	Curriculum activities taught	Increase	Core activity tally (Wang et al., 2022)
Psychosocial Efficacy	Proper handwashing	Increase	Midline behaviour rate (Zisa et al., 2022)

Propositions and Implications

Propositions link school hygiene programming context to actionable design decisions and measurable behaviour outcomes. The proposed model posits that governance capacity, resource availability, and school infrastructure jointly shape feasible intervention choices, which in turn influence observed_handwashing_with_soap_rate, behaviour_persistence_rate, and fidelity_score. Three propositions follow: (i) decision recommendations are more consistent than baselines such as logistic regression, causal forest, or infrastructure-only improvements; (ii) predictive utility is stable under grouped and external holdouts; and (iii) a compact coding rubric enables consistent construct labeling by independent reviewers.

Implications are methodological: the propositions are designed to be refutable through cohort-based validation with leakage controls (train-only preprocessing and entity-id audits) and uncertainty reporting via BCa bootstrap intervals with false discovery rate correction. The model targets programmatic decision support under governance and resource constraints, rather than site engineering design, procurement bills of quantities, or clinical health impact trials. Alternative mechanisms, including effects attributable to infrastructure alone or to messaging alone, remain plausible and should be separated empirically; validation results are not reported here.

Testable Propositions for Observed Handwashing With Soap Rate

Evaluability is strengthened by specifying propositions that can be judged against decision rules for observed handwashing with soap. Equation (3) defines the observed handwashing with soap rate as 100 times the count of handwashing-with-soap events divided by the number of observations. Table (4) links each proposition to a metric and an acceptance criterion, including an increase >=20 pp versus baseline, behaviour persistence rate >=70%, and fidelity score >=0.80, all requiring a 95% CI pass.

Fig. (5) codifies the validation blueprint, requiring grouped holdouts by entity and context and external holdouts by predefined groups before any proposition is accepted. Stability is assessed through an external holdout delta that is not below baseline, with the decision rule that all holdouts pass. These criteria also support stress testing under affordability and capacity constraints and checking coding consistency. Empirical outcomes and confidence intervals are not reported here, so the propositions remain a prespecified evaluation plan.

$$HWWS\_rate = 100 \cdot \frac{N_{HWWS}}{N_{obs}} \quad (3)$$

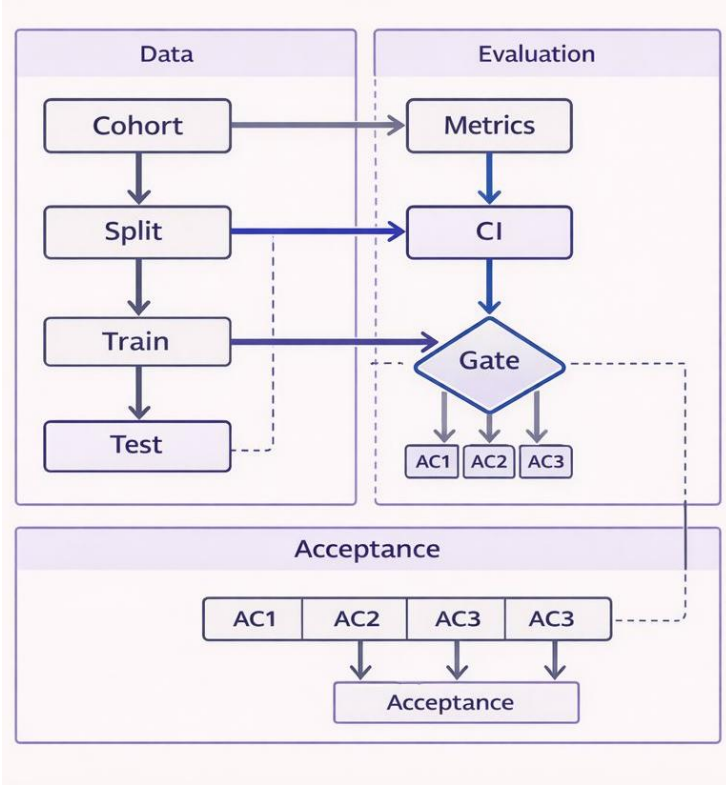

Figure 5. *Evaluation blueprint with acceptance criteria*

Table 4. Propositions, metrics, acceptance criteria

Proposition	***Metric***	***Acceptance Criterion***	***Decision Rule***
H1: Beats baseline	Observed handwashing rate	Increase >=20 pp	95% CI pass
H2: Holds stress tests	Behaviour persistence rate	Rate >=70%	95% CI pass
Coding consistency	Fidelity score	Score >=0.80	95% CI pass
Stable across groups	External holdout delta	Not below baseline	All holdouts pass

Alternative Explanations: Infrastructure-Only and Messaging-Only Baselines

Separating genuine program effects from simpler drivers, including feature correlations or hardware access, is central to interpreting school hygiene interventions (Dangis et al., 2023; Galli et al., 2024). Table (5) enumerates four baselines and competing explanations, linking each attribution to a discrimination strategy such as group holdouts with bootstrap uncertainty or targeted ablations of governance and cost. For alternative explanations, these contrasts constrain attribution. For baselines, logistic regression and causal forest test whether associations or heterogeneous effects alone can account for observed gains.

Messaging-only accounts remain plausible because school programs can change habits through education and games, sometimes with sustained improvement (Fradianto et al., 2022). Related school-based behaviour education in other hygiene domains also reports measurable pre-post shifts, suggesting that exposure and practice may drive part of the response (Menor-Rodríguez et al., 2022). Discrimination therefore emphasizes fidelity and persistence measures, alongside checks that infrastructure-only upgrades align with service-level changes rather than feedback mechanisms. Multicomponent trial protocols highlight how combined packages can confound attribution if components are not isolated (Galli et al., 2024).

Table 5. Baselines and alternative explanations

Baseline Or Explanation	***What It Attributes Gains To***	***How To Discriminate***
Logistic Regression baseline	Observed feature associations	Group holdouts; bootstrap CI
Causal Forest baseline	Heterogeneous treatment effects	Ablate governance, cost
Standard health education	Messaging exposure only	Fidelity and persistence
Infrastructure-only upgrades	Hardware access changes	Slice by service level

Robustness Stress Tests Under Grouped Holdouts and Climate Constraints

Robustness to governance, resource, and implementation constraints was examined operationally through grouped holdouts and targeted stressors that challenge key assumptions of the decision-support model. Table (6) specifies the

leave-group-out holdout, an entity ID split for leakage audit, affordability and operator-capacity stress tests, and a bootstrap confidence-interval gate with baseline overlap <=50% as the pass criterion. Equation (4) defines per-group uplift as the difference between model and baseline performance.

These checks were intended to probe whether the argument remains stable when common field assumptions are relaxed, rather than only when conditions are favourable. Fig. (6) enumerates the stress-test scenarios and links each to the assumption it weakens, clarifying how failure would be interpreted. For robustness of reasoning, passing requires meeting the same primary metrics under each stressor and avoiding cross-split contamination in the leakage audit; empirical results are not reported here.

$$\Delta m_g = m_{model,g} - m_{baseline,g} \quad (4)$$

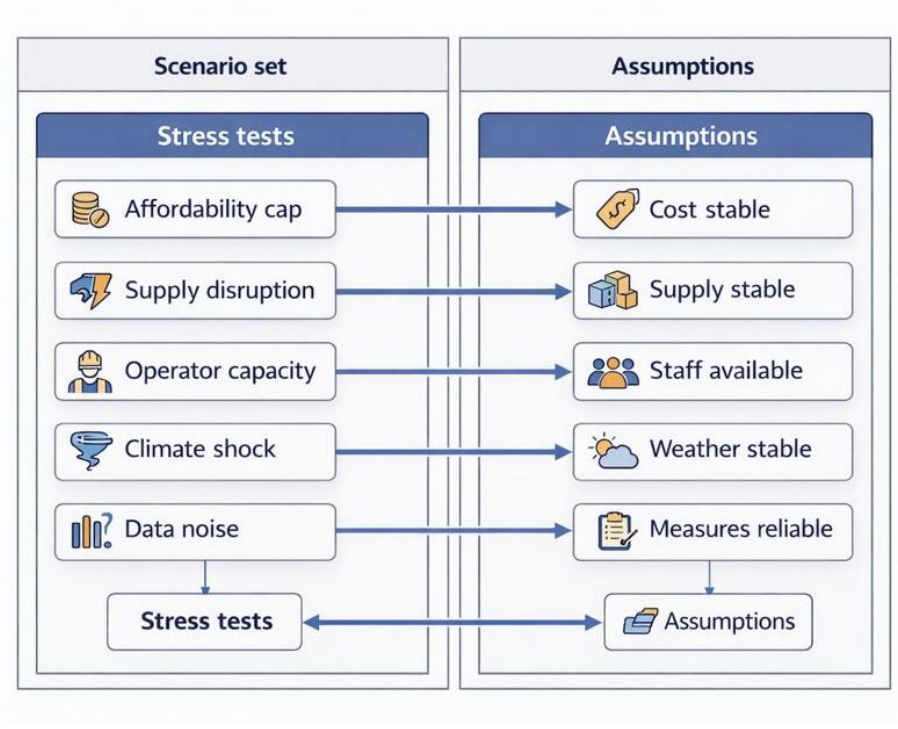

Figure 6. *Stress tests and assumption sensitivity*

Table 6. Holdouts and stress test matrix

Test Type	*Partition Or Stressor*	*Primary Check*	*Pass Criterion*

Grouped Holdout	Leave-Group-Out	Primary metrics	All AC met
Leakage Audit	Entity ID split	No cross-split	No leakage found
Resource Stress	Affordability caps	Primary metrics	All AC met
Capacity Stress	Operator response limit	Primary metrics	All AC met
CI Gate	Bootstrap CI	Baseline overlap	Overlap <=50%

Limitations and Future Work

Feasibility constraints are likely to shape uptake of behaviour-centered decision support in school hygiene programming, particularly where staffing, governance, and reporting infrastructure are limited. A central limitations concerns whether audit-and-feedback cycles can be sustained once external resources taper. Qualitative evidence from an audit-and-feedback implementation indicates that acceptability can coexist with difficulties trusting or interpreting performance reports and with competing priorities, making the intervention sensitive to organizational climate and resourcing (Cunha-Cruz et al., 2023). Data quality can become the bottleneck.

Generalizability is also bounded by the evidence base available for constructing and validating the proposed model. Small-scope qualitative studies can clarify mechanisms and implementation barriers, but their two-site or otherwise narrow settings do not establish transfer to new geographies or school systems (Cunha-Cruz et al., 2023). Future work should test the model under grouped and external holdouts and document where recommendations fail, for example when construct coding proves unreliable or when measured hygiene outcomes do not track program decisions. Such falsifiers remain not reported here.

Conclusion

Implementation fidelity emerges as a practical lever for school hygiene programming because even well-specified activities can fail when delivery is inconsistent. Evidence from a randomized optimization trial indicates that structured monitoring and feedback and site-based mentorship increased teachers' delivery of core curriculum activities, with the combined strategy achieving the

highest fidelity (Wang et al., 2022). The present study therefore treats fidelity supports as decision variables, not merely implementation afterthoughts, when mapping context to program choices. Decision guidance is strengthened when fidelity is made observable and actionable through a rubric, measurable indicators (e.g., fidelity score), and a validation plan that tests transfer across grouped and external holdouts. Fidelity-focused supports should be selected to match constraints in staffing, governance, and resources, while recognizing that alternative mechanisms (such as infrastructure changes alone) may dominate in some settings and are not ruled out here. Empirical confirmation remains necessary (Wang et al., 2022).

References

Beya, M., Agegnehu, W., & Shinde, S. S. (2022). Assessment of hygiene behaviour and associated factors among school children in shey bench, southwest, ethiopia. An institutional based-cross sectional study. The Open Public Health Journal, 15(1). https://doi.org/10.2174/18749445-v15-e2206300

Bilal, S., Misra, S., Hussain, S., Tan, S. S., & Priya, E. (2023). Do right, be bright: A protocol on the development of an inter-professional health intervention model for pre-school children through a community-based service-learning initiative. Journal of Multidisciplinary Healthcare, Volume 16, 1301–1310. https://doi.org/10.2147/jmdh.s405031

Chutia, L. (2023). Personal hygiene:knowledge, attitude, and practice among higher primary school children in urban bengaluru, india. Journal of Emerging Technologies and Innovative Research, 10(04), f295–f304. https://doi.org/10.56975/brx2ja89

Cunha-Cruz, J., Hilgert, J. B., Harter, C., Rothen, M., Hort, K., & Mallott, E. K. (2023). Feedback on audit and action planning for dental caries control: A qualitative study to investigate the acceptability among interdisciplinary pediatric dental care teams. Frontiers in Oral Health, 4, 1195736–1195736. https://doi.org/10.3389/froh.2023.1195736

Dangis, G., Terho, K., Graichen, J., Günther, S. A., Rosio, R., Salanterä, S., Staake, T., Stingl, C., & Pakarinen, A. (2023). Hand hygiene of kindergarten children—understanding the effect of live feedback on handwashing behaviour, self-efficacy,

and motivation of young children: Protocol for a multi-arm cluster randomized controlled trial. PLoS ONE, 18(1), e0280686–e0280686. https://doi.org/10.1371/journal.pone.0280686

Fradianto, I., Andriyanto, A., Nur, A., & Yulanda, N. A. (2022). Improving handwashing behaviour of school-age children through a game-based educational program. ASEAN Journal of Community Engagement, 6(2). https://doi.org/10.7454/ajce.v6i2.1138

Galli, A., Abuzahra, Y. M., Bänziger, C., Ballo, A., Friedrich, M., Groß, K., Harter, M., Hattendorf, J., Peter-Varbanets, M., Tamas, A., Owen, B. N., & Winkler, M. S. (2024). Assessing the effectiveness of a multicomponent intervention on hand hygiene and well-being in primary health care centers and schools lacking functional water supply in protracted conflict settings: Protocol for a cluster randomized controlled trial. JMIR Research Protocols, 13, e52959–e52959. https://doi.org/10.2196/52959

Ghose, S. S., Patel, N. A., Marshall, T., George, P., Taylor, J., Karakuş, M., Crocker, L. D., Hoey, T., & Goldman, H. H. (2024). Assessing the evidence base for school-based promotion and prevention interventions: Introduction to the series. Psychiatric Services, 75(9), 888–894. https://doi.org/10.1176/appi.ps.20230542

Irawati, I., Sari, A., & Amirah, A. (2022). Analysis of factors influencing community behaviour towards community-based total sanitation. Journal of Asian Multicultural Research for Medical and Health Science Study, 3(2), 42–49. https://doi.org/10.47616/jamrmhss.v3i2.261

Jane, A., & Pienaah, C. K. A. (2023). Review of the effects of adequate sanitary facilities on the participation and performance of the school girl child in ghana. ISABB Journal of Health and Environmental Sciences, 8(1), 1–14. https://doi.org/10.5897/isaab-jhe2021.0073

Jiang, J., Yao, J., Yu, K.-R., & Li, C.-N. (2023). An empirical study on “how to retain rural teachers with emphasis on hygiene or motivation factors”: A case of western china. Frontiers in Psychology, 14, 1114107–1114107. https://doi.org/10.3389/fpsyg.2023.1114107

Kalubi, J., Riglea, T., O'Loughlin, E. K., Potvin, L., & O'Loughlin, J. (2023). Health-promoting school culture: How do we measure it and does it vary by school neighborhood deprivation?*. Journal of School Health, 93(8), 659–668. https://doi.org/10.1111/josh.13304

Kouévi, T. A., Okry, F., Kpangon, H., Kouévi, A. C., Amoukpo, H., Hounkpatin, L., Attakin, E., Tossou, C. R., Achigan-Dako, E. G., & Kestemont, M. (2024). Designing gender-specific toilet and urinal needs calculation templates for rural and urban schools: Lessons from the republic of benin. European Scientific Journal ESJ, 20(2), 101–101. https://doi.org/10.19044/esj.2024.v20n2p101

Kuhlmann, A. S., Palovick, K. A., Teni, M. T., & Hunter, E. (2023). Period product resources and needs in schools: A statewide survey of missouri's school nurses. Journal of School Health, 93(7), 557–564. https://doi.org/10.1111/josh.13326

March, C. A., Hill, A., Kazmerski, T. M., Siminerio, L. M., Miller, E., Libman, I., & Switzer, G. E. (2022). Development and psychometric analysis of the <scp>d</scp> iabetes <scp>d</scp> evice <scp>c</scp> onfidence <scp>s</scp> cale for school nurses. Pediatric Diabetes, 23(6), 820–830. https://doi.org/10.1111/pedi.13375

McLoughlin, G. M., Sweeney, R., Liechty, L., Lee, J. A., Rosenkranz, R. R., & Welk, G. J. (2022). Evaluation of a large-scale school wellness intervention through the consolidated framework for implementation research (CFIR): Implications for dissemination and sustainability. Frontiers in Health Services, 2, 881639–881639. https://doi.org/10.3389/frhs.2022.881639

Menor-Rodríguez, M. J., Rodríguez-Blanque, R., Montiel-Troya, M., Cortés-Martín, J., Cordero, M. J. A., & Sánchez-García, J. C. (2022). Educational intervention in the postural hygiene of school-age children. Healthcare, 10(5), 864–864. https://doi.org/10.3390/healthcare10050864

Muche, N., Wasihun, Y., Wondiye, H., Bogale, E. K., & Anagaw, T. F. (2023). Behavioural responses for face cleanliness message to prevent trachoma among mothers having children age 1–9 years old, in fogera district, northwest ethiopia: An application of extended parallel process model. International Journal of General Medicine, Volume 16, 1927–1941. https://doi.org/10.2147/ijgm.s412380

PANCHACOLA, D. R. L. (2023). EXTENT OF SCHOOL-BASED FEEDING PROGRAM IMPLEMENTATION ON HEALTH OUTCOMES AND EDUCATIONAL SUCCESS OF ELEMENTARY STUDENTS IN PAGSANJAN DISTRICT. International Journal of Research Publications, 124(1). https://doi.org/10.47119/ijrp1001241520234848

Paula, J. S. de, RODRIGUES, P. A., Mattos, F. de F., Abreu, M. H. N. G. de, Chalub, L. L. F. H., & Zina, L. G. (2022). Mother's education and family relations protect children from dental caries experience: A salutogenic approach. Brazilian Oral Research, 36, e111–e111. https://doi.org/10.1590/1807-3107bor-2022.vol36.0111

Perpelea, A.-C., Sfeatcu, R., Tănase, M., Imre, M., Totan, A., Cernega, A., Funieru, C., & Pițuru, S. (2024). A STEPwise approach for oral hygiene behaviour of schoolchildren in romania. Healthcare, 12(2), 198–198. https://doi.org/10.3390/healthcare12020198

Pico, A. M. P., Álvarez, E. M., Rodríguez, J. V., & Mayordomo, R. (2022). Differences in hygiene habits among children aged 8 to 11 years by type of schooling. Children, 9(2), 129–129. https://doi.org/10.3390/children9020129

Rany, N., Dewi, O., & Herniwanti, H. (2022). Effectiveness of media modules on triggering community-based total sanitation programs (STBM). Jurnal Penelitian Pendidikan IPA, 8(5), 2470–2475. https://doi.org/10.29303/jppipa.v8i5.2354

Raza, N., Raza, M., RAZA, Z., & BAKHAT, S. (2023). Comparative analysis of school-based wash facilities, implications on children behaviours and health coupled with a policy framework for enhancing cognitive learning in children. NUST Journal of Natural Sciences, 8(1). https://doi.org/10.53992/njns.v8i1.109

Trandafir, A.-V., & Lotrean, L. M. (2025). Education for improving awareness and practices regarding hand hygiene among romanian school children. Sustainability, 17(1), 304–304. https://doi.org/10.3390/su17010304

Tunggeng, M. G. R., Natasya, D., Annisa, P. R., Dawa, M. M. A., Nopianti, N. I., Jafar, N., & Gani, A. P. (2025). Clean and healthy living behaviour education for elementary school students in katimbang subdistrict, makassar. Abdimas Jurnal

Pengabdian Masyarakat Universitas Merdeka Malang, 10(1), 136–145. https://doi.org/10.26905/abdimas.v10i1.13835

Vennegoor, G., Assema, P. van, Eekhout, I., Lezwijn, J., Molleman, G., & Jansen, M. (2022). Measuring implementation of health promoting school (HPS) programs: Development and psychometric evaluation of the HPS implementation questionnaire. Journal of School Health, 93(6), 450–463. https://doi.org/10.1111/josh.13277

Wang, B., Deveaux, L., Cottrell, L., Li, X., Adderley, R., Dorsett, B., Firpo-Triplett, R., Koci, V., Marshall, S., Forbes, N., & Stanton, B. (2022). The effectiveness of two implementation strategies for improving teachers' delivery of an evidenced-based HIV prevention program. Prevention Science, 23(6), 889–899. https://doi.org/10.1007/s11121-022-01335-x

Yamgai, P. F., Pouokam, G. B., Foudjo, B. U. S., Mazzanti, F., Sando, J. T., Samuel, C., Silapeux, A. G. K., Fokou, É., & Frazzoli, C. (2022). Combined education course on nutrition, hand-washing and dental care in primary schools in yaoundé, cameroon. Journal of Global Health Reports, 6. https://doi.org/10.29392/001c.33812

Zisa, A., Nilsson, K., Mirza, R., & Vachon, T. (2022). Achieving handwashing with social art for behaviour change: The experience of the lazos de agua programme in latin america. H2Open Journal, 5(2), 323–332. https://doi.org/10.2166/h2oj.2022.029