



## Achieving handwashing with Social Art for Behaviour Change: the experience of the Lazos de Agua programme in Latin America

Anna Zisa <sup>\*</sup>, Kristina Nilsson, Raisa Mirza and Tania Vachon 

One Drop Foundation, Montreal, Canada

\*Corresponding author. E-mail: [anna.zisa@ondrop.org](mailto:anna.zisa@ondrop.org)

 AZ, 0000-0001-6399-7387; TV, 0000-0002-0440-3849

### ABSTRACT

The effectiveness of different hygiene behaviour change approaches is inconsistent. Proven effective elements of behaviour promotion include the following: involving the community, adding psychosocial theory-derived elements and using interpersonal communication with active teaching methods and innovative and culturally sensitive messaging. The One Drop Foundation Social Art for Behaviour Change (SABC) approach encompasses those elements and is embedded in a system-strengthening approach involving users, service providers and policymakers within the Lazos de Agua Programme. Halfway into the programme, the SABC approach has been implemented in more than 280 rural and urban communities in five Latin American countries. According to its midline outcome measurement, the programme's efforts have contributed to a 15% point increase in the population practising proper handwashing within intervention areas. Story-based interviews revealed that SABC interventions are believed to have caused lasting changes in behaviour, perception and skills which transcend beyond the individual and are felt at the household and community levels. While the SABC approach is mostly limited to addressing psychosocial factors, the experience of this programme proves that artists can serve as behaviour change facilitators to accompany water, sanitation and hygiene (WASH) system projects. The SABC approach builds capacity, both within artist groups as permanent local institutions which can act as behaviour change facilitation service providers, and within service users, who become empowered and can continue influencing behaviour change among their peers.

**Key words:** behaviour change, community involvement, handwashing, hygiene, monitoring and evaluation, WASH system-strengthening

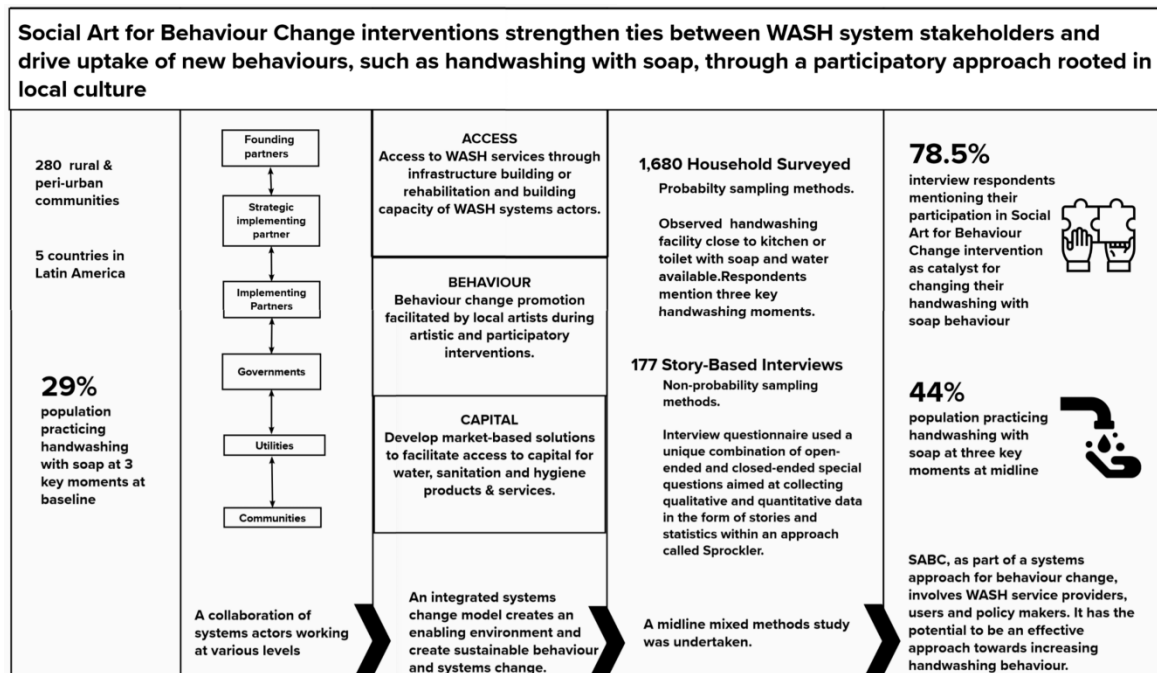
### HIGHLIGHTS

- SABC is a system approach for behaviour change, involving users, service providers and policymakers.
- The SABC approach in Latin America has shown it has the potential to be an effective approach towards increasing handwashing with soap.
- Through the SABC approach, capacity is built within artist groups as permanent local institutions that can act as behaviour change service providers.

---

This is an Open Access article distributed under the terms of the Creative Commons Attribution Licence (CC BY 4.0), which permits copying, adaptation and redistribution, provided the original work is properly cited (<http://creativecommons.org/licenses/by/4.0/>).

## GRAPHICAL ABSTRACT



## INTRODUCTION

Handwashing with soap remains the most simple and powerful hygiene practice to curb the spread of viruses and other infectious diseases that weaken or kill millions of people around the world every year (Prüss-Üstün *et al.* 2016; World Health Organization 2020). Although the solution seems basic, the alarming reality is that 30% of the world's population lack handwashing facilities with soap and water at home, and that critical settings such as health care facilities (at least 16%) and schools (44%) around the world lack basic handwashing services (WHO and UNICEF 2018, 2019, 2021). As expressed by the Global Handwashing Partnership (2017), 'behaviour change efforts are critical to ensure handwashing with soap becomes habitual'. Handwashing-promotion efforts that address key identified enablers and barriers have been found to be more effective (Kalam *et al.* 2021). However, determinants associated with the practice of handwashing with soap are varied and differ depending on the context. Empirical evidence has identified these determinants to include the following among others: the availability of handwashing facilities, access to soap and water, social and cultural norms and broader social and structural factors (White *et al.* 2020). This suggests that tackling handwashing determinants should involve several actors and factors to be working together, including the actors and factors required for ensuring the continuous delivery of water services which are the subject of many water, sanitation and hygiene (WASH) programmes across low-income settings.

Even when behaviour change efforts are part of WASH programmes, evidence of sustained behavioural uptake is mixed (Hulland *et al.* 2015; Taylor *et al.* 2015; De Buck *et al.* 2017). While some observational studies and numerous impact evaluations using experimental or quasi-experimental designs show significant increases in behavioural outcomes (Biran *et al.* 2014; Briceño Coville & Martinez 2015; Pickering *et al.* 2015), others have shown no significant effect of behaviour change efforts on behavioural outcomes compared to control groups (Huda *et al.* 2012) or have shown an attenuation of desired effects over time (Parker *et al.* 2006). Inconsistencies in the effectiveness of behaviour change interventions may be rooted in the type of approach used for promoting behaviour change and the understanding and tackling of determinants that influence WASH behaviour change (De Buck *et al.* 2017). De Buck *et al.* (2017), identified that effective elements of behaviour promotion include the following: involving the community, psychosocial theory-derived elements and using interpersonal communication with active teaching methods and messaging that is innovative and culturally sensitive. The One Drop Foundation Social Art for Behaviour Change™ (SABC) approach includes these effective elements and has been integrated into a WASH system-strengthening programme, the Lazos de Agua Programme (LAP).

Implementation of the LAP goes from 2016 to the end of 2022 and is carried out in Colombia, Guatemala, Mexico, Nicaragua and Paraguay by Plan Colombia, Water For People, Living Water International, WaterAid and Fundación Moisés Bertoni, respectively.

This article presents how handwashing is encouraged through the SABC approach, embedded within a system-strengthening programme. It argues why SABC has the potential to be an effective approach towards sustaining handwashing behaviour based on the progress achieved halfway into the LAP and shares the limitations and learnings of its implementation in five countries in Latin America.

## METHODOLOGY

### System-strengthening model

Designing and implementing the LAP involves coordinating and involving multiple actors, including funding agencies (foundations and multilateral development banks); national-level authorities (ministries of water, health, education), service authorities (local governments at various levels), service providers (often voluntary water user committees), civil society (implementing NGOs and artist groups) and users (community members). The LAP follows the One Drop Foundation's A•B•C for Sustainability™ model, a systemic approach to support holistic programme implementation where A stands for Access, B for Behaviour and C for Capital:

- The A (Access) seeks to increase the proportion of the population using at least basic levels of water and sanitation services as defined by the Joint Monitoring Programme (WHO and UNICEF 2021) through the construction and rehabilitation of infrastructure and strengthening the governance, operations and maintenance capacities of water user committees and other entities responsible for providing WASH services.
- The B (Behaviour) seeks to increase the proportion of the population practising desired WASH behaviours through the implementation of the One Drop Foundation Social Art for Behaviour Change™ (SABC). The SABC™ approach integrates psychosocial theory-derived elements from the Transtheoretical Model of Behaviour Change developed by Prochaska & DiClemente (1983) and the Integrated Behavioural Model for WASH (IBM-WASH) developed by Dreibelbis *et al.* (2013). The latter framework identifies three dimensions that influence WASH behaviours, notably contextual, psychosocial and technological. SABC is a participatory and creative approach undertaken in collaboration with intervention communities to bring about behaviour change. By engaging participants through social art, SABC interventions connect and empower community members, improving their leadership and other interpersonal skills and giving them a sense of ownership and agency over their WASH services.
- The C (Capital) component is intended to develop market-based solutions – including financial products, income-generating activities and other services – to increase the pace of making safe water and sanitation accessible to all.

Each country-based project part of the LAP has its own set of actors and factors that need to be addressed to create a transformative WASH programme. Each project uses a system approach aiming to strengthen the enabling environment that provides support and creates coordination mechanisms between the various actors within the system. The projects collaborate and support various parts of this system to promote long-term and sustainable access to WASH services through an integration of the multiple layers of government, community and value chain actors. Given that key determinants of handwashing with soap are access to water, soap and a handwashing station at home, handwashing promotion in the LAP is married to the promotion of another behaviour: the payment of water tariff by the users, which allows the maintenance of the water supply infrastructure, and thereby sustained access to water for handwashing. Institutional involvement has been instrumental in helping the uptake of both the handwashing and the water tariff payment behaviours.

### Behavioural change intervention design and implementation

SABC interventions are designed and implemented by local artists trained on the SABC approach by the One Drop Foundation's country-based implementing partners. Before implementation, formative research reveals the profile of the priority groups who ought to practise the desired WASH behaviour, and the behavioural determinants that influence whether these groups engage or not in the behaviour. This step uses Dreibelbis *et al.* (2013) IBM-WASH model to acknowledge and investigate behavioural determinants belonging to contextual, psychosocial and technological dimensions that operate on five levels: structural, community, household, individual and habitual.

Once these behavioural determinants have been identified and prioritized, artists start ideating and prototyping SABC interventions, including folklore and art techniques, alongside priority group members from the communities. The resulting SABC interventions are diverse but all have common elements: they are artistic, participatory, based on the cultural and behavioural realities of the intervention communities and aim at encouraging the desired behaviour. Each community hosts multiple interventions including one-time and multi-session interventions. One-time interventions invite the community at large thereby involving numerous participants: for example, theatre shows followed by a facilitated discussion where attendees express a commitment to a concrete solution. One-time interventions are either led by artists, or by community members, who were involved in multi-session interventions. Multi-session interventions are led by artists and involve fewer participants actively involved in an artistic process to co-create: for example, short films, songs, murals or puppet shows. At the end of a multi-session intervention, the participants, referred to as leaders of change, lead a one-time intervention, referred to as a *replica*, accompanied by artists thereby presenting their creation to the community at large.

### Outcome measurement

While the LAP aims at changing various WASH behaviours, this article will focus on handwashing with soap. To measure the prevalence of handwashing behaviour (as well as other WASH outcomes which are not the subject of this paper), a probabilistically representative sample of households was surveyed in each project, totalling over 1,680 households among four projects, at their respective baseline (2017–2019) and again at midline, 22 months later on average and before the start of the COVID-19 pandemic except for the project in Colombia (see Table 1). The project in Guatemala started before the other four projects and had a different monitoring and evaluation system and is therefore excluded from these results. The endline household survey in late 2022 has yet to occur. The number of households surveyed at baseline or midline ranged from 306 up to 615 depending on the project (see Table 2). In Colombia, Paraguay and Mexico, the sampling design was multi-stage, stratified first and then random. In Nicaragua, households from all communities of intervention were sampled randomly and proportionately to the communities' population. For all projects, sample sizes were calculated at a 95% confidence level and a 5% margin of error. The household questionnaire used can be found in the Supplementary Material.

Households were considered to practise handwashing if they met all of the following criteria: the enumerator observed a handwashing station (fixed or mobile) within 10 paces of the cooking area or the toilet, that had water and soap available, and the respondent mentioned at least the three handwashing key moments encouraged by the Programme – after defaecating, before eating and before preparing food – when asked: 'On what occasions do

**Table 1** | Household survey data collection dates

	Baseline	Midline	Time elapsed between measurements
Colombia	2018-12	2020-12	24 months
Mexico	2018-05	2019-09	18 months
Nicaragua	2018-01	2019-08	18 months
Paraguay	2017-05	2019-08	27 months

**Table 2** | Number of households surveyed and sample universe

	Number of households surveyed		Population of intervention communities (sample universe)
	Baseline	Midline	
Colombia	418	358	20,000
Mexico	306	414	62,500
Nicaragua	584	615	24,400
Paraguay	377	403	87,200
Total	1,685	1,790	194,000

members of your household wash their hands with soap and water?’ without answer options given by the enumerator.

In addition to household surveys, story-based interviews were conducted during the second semester of 2020. Story-based interviews complemented household surveys for measuring handwashing by providing depth and isolating the effect of SABC interventions among other programme efforts which include building infrastructure and capacity building of WASH service providers. A story-based data collection approach called Sprockler, developed by the organization *Perspectivity*, was used. Within the Sprockler approach, the interview questionnaire uses a unique combination of open-ended and closed-ended special questions aimed at collecting qualitative and quantitative data in the form of stories and statistics. At the core of the questionnaire in the Sprockler approach, the respondent is invited to share a story after which closed-ended questions follow through which the respondent self-interprets the meaning of their story. Chances of misinterpretation are reduced by asking respondents questions about their story which also allows them to own and reflect upon their stories. Sprockler uses special questions such as bipoles or tripoles, which trigger more intuitive and instinctive responses and therefore help the self-interpretation set-up to provide more accurate and nuanced findings. Within the Sprockler approach, the importance of stories and the natural tendency and skill humans have for telling stories is not only acknowledged but embraced. Respondents share their experiences through stories, and by collecting many of such experiences and visualizing responses from close-ended questions, recognition of emerging patterns that tell something about the world surrounding the respondents is enabled (*Perspectivity n.d.*). Voicing experiences through stories can contribute to decreasing participant bias and is particularly suitable among highly indigenous and other population groups where storytelling and oral forms of knowledge transmission are a common means of communication.

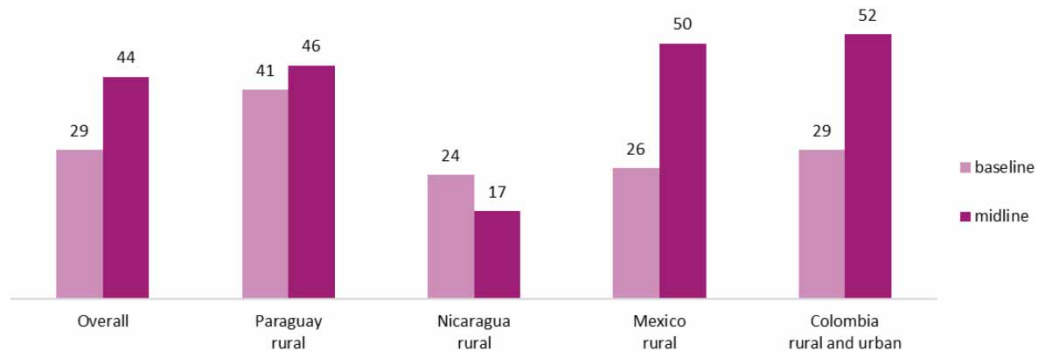
In total, 177 community members across four projects who had participated in SABC interventions were interviewed with the Sprockler approach, ranging between 30 and 63 respondents per project (Table 3). Respondents were sampled using non-probability sampling methods to represent the diversity of SABC participants in terms of gender, age, occupation, type of SABC intervention they participated in and time elapsed since the last SABC intervention they participated in. The interview questionnaire can be found in the Supplementary Material. Two story-based questions were at the core of the questionnaire. The first invited the respondent to share a memory about a moment that happened when they participated in SABC interventions, and the second asked them to share and describe any changes, big or small, that they have noticed in their life or community since participating in SABC interventions.

**Table 3** | Socio-demographic information about SABC participants interviewed

		Colombia	Mexico	Nicaragua	Paraguay	Total
Total		34	50	63	30	177
Gender	Woman	32	40	41	17	130
	Man	2	10	22	13	47
Age	<13	2	0	0	0	2
	13–17	8	2	1	6	17
	18–30	11	7	28	7	53
	31–40	3	15	11	4	33
	41–50	3	21	16	10	50
	51–60	4	3	5	2	14
	>60	3	2	2	1	8
Occupation	Domestic worker	15	27	26	3	71
	Student	15	3	4	10	32
	Teacher	1	3	4	7	15
	Farmer/rancher/fisherman	1	3	16	1	21
	Member of water committee	0	9	2	6	17
	Other	2	5	11	3	21

## RESULTS

According to household surveys, the population practising handwashing with soap at three key moments increased from 29 to 44% between baseline and midline for the four projects combined (weighted average), an increase that was observable among them all except for project Nicaragua (Figure 1).

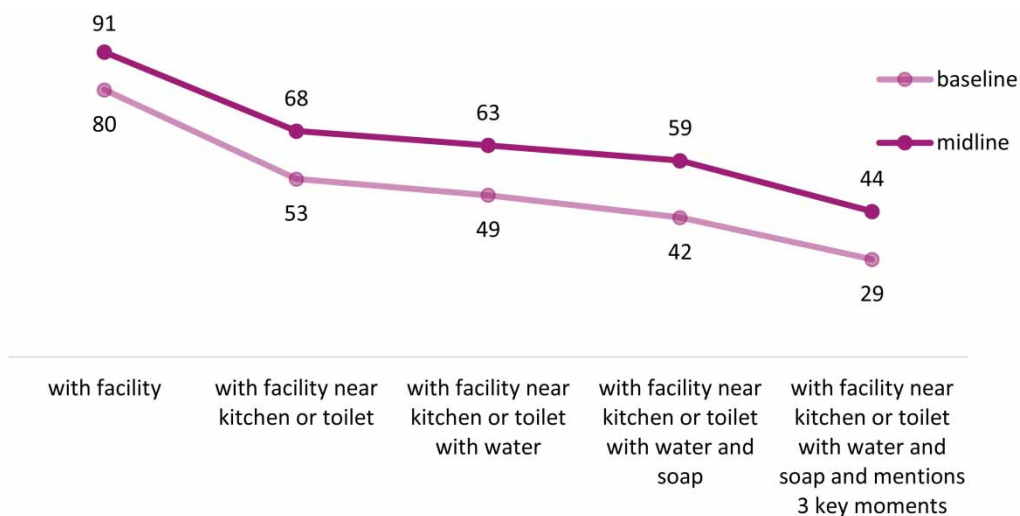


**Figure 1** | Proportion of the population handwashing with soap within the intervention areas per project and overall across projects at baseline and midline (%).

Various programme efforts could have contributed to this increase, from the improvement of drinking water and sanitation services for households to the SABC interventions encouraging this behaviour. As seen in [Figure 2](#), there was an increase between baseline and midline in the proportion of households meeting each of the criteria for handwashing, being contextual (a handwashing station close to the kitchen or toilet, and water availability), psychosocial (mentioning three key moments) and technological determinants (soap availability). According to story-based interviews, SABC interventions contributed to this change with 78.5% out of the 177 respondents identifying handwashing with soap at key moments among the changes they have noticed since participating in SABC interventions. In particular, some respondents from story-based interviews mentioned adding soap to their handwashing practice since participating in SABC interventions:

*The change that we have had in the community is in handwashing. People did not use to care if they washed their hands only with water. Now we have had the experience that one has to wash with soap and water at all times.* (Nicaraguan domestic worker, participant in multiple SABC interventions, the most recent occurring 6–12 months before the interview)

*...sometimes we used to wash our hands only with water and we would say our hands were clean and I learned that in order to eliminate all the bacteria we have to wash our hands with plenty of water and soap and I think I didn't do that before, and after the workshop yes.* (Nicaraguan domestic worker, participant in multiple SABC interventions, the most recent occurring 6–12 months before the interview)



**Figure 2** | Proportion of the population within the intervention areas meeting the different criteria for handwashing at baseline and midline (%).

Other responses from interviews referred to building handwashing facilities and using running water:

*...before handwashing was done in a little tray, now we know that it is with running water, fluid water that falls, so those who cannot afford a container with a tap build it themselves. Young people and children have built handmade artisanal containers that allow water to fall while they wash their hands, that is very interesting. (Colombian teacher, participant in multiple SABC interventions, the most recent one occurring less than 6 months before the interview)*

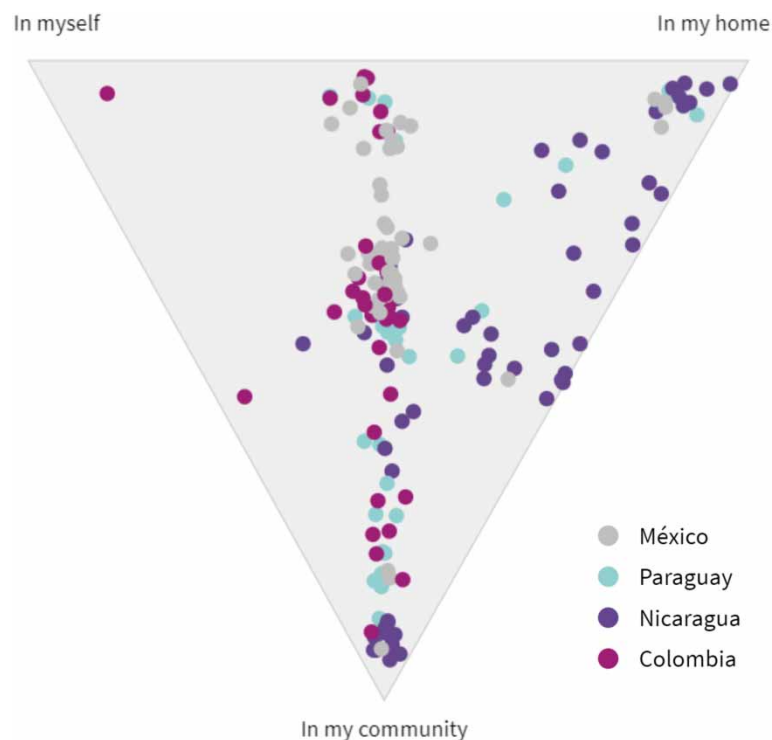
*We wash our hands radically different than we used to because before you would take the pot and wash your hands, even if it was just one person, they would wash their hands inside the pot, but from then on we don't do that anymore, we don't put our hands inside the pot, we instead let the water fall, with water running and soap. (Colombian domestic worker, participant in a SABC workshop occurring less than 6 months before the interview)*

According to story-based interviews, changes perceived by respondents since participating in SABC interventions transcend the individual and are felt at the household and community level (Figure 3).

*The first change I noticed happened in my institution. The kids wash their hands and now with the pandemic it worked out that they have practised how to handwash properly. (Paraguayan teacher, participant in a SABC workshop that took place one or two years before the interview)*

At the community level, beyond increasing handwashing, the LAP has strengthened the role of artists as mediators of change by bringing together water user committee members and water users to improve their collaboration: this mediation has improved discussions between water users and water user committee members, which gives users more confidence in the committee's actions and contributes to them becoming more assiduous in paying the water service tariff.

*Those of us on the (water user) committee are from three different communities, and what we have felt is that the communities have become more united since then, since this activity brought us together, the three of us are*



**Figure 3** | Story-based interview responses to the question 'Where do you recognize this change?' referring to the change respondents mentioned since participating in SABC interventions.

*more united, before, each one of us was on our own. We dialogue more. Before, nobody gave their opinion out of shyness, people have become more open and ask questions and we like that.* (Mexican farmer, participant in a SABC activity that took place less than six months before the interview)

*As a user, I see a big change in the understanding, there is more dialogue and people know their rights. We as a family have learned to value hygiene, to wash our hands at key times, and I personally have improved a lot, I have grown as a person. Before I couldn't speak in public and now I can do it thanks to the constant training I receive.* (Paraguayan member of the water user committee, participant in a SABC activity that took place less than six months before the interview)

A group of 10 women of the village San José de Manantiales, in the state of Guanajuato, Mexico, who initially met through the SABC intervention of a puppet theatre production gained the confidence to have their voices heard and replaced the members of their water user committee by themselves, a role that was previously dominated by men.

At the state level, the community engagement from the initial SABC interventions were enough to convince the Guanajuato State Water Commission (in Spanish Comisión Estatal del Agua de Guanajuato or CEAG) to incorporate elements of the SABC approach as part of their social assistance programmes and engagement with water user committees. In particular, the CEAG has added participatory and artistic methods to the role traditionally played by community engagement officers referred to as 'water promoters'. Following training and support by the State Water Commission, with technical support from the LAP, these promoters now have new SABC tools and ways of involving communities in the management of water systems.

Finally, at the national level, officials from CONAGUA, the Mexican National Water Commission, supported the State Water Commission's efforts by funding their WASH programmes, including social assistance interventions which included SABC training workshops at the municipal level. Tapping into the collective intelligence, connecting various stakeholders through creative and participatory processes has been appreciated by the CEAG and CONAGUA organizations and is inspiring them to modify their approaches in other locations. This led to the creation of a 'Coordination Table' (*mesa operativa*) which brings together several actors of the water services provision system to define clear ways on how some elements of the SABC approach can be integrated into the social assistance programmes carried out by CONAGUA at the federal level.

## DISCUSSION

While the SABC approach includes effective elements of behaviour promotion identified by De Buck *et al.* (2017) and is contributing to an increase in handwashing, it has limitations. The SABC approach cannot address contextual or technological determinants as framed in the IBM-WASH by Dreibelbis *et al.* (2013). SABC interventions are most apt for addressing psychosocial determinants at the community, household and individual levels such as self-efficacy, social integration, cultural identity and social norms, but are limited in their ability to change infrastructure gaps and broader sector systems weaknesses. These gaps are an argument for embedding this approach within larger WASH system-strengthening approaches that could tackle other determinants. This was done with the LAP, which takes a systemic approach to behaviour change by bringing together actors for ensuring Access, Behaviour and Capital to communities. SABC interventions work within this framework to strengthen ties between stakeholders and to drive uptake of new behaviours through a participatory approach rooted in the local culture. Besides handwashing with soap and water tariff payment, the SABC approach can be tailored to address different WASH behaviours, as relevant in different contexts, such as latrine use in areas where open defaecation is common. For example, other projects co-financed by the One Drop Foundation have addressed handwashing with soap and latrine use with SABC in Mali, Burkina Faso, Malawi and India that could provide learnings to behaviour change efforts in those areas. Since the design of SABC interventions relies on context-specific evidence and local arts, their implementation can be adapted to any region. Through SABC, the acceptability by users of newly developed sanitation systems could be addressed, which could potentially benefit the sustainability of sanitation systems by lifting the score of the social sub-index of the Sanitation Sustainability Index developed by Hashemi (2020).

Burton *et al.* (2021) argue that in order to better design and evaluate 'transformative WASH' programmes, a mixed-methods toolkit utilizing human-centred design practices, and proxy methods such as 'participatory design' or 'behaviour-centred design theory' should be prioritized in order to overcome a siloed approach in delivering long-term impact. As part of the monitoring and evaluation of the LAP, the use of mixed-methods



combining household surveys with story-based inquiry through Sprockler has emerged as a dynamic way to capture important data around participation in SABC interventions, and the uptake of the behaviours. These interactive and relational elements allow opportunities for iteration of programming to better fit the needs of users.

Another challenge in implementing the SABC is that it can be complex for artists to design artistic interventions that also aim to change perceptions around taboo topics, increase confidence in services or products or improve self-efficacy in practising a behaviour. The development of the intervention's prototypes may require substantial external support and time early in the projects affecting their cost-effectiveness. Nonetheless, artists have shared their appreciation when involved in the design process from the beginning instead of responding to isolated tasks. The experience of the LAP proves that through the SABC approach, artists can serve as behaviour change facilitators to accompany WASH projects and trigger behaviour change. Through their deep connection to the local context and their imagination and creativity, artists implementing SABC interventions generate a fun and enabling environment by translating complex and often taboo issues into accessible formats that inspire, activate and sustain change. This further empowers people in communities to take charge of their water and sanitation services, participate in water user committees and add soap to their handwashing routine. Examples such as Guanajuato, Mexico, show that SABC interventions can be used as a platform to drive broader behaviour changes among various actors in the WASH value chain and sector, to train, explore, elaborate, innovate and share their experiences, learnings and insights.

Results obtained until now in the uptake of handwashing with the SABC approach are encouraging, as is the institutionalization of the approach by the Mexican Government at the municipal, state and national levels. In the other LAP programme countries, implementing partners continue to collaborate closely with municipal, state and national governments in order to coordinate and support the continuous delivery of WASH services through strong WASH systems after the end of the programme. An endline household survey is planned for the LAP in the last quarter of 2022 which will provide additional opportunities to examine the factors that support a resilient WASH system and will bring further insights about the sustainability of this systemic programme. This new data will be made available at the end of the project, which could inform the potential of scaling the implementation of SABC interventions to the wider Latin American region.

## CONCLUSIONS

SABC, as part of a system approach for behaviour change, involves WASH service providers, users and policy-makers. It has the potential to be an effective approach for increasing handwashing behaviour. The programme works with relevant sector actors at multiple levels and seeks to modify the factors that influence sustained WASH service delivery and use, through multi-sectoral collaboration and system-strengthening, while keeping community users at the centre of the programme.

Ultimately, this aims to create an enabling environment that addresses the Access, Behaviour and Capital needs of the various users in the system. In Guanajuato, Mexico, the government has adopted elements of the SABC approach to strengthen their pre-existing social assistance programmes with a focus on ensuring that all households pay their monthly water tariffs, an essential behaviour to ensure smooth water service provision which is needed for households to continue handwashing with soap. Mixed-methods evaluation of the programme through household surveys and story-based inquiries support the conclusion that SABC interventions were memorable to participants, even after 6–12 months of their last participation in an intervention, and that the vast majority believed the changes in the communities would be long-lasting. Ongoing monitoring and an endline evaluation of the programme will provide further insights on the sustainability of the outcomes.

## FUNDING

The Lazos de Agua programme (LAP) is funded through a multi-stakeholder partnership including the founding partners – the Coca Cola Foundation, the Inter-American Development Bank, FEMSA Foundation and the One Drop Foundation – national and local governments, implementing organizations and communities. The One Drop Foundation is also the LAP's Strategic Implementing Partner, coordinating the programme and providing technical assistance to the implementing organizations in various approaches including Social Art For Behaviour Change, value chain, system-strengthening, integration of the components of the ABC for sustainability model, monitoring, evaluation and learning, and communications. An evaluation was undertaken as part of the LAP,

funded by the founding partners, and conducted in countries by monitoring and evaluation staff of the implementing organizations. Funding for writing this article has been provided as part of the ongoing staff salary of the One Drop Foundation, as part of its Knowledge and Innovation Unit.

## DATA AVAILABILITY STATEMENT

All relevant data are included in the paper or its Supplementary Information.

## REFERENCES

- Biran, A., Schmidt, W. P., Varadharajan, K. S., Rajaraman, D., Kumar, R., Greenland, K., Gopalan, B., Aunger, R. & Curtis, V. 2014 Effect of a behaviour-change intervention on handwashing with soap in India (SuperAmma): a cluster-randomised trial. *The Lancet Global Health* **2** (3), e145–e154.
- Briceño, B., Coville, A. & Martinez, S. 2015 Promoting handwashing and sanitation: evidence from a large-scale randomized trial in rural Tanzania. *World Bank Policy Research Working Paper*, (7164).
- Burton, J., Patel, D., Landry, G., Anderson, S. M. & Rary, E. 2021 Failure of the ‘gold standard’: the role of a mixed methods research toolkit and human-centered design in transformative WASH. *Environmental Health Insights* **15**, 11786302211018391.
- De Buck, E., Van Remoortel, H., Hannes, K., Govender, T., Naidoo, S., Avau, B., Veegaete, A. V., Musekiwa, A., Lutje, V., Cargo, M. & Mosler, H. J. 2017 Approaches to promote handwashing and sanitation behaviour change in low-and middle-income countries: a mixed method systematic review. *Campbell Systematic Reviews* **13** (1), 1–447.
- Dreibelbis, R., Winch, P. J., Leontsini, E., Hulland, K. R., Ram, P. K., Unicomb, L. & Luby, S. P. 2013 The integrated behavioural model for water, sanitation, and hygiene: a systematic review of behavioural models and a framework for designing and evaluating behaviour change interventions in infrastructure-restricted settings. *BMC Public Health* **13** (1), 1–13.
- Global Handwashing Partnership 2017 Handwashing – Vital for Sustainable Development. <https://Globalhandwashing.Org/>. Retrieved April 3, 2021, from <https://globalhandwashing.org/wp-content/uploads/2017/09/AdvocacyBrief-Vital-for-Sustainable-Development.pdf>.
- Hashemi, S. 2020 Sanitation sustainability index: a pilot approach to develop a community-based indicator for evaluating sustainability of sanitation systems. *Sustainability* **12** (17), 6937.
- Huda, T. M. N., Unicomb, L., Johnston, R. B., Halder, A. K., Sharker, M. A. Y. & Luby, S. P. 2012 Interim evaluation of a large-scale sanitation, hygiene and water improvement programme on childhood diarrhea and respiratory disease in rural Bangladesh. *Social Science & Medicine* **75** (4), 604–611.
- Hulland, K., Martin, N., Dreibelbis, R., Valliant, J. D. & Winch, P. 2015 *What Factors Affect Sustained Adoption of Safe Water, Hygiene and Sanitation Technologies? A Systematic Review of Literature*. EPPI-Centre, Social Science Research Unit, UCL Institute of Education, University College London, London.
- Kalam, M. A., Davis Jr., T. P., Shano, S., Uddin, M. N., Islam, M. A., Kanwagi, R., Islam, A., Hassan, M. M. & Larson, H. J. 2021 Exploring the behavioral determinants of COVID-19 vaccine acceptance among an urban population in Bangladesh: implications for behavior change interventions. *PloS one* **16** (8), e0256496.
- Parker, A. A., Stephenson, R., Riley, P. L., Ombeki, S., Komolleh, C., Sibley, L. & Quick, R. 2006 Sustained high levels of stored drinking water treatment and retention of hand-washing knowledge in rural Kenyan households following a clinic-based intervention. *Epidemiology & Infection* **134** (5), 1029–1036.
- Perspectivity n.d. Available from: <https://sprockler.com/help#faq>.
- Pickering, A. J., Djebbari, H., Lopez, C., Coulibaly, M. & Alzua, M. L. 2015 Effect of a community-led sanitation intervention on child diarrhoea and child growth in rural Mali: a cluster-randomised controlled trial. *The Lancet Global Health* **3** (11), e701–e711.
- Prochaska, J. O. & DiClemente, C. C. 1983 Stages and processes of self-change of smoking: toward an integrative model of change. *Journal of Consulting and Clinical Psychology* **51** (3), 390.
- Prüss-Üstün, A., Wolf, J., Corvalán, C., Bos, R. & Neira, M. 2016 *Preventing Disease Through Healthy Environments: A Global Assessment of the Burden of Disease From Environmental Risks*. World Health Organization, Geneva.
- Taylor, D. L., Kahawita, T. M., Cairncross, S. & Ensink, J. H. 2015 The impact of water, sanitation and hygiene interventions to control cholera: a systematic review. *PLoS one* **10** (8), e0135676.
- White, S., Thorseth, A. H., Dreibelbis, R. & Curtis, V. 2020 The determinants of handwashing behaviour in domestic settings: an integrative systematic review. *International Journal of Hygiene and Environmental Health* **227**, 113512.
- WHO 2020 *Global Report on the Epidemiology and Burden of Sepsis: Current Evidence, Identifying Gaps and Future Directions*. Geneva.
- WHO and UNICEF 2018 *Drinking Water, Sanitation and Hygiene in Schools: Global Baseline Report 2018*. World Health Organization and the United Nations Children’s Fund, New York.
- WHO and UNICEF 2019 *WASH in Health Care Facilities: Global Baseline Report 2019*. World Health Organization and the United Nations Children’s Fund, Geneva.
- WHO and UNICEF 2021 *Progress on Household Drinking Water, Sanitation and Hygiene 2000–2020: Five Years into the SDGs*. World Health Organization (WHO) and the United Nations Children’s Fund, Geneva. Available from: <https://washdata.org/> (accessed 30 August 2021).

First received 29 January 2021; accepted in revised form 28 April 2022. Available online 16 May 2022