41st WEDC International Conference, Egerton University, Nakuru, Kenya, 2018

TRANSFORMATION TOWARDS SUSTAINABLE
AND RESILIENT WASH SERVICES

Designing a food hygiene intervention for children 6-9 months in an informal settlement in Kisumu, Kenya

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PAPER 2946

Diarrhoea is a major public health issue in developing countries, especially among children as it contributes to growth faltering and malnutrition. Interventions targeting food hygiene are required to prevent the occurrence of diarrhea through contaminated food. The 'Safe Start' is a hygiene intervention study being implemented in informal settlements of Kisumu, and targeting early childhood exposure to enteric pathogens through contaminated food. Before introduction of the intervention, a formative study was conducted to identify target behaviours and design an intervention. This paper reports on the Trial of Improved Practices (TIPS) process, carried out during the formative phase and aimed at designing and testing candidate interventions before introduction on a larger scale. The process targeted four major behaviours, hygienic storage, handwashing with soap, hygienic feeding and reheating, and as a result, an intervention comprising education, environmental modification and motivational messaging was designed.

Introduction

Proper nutrition is critical in child health and development as it ensures that children are able to develop and grow. Malnutrition manifests in forms such as stunting, being overweight and being wasted. According to the United Nations Children's fund (UNICEF) and the World Health Organisation's (WHO) report of 2017, approximately 155 million children globally are stunted, and 52 million are wasted. In Africa, 59 million are stunted and 14 million are wasted (UNICEF, WHO, & Bank, 2017). Early childhood programmes are critical for ensuring that children develop the skills required to become productive adults (Black et al., 2017). Such early childhood programmes as complementary feeding need to be complemented with programmes such as improved water and sanitation (Dewey & Adu-Afarwuah, 2008).

Studies reveal that food is a great contributor to faecal exposure in young children (Wang et al., 2017). Exposure to faecal matter means that children are exposed to pathogens that are likely to lead to infections that present in forms such as diarrhoea. Recent studies indicate that diarrhoea is significantly related to childhood growth faltering in children under five years (Kirk, Angulo, Havelaar, & Black, 2017). Interventions should therefore focus on reducing the risks and pathways for diarrhoea.

'Safe Start' is a hygiene intervention that targets early childhood exposure to enteric pathogens through contaminated food. The intervention has been developed based on findings from two phases of formative work. The first phase was aimed at identifying potential behavioural interventions for reducing exposure to faecal pathogens through observations and interviews, and the second phase was aimed at assessing the feasibility and acceptability of interventions through a participatory process called the 'Trials for improved practices' (TIPS).

The TIPs methodology first developed in the 1980s in the field of nutrition and has been successfully applied to many areas of public health in low-income settings including complementary feeding programmes (Wijesinha-Bettoni, Kennedy, Dirorimwe, & Muehlhoff, 2013). TIPs uses a participatory approach where a small number of the target population pilot test the candidate intervention in their own homes and provide feedback on challenges with the design or recommendations for improvement. In this

way, interventions are iteratively improved before introducing the intervention on a larger scale. TIPs focus on real world delivery, allowing for testing of implementation and delivery styles and overcoming challenges and potential pitfalls. They focus on understanding behaviour (what people do), rather than what people say, know or believe, and actively seek to balance the preferences of the target populations with the 'ideal' intervention. TIPS has been applied in researches aimed at designing handwashing stations (Wijesinha-Bettoni et al., 2013) and prolonging the lifespan of insecticide treated nets (Harvey et al., 2013). The aim of the TIPS process reported in this paper was to engage caregivers of children to co-design an acceptable, feasible and scalable package of household items and accompanying messages to reduce oral exposure to faecal pathogens through the performance of improved food hygiene behaviours. The specific target behaviours during the TIPS phase were handwashing with soap, hygienic feeding, hygienic food storage, and reheating.

Methods

Study site

This phase of the study was conducted in Obunga-an informal settlement in Kisumu city. Kisumu city is in Kisumu County, on the western side of Kenya. It is the third largest city with a population of approximately 420,000 residents (Republic of Kenya, 2013). It is estimated that approximately 60% of the city's population live in informal settlements which are characterised by poverty, inadequate water and sanitation and poor housing (NCPD, 2013). Informal settlements in Kisumu include Nyalenda A, Nyalenda B, Manyatta A, Manyatta B, Bandani and Obunga. TIPS was carried out in Obunga.

Participant selection

With the help of Community Health Volunteers (CHVs), households with children between 6 and 9 months were identified. Information about the child, such as date of birth, was taken in order to verify that the children were within the age bracket. Primary caregivers of children were identified for selection in the study. An initial formative phase identified caregivers' food hygiene practices that are crucial in preventing contamination of food. These practices included handwashing with soap, hand feeding, unhygienic feeding and feeding children food that had not been reheated. Designing the intervention was conducted in two approaches: using motivational messaging and through modification of the (home) environment.

Developing the intervention and data collection

Environmental modification

Having identified the targeted behaviours, a range of household items that could be used to improve the identified behaviours (food storage, infant feeding, storage of infants feeding items, and handwashing with soap) were purchased from the local market. CHVs identified a few caregivers who were invited for FGD sessions. The aim of the discussions was to identify a package of items that could be easily used by caregivers in child food hygiene practices. Caregivers were involved in a discussion and an exercise where they were asked to select items that they could use for food hygiene (handwashing with soap, food storage and hand feeding). For sustainability, the caregivers were to select items within a specified budgetary allocation. Two FGDs were conducted. From the FGDs, a starter pack containing a feeding bowl, pack of spoons, handwashing bucket, soap dish and storage containers was identified (Photograph 1)

Thirty caregivers were given the starter pack to use in their homes. The team that delivered the intervention engaged the caregivers in a conversation, finding out what they would use the package for, and encouraging them to use the package for the desired purpose of food hygiene. A week later, a different team returned to the caregivers for a 'learning session' which was a conversation with the caregivers on the delivery process, the use of the items, challenges in using the items, and suggestions for improvement. During the visits, the caregivers also demonstrated how they were using the items, and the team also made observations on how the items had been/were used. Suggestions from these visits were noted and caregivers were encouraged to keep using the items for food hygiene. Results from this learning session led to improvement and inclusion of some of some items. For example, the storage and handwashing containers were improved. Some caregivers received a round of the improved items to use. Another learning session was conducted with the caregivers to again take note of usage, benefits and challenges, information that was used to further improve the package (Photograph 2).

Motivational messaging

Motivational messaging materials were designed by following the 'create' stage of the Behaviour Centred Design (BCD) model (Aunger & Curtis, 2016). Through a creative workshop process, results from the initial phase were reviewed to understand caregivers' motives for taking care of their children. Three campaign ideas were generated from the workshop:

1. Mothers want to take care of their children so that they can prosper and support their families
2. A happy baby is happy and playful
3. Caregivers look up to their own mothers or older experienced caregivers as role models for advice on caregiving

The main motive identified was nurture-mothers desired to have happy and healthy babies. Together with a designer, illustrations in line with these three campaign ideas were developed into posters. The posters contained the key target behaviours.

Again, a few mothers were selected and invited for a focus group discussion to test the messages. From this FGD, the first two campaign ideas were selected for testing at the household level-The 'Happy Baby' campaign and the 'Successful Child' campaign. Again, the forms of message delivery were identified: a poster with a calendar, stickers and text messages. Feedback from the FGD sessions was used to revise and improve the motivational messaging items (Photographs 3 and 4).

To test the acceptability of the messages, half of the participating households received the 'Happy Baby' campaign and half received the 'Successful Child' campaign. During delivery of the messaging items, the delivery team continued discussing with caregivers about the food hygiene practices which were also emphasised in the posters and stickers. The 'Happy baby' campaign adopted a happy/playful campaign while the 'Successful Child' was more formal with discussions about future aspirations of the child. A team went back to the households again for a learning session.

Finally a few other households received the combined package of the environmental modification and motivational messaging items. This was mainly to test the feasibility and acceptability of the combined intervention. Text messages were sent to caregivers once in two days and at different times of the day to remind them about the food hygiene practices. A final learning session was done again with the caregivers.

On Ethical consideration, this study was approved by the Great Lakes University of Kisumu (GLUK) and the London School of Hygiene and Tropical Medicine (LSHTM). All Community Health Volunteers and caregivers received a participant information sheet and gave a written consent for participating in the study.

Results

Environmental modification items given to the households included a bucket that had a tap, soap, cylindrical food storage containers for storing liquid food, rectangular storage container for storing solid food; a bowl, spoons and cup for hygienic feeding (photograph 1). During the learning sessions, all caregivers reported making use of the feeding items for feeding. The handwashing container reported several uses, such as handwashing, storing water for multiple uses (such as drinking, cooking and bathing the baby), storing the baby's utensils and cleaning the baby's utensils. The soap dish was used to store soap for bathing the baby. The cylindrical storage containers were used to store the baby's milk, porridge, water and juice; while the round/rectangular containers were used for feeding, packing children's food when leaving the house, and storing food for the children.

Caregivers reported several benefits of the items. The handwashing bucket was noted to be appealing in appearance (as it was white in colour). It was portable, could store water for various uses and it made handwashing convenient because it had a tap. The storage containers were noted to be ideal for storing liquids because they had a lid which prevented dirt and dust from getting into the food. It was portable and ideal for storing just enough amount of food for the baby. Caregivers reported that the feeding bowls were appealing to the baby, small enough, were of good quality and were easy to clean. Similarly, the spoons were reported to be attractive, small enough for children, and safe to use on the baby.

Even with the benefits, caregivers reported several challenges with the items. Many caregivers reported that the handwashing bucket was leaking, others reported that it was difficult to clean the bucket as it was white. The caregivers also faced challenges in setting up the buckets. Some caregivers did not have space in their houses, and others reported that they lacked a stand to support the buckets. The caregivers also noted that the storage containers were small and could only store smaller amounts of food. With the improved package that contained an improved handwashing container and food storage containers (photograph 2), caregivers confirmed that the handwashing container had improved their handwashing practices.

With regards to the practices, the delivery team made observations in the house to confirm the information given by the caregivers. It was initially noted that handwashing with soap was low. Caregivers felt that they 'washed their hands' every time they engaged in activities that required them to get into contact with water. Observations during the first visit confirmed this as most buckets had been kept away or were used for other purposes. During the subsequent learning visit, reported cases of handwashing with soap increased, it was observed that the handwashing containers had been set up in the houses, and there was soap near the handwashing bucket.

Most caregivers made use of the storage containers for their children's food. Observations in a few households confirmed that caregivers stored porridge and milk in the cylindrical storage containers. Again, most of the caregivers reported making use of the feeding items, and the delivery team observed that the feeding items had been cleaned at the time of visit, indicating that they had been in use.

In most of the houses, the stickers had been stuck on the handwashing containers, the doors and walls. The posters/calendars were put up on the walls. Interestingly, some caregivers laid the calendars on the table and made use of them as table mats. The reason for this use was that the calendars were of good quality. Caregivers reported that the messages in the calendars and stickers resonated with their desires for their children, exemplified by statements such as *"I want my child to be successful like the one in the calendar"* Caregivers also appreciated the text messages, noting that they reminded them to keep practicing food hygiene.

With regard to the impact of the messages and environmental modification items, caregivers noted that their knowledge on food hygiene had improved. They expressed this in statements such as *"I did not know that cooking without washing hands was harmful to the baby's health."* Some caregivers also noted that handwashing with soap among their family members had improved, as the presence of the handwashing container was a reminder to wash hands. Most mothers also reported that their children encountered less episodes of diarrhoea. Photos of the items are shown in figure 1-4 below

Photograph 1. Initial Environmental Modification pack

Photograph 2. Improved Environmental Modification pack

Challenges

It was difficult for most of the caregivers to practice reheating of food. Most caregivers who used charcoal or kerosene reported that they did not have enough fuel to reheat the child's food during the day.

Photograph 3. Happy baby poster

Photograph 4. Successful baby poster

Discussion

Food hygiene is an important component to reduce childhood malnutrition and growth faltering. Reviews suggest that interventions, including those that target infant feeding, should be introduced during the first two years of life (Victora, de Onis, Hallal, Blossner, & Shrimpton, 2010). This study targeted mothers with children aged at least six months when complimentary feeding begins. A number of studies have investigated the link between WASH and nutrition, with two recent studies from rural Bangladesh and rural Kenya suggesting that integrating water, sanitation and hygiene interventions and nutrition has little effect on childhood growth or reduction in diarrhoea episodes (Luby et al., 2018; Null et al., 2018). The Safe Start study is however being implemented in an informal settlement, with different conditions from rural areas.

As mentioned, the aim of the TIPS phase was to design an intervention to improve food hygiene. Through the process, several lessons and adjustments were made to the intervention package as a result of the learning sessions from the caregivers. A key lesson learnt was the importance of integrating an educational component in the study. This finding was confirmed from findings from the first phase as well as the TIPS process where caregivers confirmed that they did not comprehend the link between nutrition and childhood growth. This kind of knowledge gap is an important aspect for any intervention especially for behaviour change.

Through the TIPS process, we were able to learn the challenges of handwashing with soap among caregivers living in informal settlements. For instance we understood the need to make use of hardware that is 'familiar' with the caregivers. The initial buckets, though with a tap to encourage handwashing, were not as favourable for handwashing as the improved version of the handwashing container. This improvement was drawn from the learning sessions where mothers suggested the types of handwashing containers that they preferred. Another adjustment that was made was to provide a bigger handwashing container. Most informal settlements have unreliable supply of water, and as such a bigger container would require less refill than a smaller container. A bigger container is also less likely to be toppled over by a child especially during the toddler phase when the child starts walking.

Finally, the TIPS process provided valuable lessons concerning the motivational messages. Through the process we learnt how the caregivers used the calendars and posters. Whereas the posters were meant to be hung on walls, caregivers also used them as table mats-providing helpful lessons that were adopted for the intervention. Table mats were adopted as part of the intervention to reinforce and encourage the caregivers to practice hygienic feeding.

Through the TIPS process, an acceptable and feasible hygiene intervention was designed. Motives associated with caregiving have been identified, and these will be used to make caregiving appear rewarding to the caregivers hence increase the likelihood of taking up the behaviours. The 'Happy baby' and 'Successful child' campaigns will be used to encourage caregivers to have happy children who turn out to be successful children. These motivational messages will be combined with the environmental modification package to facilitate caregivers to adopt the targeted behaviours.

Acknowledgements

The author/s would like to appreciate the SHARE consortium for funding the study, the study participants, CHVs, the County Government of Kisumu, and the Great Lakes University of Kisumu.

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