A TRANSDISCIPLINARY CO-DESIGN AND BEHAVIOUR CHANGE APPROACH TO INTRODUCING SODIS TO RURAL COMMUNITIES IN MALAWI

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Introduction

Despite the increasing volume of evidence demonstrating the efficacy of solar water disinfection (SODIS) as a household water treatment technology, there still appear to be significant barriers to uptake in developing countries. SODIS potential is often treated with skepticism both in terms of effective treatment, and the safety of plastics used. As such it is significant barriers to uptake in developing countries. SODIS potential is often treated with the context, and (2) a cyclical design process (Figure 1). The processes took place over 18 governor, Water, Sanitation, Health And Appropriate Technology Development Centre (WASHTED) at the University of Malawi – Polytechnic from June 2016 – September 2018. The outputs of this formative stage will lead to the piloting of a SODIS system for 12 months (November 2018 – October 2019) in Chikwawa District, Southern Malawi.

This paper highlights activities pertaining to co-design process between the transdisciplinary research team, and potential end users. The process sought to ensure that the design is socially accepted, locally adapted, and can be effectively operated and managed during field trials. We present results to date.

Methods

The development of the SODIS system was constructed to be an informed co-design process with the recipient communities, taking into consideration their specific needs, challenges and perceptions. As such the design process had 2 stages: (1) understanding the context, and (2) a cyclical design process (Figure 1). The processes took place over 18 months and ran concurrently at some stages.

Results

Understanding Context

The results of the systematic review indicated that although significant progress has been made in access to improved water systems in Malawi in the last 20 years, water access and governance in Malawi are affected by a number of issues including:

- Reducing volume of freshwater available per capita
- Political issues and power relations
- Resources to operationalise policy
- Slow pace of gender mainstreaming
- 82% of rural population dependent on groundwater
- Up to 39% of water points are non-functional
- Areas of low coverage (Figure 2) due to hydrological challenges
- Average 90% of household water fecally contaminated but only 30% of population treat water

The Risks, Attitudes, Norms, Abilities and Self Regulation (RANAS) modelling provided the data needed to identify behavioral factors which could impact on the willingness of a water treatment being accepted and sustained at household level. The survey of 100 households identified the main factors outlined in Figure 5.

Co-Design

Having understood the context in which target communities are accessing and using water, we identified several factors for consideration in the development of a SODIS treatment system which can be categorised under 2 headings:

- Larger volumes for household needs
- Reduce turbidity

Supporting materials

- Convince of efficacy
- Target whole community to address social norms
- Full household participation to support sustainability
- Educational tools for use (practical) and behavior change

With these in mind, the design team developed several permutations of a large volume (20 litres) SODIS system with a combined simple filtration unit to reduce turbidity before SODIS treatment. These sample systems were subject to 3 levels of evaluation:

1. Efficacy – UV transmittance, longevity, aging, reduction and inactivation of E.coli, MS2 and Cryptosporidium sp. were conducted under controlled conditions (Figure 6)

2. Ability to be produced locally – this was determined through discussions with local manufacturers and production of model units (Figure 7)

3. User acceptability – this was determined through shared dialogue workshops with community members, demonstrating and evaluating their response to sample systems (Figure 8)

This iterative process led to the production of two final systems (Figure 9)

Next stage

- Trial in Practice Study of prototypes to finalise designs
- Cluster randomised before and after trial with a control population of prototypes for 12 months

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