



Wash! Track! Win! An Automated, Gamified Hand Hygiene Monitor for Adolescents

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1. The Problem: Poor Hand Hygiene

The CDC recommends at least 20 seconds of handwashing to prevent the spread of disease through hand contact (1).

- Yet **~1 in 11 adolescents** globally rarely or never wash their hands with soap (2).
- New Jersey reported over **7,700 cases of handwashing-preventable diseases** in 2024, climbing back after a COVID-era dip (Fig 1).

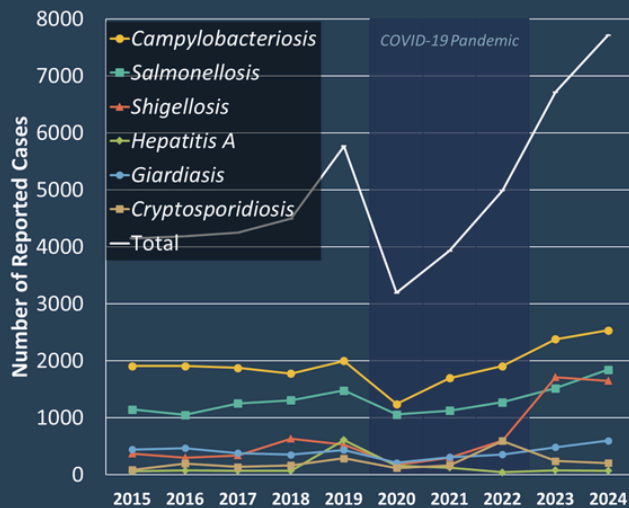


Fig 1. Annual reported cases of selected handwashing-preventable communicable diseases in New Jersey, 2015-2024 (3).

To understand these behaviors locally, we surveyed **427 respondents across 8 NJ schools**. Our findings mirrored global trends (2, 4) (Fig 2):

- Over 64% washed for less than 20 seconds.
- The top barriers were time constraints (65.8%) and forgetfulness (46.6%).

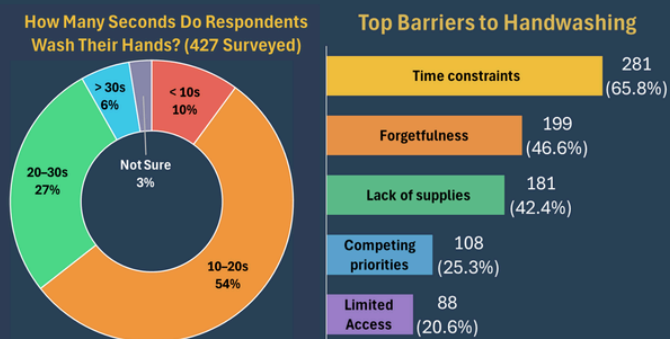


Fig 2. Self-reported handwashing duration (left) and top barriers (right) among 427 NJ students, Nov-Dec 2025.



This work advances UN Sustainable Development Goal 3: Good Health and Well-Being, turning a daily habit into an engaging, measurable solution for communities hit hardest by preventable disease.

2. Proposed Solution: Hand Hygiene Monitor



Fig 3. User flow diagram for the Smart Hand Hygiene Monitor.

We built an **automated hand hygiene monitor that makes the 20-second wash feel engaging rather than tedious**. The camera detects hands and scores each wash on three factors: duration, scrubbing, and motion variety (Figs 3-4). The system runs on a small onboard computer (Raspberry Pi 4B).



Fig 4. Prototype of the Smart Hand Hygiene Station designed for public school use.

Our device also includes gamified features such as live animations, real-time scoring, and on-screen feedback that makes every wash feel like a win!

3. Pilot Study: Will It Work?

We designed a **pilot study at Carteret High School with 81 students across 4 classes**, split by a control group (n=17) and a treatment group (n=14) (Fig 5). In Week 1, both groups will wash their hands without on-screen feedback to assess how students normally wash their hands. In Weeks 2-3, the treatment group receives the full gamified experience (live animations and real-time feedback), while the control group continues without it.

	Phase 1: Baseline		Phase 2: Intervention	
	Week 1	Week 2	Week 3	
Control n = 17	Gamification OFF	Gamification OFF	Gamification OFF	
Treatment n = 14	Gamification OFF	Gamification ON	Gamification ON	

Fig 5. Experimental timeline for the pilot study at Carteret High School, 2026. Data is collected at the class level; no personal information is recorded.

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Works Cited

