Sustaining Shared Sanitation: The Critical Role of O&M Financing in Improving User Quality of Life

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Background

Despite their prevalence in urban sanitation, the service quality of shared toilet facilities remains highly variable and contested globally.

Between 2020 and 2025, WSUP implemented 305 standardized shared toilets, integrating uniform construction protocols with user-focused behaviour change communication (BCC) and technical training.

While structural standards and behavioural nudges are constant, service quality fluctuates significantly due to linear variables (e.g., infrastructural depreciation) and composite factors (e.g., Operations and Maintenance financing).

This study utilizes a bespoke O&M-F scale and the SanQol index to evaluate the correlation between financial management strategies and the quality-of-life outcomes afforded to users.

Conceptualization

To reflect local operational realities, this study applies a weighted SanQoL model prioritizing disgust and disease (30% each) due to their sensitivity to O&M, while assigning lower weights (15%) to safety and privacy, and minimum (10%) to shame based on the standardized construction and socio-economic homogeneity of the facilities.

The conceptual framework underpinning this study positions O&M financing (G2) as the upstream variable whose effects on SanQoL (G1) are mediated by two observable intermediaries: operational behaviour (G3) and physical condition (G4).

Financing enables the material preconditions for good behaviour — cleaning agents, designated personnel, regular emptying — and good behaviour, in turn, shapes the physical conditions that users experience. This mediated pathway, rather than a direct financing-to-quality-of-life translation, is the central theoretical proposition of the study.

Methodology

This cross-sectional study surveyed 305 active shared toilet chambers installed since 2020 in four wards of Chattogram, Bangladesh, using a census approach. The study operationalizes four composite measurement groups, each normalized to a 0–1 scale. The primary analytical methods are Pearson and Spearman correlation analysis, bivariate group comparison (one-way ANOVA), indirect pathway analysis, and mechanism-stratified subgroup analysis.

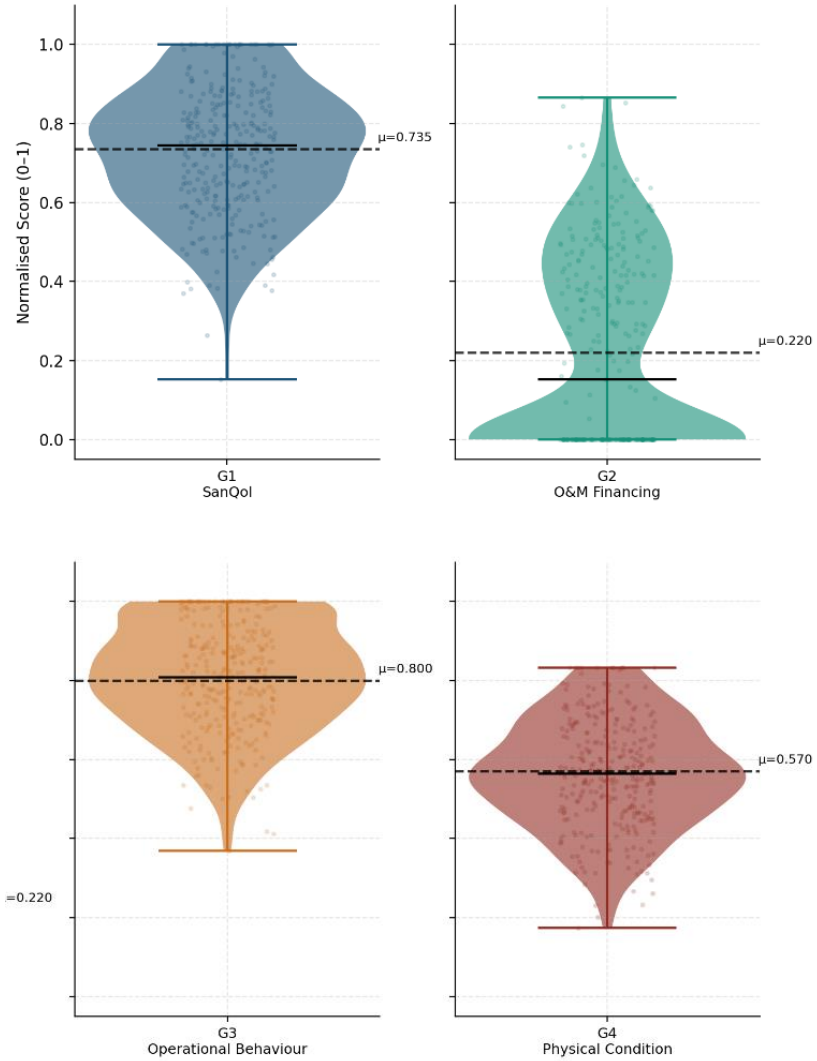
Group	Construct & Items	Measurement	Role in Study
G1: SanQoL	Sanitation Quality of Life (5 weighted items): Disgust-free (30%), Disease-free (30%), Privacy (15%), Safety (15%), Shame-free (10%), Items closely relevant to regular O&M are given more weightage.	Weighted composite index (0-1)	Core outcome variable
G2: O&M-F	O&M Financing Sustainability (7 items): Regular contributions, affordable amount, emergency repair, rehabilitation, cleaning agents, pit emptying, utility bills	Bespoke 7-item Likert scale (0–1)	Core explanatory variable
G3: Op. Behaviour	Operational Behaviour (6 items): Water pouring (self & collective), cleaning rotation, no waste, brush/agent availability, designated O&M person	Self-reported; 6-item Likert scale (0-1)	Proxy group; Behavioral Mediator
G4: Physical Condition	Physical Infrastructure Assessment (18 items): Binary checklist: pan, floor, odor, privacy, water, handwashing, lighting, waste, MHM, signage, etc.	Binary observational checklist (0–1)	Proxy group; Structural context
Cross-cuttings	Control Variables (5): Toilet age, total users per chamber, user satisfaction, women's needs consideration, O&M mechanism	Mixed; continuous, ordinal and categorical.	Control & moderating variables

Results

Operational behavior (G3) and user-centric quality of life (G1) exhibit the highest performance levels, with mean scores of 0.800 and 0.735 respectively, indicating strong toilet etiquette and generally high user satisfaction.

Physical infrastructure condition (G4) shows significant variability and a moderate mean of 0.570, suggesting that the quality and upkeep of the actual facilities are inconsistent across the study sites.

O&M financing (G2) represents a critical systemic failure, recording the lowest mean score (μ=0.220) with a distribution concentrated near zero, highlighting a severe lack of sustainable funding mechanisms for maintenance.

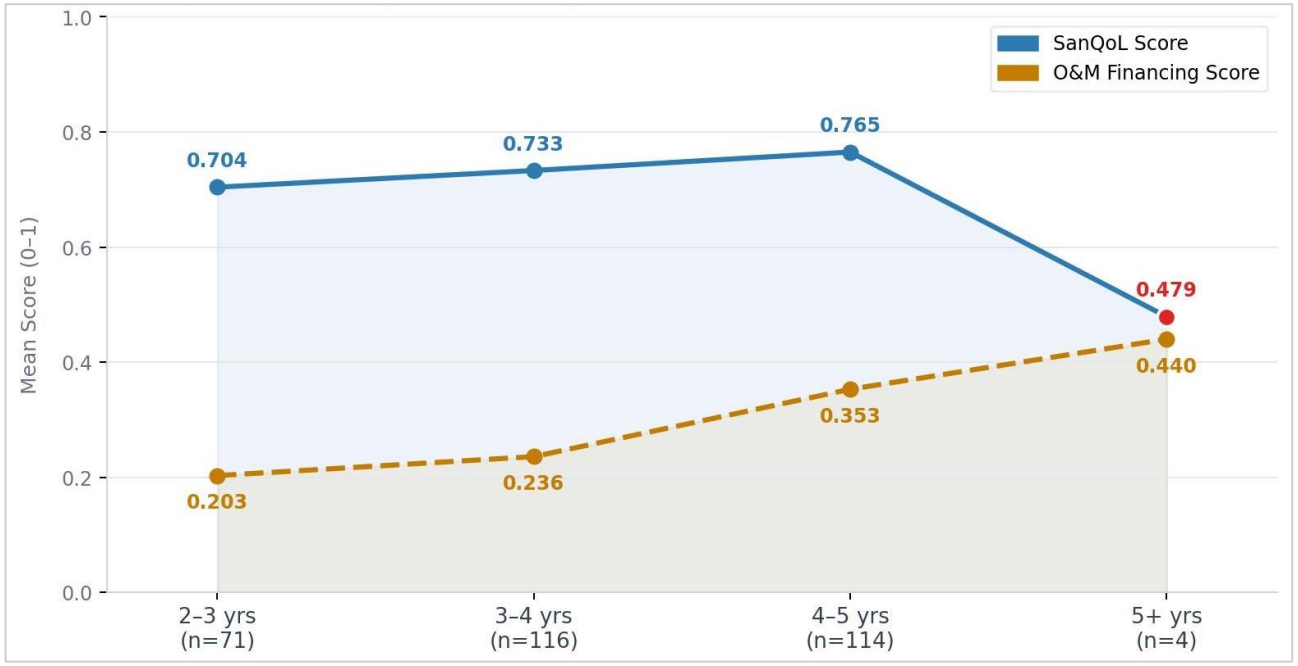


Results

Statistical analysis reveals that toilet age has no significant impact on user-perceived Quality of Life (r=0.015), indicating that the subjective experience remains relatively stable regardless of infrastructural maturity.

In contrast, O&M financing demonstrates a positive developmental trajectory (r=0.13), with the proportion of zero-scoring facilities dropping from over 50% in newer units to 25% in those older than five years.

This trend suggests that as infrastructure ages and maintenance demands—such as repairs and fecal sludge management—increase, user communities gradually formalize self-sustaining financial ecosystems to address growing operational needs.



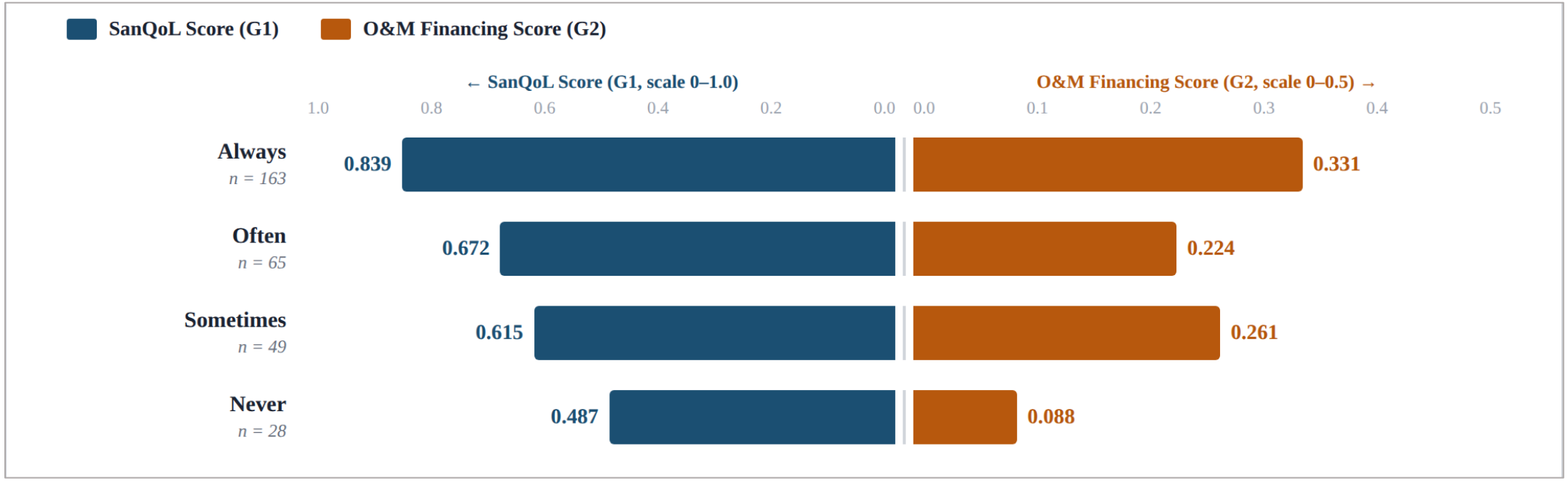
Results

Shared toilet density in the sample averages 18.04 users per chamber, though individual facilities experience a wide range of occupancy from 2 to 70 regular users.

Both user-perceived quality (SanQoL) and financial stability (O&M Financing) reach their peak performance at a moderate density of 9–15 users per chamber (Q2), identifying this range as an operational "sweet spot.“

Increased crowding beyond this threshold leads to a statistically significant decline in SanQoL (r=-0.122), likely as a result of heightened coordination challenges and physical pressure on the infrastructure.

Results



Cantering women's voices in sanitation governance serves as a primary driver for both user experience and financial sustainability, with SanQoL scores nearly doubling (0.84 vs. 0.49) and O&M Financing scores more than tripling (0.33 vs. 0.09) when their input is consistently incorporated.

Statistical validation via a strong positive correlation (r=0.466) and a significant one-way ANOVA (p=0.0032) confirms that gender-inclusive decision-making is not merely an equity imperative but a practical necessity for maintaining higher-quality, self-sustaining facilities.

Results

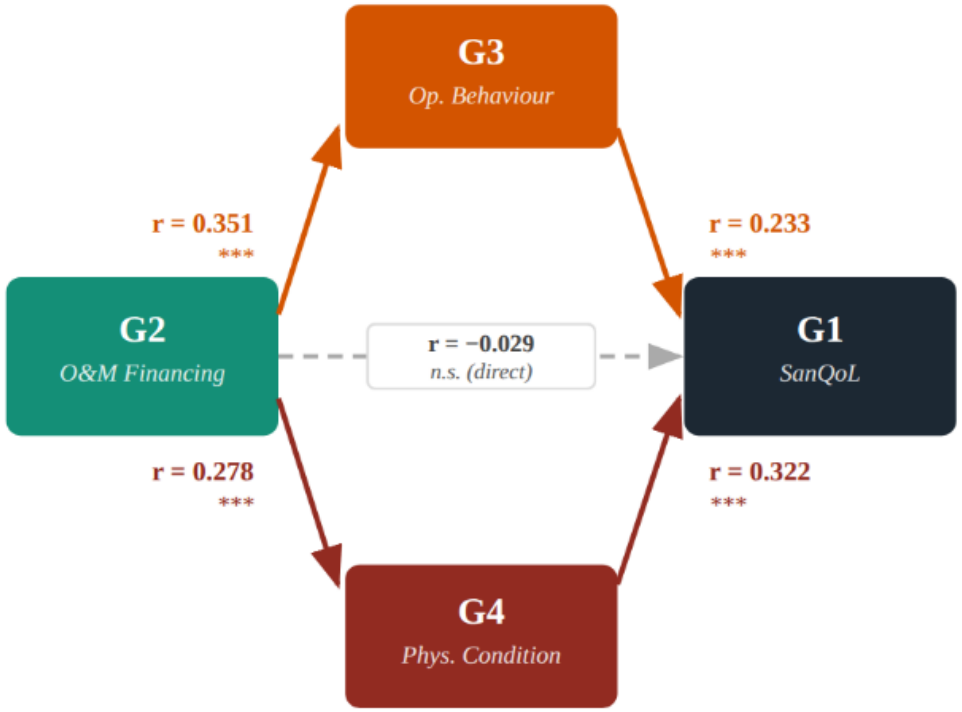
(a) Pearson Correlation Matrix

	G1 *SanQoL*	G2 *O&M Fin.*	G3 *Op. Behav.*	G4 *Phys. Cond.*
G1 *SanQoL*	1.000 —	−0.029 *n.s.*	+0.233 ***	+0.322 ***
G2 *O&M Fin.*	−0.029 *n.s.*	1.000 —	+0.351 ***	+0.278 ***
G3 *Op. Behav.*	+0.233 ***	+0.351 ***	1.000 —	+0.219 ***
G4 *Phys. Cond.*	+0.322 ***	+0.278 ***	+0.219 ***	1.000 —

Negative (−) (+) Positive

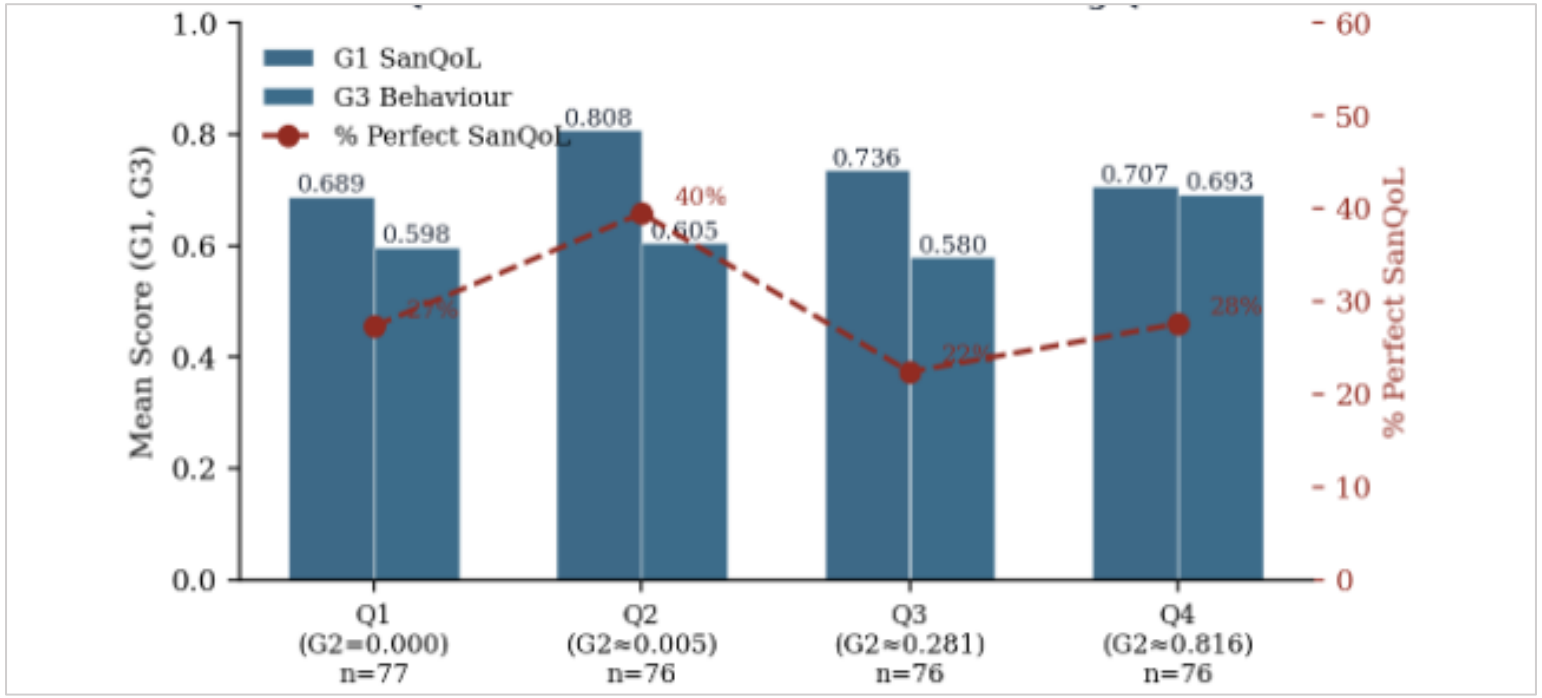
*** $p < .001$ | *n.s. = not significant ($p = .612$)* | *Diagonal = self-correlation (1.000)*

(b) Mediation Pathway: G2 → G1



*Indirect via G3: 0.351 × 0.233 = **0.082** ($p < .001$)*
*Indirect via G4: 0.278 × 0.322 = **0.090** ($p < .001$)*
Direct path r = −0.029 is non-significant ($p = .612$)

Results



The relationship between financing and QoL is non-linear; paradoxically, facilities with near-zero Q2 scores achieve the highest mean SanQoL (0.808) and the highest rate of perfect scores (39.5%). Cross-tabulation confirms that high behavioural compliance is the primary driver of quality, as sites with low financing but high behaviour record the best outcomes (G1 = 0.842), whereas high financing without behavioural follow-through yields the lowest rates of success. This suggests that while formal funding is a goal, informal ownership norms and behavioural etiquette can independently sustain high-quality experiences, whereas financing alone offers little experiential value.

Discussion

While O&M financing eventually matures to activate behavioural and material improvements, its near-systemic absence at installation necessitates immediate, proactive support from authorities rather than reactive management.

Financing is a necessary enabler rather than a direct driver; its impact on quality of life is entirely mediated by behavioural compliance and physical maintenance, rather than financial input alone.

The G2 → G3 → G1 mediated pathway is conditional and susceptible to failures, such as financing that lacks behavioural follow-through or high-quality outcomes sustained solely by informal ownership norms.

Gender-inclusive governance (r=0.466) is the strongest predictor of quality of life, outperforming financial and physical variables by aggregating responsiveness, feedback, and the political inclusion of primary users.

User density presents a critical threshold where exceeding 50 users—or the subjective perception of overcrowding—significantly degrades the quality of life, highlighting the need for active demand management.

Limitation

While the SanQol index is an established metric, the bespoke O&M financing scale was developed specifically for this study and requires further empirical validation and refinement in future research.

The cross-sectional design relied on primary data from current users, introducing potential social desirability or recall biases that may influence the composite scores for SanQol (G1) and O&M Financing (G2).

The findings are situated within the specific geographic (saline-prone) and socio-economic (industrial labour) context of Chattogram; results may vary across different regions or diverse socio-economic cohorts.

Conclusion

This study utilizes a bespoke scoring system to demonstrate that while O&M financing is a necessary enabler, it is insufficient on its own to drive improvements in user-perceived quality of life.

The findings suggest a shift in post-installation support, moving beyond a narrow focus on financial variables to prioritize governance quality and the active inclusion of women's perspectives as more powerful levers for success.

Future research should focus on validating these novel scoring scales and analysing the temporal gap between facility installation and the eventual establishment of self-sustained financial mechanisms.

Thank You

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