

# Necessary conditions for sustainable water and sanitation service delivery in schools: A systematic review

Christine Pu

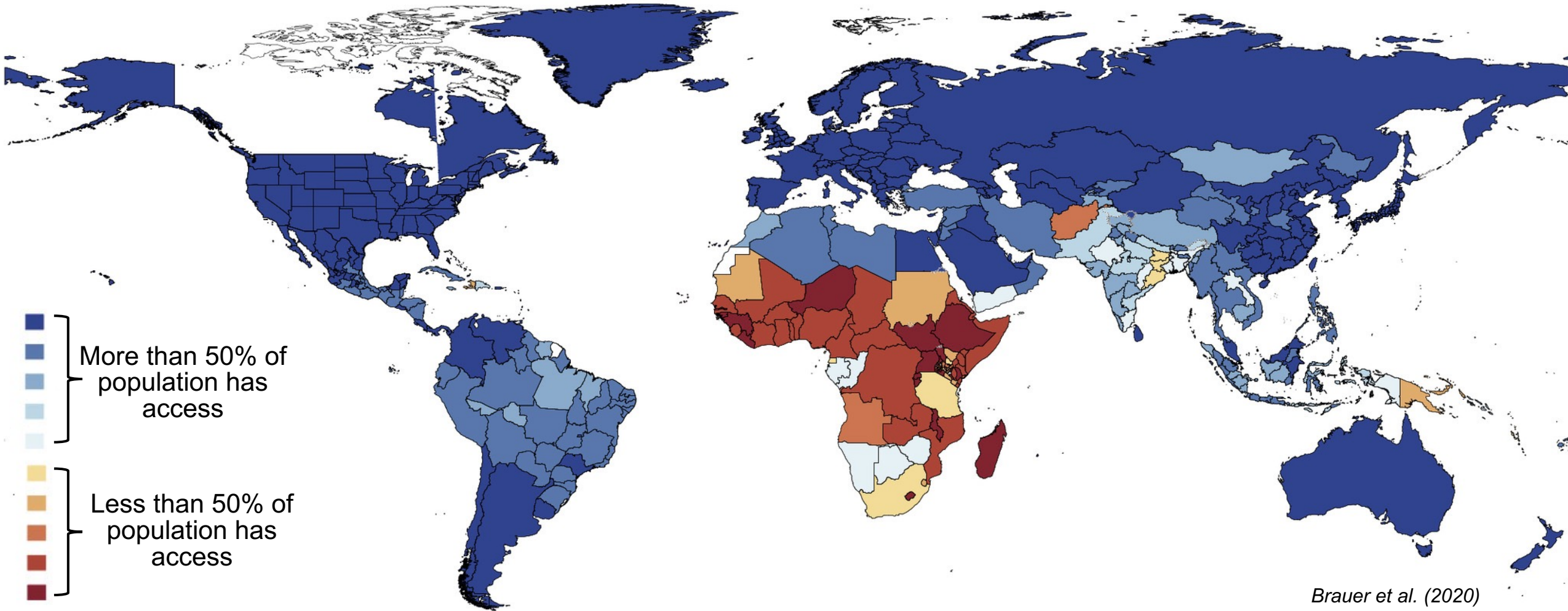
Department of Civil and  
Environmental Engineering,  
Stanford University

November 16, 2023



# Access to safe and reliable WASH services remains low in LMICs

Proportion of population with access to handwashing stations with soap and water in 2019



Schools are a critical institutional setting for WASH access improvements



To ensure sustainable service, physical infrastructure must be well-maintained...



*Photo credit: Solea Water*

... and necessary  
consumables need  
to be provided  
consistently



*Photo credit: The Better India*



Unsustainable WASH service delivery is attributed to a variety of reasons, but recent interventions targeting these barriers have had **mixed results**

Limited budgets & resources



Irregular monitoring



Unreliable water sources



Ineffective accountability systems

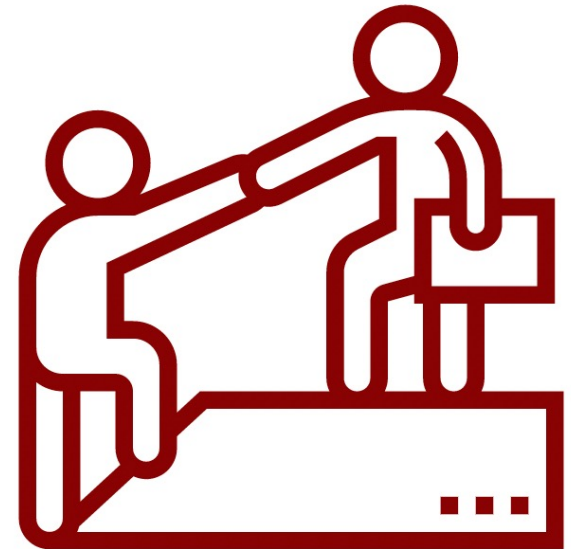
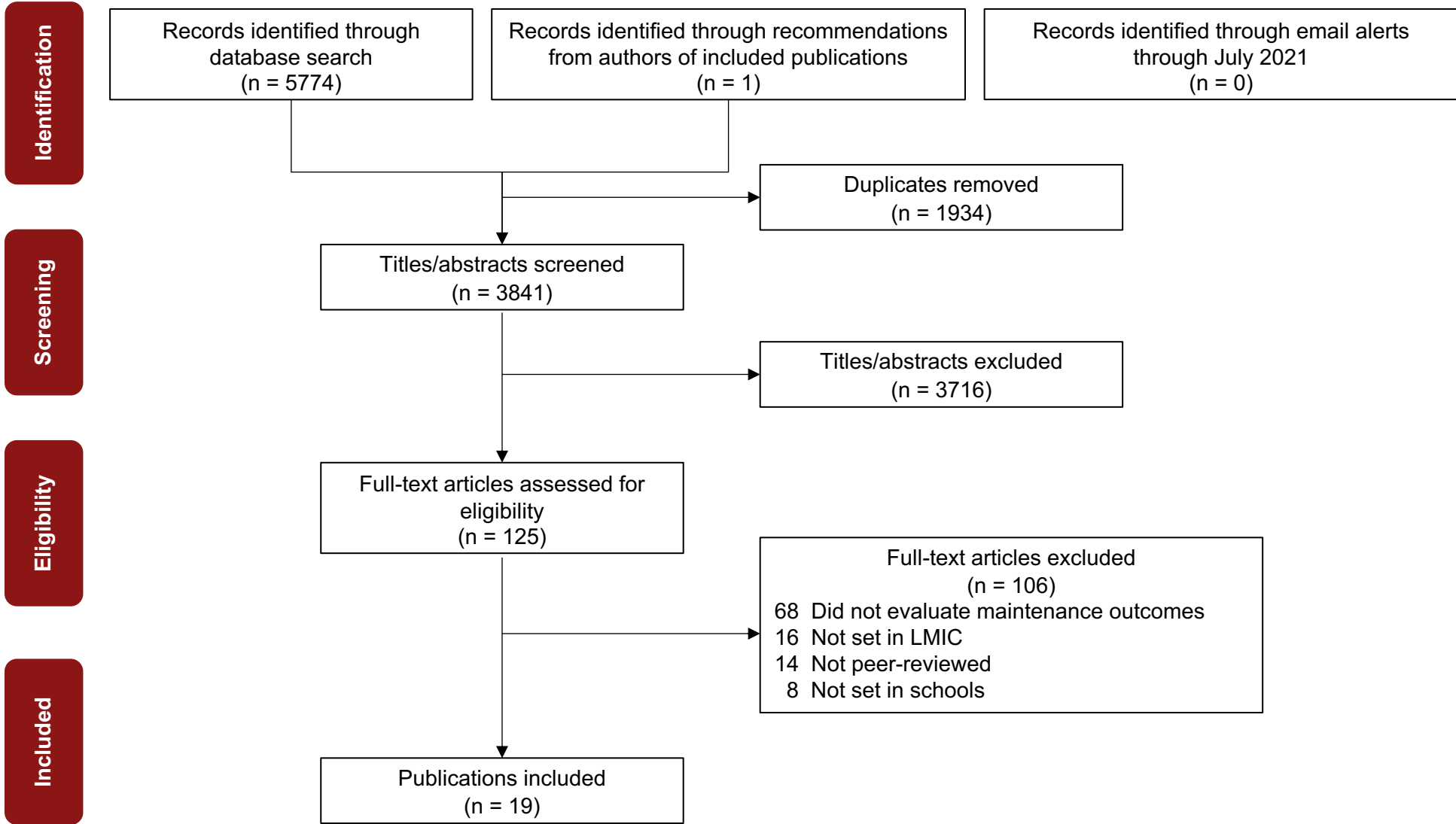


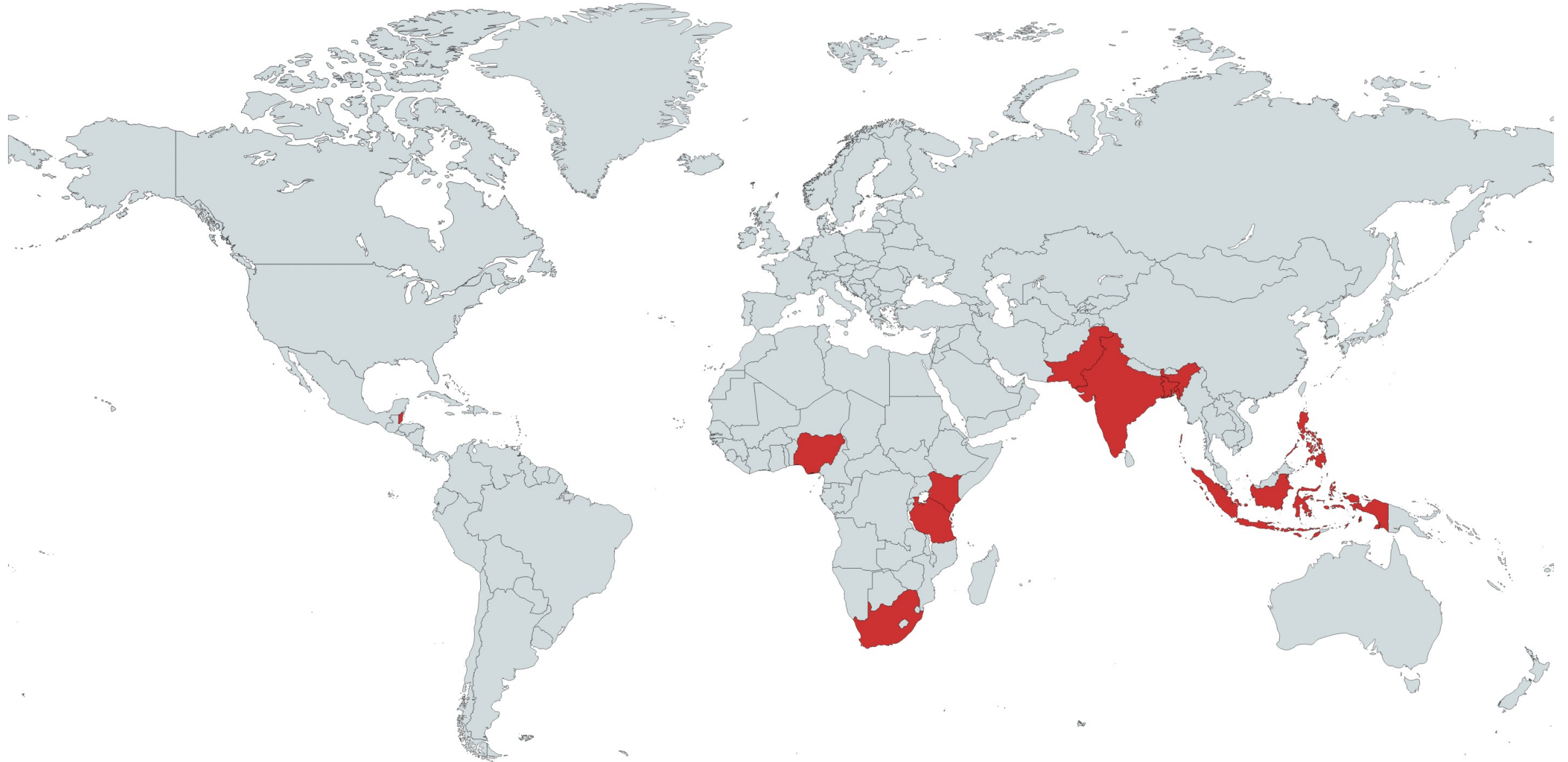
Photo credit: The Noun Project

# We conducted a systematic review of the school WASH service delivery literature in LMICs (Prospero: [CRD42020199163](https://doi.org/10.1111/1471-2575.14916))





# Settings of included publications (n=19) in the systematic review



## The majority of interventions had negligible effects on sustainability

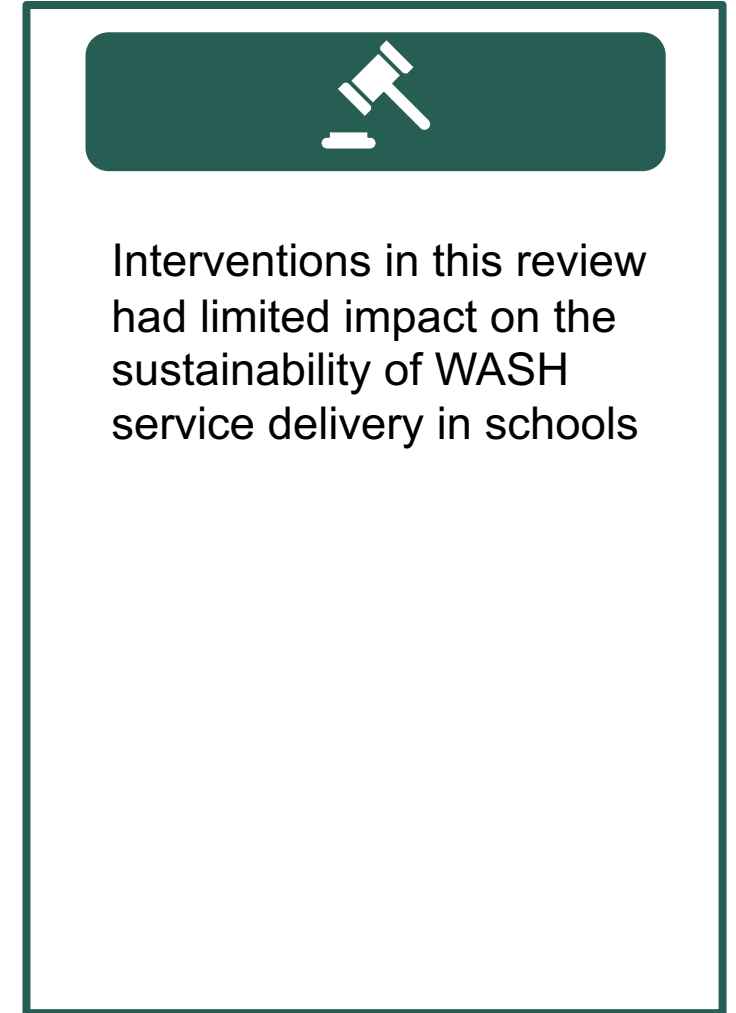
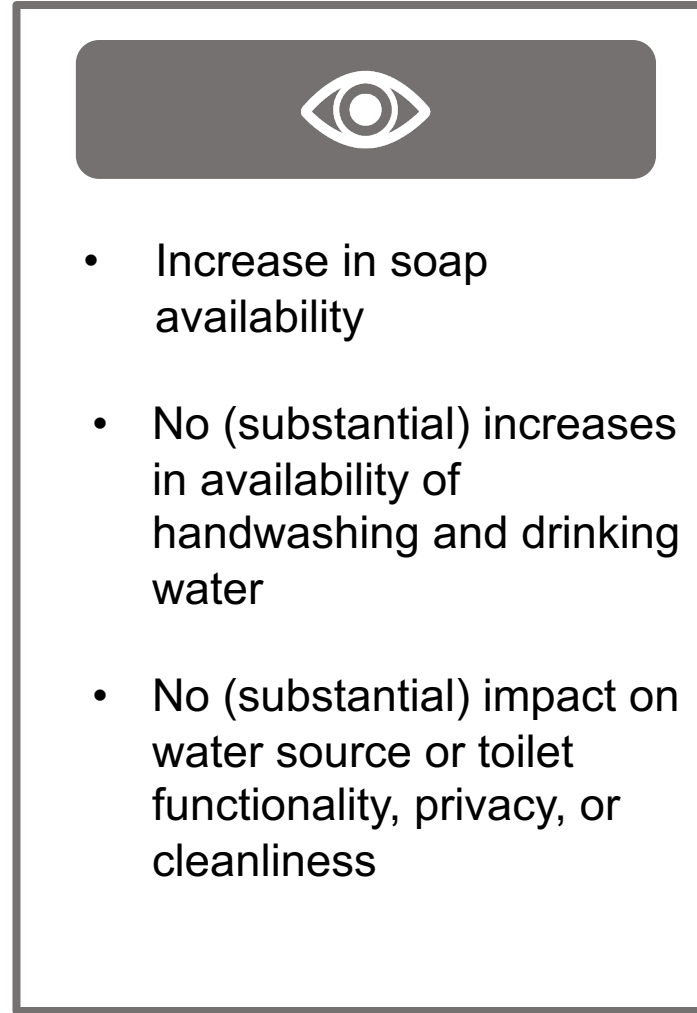
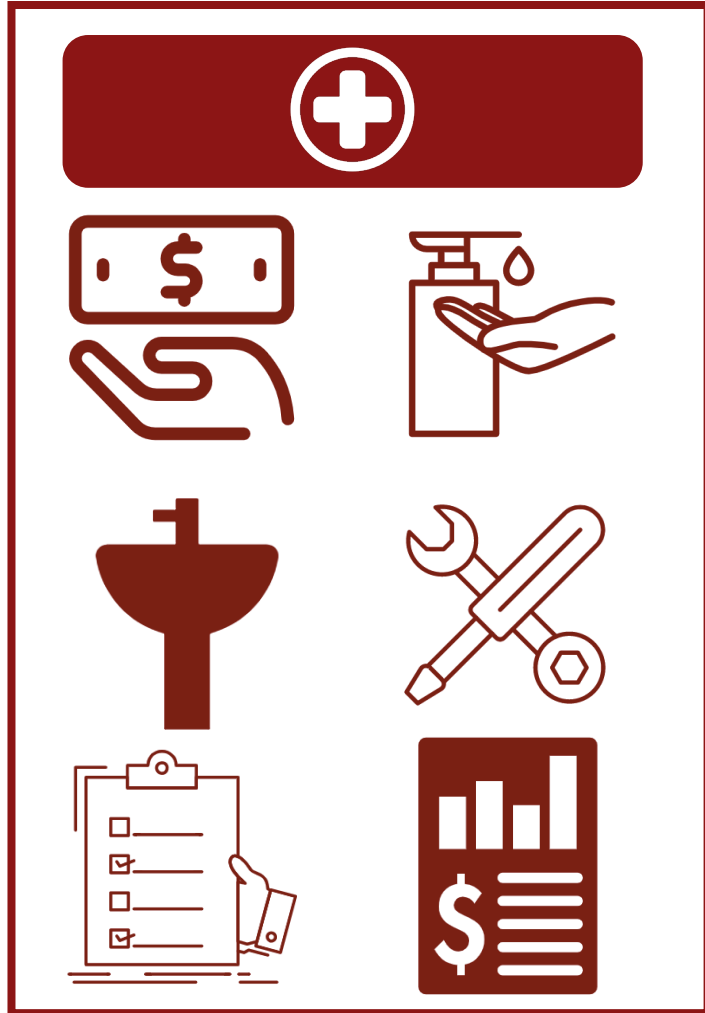


Photo credit: The Noun Project

# Observational studies emphasize accountability and information needs

Targeted barriers in experimental studies  
(n = 10)

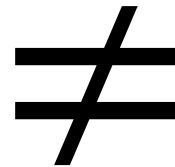
Identified barriers in observational studies  
(n = 9)

**RESOURCES**

Physical WASH infrastructure

Consumables (e.g. soap, cleaning supplies)

Financial resources to cover recurrent maintenance costs



**INFORMATION AND ACCOUNTABILITY**

Unclear information about maintenance responsibilities

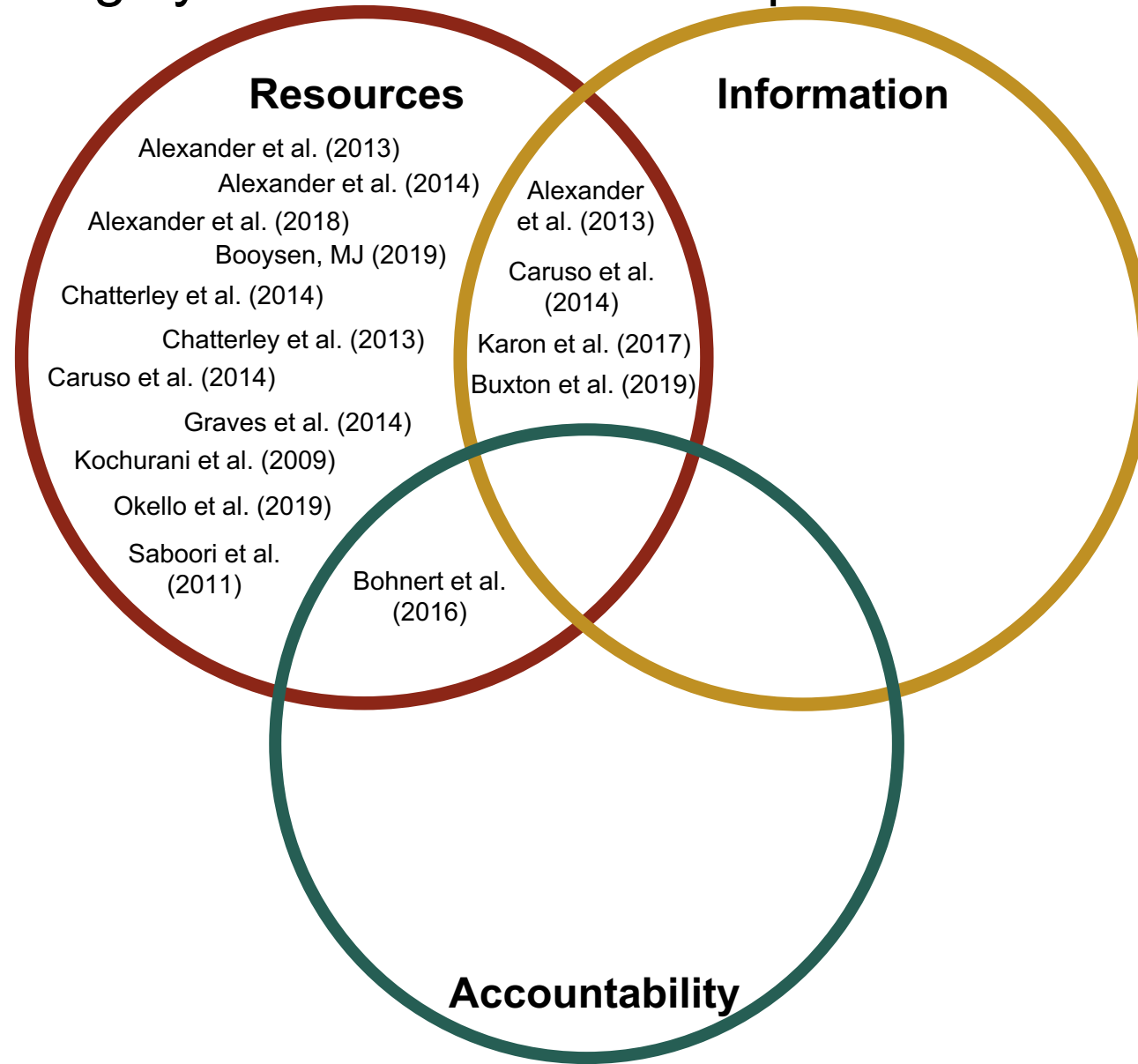
Insufficient resources to enforce existing maintenance policies

Lack of teacher authority to make maintenance-related decisions

# Resources, information, and accountability are simultaneously necessary



# Interventions have largely focused on resource provision





## Information Flow Mechanisms

- Where are existing information bottlenecks?
- What are cost-effective strategies for delivering timely, accurate information?
- Information produced must be relevant, credible, and useful for decision-making

# Accountability Mechanisms

1. Timing: being held accountable before vs. after decision-making
2. Source: party/ies to whom one feels accountable
3. Saliency: being held accountable to actions of significance
4. Standard: being held accountable for processes vs. outcomes





- “Best fit” approach > ~~“best practice”~~ thinking
- Extends usefully to other community/institutional settings and types of service delivery systems
- Diagnostic and design tool



Pu CJ, Patel P, Hornsby G, Darmstadt GL, Davis J (2022) **Necessary conditions for sustainable water and sanitation service delivery in schools: A systematic review.** PLoS ONE 17(7): e0270847. <https://doi.org/10.1371/journal.pone.0270847>



**Questions?**

Christine Pu | [cjpu@stanford.edu](mailto:cjpu@stanford.edu) | [LinkedIn](#)



**USAID**  
FROM THE AMERICAN PEOPLE

**World Vision**



**NSERC  
CRSNG**