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What factors affect sustained adoption of safe water, hygiene, and sanitation technologies? – CHAPTER FIVE

A systematic review of literature

Technical report written by Kristyna Hulland, Nina Martin, Robert Dreibelbis and Peter Winch

EPPI-Centre
Social Science Research Unit
Institute of Education
University of London

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TECHNICAL
REPORT

CHAPTER FIVE

IMPLICATIONS

Outline of Chapter

In this chapter we discuss the main findings of our review as well as the strengths and limitations of our methodology. We will then discuss the larger implications for policies and programs to promote WASH technologies and behaviours. The findings of this review imply a need for direction and leadership in guiding the research agenda on sustained adoption of WASH technologies. We discuss the steps necessary in examining sustained adoption including setting *intentions*, *planning* and *funding* assessments of long-term behaviour change; *executing* robust interventions that clearly define intervention activities and metrics for assessment; and *interpreting* and *disseminating* of these findings.

5.1 Key findings of our review

Table 17 summarizes the key behavioural factors identified in our review. We found that individual psychosocial factors, such as perceived benefit, self-efficacy, and other factors derived from individual-level behavioural models, strongly dominate the WASH literature. Interpersonal factors such as social norms are also reported to strongly affect an individual's continued practice of WASH behaviours. Understanding these factors can better inform target groups and intervention content, to achieve lasting WASH behaviour change.

Cost and durability were the two most important factors related to a technology, indicating areas where more research could be done on balancing cost-effectiveness of materials and supply-chain systems that support long-lasting hardware and long-term behaviour practice.

Finally, the greater context around an individual was found to be highly influential. Particularly in latrine use and handwashing practice, age and gender were strong determinants of an individual's continued WASH practice: individuals may be barred from using latrines or unable to practice handwashing or water treatment if they are too young, or otherwise restricted culturally or physically from accessing enabling technologies.

Surprisingly, although referenced in behavioural models, e.g. FOAM (the World Bank) or RANAS (Mosler, 2012), the concept of the "enabling environment" was not discussed in any studies in this review. As we will discuss later, an environment that is conducive not only the uptake, but *continued maintenance* of WASH behaviours is crucial to establishing sustained WASH practice.

Additionally, in a review of outcome measurement methodologies in a subset of articles assessing WASH practices after a project period has ended, we found that there is an extremely diverse array of operational definitions of "sustained adoption". This poses difficulties in making overarching conclusions about WASH use, as there are currently no standard measurement methodologies or definitions of WASH practice. As well, only 5 of 21 studies of "sustained use" (according to our definition) provided reference data from the end point of the project period, limiting our abilities to determine what overall trends in adoption were from the end of the project period to the time of the study's assessment.

Table 17. Levels of Behavioural Factors and Key findings

Determinant category	Why this is important...	Key Findings	How this can be used...
Behavioural Factors			
Psychosocial	<ul style="list-style-type: none"> • Psychosocial factors are the core of various behaviour change theories • Provide the basis of intervention design and rationale 	<ul style="list-style-type: none"> • Knowledge of the practice, self-efficacy, perceived benefits, and social norms all affect behaviour • Pre-existing habits and perceived susceptibility or severity also contribute to sustained practice 	<ul style="list-style-type: none"> • Designing intervention content • Developing effective communication strategies
Technological	<ul style="list-style-type: none"> • “Enabling technologies” • Direct interface between user and behaviour practice • Positive or negative aspects can alter behaviour adoption 	<ul style="list-style-type: none"> • Cost and durability are the most important factors across all three sectors 	<ul style="list-style-type: none"> • Designing intervention content • Selecting an appropriate technology • Implementation logistics
Contextual	<ul style="list-style-type: none"> • Factors external to user or technology influence sustained adoption • Form the environment in which behaviour change occurs 	<ul style="list-style-type: none"> • Socioeconomic status, level of education, age, and gender all strongly tied to adoption • Existing infrastructure and prior exposure to interventions also relevant • “Habit forming” environments not emphasized 	<ul style="list-style-type: none"> • Programme planning and implementation • Communicating results across different groups and settings
Programme characteristics			
Measuring Outcomes	<ul style="list-style-type: none"> • Well-defined indicators and measurements are essential to developing solid evaluations methodology • Helps understand the abilities and limitations of current measurement metrics 	<ul style="list-style-type: none"> • “Sustained” adoption is interpreted in many ways by studies • Studies employ a variety of measures, and rely heavily on verbal forms of participant report • Observations of practice were not performed, beyond spot checks 	<ul style="list-style-type: none"> • Establish metrics that capture WASH practice, particularly over longer periods or “automatic behaviours” • Provide an evidence base for selecting and evaluating WASH programming

Determinant category	Why this is important...	Key Findings	How this can be used...
Communication strategies	<ul style="list-style-type: none"> • Communication and education provide participants with ways to learn about and troubleshoot WASH technologies • Can incorporate key behavioural factors (above) 	<ul style="list-style-type: none"> • Interpersonal communication was strongly linked to better recall and continued WASH practices • Mass media events and group communication also represented in literature 	<ul style="list-style-type: none"> • Inform programme planning and intervention design • Identify key communication channels to effect sustained behaviour change

5.2 Two understandings of WASH behaviour change interventions

Key purposes of this review were to understand “intervention” and “sustained adoption”. Both turned out to be more difficult to define than anticipated. A “WASH behaviour change intervention” is a planned series of activities that create the conditions for WASH behaviours to be practiced, or promote the WASH behaviours directly. Activities that create the conditions for the WASH behaviours to be practiced including construction or installation of hardware such as wells, pumps, and latrines, or distribution of technology such as handwashing stations, water filters, or water solar disinfection units. Activities that directly promote the behaviours include home visits by health promoters, mass media communication, and promotion by community groups.

We encountered two variant understandings of “WASH behaviour change intervention”. One understanding was focused on, or even limited to, the construction or installation of hardware. This typically took place during a short time, weeks to months, at any one location. This understanding was more common in reports and articles on large-scale water and sanitation projects funded by development banks. The “intervention” happens when the borehole is drilled or the toilet is built. It follows that “sustained adoption” refers to use or adoption of the hardware in the months or years after its installation in the home or the community.

A second understanding of “WASH behaviour change intervention” refers to the entire period of external funding to a WASH project, whose activities include promotion of WASH behaviours. In this report, we refer to this as the “project period”. This second meaning is more common among NGOs and research groups. The “project period” typically lasts from one to five years. Activities during the project period include introducing the project to the community and adapting the implementation plan based on their feedback, activities to create the conditions for behaviour change (installation of hardware), and activities to directly promote the behaviour. It follows that “sustained adoption” refers to use of adoption of the hardware in the months of years after the end of the project period and/or after the end of external funding for project activities.

We now provide an example of the effect of these two different understandings of “WASH behaviour change intervention” on sustained adoption. If latrines were constructed at the outset of a two-year project, one meaning of sustained adoption would be adoption of the behaviour and use of the latrines in the months or years following construction of the latrines—including the two year project period. A second

meaning would be use of the latrines in the months or years following the end of external funding. With the end of external funding, support for household and community-level promotion of latrine use and maintenance comes to an end and the users become solely responsible for the continuation of the behaviour and associated maintenance of the technology.

Our search strategy yielded 1869 articles and reports that reported on the results of WASH behaviour change interventions. These articles and reports were drawn from both low and middle income countries, a wide range of publication dates and various institutional settings. Once we applied the inclusion criteria specified in the protocol, 148 articles and reports were then included in mapping stage. Of these 148, only 44 examined sustained practice of WASH behaviours 6 months or more after the “WASH behaviour change intervention”. Of these 44, 23 followed the first understanding of “WASH behaviour change intervention”, in that they examined sustained behaviour change 6 months or more after installation of hardware - we termed these “maintenance” studies. In the “maintenance” studies, the “sustained behaviour change” was still during the period of external project funding. Of these 44, only 21 followed the second understanding of “WASH behaviour change intervention”, in that they examined sustained adoption 6 months or more after the end of the project period. We termed these “sustained adoption” studies.

5.3 Theory of Change

Both understandings of “WASH behaviour change intervention” provided above will continue to exist in the literature. We therefore developed a Theory of Change that recognises both (Table 18, Figure 6). The far right column indicates the two understandings of sustained adoption we encountered in the literature:

- Definition 1 on the left examines sustained adoption from the point at which hardware such as a well, a toilet or a water treatment technology was installed or distributed until the end of the project period.
- Definition 2 on the right examines sustained adoption from the point at which external funding for the WASH behaviour change intervention came to an end.

We divide the life of a WASH behaviour change project into four time periods:

- 1) Early Project Period;
- 2) Late Project Period;
- 3) Early Post Project Period; and
- 4) Late Post Project Period.

During each of these four periods, there is a different context for practicing WASH behaviours. Details on the enabling and constraining factors in each of the four periods are provided in Table 18 and Figure 6. Here we sketch the main features of the four periods.

1) Early Project Period - This is frequently a period of excitement and enthusiasm. New technology is introduced into a community at low cost or no cost, and project personnel and/or community promoters explain the new technology and its advantages. The novelty of the technology, the promotional activities and other special events all encourage people to try the technology or practice the new behaviour. Conversely, failure of the project to adequately adapt the technology and behavioural recommendations to the needs of the population and the specific environmental conditions may slow adoption.

2) Late Project Period - The initial enthusiasm for the technology or the behavioural recommendations diminishes, and community members have the chance to weigh the advantages and disadvantages of the new against the pre-existing. The continued presence of project staff may ensure that cost and availability do not constitute significant barriers to use. Health promoters help people to solve problems related to new technologies. At the same time, people may realize that the promised benefits have not materialized, and return to previous technologies and behaviours. It is during this period that what we term as

“maintenance” articles assess whether behaviour has been sustained. Ideally there is planning in the late project period, so that community members are in a position to maintain the functionality of the technology, restock on essential supplies and continue to practice the recommended behaviours after the end of external funding and support.

3) Early Post Project Period - While external support ends, the promotional messages and instructions disseminated by the project are still fresh in people’s minds. Projects may have left extra supplies. People may be motivated to continue practicing the behavioural recommendations in order to maintain health benefits. At the same time, breakdowns in equipment or stock outs in essential supplies may start to bring down previous level of adoption. The behavioural cue (reminder) of regular household visits by promoters may be lost. Household members who from the outset have been sceptical of the new technology or behavioural recommendation may reassert their position, and encourage other household members to revert to previous ways. Studies assessing WASH behaviours in this and the following period were classified as “sustained adoption” studies in this review.

4) Late Post Project Period - Problems with breakdowns in equipment and stock outs may worsen, further decreasing levels of adoption. However, the desire to maintain benefits of the technology or behaviour, and new habits and social norms that resulted from the intervention activities during the project period may help sustain previous levels of practice of the WASH behaviours.

Table 18. Theory of Change for Sustained Adoption of WASH Behaviours

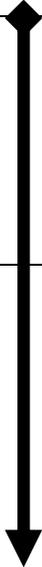
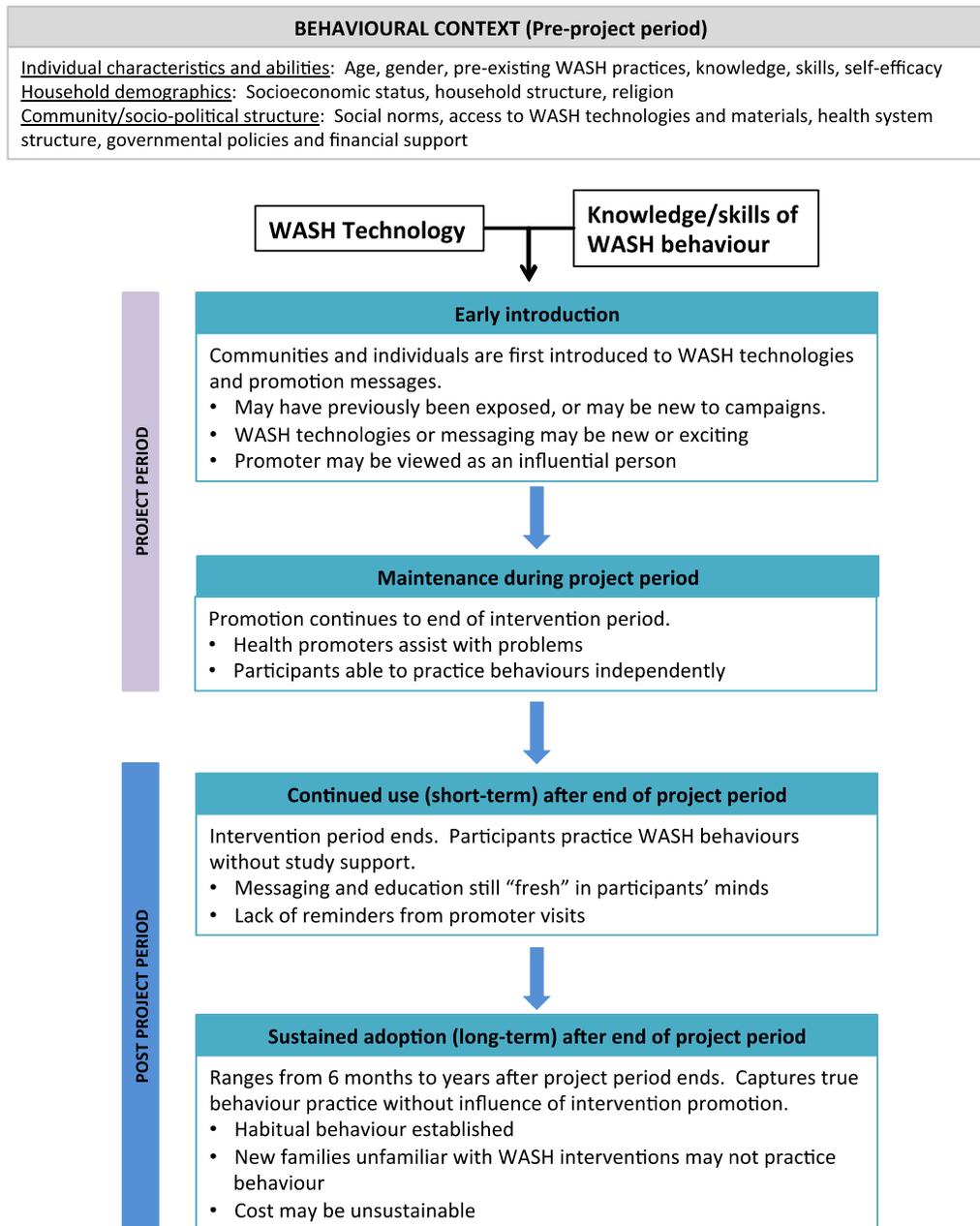
Period	Stage and main activities	Enablers	Barriers	Sustained adoption
Project Period	1 –Early Project Period <ul style="list-style-type: none"> Introduction of project or intervention to community Installation or distribution of hardware: Pumps, wells, latrines, water filters, handwashing stations Early promotion of behaviour change 	<ul style="list-style-type: none"> Promotion efforts and messaging Individual knowledge, skills, self-efficacy Availability , acceptability, cost (usu. free) and novelty of WASH technology Perceived benefits 	<ul style="list-style-type: none"> Difficulties reaching populations Dislike of technology Familiarity with prior WASH habits Reluctance of household members 	LEFT: Definition 1 RIGHT: Definition 2 
	2 – Late Project Period <ul style="list-style-type: none"> Continued promotion of target behaviours Preparation of community for end of external support Identification of alternative sources of supplies, repairs 	<ul style="list-style-type: none"> Health promoter available to assist with problems that may arise New social norms and habits established Continued support from promoters and project supervisors 	<ul style="list-style-type: none"> Actual and perceived benefits do not align Problems with communication and supply logistics Timing of practice Loss of interest 	
End of Project				
Post-Project Period	3 – Early Post Project Period <ul style="list-style-type: none"> Continued Use or Adoption Structures left in place for resupply and repair start to function 	<ul style="list-style-type: none"> Messaging still “fresh” in minds Extra supplies remaining from project period Desire to maintain health benefits 	<ul style="list-style-type: none"> Lack of supplies or technology functionality Preferences of influential household members re-emerge Regular behavioural cue (home visit) lost 	
	4 – Late Post Project Period <ul style="list-style-type: none"> Continued Use or Adoption Structures left in place for resupply and repair continue to function Problem solving by users or community groups 	<ul style="list-style-type: none"> Habitual behaviour established from continued practice Desire to maintain benefits of WASH practice New children born who benefit from and motivate behaviour practice 	<ul style="list-style-type: none"> Lack of supplies or inability to repair or maintain technology Cues to behaviour are lost or forgotten Cost of materials may be unsustainable 	

Figure 6. Flow diagram of our Theory of Change



5.4 Assessing evaluation quality in relation to the Theory of Change

In Section 3.5.4 of this report we presented our assessment of study rigour measured through a seven-point scale system adapted from Harden et al (2004). An alternative way to conceptualise evaluation quality is to consider how the available studies do or do not build the knowledge base in relation to our Theory of Change. If this Theory of Change is accepted as a basis for examining sustained adoption of WASH behaviours, then the ideal evaluation study would have the characteristics summarised in Table 19.

Table 19. Characteristics of an ideal evaluation in relation to the Theory of Change

Characteristic	Description	Quality of available literature in relation to this characteristic
1. Clear specification of the period in life of project for each measurement	<ul style="list-style-type: none"> • Indication of whether each measurement occurred in the Early Project Period, Late Project Period, Early Post Project Period, or Late Post Project Period. 	<ul style="list-style-type: none"> • Difficult to identify start and end dates of project period in many studies • Difficult to know which period corresponds to each measurement in many studies
2. Description of context for sustained adoption of WASH technologies	<ul style="list-style-type: none"> • Description of key factors affecting sustained adoption at any point in time: 1) Availability of technology; 2) availability of spare parts and/or repair services; 3) availability of essential supplies 	<ul style="list-style-type: none"> • Contextual descriptions are typically limited to “Table 1” listing of demographic characteristics • Qualitative literature exists to describe WASH practices (e.g. Dubois, 2010 or Tamas, 2009), but focus drawn to establishing psychosocial enablers/barriers over context of WASH practice
3. Measurements at multiple time points	<ul style="list-style-type: none"> • At a minimum, measurement at baseline and end of the Project Period, and at two time points in the Post Project Period 	<ul style="list-style-type: none"> • Only three studies conducted measurements at multiple time points after the end of the project period (SEUF, 2004; Parker, 2006; Bowen, 2013). • Only 5 out of 21 studies attempting to assess long-term WASH behaviours also included estimates of the level of use or adoption from the end of the project period
4. Measurements of WASH behaviours in valid and reliable way at each time point	<ul style="list-style-type: none"> • Are WASH behaviours measured in a way known to be valid and reliable based on current literature? 	<ul style="list-style-type: none"> • Overreliance on verbal report to assess WASH behaviours • Most handwashing studies do not describe the criteria used to assess handwashing practice • Water treatment outcomes are the best described group. Typically self-reported practice combined with a chemical spot check to verify use (if chlorine). • Sanitation measurements are limited almost exclusively to self-reported use and observation of latrine presence. Issues arise with the reliability of such data to accurately represent latrine use.

Characteristic	Description	Quality of available literature in relation to this characteristic
5. Measurement of range of factors affecting sustained adoption	<ul style="list-style-type: none"> • Specification of a model or framework for factors affecting sustained adoption • Valid and reliable measurement of factors in the model • Psychosocial factors assessed through multi-item scales 	<ul style="list-style-type: none"> • Most studies are not guided by a model or framework (32/148 explicitly describe a behavioural framework) • Many psychosocial factors assessed through single items on a questionnaire, rather than through a multi-item scale and confirmed with appropriate psychometric method

As we have shown through our findings, this systematic review is limited in its abilities to draw conclusions about sustained adoption by the very fact that “sustained adoption” is a loosely-defined term with inconsistent applications. For one group, “sustained adoption” may be households continuing to wash their hands during a project period, whereas for another group “sustained adoption” may be the presence of a latrine nine years after the project period ended, without mention of patterns of latrine use. The heterogeneity of interventions, study designs, and outcome measures make it difficult to draw definitive conclusions for specific studies. Instead, we have focused on the application of outcomes and range of influential factors to provide WASH promoters with a framework for future reporting.

5.5 Strengths and limitations of this systematic review

5.5.1 Overview

In Chapter 1, we describe the landscape of research, policy and practice for behaviour change related to water, sanitation, and hygiene. We highlight the fact that WASH behaviours need to be practiced daily and repeatedly for them to have a public health impact, and thus we classify them as habitual behaviours. Though there is considerable political and institutional support for WASH in lower- and middle-income countries, there are significant challenges in promoting behaviour change and sustained adoption. One challenge is limited technical capacity to analyse, understand and measure habitual behaviours, and a dearth of research examining automaticity of daily WASH behaviours. A second challenge is the narrow evidence base on sustained adoption of WASH behaviours beyond the project period. Specifically, this review finds that sustained adoption after the end of external funding and support is infrequently assessed, and as indicated in Table 19 above, the timing and type of measurements leave much to be desired:

- Only three studies conducted measurements at multiple time points after the end of the project period (SEUF, 2004; Parker, 2006; Bowen, 2013).
- Only 5 out of 21 studies attempting to assess long-term WASH behaviours also included estimates of the level of use or adoption from the end of the project period

The strengths in this review are in providing a landscape overview of the literature on adoption and sustained adoption of WASH technologies as well as a more in-depth look into the types of factors reported in the literature on sustained adoption and how these factors are evaluated.

In answering a broad research question, the evidence compiled in this review must be considered through the lenses we employed in examining the available literature.

5.5.2 Methodological limitations

5.5.2.1 Level of detail, quality and heterogeneity of findings

The studies identified in this review represent a diverse range of programmatic designs, outcome definitions, and measurement methodologies, as well as the level of detail provided on all these steps. This heterogeneity makes it extremely difficult to make conclusions about sustained WASH adoption, as there is no standardized outcome or reporting format. To address this issue of diverse definitions of sustainability and sustained WASH behaviour practice, we used a flexible, mixed-methods review methodology (Harden, 2005).

We have summarised the quality of the available literature in two ways. In Section 3.5.4 of this report we presented our assessment of study rigour measured through a seven-point scale system adapted from Harden et al (2004). In Section 5.4 immediately above, we assessed evaluation quality in relation to the Theory of Change. By both measures the general methodological quality leaves much to be desired.

5.5.2.2 Content included

The research methodology used in conducting this review provides a filter with which we identified studies. The inclusion and exclusion criteria limit the material we chose to review.

- *Electronic availability:* We attempted to access as much of the peer reviewed and grey literature on this topic as possible. However, reports and studies from lower- and middle-income countries may have been missed if not electronically available or searchable.
- *Geographic scope:* We limited this search to low- and middle-income countries where infrastructure for water, sanitation and hygiene are restricted or inadequate, and also where water-borne diseases are most prevalent. Even considering this geographic limit, we have identified that the reports on sustained adoption are concentrated in a few distinct areas where research groups or implementation organizations have a strong presence. There are few reports from the Middle East and East Asia.
- *Language:* Due to the limitations of our research team, we were only able include articles published in English, French, German and Spanish.
- *Primary data:* We limited our search to primary data including both qualitative and quantitative studies. The motivation for this was to be able to assess empirical evidence for sustained adoption. However, data gathered through secondary sources such as government surveys programme reviews, etc. are not included in this review.
- *Study quality:* Because we included a broad range of literature from peer-reviewed sources and programmatic reports, the quality and depth of the reported factors varied greatly.
- *Outcome measures:* In order to answer our research question, studies included in the mapping and in-depth review stages of the review must have reported on behavioural factors or programme characteristics related to the use of WASH technologies. In addition, we were looking for evidence of adoption or sustained reported in primary data. Overview reports of several programs or articles reporting on levels of sustained adoption (without citing related factors) would not have been eligible for inclusion in this review.

5.5.2.3 Selecting studies for in-depth review

In our review of the evidence base for sustained adoption of WASH practices, we selected only articles that directly report on sustained adoption of WASH technologies over several months or years. Though sustained adoption was a specific priority for this review, there is substantial evidence published on factors influencing behaviour change over much shorter periods of time - weeks to months - that may relate to factors of sustained adoption. The mapping section of this review provides detailed summaries of the available literature, and should be considered in research and practice on this topic.

5.5.2.4 Limitations of published material -

We recognize that information available to us in reports and published literature is limited to the priorities of the research groups, funding agencies, and implementing organization. Assessments may have been made of factors associated with sustained adoption, but presentation of these factors has not been included in the final published reports. Likewise, institutional knowledge gained from long-term implementation projects may show evidence of sustained adoption that is not available in accessible, published form.

5.6 Expanding knowledge of sustained water, sanitation, and hygiene

5.6.1 Contribution to public health practice

This review is intended to be useful to all manner of individuals interested in delivering clean water and safe sanitation to populations in order to improve health and wellbeing. We anticipate the findings of this report to apply to any of the following dimensions of public health practice:

- **Scientific research:** Contribute to understanding the mechanisms by which people adopt new practices and behaviours. Develop better metrics to study sustained adoption. Identify information and knowledge gaps that can influence other researchers to contribute to the body of knowledge about initial and sustained adoption of WASH technologies.
- **Programme planning and intervention design:** Develop relevant, appropriate interventions to achieve lasting disease impact and behaviour change. Influence intervention design and development to more effectively address the factors that promote or inhibit the sustained adoption of small-scale water and sanitation technologies. Improve intervention design, execution, analysis, and communication of results.
- **Funding:** Promote the funding of demonstrated cost-effective technologies and create a set of criteria for evaluating sustainability and feasibility of proposed projects.
- **Policy planning:** Identify gaps in WASH promotion strategies to ensure sustained adoption of current solutions. Influence policy discourse around the viability of small-scale technologies to improve access to safe drinking water and sanitation.

We provide more detail in the following sections.

5.6.2 Scientific research: Defining “sustained adoption” and evaluation methodologies

“Sustained adoption” is a highly variable term with different applications, depending on each implementing group’s background and interests. We do not suggest that there be standard definitions for what sustained adoption of WASH technologies is: each project context is unique and differences in ways various groups perceive and perform WASH behaviours should be considered in overall intervention design. Rather, as our findings have suggested, more discussion is essential to understanding, measuring, and ultimately achieving sustained WASH practices across the world. We encourage users to contribute to the evidence base for sustained adoption of WASH technologies by helping to develop mechanisms that consider a range of behavioural factors in the design, delivery and assessment of WASH interventions.

Indicators for assessing both post-implementation sustainability and key behavioural factors should be defined prior to programme implementation and measured throughout the lifespan of the intervention and beyond. Using clearly-defined indicators is essential to comparing study outcomes across locations and methodologies.

Measurement of factors influencing sustained adoption is important in interpreting why sustained adoption was successful or unsuccessful. Factors associated with use include psychosocial, contextual, and technology factors:

- *Psychosocial* motivators identified in this review include knowledge of disease transmission, social norms including social support and peer accountability, cues to action, and the desire to fulfil a good role as nurturer or caretaker of the household.
- *Contextual* factors like gender, socioeconomic status, and education are often associated with measures of sustained adoption. These factors are often taken into account at the outset of a programme. However, additional factors like infrastructure, access to markets, social roles in the household and seasonal or climatic factors also play a large role in determining sustained adoption.
- Finally, factors of the *enabling technologies* associated with WASH are important to consider. In addition to affordability, durability, local availability, and ease of maintenance and operation are key factors.

Factors associated with disuse may vary by setting, but some consistent themes were reported in several studies and discussed earlier. Designing effective interventions should include careful examination of technical design to maximize user satisfaction and feasibility of use in the long term.

Lastly, by establishing better metrics to study sustained behaviour change and adoption, the scientific and public health community can identify areas where more research needs to be conducted to understand by what means the transition to sustained WASH adoption occurs.

5.7 Designing more effective interventions and programs

5.7.1 Intervention planning and design

A well-planned intervention is crucial to the success of any WASH promotion programme. Using evidence-based technologies and promotion strategies as well as including plans for post-intervention evaluations with relevant metrics will strengthen the rigour and consistency of WASH promotion studies. Groups undertaking sustained adoption should note the following key points:

- **Emphasize habit formation from the start:** many studies have elaborated on the factors influencing *initial* adoption of WASH behaviours, but projects should plan to adapt their strategies as motivations change throughout the course of the project and post-project periods.
- **Plan for follow-up to assess sustained adoption -** Many WASH programs introduce new behaviours, and these programs must be assessed over time. Planning for and conducting post-intervention follow-up helps to build an evidence base for sustained adoption.
- **Consider context:** In addition to basic demographic information, intervention design should incorporate factors of the local environment, roles and responsibilities within households, working patterns, climate and seasonality, and governmental and institutional support.
- **Use technologies that are feasible and acceptable for long-term use:** A user-centred design approach ensures that specific recommendations of the users themselves are incorporated into the design. Pilot testing and qualitative feedback are helpful in identifying factors that facilitate or discourage use of technologies.

5.7.2 Interpretation

Interpretation and application of the results of this review requires an understanding of strengths and limitations of the original intervention plan. This review reveals the need for consistent reporting within the field of water and sanitation. Regardless of the motivation for research and intervention, measures of sustained adoption could be incorporated to leverage the evidence base for WASH related benefits.

5.7.3 Analysing factors associated with sustained adoption

In order to analyse and compare factors associated with sustained adoption, these factors must first be defined and assessed using robust methods. Analysis of factors could draw on either quantitative outcomes or qualitative data, but appropriate methods must be used to make comparisons between heterogeneous outcome measures. The use of an explicit conceptual model can guide analysis of these factors.

5.7.4 Reflexivity

It is important that researchers reflect on their role in the research. An individual's point of view can influence their methods, biases, decisions, and the overall direction of the research and the knowledge generated from the research process. Reflexivity aids the objective interpretation of findings by demonstrating the limitations and biases inherent in the research.

5.7.5 Disseminating results

In order to build the evidence base for factors that influence sustained adoption of WASH behaviours and technologies, it is essential to disseminate findings among researchers and practitioners. Reports of sustained adoption should ideally include the following elements:

- Clear description of intervention
- Selection of metrics
- Identifying deductive factors: Using a conceptual model can help researchers and programmers to identify, define and measure behavioural factors. Identifying some factors at the outset of an intervention can leverage facilitators and address known barriers
- Defining inductive factors
- The role of temporal comparison in WASH promotion
- Inclusion of reflexivity

Dissemination strategies should also ideally include stakeholders and policy makers.

5.8 Identifying areas of funding

5.8.1 Setting an intention to support WASH programming

In order to promote and study sustained adoption of WASH practices, it is essential to create a supportive environment for examining sustained adoption. The first step is to develop the intention to fund and design programs that facilitate long-term use and measure sustained adoption among policy makers, donors, programmers, and intervention recipients.

5.8.2 Funding for post-intervention evaluation

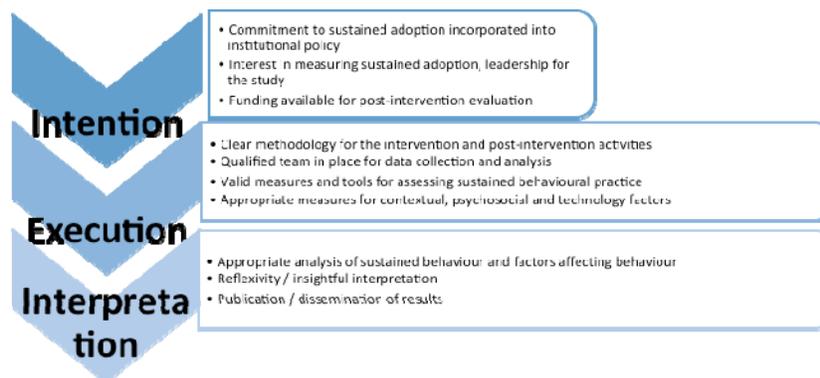
Though sustained adoption is the goal of many WASH programs, follow-up studies or post-implementation evaluations are few and far between. Funders should consider post-intervention follow-up as a key aspect of successful programs and provide funding mechanisms to ensure long-term follow-up.

5.9 Setting an agenda for Policy, Programming and Research

The findings in this review reveal that sustained adoption, and the factors that motivate or impede sustained adoption of WASH practices are under-represented in the WASH literature. In order to increase the evidence base for what actually works in the WASH sector, we outline the steps of examining sustained adoption. These steps, outlined in Figure 7, require support from policy makers, programme implementers, and evaluators at three key stages:

- Intention - Institutional mechanisms, policy and leadership must incorporate sustained adoption at the outset of programme development
- Execution - WASH interventions must be designed to measure and evaluate sustained adoption and the impact of factors affecting sustained adoption
- Interpretation - Results must be appropriately analysed and reported

Figure 7. Steps in examining sustained adoption of WASH



5.9.1 Changing institutional policy

Commitment to sustained adoption at the donor and institutional levels is essential to building the evidence base for the benefits of sustained adoption. This review is intended to help inform policy in the following ways:

- **Influence policy discourse around the viability of small-scale technologies** - There is evidence to show that small-scale household technologies can be viable solutions in the long term. However, the challenge with promoting WASH behaviours at the individual, household and community levels is ensuring that all people participate habitually over time. Without large-scale participation and long-term commitment, communities may not see the multiple benefits of practicing WASH behaviours.

- **Influence intervention design and development** - The findings of this systematic review can guide policy makers in identifying contextual, psychosocial and technology factors influential in sustained adoption. It may also highlight factors that inhibit the sustained adoption of small-scale water and sanitation technologies.
- **Identify information and knowledge gaps** - This systematic review has shown that sustained adoption is difficult to measure and that few researchers define their measures for sustained adoption. Even fewer define and measure factors influencing behavioural uptake. Policy makers may be able to address these gaps by enhancing institutional commitment to measuring factors associated with sustained adoption.

5.9.2 Leadership

Leadership is essential at both the policy and programmatic levels. This review illustrates that most programs and studies lack a clear focus on sustainability. Leadership is essential for setting the research agenda and executing rigorous evaluations of sustained adoption.

5.10 Conclusion

The success of water, sanitation, and hygiene schemes worldwide depend on daily practices and long-term commitment, in conjunction with appropriately usable and durable technologies. This review begins the conversation on factors that motivate sustained adoption of WASH technologies, and provides a platform from which to guide further research in behaviour change and post-intervention sustainability.

More emphasis needs to be placed on defining “sustainability” and translating these into metrics and programme elements that can be used to implement, evaluate, and further the discussion on sustained WASH adoption. Programs and technologies need to be designed to be supportive and flexible to motivators of both initial and long-term WASH practice. Funding mechanisms need to emphasize the importance of routine monitoring and evaluation, and be willing to invest in the longer-term behaviour maintenance. Finally, policies and regulations need to be established at the governmental and intergovernmental levels that support the right to safe water, hygiene, and improved sanitation for all people globally.